

Instructions for the use of pulsejet

- Working
- Maintaining
- Mounting
- Carburating

After rocket engines, pulsejet is the most simple and light jet engine. It is made of two parts: the head and the combustion chamber/tail pipe. The head is made with a league of aluminium; it has a "venturi" shaped air intake and holds: on the front side the needle valve and on the back side the petal valve stopped by a fire screen, which regulates its maximum opening. The second part, the combustion chamber/tail pipe made of stain steel. In its front side is brazed a deflector with a screw cut ring, where the head is screwed. In RC engines a device to maintain carburation constant during the acrobatic figures is fixed on the air suction. The functioning is very simple and is quite like the one of a two stroke engine, because during the cycle off unctioing the fases overcome one the other.

To start the engine you need an air jet to suck and atomize the fuel from the earburator as to create the right air- fuel mixture. The presson of the air jet, must be sufficient to open the valve (abuot 0.2/0.3 mm are enuogh) and fill the combustion chamber. When the chamber is full of the mixture, a spark plug, ignited by a starter begins the firing cycle. The mixture, that is knock , causes a burst, hnnmediatly the valve closes and the exhaust gases are pushed through the tailpipe, which size is calibrated to regulate the cycle of the engine. In fact the exhaust gases, spreading rapidly, act like a piston and create a depression while leaving, which is enough to open the valve. At this point the earburator starts to operate and the newly formed misture will fill the chamber and will be ignited not by the spark plug, but by the hot particles left from the previous combustion. The cycle is started and the engine is running. The engine has been preset for carburation and therefore should start at first kick. Sometimes it is not that simp?e Tf one is not sufficiently familiar one can pump for even 10 minutes and see nothing happening. Why?

First, before starting the engine, (as for every engine) it is mandatory to check that everything is perfectly working. In our case that:

1. the valve has not been damaged.
2. to check the fuel feed system.
3. to check that the ignkion system works correctly.

The valve

The valve is made of carbon steel (1%). Its purpose is to open and close the flow of mixture in the combustion chamber as the internal presson varies during the working cycle. As said before, it closet at each burst. To guarantee the perfect closing of the valve it must not be deformed, that is each of the ten "petals" closet perfectly at the edges. (Since the beginning they have been so called because of its daisy shaped lamellae diaphragm). If the valve is burned or broken , you must check that the edges don't show cracks. In this case it's required a piece of metal perfectly "PLANE" or a piece of crystal (glass) and start planning the surface with sand paper number 400. The surface of the paper should "be placed and firmly kept with one hand, and proceed heavily pressing the engine head with back and foreward movements, keeping it perfectly flat with the other hand. After every strike, the head should beTatated about 90° to replane it as uniformly as possibile. The valve holds itself with a fire screen and a screw that stops them on -the head, so, mounting it, one must make sure that after tightening every petal centers its hole on the head.

The fire screen doesn't only protect the valve from combustion flame, but controls its run with the aim of obtaining the maximum performance avoiding the breakage of the lamelle, despite 190/200 burst per second. With an accurate maintenance and a perfect carburation, a valve can last many hours.

Feeding the engine

A costant carburation is obtained through the presson burst of the tank/ taking the tank under presson. Than, for the radio control! a device has been studied for anti-acceleration, that, with a screen on the air intake, furtherly improves the feeling and allows to keep the engine working in every flight trim, at costant trust, equal to the static trust at the testing bench. This "R. C. DEVICE" comprises:

1. The spinner engine stop. When it is all inside. it is stopped. Before the starting it has to be losded wheeling it and pulling it forward, acting at the same time the R. C. servo. The engine stop has to be used beside the pilot will to turn off the engine, every time it stops by itself, because of the exhaustion of the fuel as well as for accidental causes. This to avoir that the fuel coming from the tank keeps feed the eventual flame in the combustion chamber, with the risk of fire during landing.
2. The air bubble separator. The little spinner-shaped tank has pratically three functions:

