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## **USER'S MANUAL MVL ENGINE**



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• **INTRODUCTION**

Thank you for choosing the MVL engine. We invite you to spend some time reading the user's manual which will help you discover all the features of your engine. Advices on maintenance and operation will help you to have a reliable engine and to preserve your investment. Furthermore, we invite you to deliver this manual together with the engine if you sell it, so it can be useful for the next owner as well. The manufacturer and the resellers are ready to answer your questions and, if necessary, to solve every problem, because **OUR CUSTOMERS SAFETY IS THE MOST IMPORTANT THING FOR US.**

**IDENTIFICATION OF THE OWNER**

**Serial number:      Owner's name & address:**

**Owner's signature**

**Reseller's signature**

**Date of sale**



- **MVL 125cc WITH CENTRIFUGAL CLUTCH**

- ENGINE2 - stroke single cylinder
- COOLING - Extraction from propeller
- CYLINDER CAPACITY - 125 cm<sup>3</sup> (54x54)
- CYLINDER - Aluminium Nikasil coated
- CARBURETOR - Walbro WG8
- POWER - 23 HP / 9.580 R.P.M.
- IGNITION - Electric ignition coil
- TRANSMISSION - Poly V belt driven with centrifugal clutch
- RATIO 1: 3, 65
- STARTER - Manual pull starter / FLASH OR ELECTRIC STARTER AVAILABLE
- FUEL - Unleaded gasoline + synthetic oil 2,5 %
- WEIGHT - 14 Kg. complete
- THRUST - 73 Kg.
- CYLINDER HEAD TEMPERATURE - MAX TEMPERATURE 250°C
- EXHAUST GAS TEMPERATURE NOT EXCEEDING 590 C°
- ENGINE MOUNTING - BY 4 SHOCK ABSORBING RUBBER MOUNTS
- ROTATION – COUNTERCLOCKWISE
- SEAL RING - IN VITON WITH VERY HIGH RESISTANCE
- OIL - 2,2% TOP QUALITY OIL 100/100 SYNTHETIC

- **MAIN TORQUES**

- Kg. m(Nm)
- NUTS TO FIX THE HEAD 1,6 - 16 **RETIGHTEN AFTER 1<sup>ST</sup> HOUR**
- NUTS TO FIX HALF-CRANKCASE 1,6 -16
- NUTS TO FIX THE CLUTCH 3,5 - 35
- NUTS TO FIX BACK PART OF DRIVE SHAFT TO IGNITION FLYWHEEL 2,5 - 25
- GAP BETWEEN COIL AND FLYWHEEL 0,5 mm

- **IT IS VERY IMPORTANT TO RETIGHTEN THE CYLINDER HEAD NUTS AFTER THE 1<sup>ST</sup> HOUR OF FLIGHT!**

- **ASSEMBLY:**

You can install the engine on the frame by using 4 rubber mounts of 30 mm.

To attach the propeller use only bolts of class 10/8 (100 Kg) and make sure that their length is enough to exit from the reductor-pulley. Tighten the 6 bolts M8 in a cross, at 1.5 /2.0 Kg.m.(15/20 Nm). Re-check the torque of the bolts after the first hour of engine's working.

For the connection between the carburetor and the fuel tank use a proper hose of the right diameter. The length of the fuel line must not be more than 80 cm.



### **IMPORTANT NOTES**

DO NOT try to start the engine without the propeller. DO NOT start the engine with loose bolts or parts, since this can cause the detaching of the propeller, the ovalization of the propeller holes, and the damage of the rubber mounts.

**IMPORTANT! BEFORE FLYING CHECK ALWAYS EVERY PART OF YOUR CRAFT, FROM ENGINE TO FRAME.** Verify that there are no damaged electric wires, that there are no leaks from hoses, tank, carburetor or engine's crankcase, that the propeller is not damaged or loose, that the exhaust-pipe has no cracks, that the frame is not bent or broken because of falls, that rubber mounts are not cracked, that the reduction belt is not loose and every bolt is tight. Finally you can start the engine, leaving it to warm up at a speed of 2.200 to 3.000 rpm with head temperature at least 100 °C.

