SWEDISH AeroSport

Stockholm2000-07-13

A complete manual with spare part list will be sent out within a couple of months.

Yours Sincerely

Johan Åhling
Swedish AeroSport AB

Swedish AeroSport AB
Box 8180
163 08 Spånga. SWEDEN

Tel +46 (0)8 7600367
Fax +46 (0)8 7600369
E-mail johan.ahling@swedishaerosport.se

REG Nr. SE556341-1379

SWEDISH AeroSport

A few things to think about before your first take off.

- Before your first flight, take your time and try to learn how the Mosquito works. This is a good thing to do at home when everything is much more complicated at the field.
- Adjust the harness length with the included foam blocks and the adjustable shoulder straps. The foam blocks are held by the rubber cord in the bottom of the harness.
- If not already done by your dealer, adjust the main suspension rope and put back the back plate in it's pocket (see Main suspension).
- Adjust the opening length of the leg zipper with the little velcro piece included (see Adjustment of zipper length). The zipper shall not open more than until the edge of the foam blocks.
- Install a parachute in the parachute pocket on the chest of the harness (see Parachute installation).
- Prepare your hang glider. Kut the keel 1200 mm from the hang point. Attach the limit lines if you intend to use them (see limit lines).
- Test run the engine a few times at home before your first flight, it is always 5 times harder on the field, Murphys law you know. NOTE, never run the engine on full power for more than 30 seconds on ground due to lack of cooling. On idle it is possible to run it as long as you which. NEVER run the engine without the propeller attached.
- Study and understand the included article Climbing a powered hang glider written by the instructor and Mosquito pilot Andy Buchan. It is very important to understand this article.
- Choose a day with smooth laminar head wind. 1-3 m/s head wind will make your first start much easier.
- Due to the extra weight of the engine the hang-point on the harness is moved a little bit backwards, this together with the thrust will place the pilot a little bit more forward related to the speed-bar. It is important to not give the glider a to high angle of attack. See the article by Andy Buchan.

How to start the engine.

- Connect the fuel line to the tank (filled with appropriate fuel, see the engine instructions), tickle (prime) the carburettor by pressing the button under the carburettor while pumping the primer bulb. You will feel a higher resistance when the fuel have reached the carburettor. Do never prime with the choke closed, the engine will be too "wet"
- Activate the choke on the right side of the harness (the black ball).
- Pull the start handle on your right side as fast as you can until you can hear the engine almost start. This is normally 1-2 quick pulls. Do not pull the engine too many times with the choke activated when it will make the engine wet and very difficult to start. If you think the engine is to wet (you smell the gasoline from the exhaust) ,unscrew the spark plug and pull the engine on full throttle several times. Clean the spark plug to dry it.
- Deactivate the choke and pull the handle again. Giving the engine about 1/5 gas will make it start easier. If it starts and stops again you have to activate the choke again and take the procedure once again. The engine is not possible to run with the choke activated, the choke is only a way to fill the system with enough fuel.
- DANGER! Always be prepared to hold the Mosquito as it will run on full power. The throttle system can accidentally be on full throttle. A propeller can cause lethal injuries. Always be prepared to kill the engine with the choke.
- Do not run the engine on ground with full power longer than half a minute or so, it will easily overheat due to lack of cooling on ground.
- The engine is stopped by pulling full choke. This also makes the engine more easy to start again. If you by one or another reason need to stop the engine by an emergency situation it is also possible to pull the little red handle in front of the rescue handle.
- If you feel that you need more instructions you are of course welcome to call your dealer

We at AeroSport wishes you good luck with your new Mosquito NRG

Swedish AeroSport AB
Box 8180
163 08 Spånga. SWEDEN

Tel +46 (0)8 7600367
Fax +46 (0)8 7600369
E-mail johan.ahling@swedishaerosport.se

REG Nr. SE556341-1379

SWEDISH AeroSport

Climbing a Powered Hang Glider

There are now around 100 Powered Hang Gliders in the UK. A common problem which many pilots new to power are experiencing is that they are tempted to fly with too low an airspeed just after take-off.

Watch an experienced pilot fly a Powered Hang Glider and they make it look all so easy. All they do is pick up the wing, rev the engine and run. The glider lifts them up and off they zoom, climbing smoothly towards that building Cu while those left behind grit their teeth with earth-bound frustration.

Watch someone new to Powered flight and the story is often very different. They may take-off nicely but once in the air something seems to go wrong. To observers on the ground they appear to wobble around and loose directional control. To the pilot there is a feeling that the glider wants to wind into turns and the wing feels unstable. Why???

The answer is simple. A lack of AIRSPEED.

Hang gliders are designed to fly over a range of airspeeds. One very marked effect of flying at a low airspeed is that the wing becomes more difficult to control. If you are not sure about this go and find a bit of empty sky high up and fly slowly. Try a turn or two. How does the wing feel? Heavy and sluggish? Does it drop into turns? Now fly a bit faster and see how much easier the wing responds to your inputs and how much nicer it is to fly.

For the sake of argument let's say that your wing needs an airspeed of 25mph to keep flying properly and that when flying in your normal hang gliding harness the control bar position is as shown in Fig.1. Now think of the situation when you fly the same wing wearing a Powered Hang Gliding harness with the motor switched off. The weight of the motor behind your feet effectively pushes you forwards through the control frame as in Fig.2. What the pilot notices is that the bar has to be further back for the same 25mph airspeed.

Now add power! The thrust pushes the pilot still further forwards as shown in Fig.3, even though the wing is still flying at 25mph. But because the engine power is pushing the wing forwards the aircraft will be climbing. Weird - the bar is far back but the glider is climbing!

