CORS-AIR MOTORS

USER'S MANUAL ENGINE

BLACK BEE WITH CLUTCH

Last update
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INTRODUCTION

Thank you for choosing our engine the CORS-AIR BALCK BEE. We invite you to spend some time reading this manual, which will let 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 YOUR AND THE OTHER PEOPLE'S SAFETY IS THE MOST IMPORTANT THING FOR US.

IDENTIFICATION OF THE OWNER

Owner

Address

Serial number

Reseller

Address

Owner's signature

Reseller's signature and stamp

Date of sale

BLACK BEE

CYCLE	Two stroke
TOTAL DISPLACEMENT	125 c.c.
BORE	54 mm.
STROKE	54 mm.
COMPRESSION RATIO	11:1
COOLING	By air
PEAK RPM max.	9800 rpm
PISTON	With two piston rings
HEAD	In alloy with high percentage of silicon and hemispheric combustion chamber, with squish
CRANKCASE	Molten in G-Al Si 9 uni 3051 alloy subsequently treated and anodized against sea salt
CONNECTING ROD	In copper plated steel 18 Ni Cr Mo5 joined to the drive shaft through very precise high speed silver-plated roller bearings
CARBURATOR	membrane walbro WG8
FEEDING	Six blade reed-valve system connected to the crankcase
SPARK PLUG	Ngk br9es or similar
SYSTEM	Six port distribution
CYLINDER	In alloy with nikasil coating
REDUCTION	With poly V belt 12 grooves 1:3,6
CYLINDER HEAD TEMPERATURE	max temperature 230°C measured under spark plug Exhaust gas temperature not exceeding 590 C°

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ENGINE MOUNTING	By 4 shock absorbing rubber mounts
ROTATION	Counterclockwise
DRIVE SHAFT	In 18 Ni Cr Mo5 with 5 thermic treatments on every component
ROLLER BEARINGS	Fit for high speed class c3
SEAL RING	In Viton with very high resistance and long duration
OIL	2,2% top quality oil 100/100 synthetic
ENGINE WEIGHT	**Hand start with clutch kg 13** • complete with airbox, exhaust, and four rubber mounts

MAIN TORQUES

MAIN TORQUES	Kg. m	(Nm)
NUTS TO FIX THE HEAD	2,5	25
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 HANDWHEEL	2,5	25
GAP BETWEEN COIL AND HANDWHEEL	0,5 mm	

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, alteration of the propeller hub , damage to 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, carburettor 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 2,2% (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

From second half of 2020, Black Bee is equipped with WB37, following the correct carburetor settings:

WB37 SETTINGS	BLACK BEE engine
H screw	1 hour + 35 /40 minutes
L screw	35/45 minutes

Previous 2020 production, Black Bee was equipped with WG8 carburetor, which has one adjustment screw for the high rpm.

WG8 SETTINGS	BLACK BEE engine
H screw	1 hour + 30 minutes to max 1 hour + 50 minutes

This is the standard carb. set up we suggest, as engine manufacturer, of course any carburator 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.

Lever **# 3** controls the choke and it has to be kept opened

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RUNNING-IN

The running-in is a key stage of the life of an engine.

Even if the high standard quality level of the machining and the exceptional material quality currently applied in the production process suggest that there is no need of an adjustment phase of the engine, the running-in is still a fundamental step in its life for getting the best performance and reliability.
The parts that require a longer running time for the operation of the propulsion and that need to get to an optimum settling are cylinder and piston.

During the running in phase and limited to this period only the fully synthetic oil percentage is 2,5%

All engines are tested in CORS-AIR before delivery, where we set carburetor and idle.
We strongly advise not to modify the carburetor settings during the engine running-in.

1. Turn on the engine and let it run at the ground for 10 minutes varying the rpm range from 3000 to 5500 rpm, after that switch off the engine and let it cool down for 10 minutes.
2. Turn on the engine and let it run at the ground for 15 minutes varying the rpm range from 3000 to 6000 rpm, after that switch off the engine at let it cool down for 15 minutes.
3. Turn on the engine and let it run at the ground for 15 minutes varying the rpm range from 3000 to 6500 rpm, after that switch off the engine at let it cool down.

