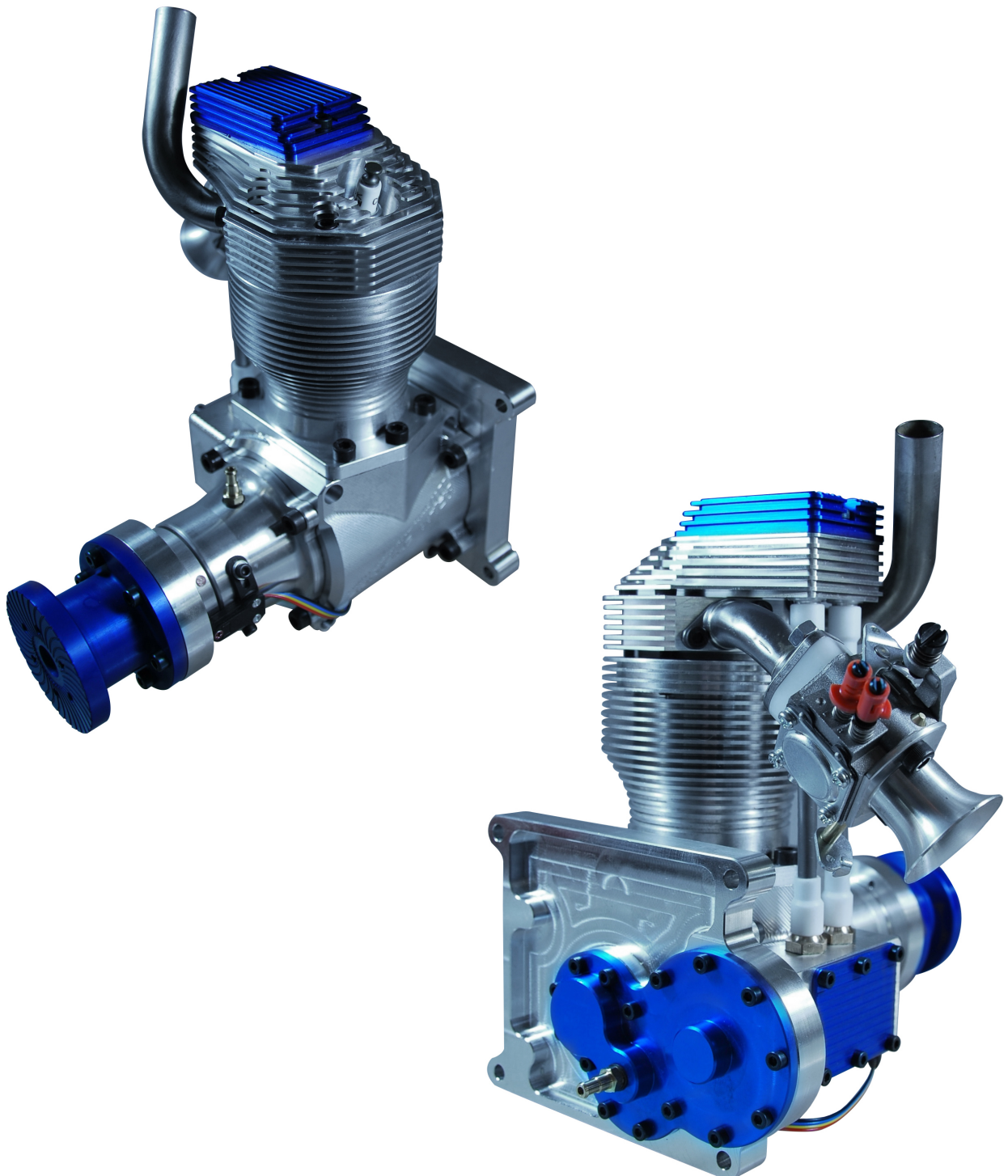


Manual

KOLM ENGINES EZ77V4



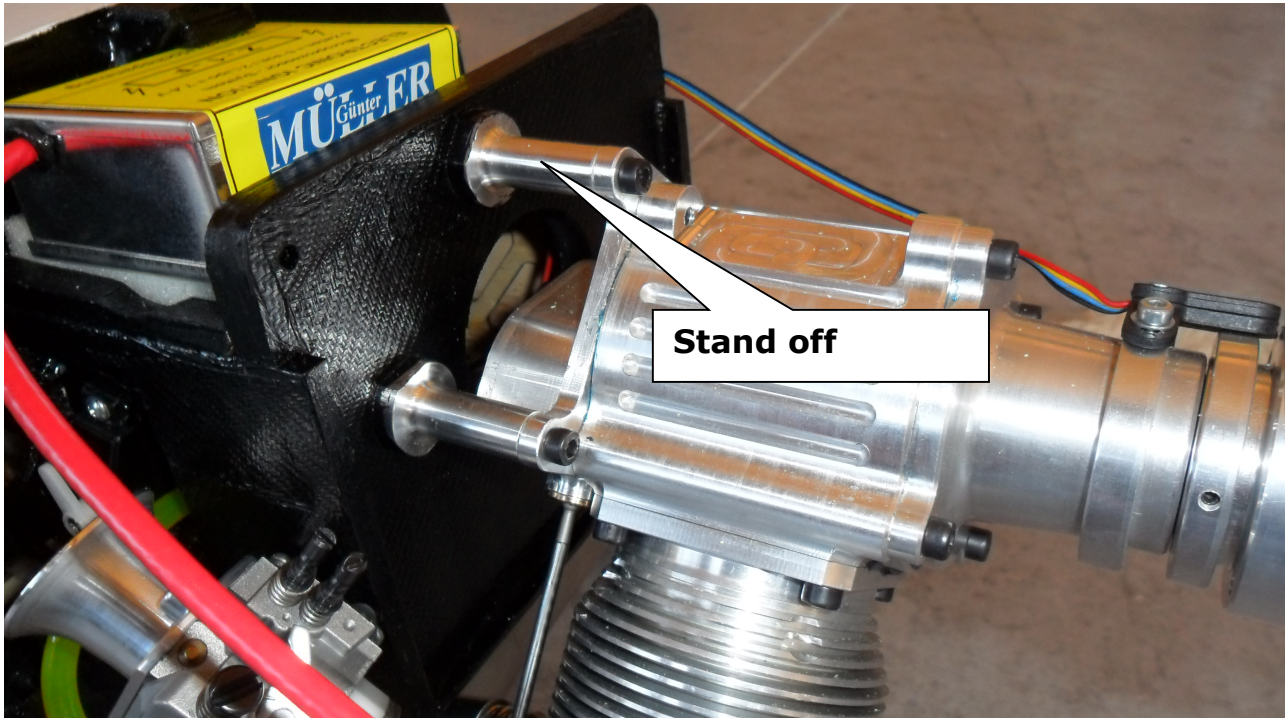