Pilots of free flying hang glider pilots often think that in order to climb they have to push the control bar forwards. What they are actually doing is reducing the airspeed to min-sink so that the glider sinks more slowly. Push the bar forwards when climbing with power and the airspeed will reduce much more than anticipated. The wing may stall, or if it does not stall it will certainly exhibit those nasty characteristics of slow speed flight, dropping into turns and feeling unstable in roll.

On a powered wing there is no need to reduce the airspeed to climb. Most flexwing microlights climb at 15-25mph above their stall speed. It is important to remember that it is the power which makes the aircraft climb, not a reduction in airspeed.

Swedish AeroSport AB
Box 8180
163 08 Spånga. SWEDEN
Tel +46 (0)8 7600367
Fax +46 (0)8 7600369
E-mail johan.ahling@swedishaerosport.se
REG Nr. SE556341-1379

SWEDISH AeroSport

Today's power packs develop around 15HP; adequate for around 300-400ft/min climb at full power even when flying at airspeeds well above min-sink.

The other effect of having the bar too far forwards when climbing is that the aircraft will have it's nose very high. The pilot is more in front of the wing rather than underneath it their weight shifts have less effect and the glider becomes harder to control (see Fig.4). There is also the rule of thumb that 'what goes up steep comes down steep'. Get engine failure when climbing steeply and the aircraft will loose a lot of height before recovering; climb at a flatter angle at a higher airspeed and recovery will be easier (see Fig.5).

I have converted over 50 hang glider pilots onto the Mosquito powered harness. Their wings have ranged from Discovery and Target Floaters to Topless Laminars and Scandals, and just about everything in between. I have yet to see a pilot pull the bar in too far when climbing!

Sure, at take-off the aircraft has to build speed flying level, but self preservation usually stops pilots from pulling the bar in too hard and nose diving downwards! Once they are airborne it is vital that they get into prone as soon as possible as only then can they pull the bar back far enough to have good pitch control. Flying in prone also gives them control over where the motor is pointing - ideally parallel with the keel of the wing - so that the power pushes forwards and not sideways!

One trick which helps at take-off is always to look ahead at a far target. As well as keeping you flying straight it helps you to judge just how steep you are climbing. If too steep - PULL IN.

Swedish AeroSport AB
Box 8180
163 08 Spånga. SWEDEN

Tel +46 (0)8 7600367
Fax +46 (0)8 7600369
E-mail johan.ahling@swedishaerosport.se

REG Nr. SE556341-1379

Engine

The Carburettor

The Raket 120 is equipped with a Walbro diaphragm carburettor fo type VG6 with fixed high speed jet.

How it works

When you pull the starter rope and the piston moves up and down the cylinder, the pressure variations in the crankcase makes the pump diaphragm (part no. 32045) move up and down. As the outer side of the diaphragm is connected to the fuel inlet nipple via two rubber valves, the movement of the diaphragm will cause a pumping action that will draw fuel from the tank to the carburettor.

After the fuel has passed the pump it reaches the inlet valve (sometimes referred to as the inlet needle valve-part no.32025). The normal position for the valve is closed. The valve can be opened only if the main diaphragm (part no 32017) is pressing down the lever (part no. 32024). It is the amount of fuel in the main chamber that makes the main diaphragm move. When the valve is open, the fuel will flow into the main fuel chamber of the carburettor. From the main chamber the fuel can flow into the venturi of the carburettor through two jets. One jet is fixed, and controls the flow of fuel at high speed. The size of this jet is factory set and shall not be changed. If you change the fixed jet to another size you will either loose some power or your engine will run too lean and seize up.

The second jet is adjustable, it is a needle valve. It controls the flow of fuel at low speed. The normal setting of this needle valve is between one turn to one and a quarter open from its closed position. Before you make any attempts to start the engine, make sure that the needle valve is set correct. Later you may open it a little bit further to make your engine run a little bit richer, or close it to make the engine run leaner.

NOTE, never set the low speed valve less than ¾ of a turn open, as leaner setting may cause severe engine problems.

The carburettor is equipped with a cold start device, sometimes referred to as the choke. The purpose of the choke is to enrich the fuel during start by restricting the air flow and increasing the vacuum in the venturi. When you intend to start your engine, you normally close the choke and pull the starter rope. After one or two pulls the engine will start. As the fuel-mixture with closed choke is very rich, the engine will normally stop immediately. Then you open the choke, open the throttle a little and pull the starter again. Now the engine shall normally start on the first pull and run smoothly .

Note that on the carburettor there is an idle speed adjustment screw that allows you to set the rpm when the engine idles. The correct setting is found in combination with the setting of the low speed needle valve. When idling you shall be able to open the throttle without any tendencies for the engine to stop or stall. When you make this adjustment you normally let the engine run at a speed a little bit over the normal idle speed by turning the inlet speed adjustment screw a little clockwise. Adjust the low speed needle valve so that the engine responds directly when the throttle is opened, both slowly and quickly. When you have found the best setting, turn the low speed adjustment screw counter clockwise until the correct idle speed is found.

Service

Actually there isn't much that can go wrong . If your fuel mixture is clean so no deposits clog up the interior of the carburettor you will have a problem free operation. We recommend you to change the two diaphragms and the gaskets once every year. If you haven't used your engine for some time, the diaphragms may have hardened and you may change them if you notice the engine is more difficult to start or it does
n't run smoothly at low rpms.

If you are troubled with unstable operation, i.e. sometimes the engine stops at idle speed, sometimes it revs up and you have to adjust the setting of the low speed needle valve. Then, it may be the inlet needle valve that is causing you problems, and we recommend you to change the inlet needle valve (part no 32025).