The throttle must be continually opened and closed, so to vary the amount of fuel/oil mixture that lubricates all parts.
At this point, you can fly the engine normally, having care to warm it up to 90/100 C° before take off.
For the first 5/6 hours of flight, fly the engine with cautions.
NEVER FLY THE ENGINE AT FULL THROTTLE FOR A LONG TIME.
The engine running-in is finished, respect your engine and it will become your trustworthy partner in flight.

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MAINTENANCE

AFTER THE FIRST HOUR OF RUNNING, CHECK THE BELT TENSIONING AND IN CASE RE-TENSIONING IT.

- ❑ AFTER THE FIRST 2 HOURS, TIGHTEN HEAD NUTS (IN CROSS ORDER) WITH A TORQUE WRENCH AT 2.5 Kg.m (25Nm).
- ❑ 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 “over tensioned” 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 CORS-AIR.

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

CORS-AIR engines are manufactured with top-quality material, therefore warranty is valid also for their accessories.
Warranty includes spare parts and labor, transport excluded.
For any defective part, please contact your reference authorized dealer or Cors-Air directly, so that you can get proper indications about how to handle it.
DURATION OF WARRANTY
1 YEAR beginning from the date of sell or exit from CORS-AIR

WARRANTY IS VOID IN THE FOLLOWING SITUATIONS:

- Alterations to the engine not approved by Cors-Air.
- 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 carburettor) or running with petrol only (oil mixture omitted).
- The presence of dirt, sand or foreign bodies in the carburettor 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 carburettor.
- Miss-assembly of engine parts or components not assembled by Cors-Air 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 Cors-Air or official dealers.
- Incidental or consequential loss or damage.
- Service bulletins from Cors-Air not having been adhered to.
- Engine used for racing use.

CORS-AIR 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.

SOME FINAL IMPORTANT ADVICE

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.

DO NOT FLY in bad weather conditions, you'll fly the day after.

REMEMBER: FLIGHT IS FOR FUN, NOT FOR RISKING YOUR LIFE! HAVE A GOOD FLIGHT AND ENJOY YOURSELF.

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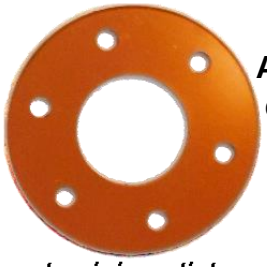
HELIX PROPELLER QUICK RELEASE SYSTEM

central bolt M12x30 (QRH1)

safety clip (QRH2)

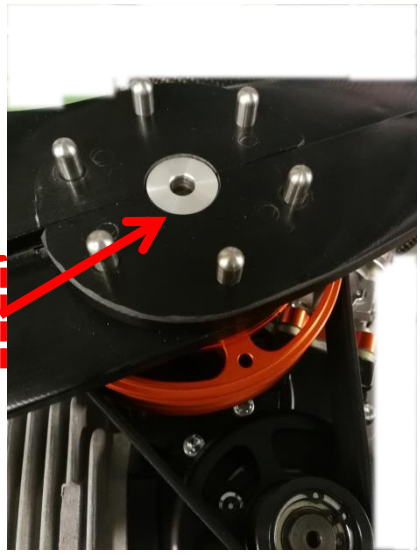
pins 47 mm. (QRH3)

propeller disk (QRH4)



aluminium disk (QRH5)

Aluminum cylinder



Instructions for assembly:

1. Put some light or medium Loctite on the 4/6 pins and tighten them completely
2. Always use the aluminum disk
3. Insert the propeller
4. Insert the aluminum cylinder
5. Insert the propeller disk
6. **Insert the central bolt and tighten it at about 1,5 Kg (15Nm), checking that the clip can be inserted**
7. Insert the safety clip

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PROPELLER QUICK RELEASE SYSTEM

1. With an allen key screw the central bolt until you feel a little bit of resistance.

2. Then turn the allen key from 10 to 15 minutes max. for tensioning central bolt.

Max. 15 minutes

Remove central bolt of quick release when propeller is not installed.
Should you try to start the engine or turn the pulley by hand, with the central bolt in position without the propeller, you may risk to damage the pulley set.

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HOW TO START THE ENGINE

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

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 less fuel gets in and less you risk to overflood your engine, which will make you even difficult to start the engine.
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.

Notes: