Instructions manual
RT Hammer engines

Rackete Turbinen
exclusive
at

www.jet-zubehoer.de

www.jet-zubehoer.de

Matthias Jautsch
Jenaer Straße 68
99099 Erfurt
Tel.: 0361-3455848
Fax: 0361-7891529
Email: jautsch@jet-zubehoer.de

Dear customer,

We are very happy that you decided for a RT Hammer turbine and thank you very much for choosing this product. We do hope that you will have a lot of fun when flying with this turbine.

Before you start, we would like to give you some advice how to handle the turbine. Please read these instructions and the safety notes very carefully before using the RT Hammer engine. If you have any questions please do not hesitate to contact us any time. It is a pleasure for us to help you.

The producer has tested the turbine very carefully and figured out the optimum parameters to be programmed into the electronic. You can see the data of the last test run on the terminal of the electronic (“info”).

Please be so kind not to change the data that was programmed into the electronic, at least at the beginning. It will ensure that the turbine runs smoothly. When starting the turbine it is possible that there is a small flame, which is absolutely normal and should not irritate you.

In case it happens that the engine does not work or does not work very well, please check if the data in the electronic is the same as when it was delivered. In addition, please check which reason the electronic gives for finishing the start process. This makes it easier for us to find the mistake and solve the problem, so that we could even help you on the phone sometimes. If we are not able to solve the problem this way, please send the turbine together with a short description of the problem to:

Jet-Zubehoer.de
Matthias Jautsch
Jenaer Straße 68
99099 Erfurt

Germany

Please read the instructions manual of the Projet electronic as well. It describes, for example, how the starting procedure works. If you have any questions concerning the electronic, please do feel free to contact us any time.

Warning

Safety notes and warnings concerning jet-powered models

Please note that operating an RT Hammer engine can be extremely dangerous. When powered by an RT Hammer jet engine the model is capable of airspeeds of up to 400 km/hr (250 mph). The case temperature of the RT Hammer can be up to 500°C (Celsius), and the exhaust gas may even reach 750°C. This is a genuine turbine and it is essential to read the instructions and warning notes supplied with the engine before you even attempt to run it.
In the interests of your own safety and that of others, the model must only be operated by experienced, disciplined modellers with sufficient specialised expertise, and it must be serviced and maintained regularly and competently. I you have no experience in building and operating models of this type, it is vital that you enlist the help and advice of an experienced jet modeller if you are to avoid potentially catastrophic errors; this applies in particular to the jet engine itself, which should only be run when an experienced operator is present. If you have a model flying group or club in your area where training and support are available, we strongly recommend that you join that group.
With this model any defect or deficiency in its construction or operation can result in serious personal injury or even death.

CAUTION!
Before you operate this model aircraft, you must determine the local by-laws and regulations which apply to you. The rules vary from country to country; please refer to your RC system instructions for more details.

WARNING!
It is your responsibility to protect others from possible injury. Keep a safe distance from residential areas in order to protect people, animals and buildings: at least 1.5 km "as the crow flies".
Keep well clear of high-tension overhead cables. Don't fly the model in poor weather, especially when there is low cloud cover or fog. Don't fly the model directly into the sun as you could easily lose visual contact with the model. To avoid collisions, always keep well clear of full-size aircraft, whether manned or unmanned. It is your responsibility to land immediately if a real aircraft approaches. When operating the R66 / 80N jet engine you must keep people and animals a safe distance from it. This means:

In front of the turbine	4.5 m
To the side of the turbine	7.5 m
Behind the turbine	4.5 m

WARNING!
The operator of the model must be in full possession of his or her bodily and mental faculties. Operating a model aircraft under the influence of alcohol or drugs is not permissible under any circumstances. This applies both to the operator and to his or her assistants.

WARNINGI
This turbine may only be used for the purpose intended by the manufacturer. It must never be used as machine for carrying people or goods, nor for any other purpose except as model aircraft. Misuse of this model may result in serious personal injury or even death.