If none of the hints above solve your problems, and you still have problems with power or unstable idle speed, check the conditions of all gaskets in the carburettor and between the carburettor, heat shield (part no. 32065) and the cylinder. If this doesn't solve your problems, we recommend you to disassemble the carburettor from the engine and have it cleaned by your dealer. You may also find professional help at a service station for power chain saws, snowmobiles or garden tools.

Ignition

The Raket 120 engine is equipped with a solid state ignition system, which consists of a minimum of parts.

1. The ignition coil with built in electronics
2. The fly wheel with the permanent magnet

When the flywheel rotates past the ignition coil, an electric current is generated. At a certain position of the flywheel in relation to the ignition coil, the electronic circuit, which is integrated in the coil assembly, causes the coil to produce a high tension spark for the spark plug.

As there are no moving parts, there is no setting needed. The only measure that can influence the ignition is the distance between the flywheel and the yoke of the ignition coil. If you have disassembled the engine, first mount the flywheel on the shaft. Don't forget the crankshaft key. Tighten the flywheel nut with 50 Nm. Then place a stainless (non magnetic) feeler gauge 0.2-0.3 mm thick between the yoke of the coil and the part of the flywheel where the pole shoes of the magnet area are seen. Tighten the screws that hold the coil to the crankcase.

The only maintenance for the flywheel it self is cleaning. Also make sure that the starter claws near the centre can move freely.

Never attempt to make any modifications of the flywheel. If the flywheel is damaged, replace it with a new one.

Spark plug

The spark plug is a special design for this type of engine. When you replace the spark plug, make sure that you get an original part or an identical replacement. Other spark plugs can permanently and mechanically damage your engine. In original the engine is equipped with a Nippon Denso W22MP-U spark plug. This has the correct length of the threaded part which exactly matches the threaded part of the cylinder.

The correct distance between the centre electrode and the side electrode is 0.5-0.7 mm.

During normal operation the spark plug shall have a brownish surface in the centre electrode. However, the colour can differ a lot. If you stop the engine directly after heavy load, the centre electrode can be light grey or light brown. On the other hand, if your engine have been idling for a while before you examine the spark plug, the centre electrode may be dark brown or even black. For all the different applications that the engine has been tested for the recommended spark plug Nippon Denso W22MP-U has proven to be the best, and no "hotter" or "cooler" plug is recommended.

The normal service life of a spark plug is 200-500 hours. However, we recommend that you have extra spark plugs available, as e.g. repeated attempts to start a flooded engine (too rich fuel mixture) can destroy a spark plug,

The magnapull rope starter

When you intend to start your engine. Then you shall remember two simple rules.

Never just pull the out the rope. Grab the start handle and pull out the rope. Test once, slowly, to extend full length of the rope. Notice this length, and then never pull it out so far again. Because, the life length of the starter rope is very long, subject that you don't pull it to the end. Even if the end of the rope is protected by a sleeve, it is the full extension of the rope that cuts the knot at the end. A broken rope is also very easily breaking the magnapull spring.

How to mix gasoline and oil for proper fuel

Every engine needs oil to lubricate cylinder and piston, and all the different bearings and sealings.

This engine is a two-stroke engine, and two-stroke engines don't have any separate oil for lubrication. As oil still is needed, the oil is mixed with the gasoline, and thus follows the fuel in and around the whole interior of the engine. If you would attempt to run the engine on fuel with no oil in it, the engine would break down due to the internal friction between cylinder and piston. For this reason it is important that you always use a gasoline and oil mixture as fuel.

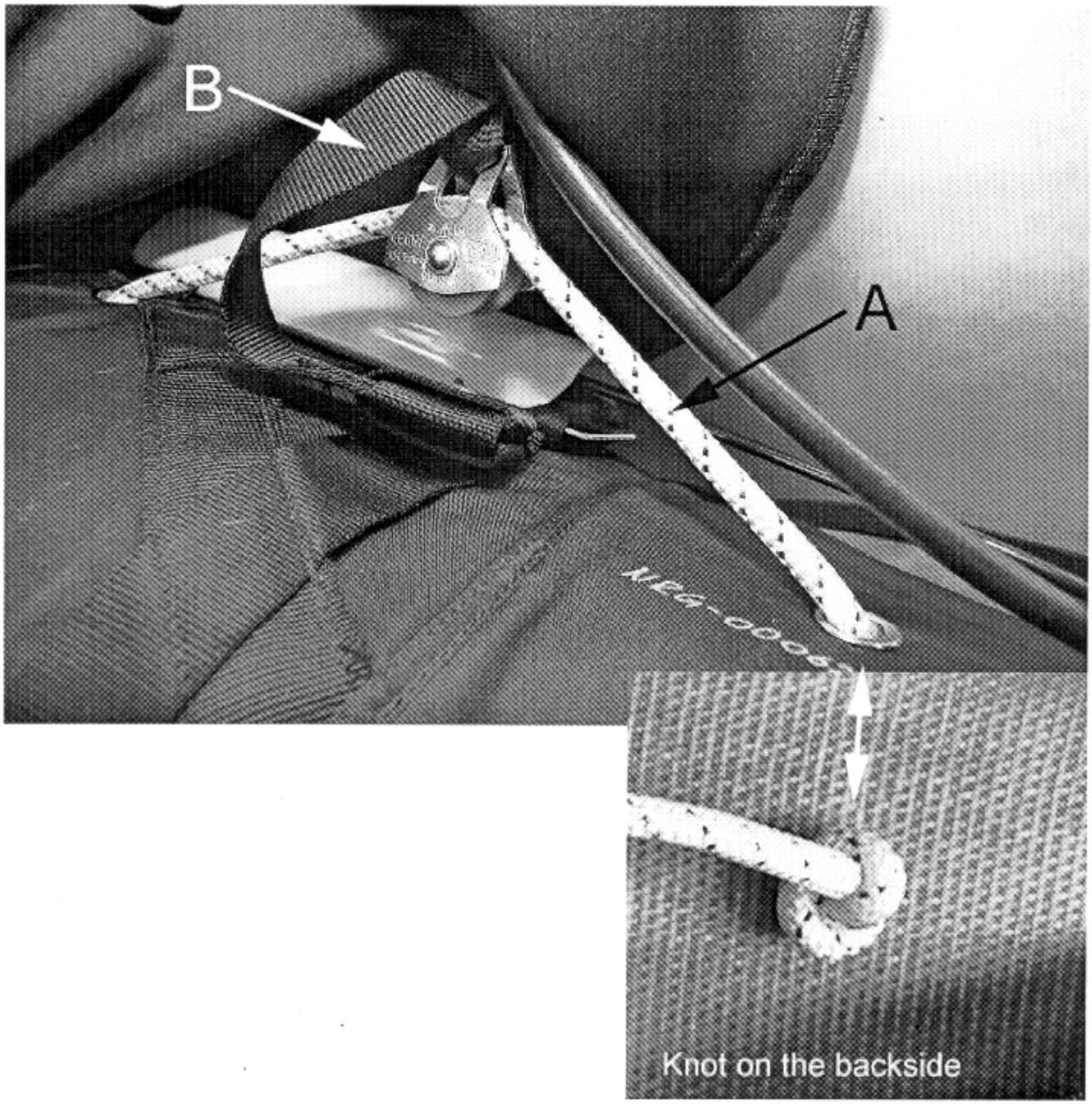
This engine is designed to run on a mixture of 3-4% good quality fully synthetic oil in lead free gasoline, 95-98 octane. Lower octane is possible to use if 95-98 is not avalable.

How to get 4% oil mixture: (25+1)

Use a clean can or fuel container. Mix 10 liters of fuel with 0.4 liters of synthetic oil. Shake well. Your gas station can offer you a variety of two stroke oils. We recommend the type that is used for chain saws, lawn movers and smaller motorcycles. Two stroke oils for marine use is called outboard oil, and is not recommended depending on the extra ingredients for corrosion control.

Don't use so called racing oil, sometimes also called castor oil. This type of oil mixes not so well with the gasoline, and may later separate in the tank.

Main suspension

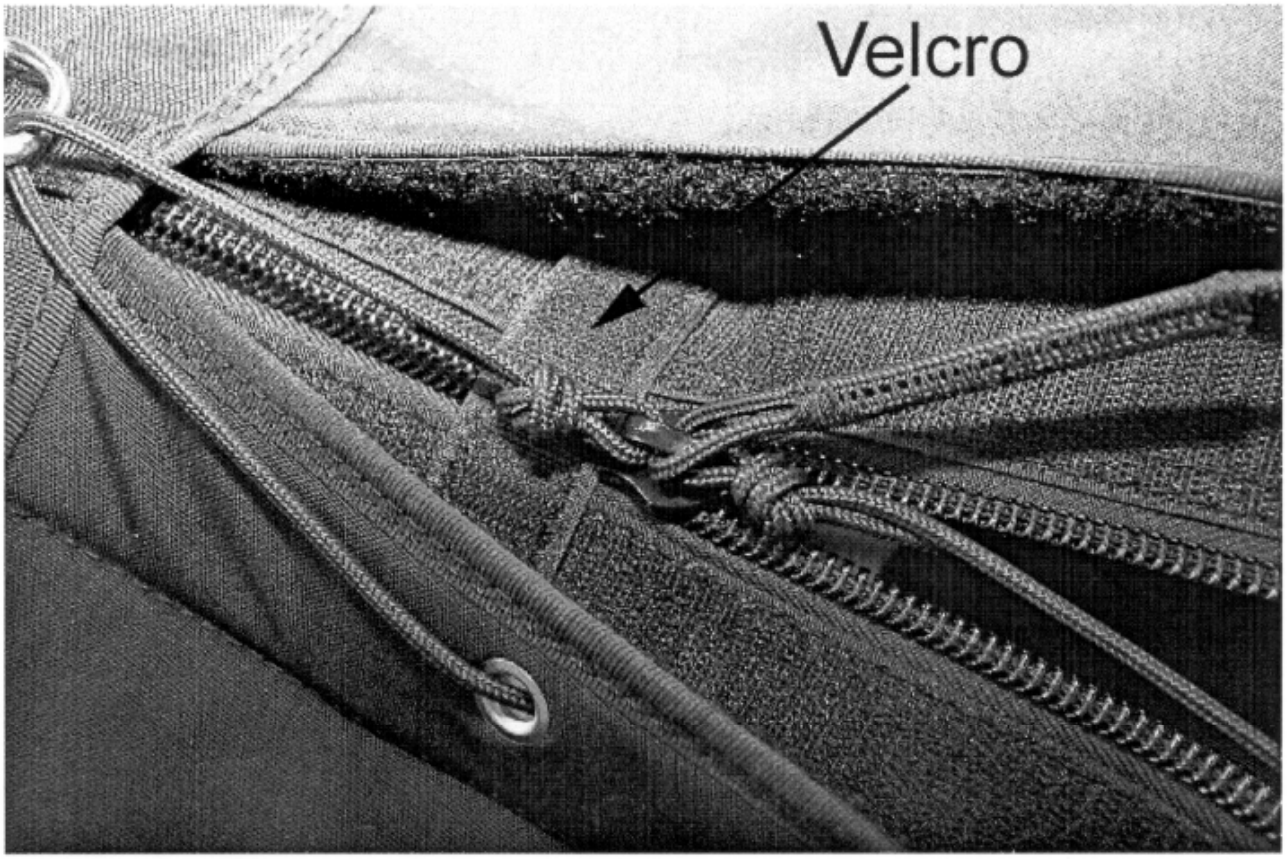


Before first flight it is very important to tightening and lock the main suspension rope (A) as the pictures show.