- a. To separate air bubbles caused by the momentary pendulum escape from the fuel into the tank during the acrobatic flights;
 - b. Gravity filter. In fact when the air goes up in the high part of the little tank, the heaviest bodies deposit themselves in the bottom, guaranteeing the cleaning of the carburetor holes;
 - c. Anti-acceleration feed. Feeling the carburetor, drawing the fuel at the little tank center, one eliminates the fuel inertia from the fuel manifold avoiding dangerous carburation bounds.
3. Air intake screen. It has the exact object to avoid the excess of air caused by the speed increase, particularly in the dives. It is proportioned so that the engine draws the only air necessary.
 4. The carburetor. It is improperly so called. Actually it is only a fuel regulator, because the carburetor is composed of the regulator and the "Venturi" tube of the air intake of the engine. Normally the needle valve has to be opened from 3 to 4 turns, a quarter of a turn more or less do not prejudice the carburation at take off. For an eventual adjustment during the flight, a lever has been placed on the needle, to be stopped by a nut and a lock nut, after having found the right carburation. For a right carburation, see proper instructions. The engine works with every kind of fuel.

The tank

For a 5 - 6 minutes flight, it is necessary a tank with a litre of capacity. Because of the remarkable weight of the fuel and the short time needed to consume it, it is important to place the tank in proximity of the center of gravity of the model, to avoid the displacement of the center of gravity from full to empty. It is recommendable the "always full bag" tank, but the one with draught at pendulum can equally well work. Having the "always full bag" means for sure a complication, but in case of accidental stop at take off, one is sure that the fuel does not flow from the tank to the combustion chamber (that 90% of the times has the flame a light) through the pressure intake with the risk of fire. The tank is pressurized with the appropriate pressure intake, that takes the pressure from the combustion chamber of the engine. The pressure intake has to be well exposed to the air to avoid the overheating of the rubber tube that goes to the tank. Furthermore, one recommends that the tube at the pressure intake exit holds itself straight for at least 2 cm., to avoid that the coming out of warm air melts the rubber tube (that is to avoid the rubber tube curve when it is out of the pressure intake). The coupling pressure intake - tank has to be done with a little black rubber tube, a strengthened type, whilst the fuel manifold that collects the tank to the engine, is made of normal silicone rubber. Before setting the tank on the model one must make sure of the perfect tightness of the assembly and, if present, that the pendulum works well.

Mounting the engine on the model

To avoid the overheating of engine and model, with the relative danger of fire, it is advisable to take the maximum care in the cooling of the engine. The engine must be strongly fixed in the anterior side and, posteriorly, the support has to be quite loose to prevent the tail pipe from sliding when it dilates and elongates of about 3-4 mm. because of the heat. If the posterior tail support doesn't allow the tube to slide when hot, it will be forced to bend. From the structure of the model, the engine has to be distant at least 2 cm. And, at about 1cm. from the fuselage, it is necessary to interpose a sheet screen in aluminium, 0.3 mm. thick and at least 10 cm. wide. In the case that the engine is mounted inside the model it is necessary to take care of its cooling and of the protection of the structure of the model with an appropriate engine cooling duct, again in aluminium 0,3 mm.

Starting the engine

After having perfectly filled the tank, to immediately and easily pressurize it, and after the little anti-acceleration tank of the air bubble separator has been escaped (screwing off the proper stopper, to be mounted on the highest part) one loads the engine stop, making sure that the fuel can easily escape. Then, to avoid that the engine throws itself you have to throttle the fuel manifold with tweezers or simply with the fingers. Now you have to make sure that the ignition plant, that is starter and spark plug gives a good spark and the ratio receiver is switched off, to avoid vibrations to the servos. After these checkings one inserts the spark plug in the engine switches on the starter and starts to pump (or blow intermittently with an air jet coming from a air compressor or a compressed air cylinder) opening contemporaneously the throat in the fuel manifold. If every thing is efficient, the engine starts after a few pumpings.