WARNING!
The operation of the turbine may be carried out only under exact compliance with the instructions. Before you fly the model it is essential to check the Centre of Gravity and the control surface travels. Before you fly the model, carry out a careful check of all the working functions and all the control surfaces. Check the range of the radio control system with the transmitter aerial collapsed. If the check is satisfactory, repeat it with the engine running, with an assistant holding the model securely. Read the instructions supplied with your radio control system, and make sure that you observe the manufacturer's recommendations.

LIABILITY EXCLUSION
We at Jet-Zubehoer.de are not in a position to influence the way you build and operate your model and the turbine, and we have no control over the methods you use to install, operate and maintain the components being connected with the model. For this reason we are obliged to deny all liability for loss, damage or costs which are incurred due to the incompetent or incorrect use and operation of our products, or which are connected with such operation in any way. Unless otherwise prescribed by binding law, the obligation of company Jet-Zubehoer.de to pay compensation is excluded, regardless of the legal argument employed. This applies to personal injury, death, damage to buildings, loss of turnover and business, interruption of business or other direct and indirect consequent damages.
In all circumstances our total liability is limited to the amount which you actually paid for this turbine.

By operating this model and the turbine you assume full responsibility for your actions.

It is important to understand that Jet-Zubehoer.de is unable to monitor whether you keep to the instructions contained in this operating manual regarding the construction, operation and maintenance of the aircraft and the turbine, nor whether you install and use the radio control system correctly. For this reason we at Jet-Zubehoer-de are unable to guarantee or provide a contractual agreement with any individual or company that the model you have made will function correctly and safely. You, as operator of the model, must rely upon your own expertise and judgement in acquiring and operating this model and the turbine.

GUARANTEE LIMITATION
The guarantee covers the repair or replacement of any part which clearly exhibits a manufacturing or material fault. The guarantee period is 24 months from date of purchase, and defects will be made good at no charge. Further-reaching demands are excluded. The purchaser is liable for transport, packing and carriage costs. We accept no liability for damage in transit. If you are obliged to send the defective part to Jet-Zubehoer.de, be sure to include a brief but accurate description of the fault, together with a copy of the dated purchase receipt. The guarantee does not apply if the failure of the component or of the model is due to accident, incompetent handling or incorrect usage.

SUPPLEMENTARY SAFETY NOTES

- Turbines may damage your hearing; always wear ear protectors when operating these engines.
- Never run a jet engine in an enclosed space such as a workshop, garage, hall etc.
- When the turbine is running, keep your hands at least 15 cm away from the area of the intake tunnel.
- Keep this potential hazard in your mind at all times!
- When the jet engine is running, never look, reach or walk into the area of the hot exhaust gas flow.
- When running the jet engine always ensure that no persons, animals or movable objects are in the plane of rotation of the engine (lateral to the engine!).
- Whenever you are operating a jet engine it is essential to keep a fully charged, correctly maintained CO_2 fire extinguisher - not a powder-based type - to hand at all times.
-

Before you run the engine, remove all loose objects from the area of the intake duct. This applies to cleaning cloths, screws, nuts, cables and any other miscellaneous objects. Check in particular that you have not left any small loose items in the inlet duct, such as waste materials from building the model, odd screws or even sanding dust. Loose parts can very quickly enter the turbine and cause serious damage.

Close the inlet and outlet funnel during the installation of the turbine to prevent that objects inadvertently penetrate into the turbine.

Make sure that 5% lubricating oil is added to the fuel. Use only special synthetic lubricating oils. The bearings are lubricated with part of the fuel, therefore it is necessary that you put 5% oil into the fuel. You can use kerosene or Aral Ultimate diesel as fuel.

Hold the nose of the model upwards briefly before starting the turbine to make sure that there is no fuel in the turbine.

WARNING!

An aircraft model with turbine propulsion achieves considerably higher flight speeds than for example a model with impeller propulsion because of the considerably higher speed of radiation at the same standing thrust.
The reachable flight speeds (- 350 km/h / 220 mph) are usually higher than it is permitted for standard aircraft models (danger of fluttering of the rudders, as well as mechanical overstraining of the cell and the servos!!!).