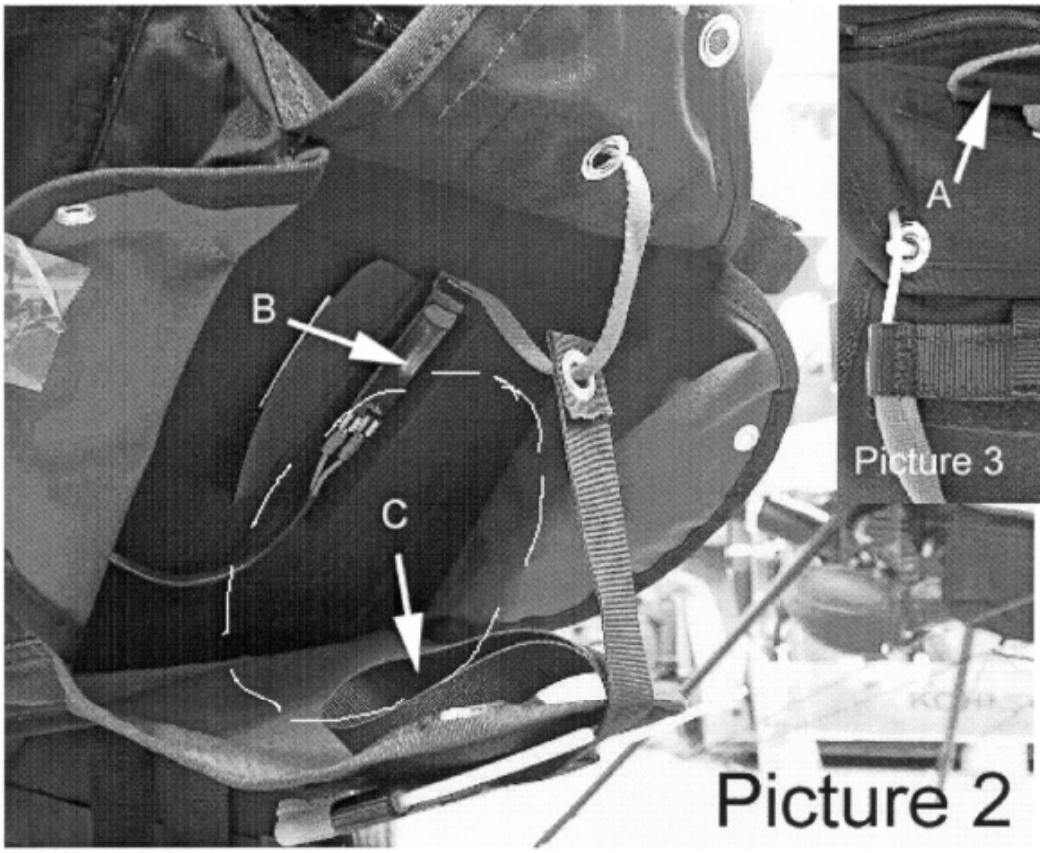
Tightening the rope as hard as you can by hand, then make the knot on the backside.

The safety loop (B) must be loose like the picture show

Adjustment of zipper length



Parachute installation



Installing the parachute

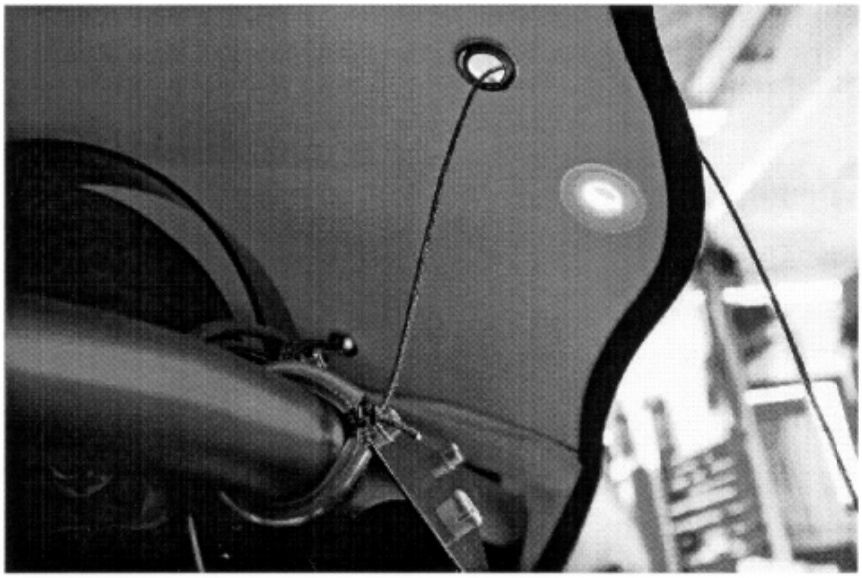
1. Put the little red emergency cut off handle (A) on the velcro as shown in the picture. Pull the narrow webbing from the handle through the eyelet on the parachute container, continue through the eyelet on the parachute handle. Finally put the webbing between the two halves of the kill switch (B)