- **FUEL**

*Use for the mixture only premium gas for cars 98 octane, together with good-quality, synthetic oil for mixtures at a quantity of 2,5% (DO NOT USE MIXTURE ALREADY DONE AT PETROL PUMPS).*

*When you prepare the mixture, make sure that the can has not dirt or water in it, put always the oil first and mix thoroughly. Never run the engine without the air-filter, because dirt and dust raised by the propeller can damage it.*



• **ADJUSTMENT OF THE CARBURETTOR**

The carburettor has one adjustment screw for the high rpm.

CARBURETOR SETTINGS	MVL ENGINE
H screw	1 hour + 20/30 minutes

Lever #3 controls the choke # 2 and must be kept open



This is the standard carb. set up we suggest, as engine manufacturer, of course any carburetor should be adjusted in base of weather conditions and flight altitudes.

**WARNING: THE FOLLOWING OPERATION HAS TO BE DONE WHEN THE ENGINE IS HOT.**

For regulating the fuel flows, play gently with lever # 1 opening it in case you need to make the engine running richer, and viceversa closing it in case you have to run the engine a little bit lean.

Lever # 2 is used for adjusting the mechanical idle, that we suggest to set up at 2500/2600 RPM.

## • **RUNNING-IN**

All the engines PARAMOTORES HE have a quality control before being delivered in order to verify if all the components related to the fixed parameters, but a further running-in is still necessary.



**A CORRECT RUNNING-IN PROCESS WILL PROLONG THE LIFE OF YOUR ENGINE!**

- Go to a quiet place, put a thick rubber carpet under your craft to avoid that stones or other things damage the propeller by putting it on earth and let the engine work at a speed of 2500 rpm for 5 minutes, then regulate speed at 3000/3500 rpm for 15 minutes, then at 4000 rpm for other 15 minutes.
- Switch off the engine and check that there are no loose nuts or bolts and that every component is ok.
- **DO NOT TOUCH THE HOT PARTS! (POWER UNIT AND EXHAUST PIPE).**



- Start the engine again and take it step by step to 4000 rpm for 5 minutes, then accelerate to 4500 rpm for 15 minutes.
- During the first 10 hours, do not subject the engine to extreme efforts and speed.
- Also during normal use excessive loads (ex. tandems with passenger) can force the engine with possible damages to the engine itself.
- **ALWAYS CHECK** at sight your craft before and after every flight, for loose parts or damage.

During the run-in period vary the power often for a proper piston ring setting.

## • **MAINTENANCE**



- **AFTER THE FIRST HOUR OF RUNNING, CHECK THE BELT TENSIONING AND TIGHTEN IT IF NEEDED.**
- **AFTER THE FIRST 2 HOURS, TIGHTEN HEAD NUTS (IN CROSS ORDER) WITH A TORQUE WRENCH AT 1.6 Kg.m (16Nm).**
- **AFTER THE FIRST 3 HOURS OF ENGINE RUNNING MAKE A NEW BELT CHECK UP AND IN CASE RETENSIONING IT AT 350 HRZ**

- **Every 20 hours:**

- Check the condition and gap (0.7 mm) of the spark plug



- *Clean the air-filter, the carburettor filter placed at the end of the fuel pipe and the filter of the fuel tank*
- *Check the torque of every bolt*
- *Check the tension and condition of the reduction belt*
- *Check fuel lines and wiring*
- *Check that the cord of the starter has no abrasions.*

**- Every 50 hours**

- *Same controls of the 20 hours and furthermore:*
- *Check the torque of the engine's crankcase nuts*
- *Change spark plugs*
- *Change the petals of the reed valve*
- *Check the reduction belt and the play of pulley bearings, change them in case of need*
- *Check the conditions of the starter gears (version with electric start)*
- *Once a year (independently from flight hours) change the diaphragm of the carburettor.*
- *N.B. It is advisable to keep records of all maintenance in a log book for the engine.*