Therefore follow absolutely: Take the gas back after the start and the acceleration to normal flight speed. In the horizontal flight half gas is enough to reach the same flight performance as in the case of impeller propulsion!
Use the full thrust performance of the turbine only at the start and in vertical flight figures upwards.

Check lists

In the following we have summarized the main points that you should not forget before starting the turbine:

- Fill the fuel tanks
- Check whether the fuel hoses are free of bubbles.
  If you have to deaerate the hoses, press the small button on the IO-Platine (details can be found in the instructions manual of the electronic).
- Do you have 5% of oil in the fuel? (1 liter of oil on 20 liters of kerosene)
- Make sure that the ventilation of the fuel tank is open!
- Make sure that you charged the supply battery as well as the receiver battery.
- Keep ready a CO_2 fire extinguisher!
- Fill the gas tank (not necessary when using kerosene start).
- Switch on the receiving system.
- Connect the gas.
- Put the model on the runway with the nose into the wind.
- Start the turbine.
- If necessary test the range.

IMPORTANT!
Before you can start your first flight, the turbine has to be calibrated. In the electronic menu “set up”, then point 40 “pump set up”, then point 42 “run calibration”, you can do the calibration run (see Projet manual page 11). This run is necessary only once. It has to be repeated only in case you change something in the tank system, for example the length of the hoses, the clunk or the pump.

After the flight

- Switch off the turbine.
- Put the model with the nose into the wind and wait until the cooling process is finished (approx. 2 min).
- Switch off the receiving system!
- Separate the gas connection in the model.

Power supply

The power supply of all components of the turbine (starter / glow plug / ECU / fuel pump / valves ...) is raised by one supply battery which is clipped directly to the ECU. The power supply of the ECU is switched on automatically as soon as the receiver is switched on. Approx. 300 - 400 mAh capacity are taken from the battery per flight (approx. 10 min. incl. start and cooling). Therefore the enclosed fast chargeable 1700 mAh NiCad battery must be recharged after three flights at the latest!

How to charge the supply battery

For charging, the supply battery has to be disconnected from the electronics.
NEVER connect the electronics directly with a battery charger (that means without a battery in between).

Fuel / fuel supply

Kerosene (Jet-A1), diesel or paraffin can be used. Add about 5% oil to the fuel, that means 1 liter of oil on 20 liters of fuel.

Special turbine oil can be used as lubricating oil. We recommend EXXON MOBIL turbine oil from Jet-Zubehoer.de.

Tank connection scheme (see enclosure 1)

In the scheme you can find our proposal to connect the tank in a proper way. This version has the advantage that possible leaks in the fillsystem do not influence the fuel supply of the turbine.

In general it is recommended to keep the tube length on the suction side of the pump as short as possible. The tube length is relatively uncritical on the pressure side of the pump.

Important:
Please pay attention when connecting the fuel stop valve. It is important that the flow direction of the fuel is the same as indicated by the arrow on the valve.

Tip:
The connecting tubes can be fixed on the connection nipples of the fuel valve quite easily if you warm up the tube ends a little bit (e.g with a hairdryer).

Fuel pump

After the ignition of the turbine on gas the number of revolutions of the turbine is powered up by the little starter engine. Then, the fuel pump is switched on by the electronics on minimal performance. Starting from this start voltage the turbine then is powered up by slowly increasing the pump voltage. The pump voltage which the pump is provided with immediately after the ignition has already been set by us before delivery. In case of changing the fuel pump or the ECU it can be necessary to readjust the rub voltage of the pump.

The ECU has a special function for setting up the rub voltage of the pump, which can be called as follows:

1. Disconnect the fuel supply to the turbine (if necessary put the fuel supply tube back into the overflow of the tank). If the fuel supply is not disconnected, the turbine is flooded with fuel in the following setting up process, which inevitably leads to a hot start at the next starting process!!!
2. Switch on the electronics and the transmitter.
3. To set up the voltage, use the GSU of the electronics and go to point 40 “Pump set up”, then to point 41 to set up the value. Reasonable values are between 0,1 and 0,3 Volt.
4. Press ENTER to store the new value.

The pump can be started / tested by pressing and keeping the small button on the IO-Platine now.
The rub voltage should be adjusted so, that the pump just certainly rubs in every position and the fuel is dosed "drop by drop".

If the rub voltage is set too low it can be, that the pump is provided with voltage , indeed, but it actually does not run (→ red “Pump running” LED is on, but the pump does not run).This has the consequence that the turbine runs very long on gas after igniting and does not take any speed because no fuel is delivered. If this time is too long, the electronics stops the start process.

If the rub voltage is set too high, too much fuel is injected initially, what can result in a strong flame formation behind the turbine in the first start phase.

Gas connection diagram (see enclosure 2)

Important:
Please pay attention when connecting the gas stop valve. It is important that the flow direction of the gas is the same as indicated by the arrow on the valve.

Tip:
The connecting tubes can be fixed on the connection nipples of the gas valve quite easily if you warm up the tube ends a little bit (hairdryer).

The connection nipple of the gas tank should point up, because liquid gas flows to the tubes otherwise.
A little silicone oil should be given into the gas tank fill connector at every filling process to lubricate the o-rings of the coupling socket as well as the gaskets in the gas valve (propane/butane gas degreases very strongly).

Glow plug

A normal plug is used as glow plug. The glowing spiral must be pulled out approx. 3 - 4 mm (e.g. with a pin) and glow light red. If necessary the glowing voltage can be regulated in the menu “Adjust”, point 70 “glow plug power” (see page 15 in the Projet manual).

Filling of the gas tank (see enclosure 3 – How to fill the gas tank)

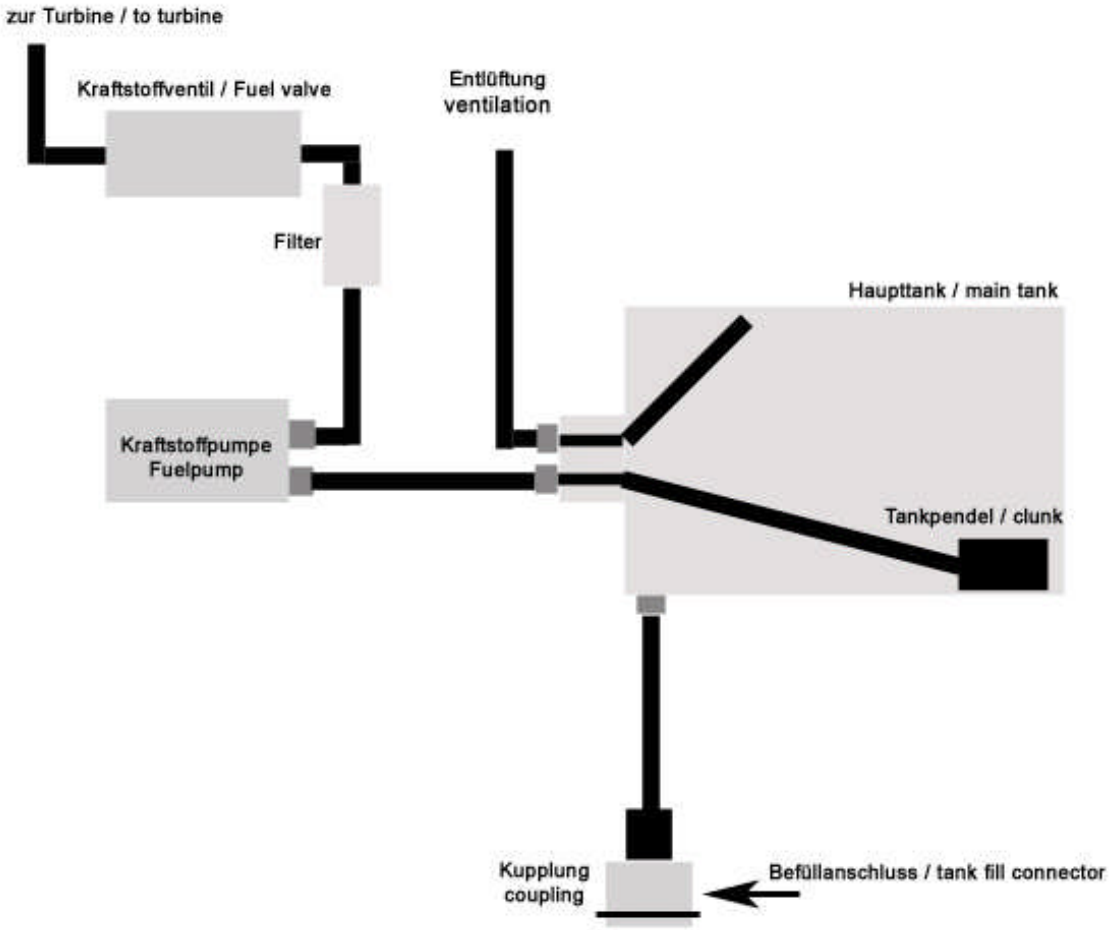
To fill the gas tank a gas bottle is fixed instead of the connector plug, which comes off in the direction of the gas valve.

The filling process then goes on as follows:

1. Plug in the connector plug of the gas filling bottle into the self blocking coupling socket.
2. Turn the gas filling bottle upside down.
3. Turn on the valve of the gas filling bottle so that liquid gas flows into the gas tank.
4. Turn the gas filling bottle back to the normal upright position shortly before the gas river grinds to a holt. The liquid gas still situated in the tubes is pushed completely into the gas tank.
5. Turn off the valve of the gas bottle.
6. Seperate the gas filling bottle by solving the quick coupler.

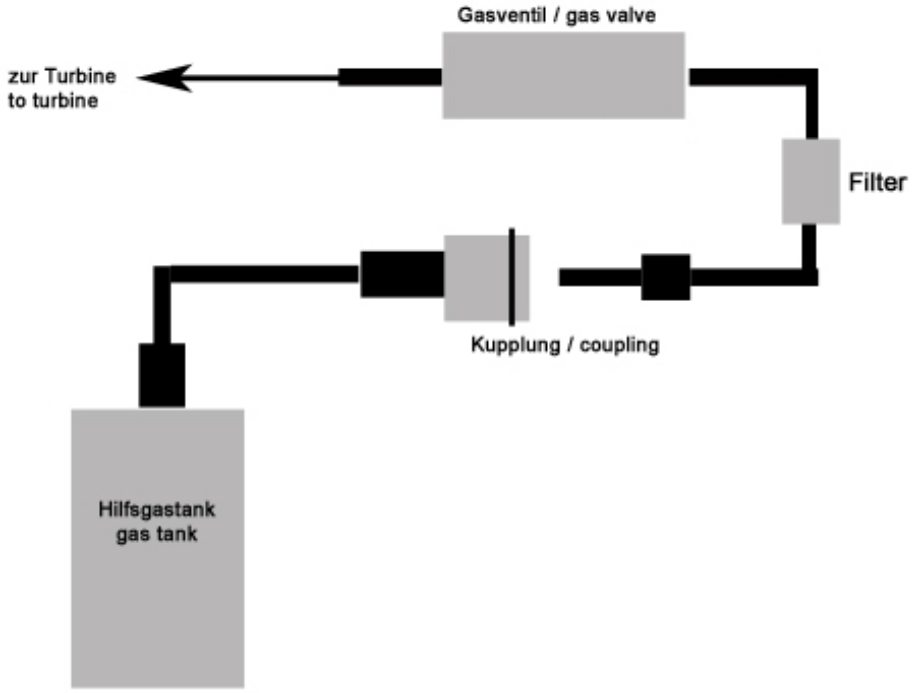
Tankschema / How to built and connect the main tank

Anlage 1



Hilfsgasanschlussschema
How to connect the gas tank

Anlage 2



Anlage 3

Füllschema für den Hilfsgastank
How to fill the gas tank