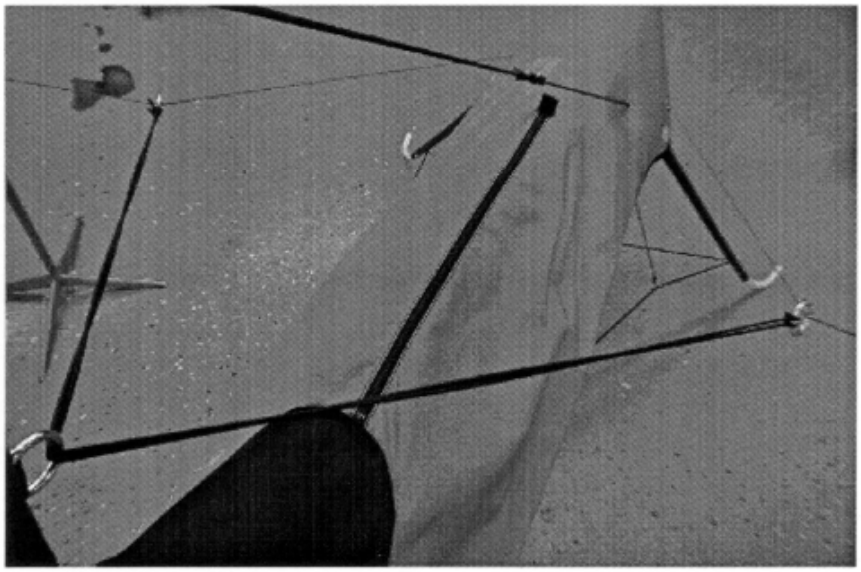
2. Attach the webbing loop (C) to the inner container for your parachute and place the parachute in the marked space.

3. Close the container as shown in picture 3 with the 2 included rubber loops (D).

WARNING! Aways check the parachute container before every flight. Accidently released parachute may cause serious injurious.

Limit lines





Attach the limit lines to the Mosquito as shown in the 2 pictures above.

Then fasten and adjust the 2 limit lines to the wing like shown in the drawing.

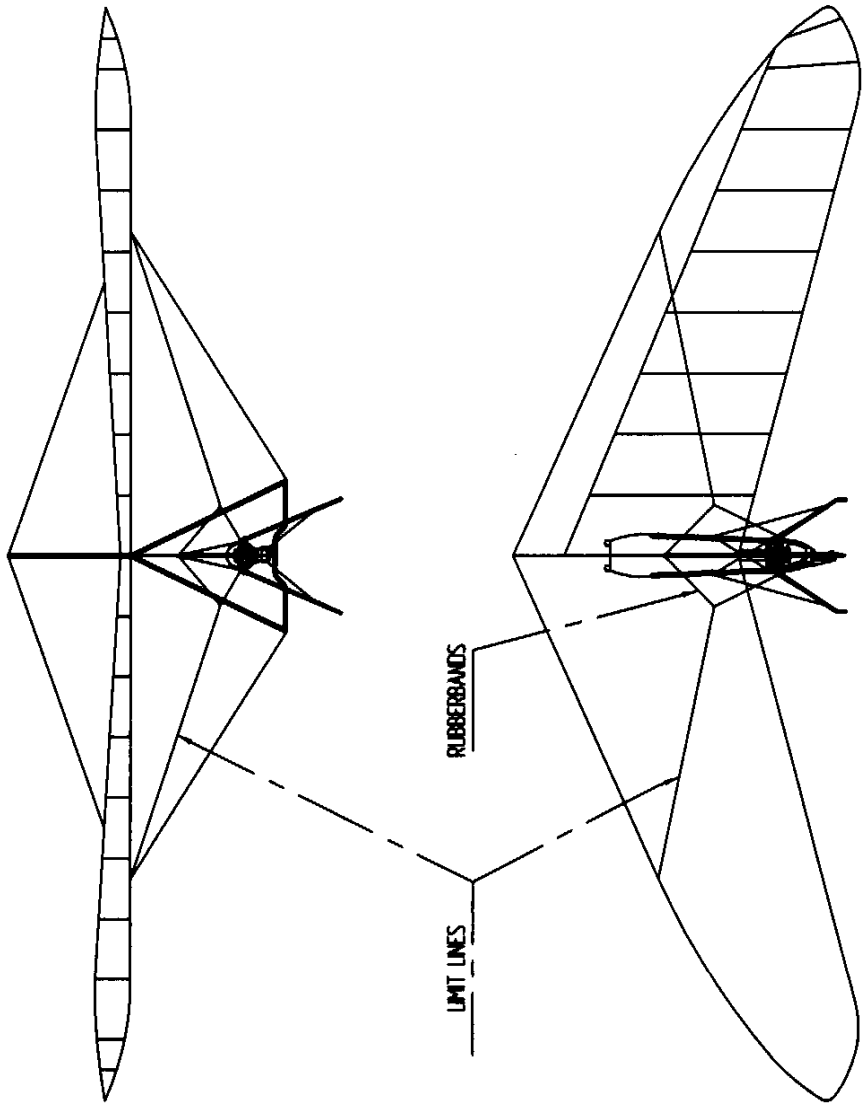
To make the adjustement put the glider on the ground with a little nose down.

Fold the legs and hold the engine close to the ground.

Adjust the lines so you can move parallel with the keel and not more. Add another 15-20 cm to each limit line and you are there.

Too long limit lines is better than too short when too short lines will limit your possibility to control the glider.