1. Warranty

Refer to the bottom of the manual

2. Engine Installation

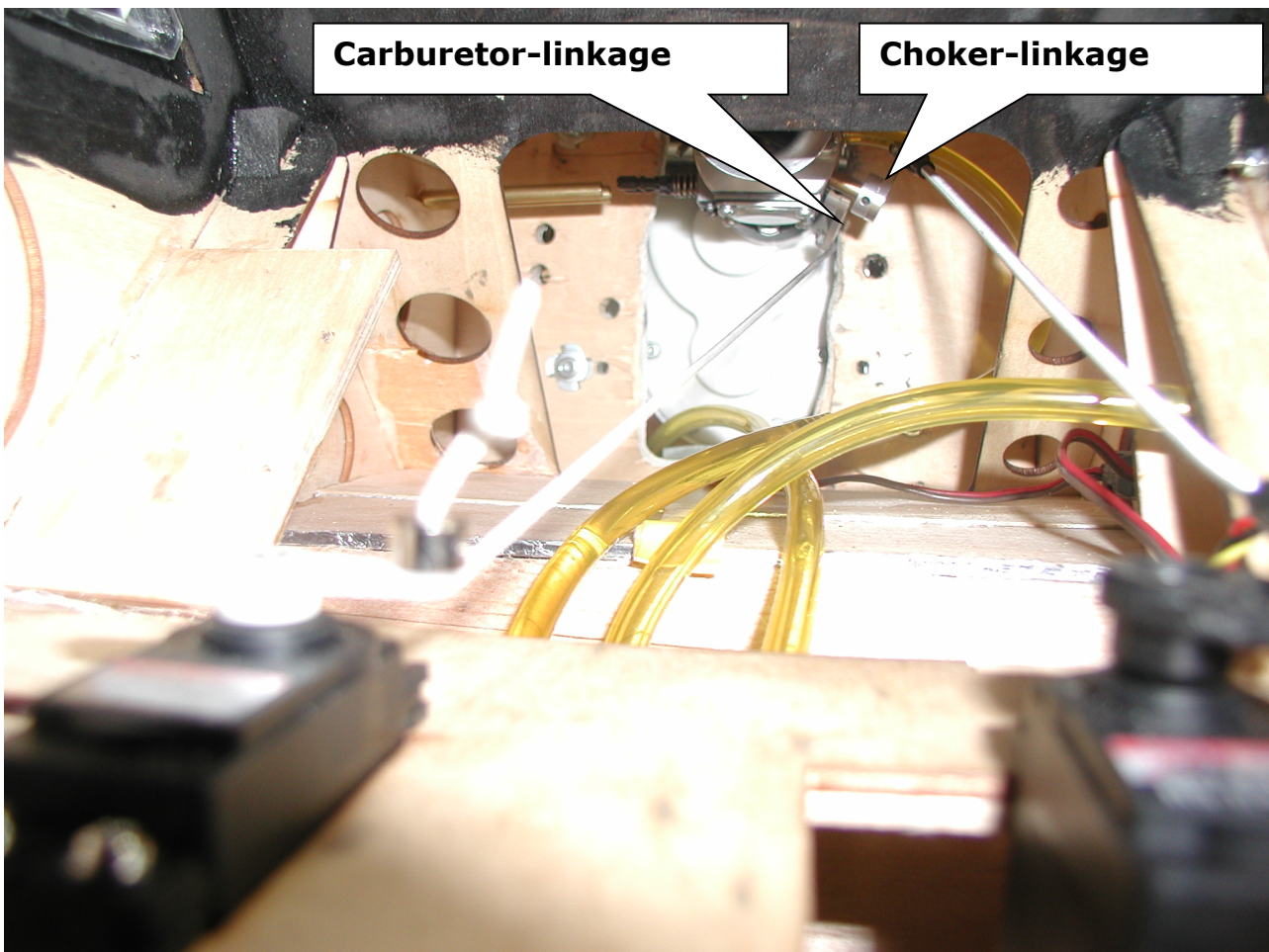
Motor Mount:

Mount the engine to the firewall/engine box using 4 M4-Bolts. Standoffs are available in 30, 35, 40, 45 and 50mm length. These can be shortened, of course. Always use locking washers when you mount your motor in order to keep bolts from accidentally coming loose. Please make sure that the bolt has at least 6-8mm thread depth.



Carburetor linkage:

The carburetor comes stock with aluminum levers. We recommend to run the throttle via a pull-cable, this is easy to accomplish and can even operate around bends. A standard servo will be suffice. In order to simplify the startup procedure we recommend running a choke servo, as well. This allows you to use the choke not only for priming but as a Emergency Shutoff, should it be needed.



Cooling:



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4 stroke model aircraft engines

Sufficient front and/or cooling apertures on the cowl are required to ensure the sufficient cooling of the engine. In most cases (semi)scale openings will be sufficient, just like they can be found on the original airplane. Most important are adequate vents aft the engine. The more sizeable the cowl the more likely baffles are required in order to guide the air and limit incoming airflow. This can be done using balsa or light-ply with a gap of 2mm to the cylinder and cylinder head. Ideally a ratio of 1:3 of incoming to escaping air aperture should be achieved.

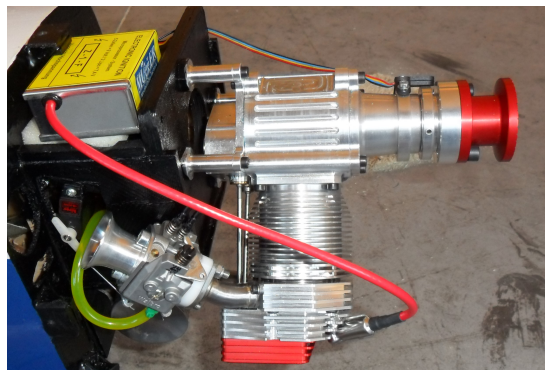
3. Mounting the ignition

Ideally the ignition will be mounted on the firewall, right next to the engine. Make sure that no cable or wire makes contact to any corners or sharp objects. If needed protect the cable using a piece of fuel tubing or cable loom.

You can use a standard On/Off switch as you would use it for your receiver or an electronic ignition switch such as the Spark Switch, also available from Vogelsang Aeroscale.

For a battery use either a 5-cell NiCad/NiMH battery, a 2 cell LiPo or 2 cell LiFe pack at a minimum capacity of a minimum of 2000mAh. The hall sensor has been adjusted at the factory and simply needs to be connected to the ignition module. To increase safety it is recommended to use either electric tape, heat shrink tubing or a safety clip to secure the connectors.

Please consult the manual provided by the ignition manufacturer regarding further information.





4. Fuel setup

EZ50/65: 350 - 500 ml

BX100/135: 650 - 1000 ml (1000ml for tow planes)

IL100/135: 650 - 750ml

IL200: min. 750ml

The tank can be up to 4 inches below the level of the clunk.

When possible use the transparent yellow Tygon tubing outside the tank as it allows you to check whether fuel has been transported as well as for bubbles in the fuel line.

As Tygon grows when coming in touch with fuel make sure to secure all fittings with wire or clamps.

We recommend a felt clunk, available from Vogelsang Aeroscale, as it filters not only debris out of the fuel, it blocks foam and micro-bubbles from entering the fuel line.



5. Fuel

These engines can, in theory, be run on any 2-stroke fuel as 2 years of testing have shown.

Breaking the engine in:

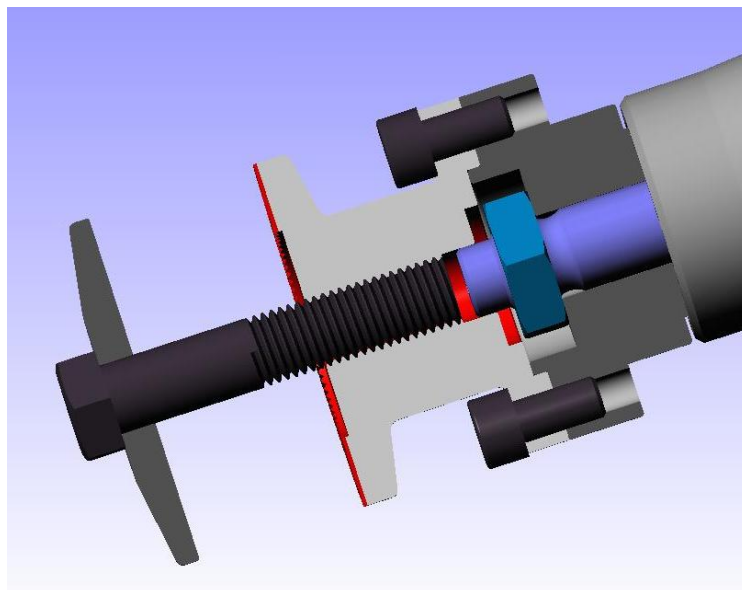
We recommend a 1:50 mix for initial break-in and later operation. We recommend Amsoil Saber but that does not imply that other brands and blends may not bring the best in results, either.

6. Air screw

The thrust that the engine generates is in direct relation to the air screw that is being driven, countless tests and comparisons have produced countless results.

The following should serve as a guide, we tested and flew all these propellers and achieved good results. The following is important:

- The air screw needs to be balanced
- The center bolt needs to be tight and needs to be checked in regular intervals
- Please pay attention to your propeller hub as they come in different thicknesses. You may need to adjust the length of your center bolt. It may not touch the crank shaft when tightened down but needs at least 15mm, or 0.6 of an inch thread depth.



- Check the propeller for damages before flight

7. Specifications

Air screw	nmin [r/min]	nmax [r/min]	Thrust [kg]	Noise [dBA]
<i>2-blade</i>				
Mejzlik 24 x 10	1.000	6.300		
Mejzlik 26 x 8	1.000	5.700		
Metts 26 x 10	1.000	5.200		
Engel 27 x 12	850	5.350		



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4 stroke model aircraft engines

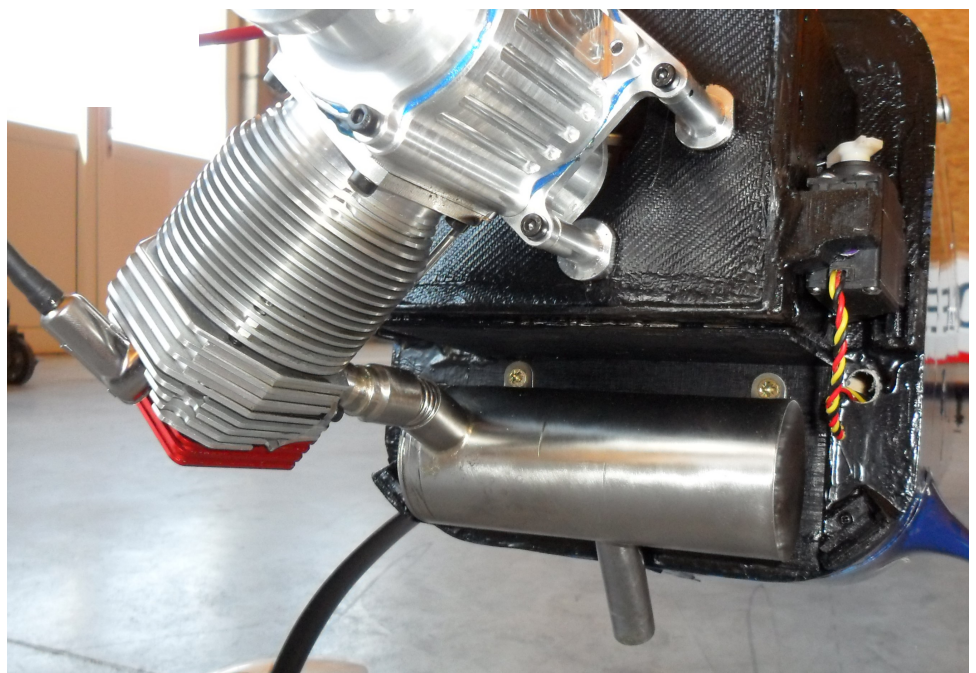
3-blade			
Mejzlik 22 x 10	1.000	6.000	
Mejzlik 24 x 10	1.000	5.500	
4-blade			
Engel 27 x 12	700	3.700	

8. Exhaust solutions

The exhaust solution is more often than not limited by the space available in the airframe. Therefore we have several solutions to offer:

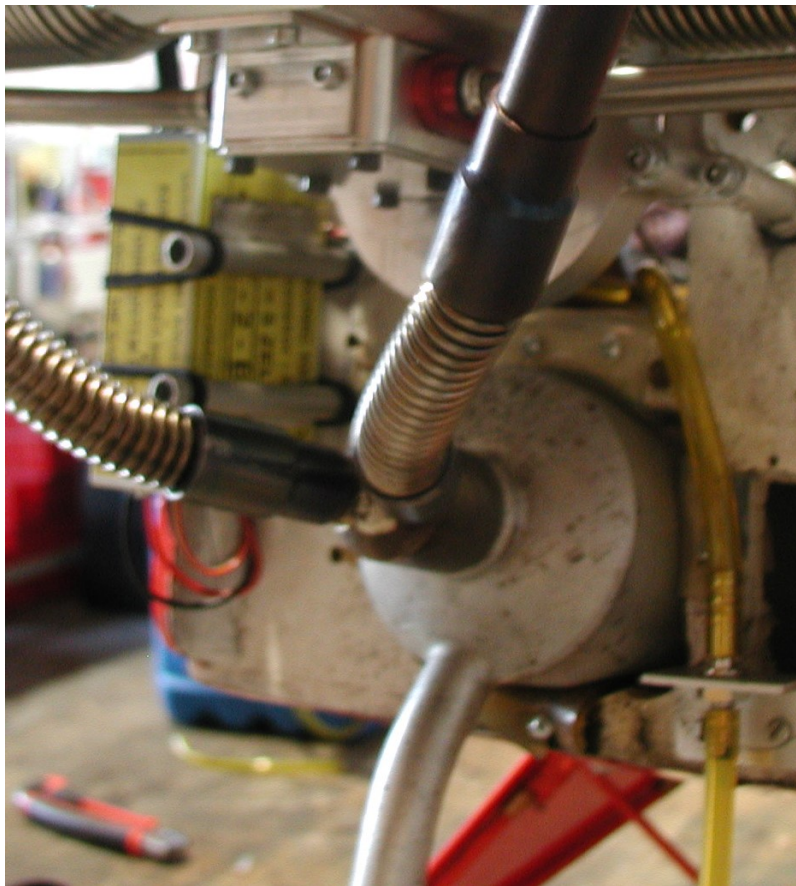
Muffler underneath the Cowl:

Should you want to install the muffler underneath the cowl you can use an old and empty gas cartridge. Perorate the bottom of two such cartridges and solder them together. Make for a center hole for the exhaust tube. Use two metal brackets to mount your custom made muffler to the firewall or motor mount. You can download a plan for this project at www.cnctech.net and www.team-aeroscale.com.



Standard-Muffler:

Those who prefer to purchase off the shelf can purchase canisters from Vogelsang Aeroscale. Zimmermann canisters are in stock and stainless steel flex tube manifolds are available, as well. These will be plug and play, no soldering necessary. The canisters are polished stainless steel and can be repaired or modified, should the need ever occur.





9. Carburetor settings

Your engine will be dialed it at the factory, but of course it will be very likely that minute adjustments will have to be done as the air/temp/altitude at the final destination most likely differ from those at the factory in Austria. Good "default settings" are

High needle (H): 1½ turns out

Low needle (L): 1¾ turns out

The engine will be operating with these settings and can, after a 1 minute warm up period, be dialed to accommodate for the ambient conditions.

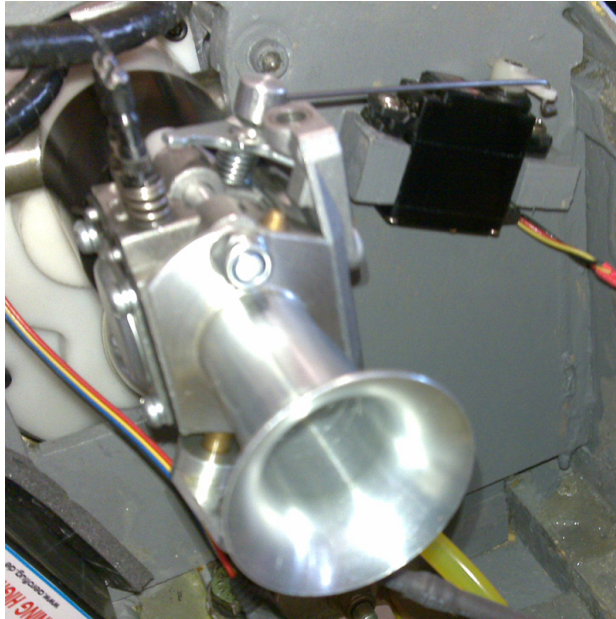
Dialing in full throttle:

Let the engine warm up for one minute. Turn the High needle (H) carefully clockwise (in) until the engine speed drops. Now carefully turn back counter-clockwise (out) until the highest engine speed is achieved.

Dialing in idle:

Let the engine warm up for one minute. Throttle the engine down and watch the engine speed. Should the engine start to sag and then subsequently stop operating your low needle (L) setting is too rich. Should the engine speed up and then stop operating your low needle setting is too lean. Once you have achieved a stable idle you want to let the motor idle for 10 seconds and then instantly go to full throttle. The engine should follow at once. Should the engine die right away you are too lean on the low needle. Should it lag and cough on the way up you are too rich on the low needle.


KOLM *by Ploberger Modelltechnik* **engines**
4 stroke model aircraft engines





10. Beginning of operation

- Tie down the model or have a friend assist and hold the airplane
- Engage ignition
- Use a protective leather glove or starter
- Close choke all the way
- Set throttle to idle
- Flip the engine until it starts igniting. You now have sufficient fuel. The engine will usually die with choke closed after a few cycles
- Open choke and slightly increase throttle setting, for example set to throttle down, throttle trim all the way up.
- Start engine
- Let the engine warm up for one minute

11. Maintenance

- Retightening cylinder head bolts

All bolts will be retightened at the factory after the initial test runs. We recommend to retighten every 2 hours in the beginning, the interval can then be increased to every 5 hours.

- Retightening cylinder mount bolts

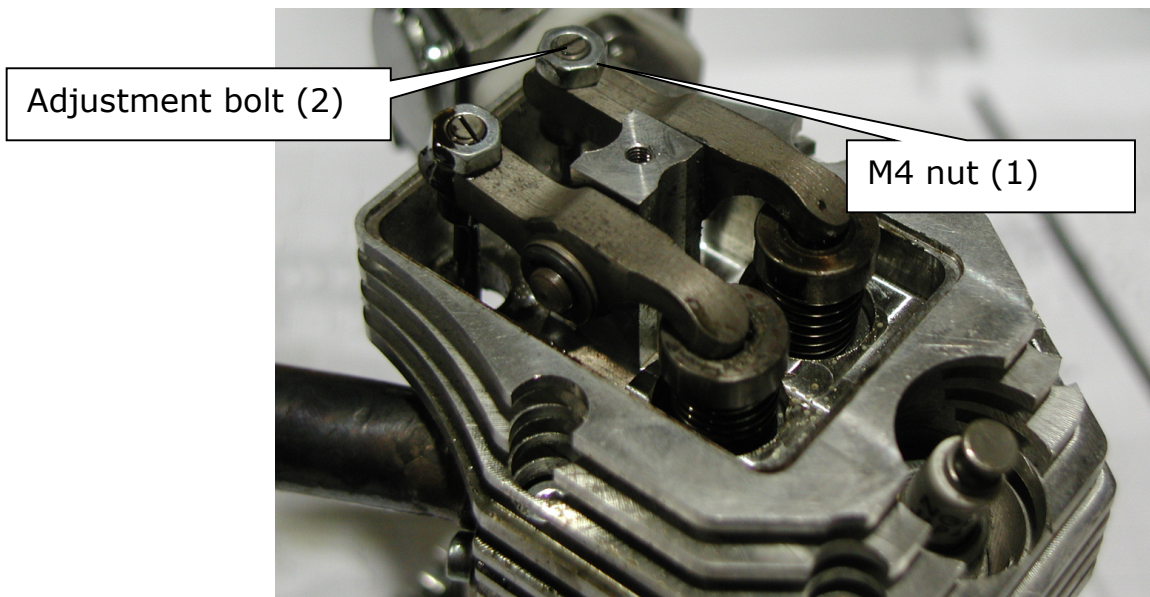
All cylinder mount bolts on the bottom of the cylinder will be retightened at the factory after the initial test runs. We recommend to retighten every 2 hours in the beginning, the interval can then be increased to every 5 hours.

- Setting valve gaps

All valves will be set at the factory and reset before the engine is shipped. The gap is 0.1mm and should be checked every two hours initially. The interval can be increased to 5 hours, then to 10 hours once you find that the setup has settled.

Procedure:

- Loosen M4-nut(1)
- Slip feeler gauge between rocker and valve
- Adjust the adjustment bolt (2) until the feeler gauge can be freely moved without space between gauge and rocker/valve.
- Retighten M4-nut
- Check feeler gauge again
- Repeat if necessary



12. Risks and Dangers of model engine operation

Must be read before operating the model engine:

Operating model engines requires practice, expert knowledge and most of all responsibility. A lot of force and power can and will be generated, enough to injure and damage people and objects. Never operate the engine outside of certified model airplane club fields. Inform bystanders about the dangers of running engines.

Ensure a minimum distance of 5 yards of bystanders to your engine. You alone are responsible for the safe operation of the engine and for the safety of yourself and others. Rotating propeller and all moving parts represent danger. Do not touch. A propeller is forceful enough to, for example, cut off a finger.

Make sure that no-one is in line with your propeller. Propellers can fail and lead to injury or death. Make sure that no foreign objects come in contact with the engine or propeller. Watch your clothing as it could get caught.

Check the engine and all attached parts (propeller, exhaust, gears etc) before flight. Do not start unless you can ensure that everything is safe to be operated.

The engine needs to be securely mounted using adequate bolts and secured nuts.

Use a starter or adequate aid to start the engine. For example a rubber-covered stick. Should you decide to start by hand make sure that you wear protective gear such as an adequate leather glove. Be aware that an engine may backfire, injuries can occur if proper care is not taken. As engines can be louder than 85dB (A) ear protection is recommended.



In order to be able to kill the engine the throttle servo travel needs to be adequate. Meaning, it needs to fully close when throttle and throttle trim are down. Should the engine fail to stop operating you can either close the choke flap, kill the ignition or close the fuel line to the carburetor. Never grab the spinner, the gear or the propeller.

Fuel is toxic and poisonous. Do not let it come in contact with skin, eyes or mouth. Use protective gear when handling fuel such as eye protection and adequate gloves. Store fuel in adequate containers and outside the reach of minors. Fuel is flammable. Keep away from fire, excessive heat and sparks. Do not smoke or have open flames.

Buyer assumes all risk of injury, harm and damage, of every nature whatsoever, to himself/herself and his/her property. Buyer fully and completely waives and releases any and all claims which he/she might have at any time arising out of the purchase, handling, or operation of the Model Engine. This assumption, waiver and release is complete, full, and comprehensive.



WARRANTY

- 1) The limited warranty extends to the original purchaser ("Buyer") of the engine and is assignable or transferable to any subsequent purchaser / end-user.
- 2) Upon request from Kolm Engines the Buyer must prove the date of the original purchase of the Model Engine by a dated bill of sale or dated itemized receipt.
- 3) Warranty coverage begins the day you buy the engine. For 1 (one) year all labor and parts will be repaired or replaced free of charge should there be proven defects of fabrication or material defects. All parts, including repaired and replaced parts are covered for the original warranty period. When the warranty on the engine expires, the warranty on all replaced and repaired parts also expires.
- 4) During the limited warranty period, Kolm Engines will repair or replace, at Kolm Engines's option, any defective parts with new or factory rebuilt replacement items if such repair or replacement is needed because of engine malfunction or failure during normal usage. No charge will be made to the Buyer for any such parts. Kolm Engines will also pay for the labor charges incurred by Kolm Engines in repairing or replacing the defective parts. The limited warranty does not cover defects in appearance. Kolm Engines shall not be liable for any other losses or damages.
- 5) Any further claims are excluded. Costs for packaging and shipping are paid by the buyer. No liability is assumed for loss during transport.
- 6) The Buyer must operate and maintain the engine in accordance to the engine manual.
- 7) The Buyer shall have no coverage or benefits under this limited warranty if any of the following conditions are applicable
 - a) The engine has been subject to abnormal use, abnormal conditions, improper storage, unauthorized modifications, unauthorized repair, misuse, neglect, abuse, accident, alteration, improper installation or other acts which are not the fault of Kolm Engines, including damage caused by shipping.
 - b) The engine has been damaged from external causes such as crash damage, foreign object damage, weather, Act of God, improper electrical connections, or connections to other products not recommend for interconnection by Kolm Engines.
 - c) The engine is operated for commercial or institutional use.
- 8) If a problem develops during the limited warranty period, the Buyer shall take the following step-by-step procedure:
 - a) The Buyer shall contact Vogelsang Aeroscale or Kolm Engines in order to go through a checklist with them. Should said service over the phone not



lead to the expected results the buyer will ship the engine prepaid and insured to Kolm Engines or Vogelsang Aeroscale per Kolm Engines or Vogelsang Aeroscale's instructions.

b) The Buyer shall include a return address, daytime phone number and email, complete description of the problem and proof of purchase.

c) The Buyer will be billed for any parts or labor charges not covered by this limited warranty.

d) If the engine is returned to Kolm Engines or Vogelsang Aeroscale during the limited warranty period, but the problem with the engine is not covered under the terms and conditions of this limited warranty, the Buyer will be notified and given an estimate of the charges the Buyer must pay to have the engine repaired, with all shipping charges billed to the Buyer. If the estimate is refused, the engine will be returned freight collect. If the engine is returned to Kolm Engines or Vogelsang Aeroscale after the expiration of the limited warranty period, Kolm Engines's normal service policies shall apply and the Buyer will be responsible for all shipping charges.

9) The Buyer must bear the cost of shipping the engine to Kolm Engines in Detmold, Germany or Vogelsang Aeroscale and bear the cost of shipping the engine back to the Buyer.

10) Kolm Engines shall not be liable for delay in rendering service under the limited warranty, or loss of use during the period that the engine is being repaired.

11) Kolm Engines neither assumes nor authorizes any other person or entity to assume for it any other obligation or liability beyond that is expressly provided for in this limited warranty.

12) This is the entire warranty between Kolm Engines and the Buyer, and supersedes all prior and contemporaneous agreements or understandings, oral or written, and all communications relating to the engine, and no representation, promise or condition not contained herein shall modify these terms.

13) Buyer must fully accept all conditions of the PURCHASE AGREEMENT, FULL ASSUMPTION OF LIABILITY AND INDEMNITY AGREEMENT

14) If the Buyer is not prepared to fully accept the liability associated with the use of this engine, the Buyer is advised to return this engine immediately in new and unused condition to the place of purchase.

15) This limited warranty allocates the risk of failure of the engine between the Buyer and Kolm Engines or one of its dealers. The allocation is recognized by the Buyer and is reflected in the purchase price of the engine.

PURCHASE AGREEMENT, FULL ASSUMPTION OF LIABILITY AND INDEMNITY AGREEMENT



Buyer purchases from Kolm Engines or from one of Kolm Engines's authorized dealers, an engine and ignition for the invoice price, accompanying this sale, and Buyer and Kolm Engines agree to all of the following terms and conditions:

1. Buyer's Representations. Buyer represents that he/she is very experienced in model airplane operation, and that all of the information set forth in the Purchase Application is true and correct. Kolm Engines and Vogelsang Aeroscale, LLC rely on such representations, and would not enter into this sale but for these representations.

2. Buyer's Acknowledgment of Risks and Dangers. Buyer recognizes that operation of the engine and model engine may be dangerous, and that under certain circumstances, its handling will be dangerous. As set forth in Paragraph 3 below, Buyer accepts full responsibility for all of these risks and waives all liability as against Kolm Engines and Vogelsang Aeroscale, LLC.

(a) Buyer's Acknowledgment of Danger. Buyer expressly acknowledges that use of the engine is dangerous if improperly handled, and could inflict injury if attempts are made to handle it properly, if the user does not fully acquaint himself/herself with the Model Engine's operation procedures. Improper use of the Model Engine or failure to follow Academy of Model Aeronautics ("AMA") guidelines and rules will result in injury to the user, the user's assistant, or bystanders. Operation of the Model Engine in any location other than an approved location, and under safe circumstances could lead to injury to bystanders.

(b) Buyer's Obligation to Become Fully Acquainted With Operation Procedure. Buyer acknowledges receipt of operating instructions for the engine which depicts its installation and operation. Buyer agrees to thoroughly acquaint himself/herself with these materials, and to require his/her assistant to become equally familiar with them. Buyer expressly agrees not to allow any person to assist in the start-up procedure of the Model Engine, who has not become thoroughly familiar with these materials.

(c) Agreement to Use Qualified Assistant in Start-Up Procedure. Buyer acknowledges that the start-up procedure for the Model Engine cannot be safely done, without an assistant. Buyer expressly agrees to use an assistant, who is thoroughly familiar with the Model Engine and its operation as set forth above, on each occasion when the Model Engine is started up.

(d) Warning to Bystanders. Buyer acknowledges that injury to bystanders could occur, during the start-up procedure or when operating the engine in combination with a model engine. Buyer expressly agrees to take all steps necessary to assure that no bystander will be in a position to receive injuries during the start-up procedure, or while the model engine is running.

Full Assumption of Liability; Waiver and Release of Kolm Engines and Vogelsang Aeroscale, LLC.

Buyer assumes all risk of injury, harm and damage, of every nature whatsoever, to himself/herself and his/her property. Buyer fully and completely waives and releases any and all claims which he/she might have at any time arising out of the



purchase, handling, or operation of the engine. This assumption, waiver and release is complete, full, and comprehensive.

Kolm Engines and Vogelsang Aeroscale, LLC and its dealers cannot supervise the adherence to the assembly and operating instructions for the aircraft model and the engine/engine, nor the installation, operation, use and maintenance of the model aircraft components. Therefore, Kolm Engines and Vogelsang Aeroscale, LLC do not assume any liability for losses, damage or costs caused by the proper or improper operation and proper or improper behavior use of the Kolm Engines engine or the model airplane. By operating the engine you confirm to be aware of the fact that Kolm Engines and Vogelsang Aeroscale, LLC cannot supervise or control the compliance with the instructions in this manual regarding assembly, operation and use of the aircraft model, engine and remote control unit. On Kolm Engines and Vogelsang Aeroscale, LLC's part, no promises, contractual agreements, guarantees or other agreements with persons or companies regarding the safety, functionality and operation of the model and the ignition/engine have been made. When buying this aircraft model or engine/model engine, you as the operator were relying on your own expertise and judgment.

(a) Release Even If Kolm Engines and Vogelsang Aeroscale, LLC Is Negligent. The waiver and release contained herein releases Kolm Engines and Vogelsang Aeroscale, LLC from all conduct, no matter how it could be characterized or alleged. Kolm Engines and Vogelsang Aeroscale, LLC shall not be liable for its own negligence, whether active, passive, primary, or secondary. Vogelsang Aeroscale shall not be liable for its sole negligence. Kolm Engines and Vogelsang Aeroscale, LLC shall not be liable for its willful misconduct. Kolm Engines and Vogelsang Aeroscale, LLC shall not be liable based on any theory in strict liability in tort. Kolm Engines and Vogelsang Aeroscale, LLC shall not be liable for any alleged breach of warranty, whether express or implied, of any nature whatsoever, whether a warranty of fitness for a particular use, merchantability, or otherwise. There is no warranty of merchantability; there is no warranty of fitness for a particular purpose; and there are no warranties which extend beyond the description on the face hereof or Kolm Engines and Vogelsang Aeroscale, LLC's One Year Limited Warranty.

(b) Waiver Effective for All Time. The waiver and release contained herein is effective, without regard to the passage of time. It is effective indefinitely. It will not be changed by any modification to the engine, to any later sale, or other changes in circumstances.

(c) Release Extends to Kolm Engines, Vogelsang Aeroscale, LLC and All Its Associates. The waiver and release contained herein protects Kolm Engines, Vogelsang Aeroscale, LLC and all of its employees, officers, principals, owners, designers, and agents ("Associates").

4. No Modifications to engine. Buyer agrees to make no modifications of any kind to the engine. This Agreement pertains to the entire life of the engine.