*It is also advisable to install an instrument (CHT) to control the head temperature at sight.*

**• TENSION OF THE REDUCTION BELT DRIVE – USE CAUTION**



*Attention: a belt which is overtensioned can do permanent damage to bearings of pulley and drive shaft.  
Therefore we strongly suggest for you to follow carefully these instructions.*

*Before adjusting the belt take a felt pen or marker and make a small sign on the cam shaft and on the front of the reduction plate.*

*This is your Zero or start point and from here you will be able to clearly see how much you move the eccentric tensioning cam in relation to the reduction plate.*

*Remember these are Fine adjustments and we suggest not to rotate the cam any more*

than 1 mm per adjustment. After each adjustment you can try to start the engine and check the result.

If the engine does not start well then it usually means the belt is still too loose and is slipping, in this case repeat the operation by tensioning the belt another 1 mm. Consider that if the belt slips a little, but the engine still starts fine, then the tension is correct. Belt tension always increases automatically when the engine is running because of thermal expansion in the pulleys.

Once you have found the correct tension, do not adjust it any more. In case of doubts please contact your paramotor dealer – or the HE team.

**To adjust the belt do the following:**

- Loosen the cam of pulley bolt located, once this is loosened then you can turn the cam with a n.27 mm size wrench - careful to observe the 1 mm increments.
- Once you have finished turning the cam remember to re-tighten the safety bolts at 2,5 kg. (25 Nm), first the back bolt, by keeping firm the cam with the wrench, and then the side bolt.

• **IGNITION**

In case the coil and/or the handwheel must be changed, it is compulsory to turn to your dealer or to trained personnel, even if this operation can appear simple at the first sight, since the timing of the engine, if wrong, can change the performance and cause damage to the engine. To check the timing: the distance between the coil and the flywheel magnet is 0,4-0,5 mm.

• **WARRANTY**

Warranty includes spare parts and labor, transport excluded.

For any defective part, please contact your reference authorized dealer or HE directly, so that you can get proper indications about how to handle it.

**DURATION OF WARRANTY**

1 YEAR beginning from the date of purchase from PARAMOTORES HE.

**WARRANTY IS VOID IN THE FOLLOWING SITUATIONS:**

- Alterations to the engine not approved by PARAMOTORES HE.
- Wear & tear of components of the engine due to the instructions within the product manual not being adhered to.

- *Accidental falls or dropping of the engine or its components.*
- *Overheating and seizure of the engine due to prolonged high speed running of the engine, running with excessive loads, running with inadequate loads, running with insufficient oil in the petrol (for a wrong tuning of the carburetor) or running with petrol only (oil mixture omitted).*
- *The presence of dirt, sand or foreign bodies in the carburetor of the engine.*
- *Corrosion through bad storage of the engine or inadequate preparation for storage of the engine.*
- *Running the engine without an air-filter fitted to the carburetor.*
- *Miss-assembly of engine parts or components not assembled by PARAMOTORES HE but by the manufacturer of the paramotor or by the end user, supplied disassembled for packing and transport purposes, included all electrical or electronic components.*
- *Corrosion of the engine or components emanating from stone chips or any other impact or abnormal stress damage.*
- *Work other than the maintenance set out in the product manual having been carried out on the engine by anyone other than PARAMOTORES HE or official dealers.*
- *Incidental or consequential loss or damage.*
- *Engine used for racing use.*

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**PARAMOTORES HE AND ITS RESELLERS REMAIN AT YOUR DISPOSAL FOR EVERY INFORMATION AND ADVICE ABOUT THE USE OF THE ENGINE**

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## • **TROUBLE SHOOTING**

### ➤ **THE ENGINE DOES NOT START**

**Please check:**

- switch on-off**
- cable of the spark plug**
- correct spark plug gap**
- all the connections of the electric plant**
- that fuel arrives correctly from the tank to the carburettor**