Nr	Ant	Ändring och/eller medd.–nr	Datum	Inf	Godk



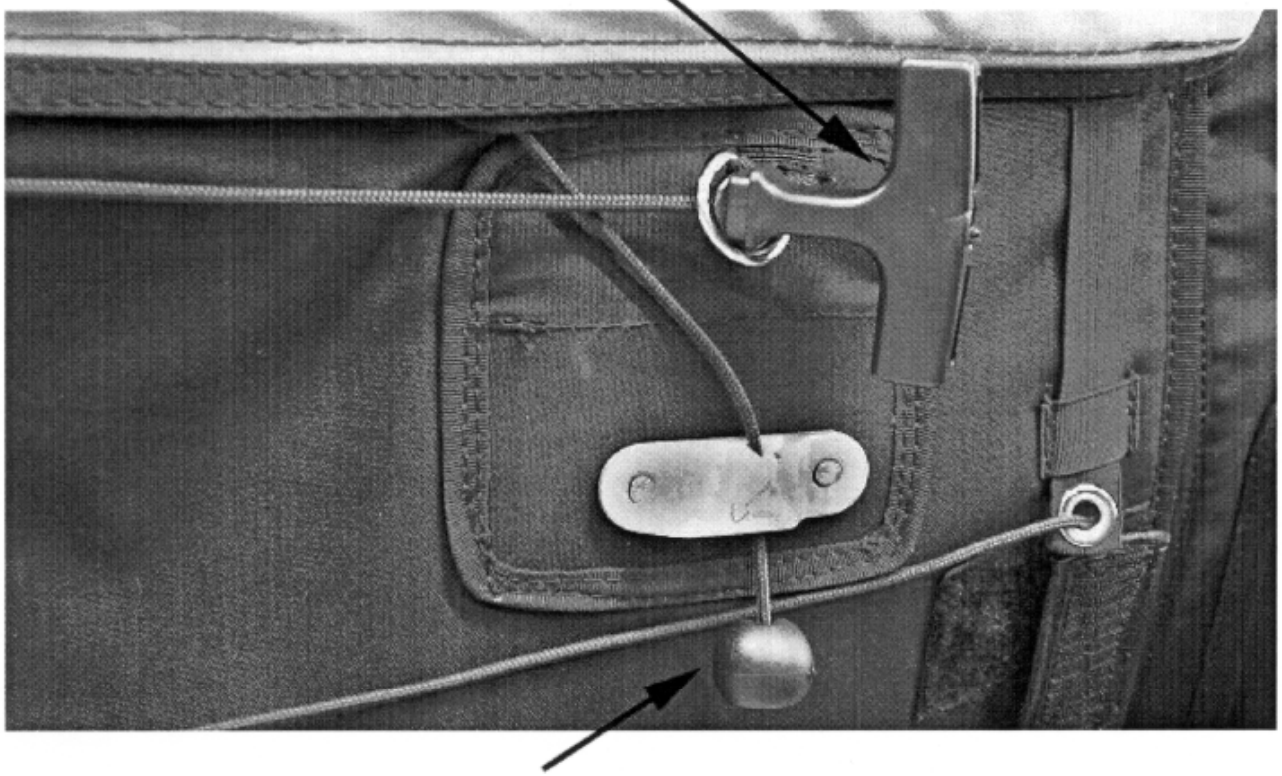
Det–nr	Ant	Benämning	Material	Mod–nr Ämne Dimension	Anm