### ➤ **FLOODED ENGINE**

- ❑ ***Dismantle the spark plug***
- ❑ ***dry it well***
- ❑ ***before re-assembling it, let the propeller turn slowly 2/3 times.***

**THE ENGINE DOES NOT HOLD IDLE SPEED OR HAS AN IRREGULAR SPEED**

- ❑ ***Clean and adjust the carburettor.***
- ❑ ***Check the reed valve petals are closing completely.***
- ❑ ***Hold the reed up to a light and you should not see any light past the petal seating area.***

➤ **THE ENGINE CANNOT REACH MAXIMUM SPEED**

- ❑ ***Check cable pulling throttle fully open.***
- ❑ ***Check that there is no dirt in the carburettor or tank-filter nor restrictions in the fuel pipe, due to too tight curves, or air bubbles.***
- ❑ ***Check the spark plug; is it's worn, change it with one of the same brand and same heat range.***

***In case the head is dismantled to be decarboned, change both the head gasket and the cylinder gasket.***

• **IMPORTANT ADVICE** 

**DO NOT FLY in bad weather conditions!**

**NEVER switch on the engine with people near propeller, or to sides.**

**The BREAKAGE of a propeller can cause very severe hurts even several meters away.**

*DO NOT keep engine at peak rpm after the take off, except for the absolutely necessary time and for emergencies (obstacles or sudden wind).*

*If you use big propellers, REMEMBER that cooling is not perfect flying at high speed, so keep under control the temperature of the engine with proper instruments (CHT).*

*In addition, dismantle the propeller at regular intervals and check that it is perfectly balanced, since an unbalanced propeller, even slightly, creates micro-vibrations which are not felt by the pilot, but can damage seriously parts of the engine with consequent breakages.*

*Please do NOT forget that the propeller has mass and a considerable inertial moment, so it's advisable not to vary suddenly the RPM of the engine, both in flight and on the ground.*

*These sharp and violent stresses could cause damages to the reduction, to the engine, to the belt and also possible deformations to the fixing holes of the propeller.*

*Once you have found the perfect carburation, DO NOT modify it unless you change flying place going to much higher or lower altitudes or unless climate and temperature are very different from the ones where you fly usually.*

## • **PROPELLER FITTING**

*Paramotores HE recommends using the Helix propellers.*



*In the case of propeller impact, it is necessary to verify that all the engine parts have not suffered any damage, paying particular attention to the components listed below: Reduction pulley and bearings; Reduction eccentric; Engine carter, engine carter support and engine rubber mounts.*

*The propeller's rotation is counterclockwise, considering the back view. Push the propeller against the reduction drive, until it is completely inserted. Now gently screw the bolts up to the end. Be sure that the bolts are suitable to the propeller in use.*

*Maximum pressure to apply:*

- *Carbon propeller: 10-12 N/m on every M6 bolt;*



## • **HOW TO START THE ENGINE**

*We wish to remind you that a correct priming is the key for starting any 2 stroke engine.*

*Please follow the following instructions:*

- 1. Lightly press pin on WG8 cover metering diaphragm for priming the carburetor.*
  - 2. Stop priming the engine once fuel gets inside the WG8. Remember that the less fuel gets in the smaller is the risk to overflow your engine, which will make you even difficult to start it.*
- 1. Quickly pull the rope, without reaching end run.*

*In winter time, or in cold weather, you may help the engine start by closing the choke ( lever # 3).*

*Pull the rope 2-3 times, until you hear the blow in engine combustion chamber, then open again the choke, and start the engine.*

*During the start-up phase, always pay maximum attention to the propeller and to those who could be nearby. Many accidents happen before to flying. On every test or warm-up, we suggest always wearing the paramotor on your shoulder, to fasten the harness, take a look around, then to turn on the engine with the pull (or electric) starter, however always be ready to press the shutdown button, in order to stop the motor in any moment if necessary.*