Konstr	Ritad	Kop	Kontr	Stand	Godk	Skala	Ersätter	Ersatt av

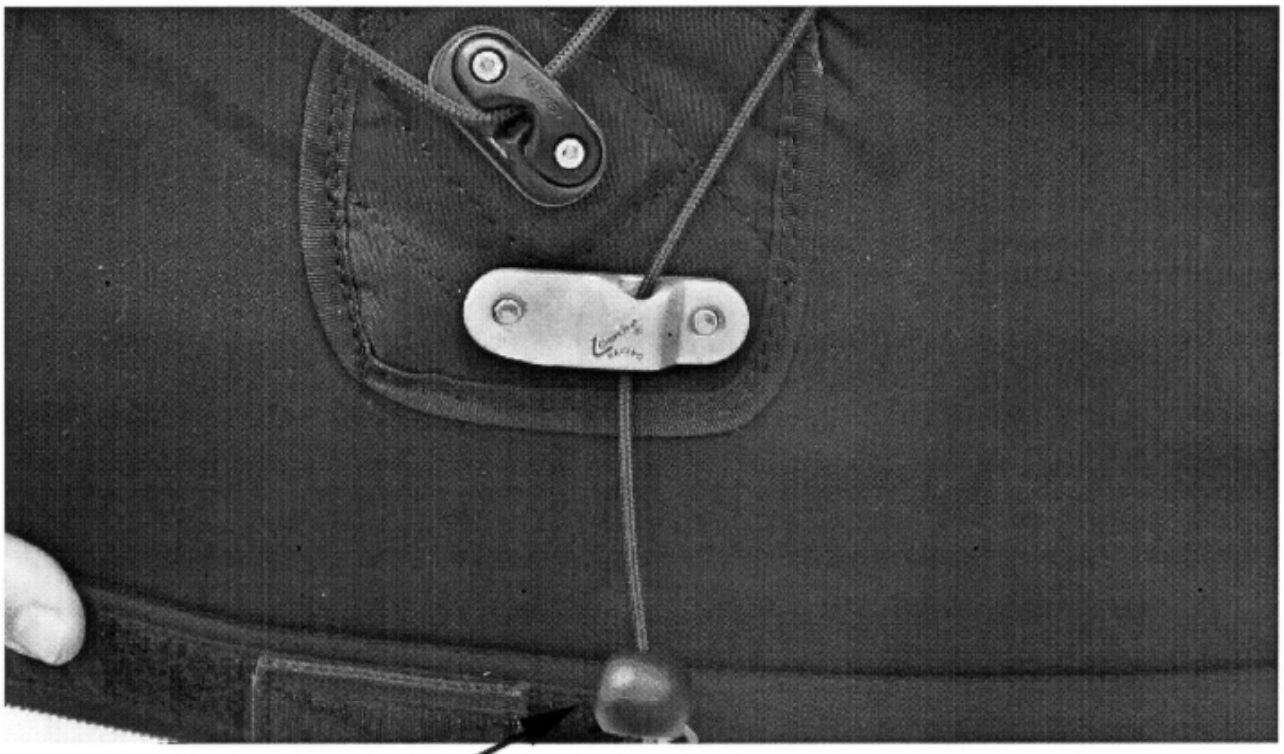
LIMITLINES

Register nr	Dat.
Rit–nr	

Starter handle

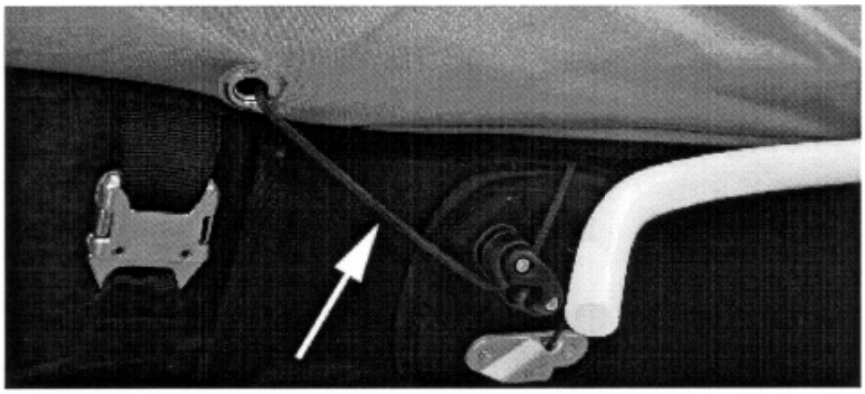


Shoke. Pull string and lock in clam cleat for full throttle

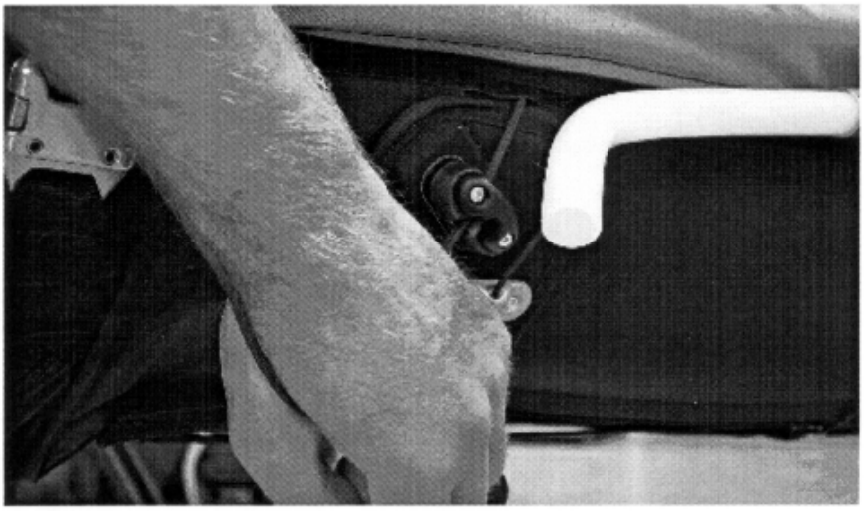


Brake. Pull string and lock in clam cleat for brake.

Angle of dangle adjustment



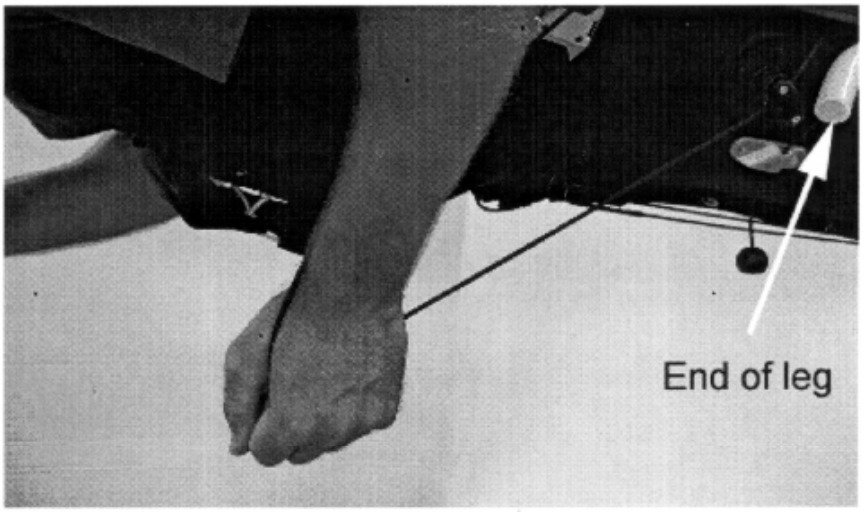
The rope on the picture is to adjust your flight angle (head up or head down).
By tightening the rope you will be more head down and by loosening
You will be more head up.



Grip the rope like the picture show. In more or less one pull you will be able to adjust from maximum head up to maximum head down.

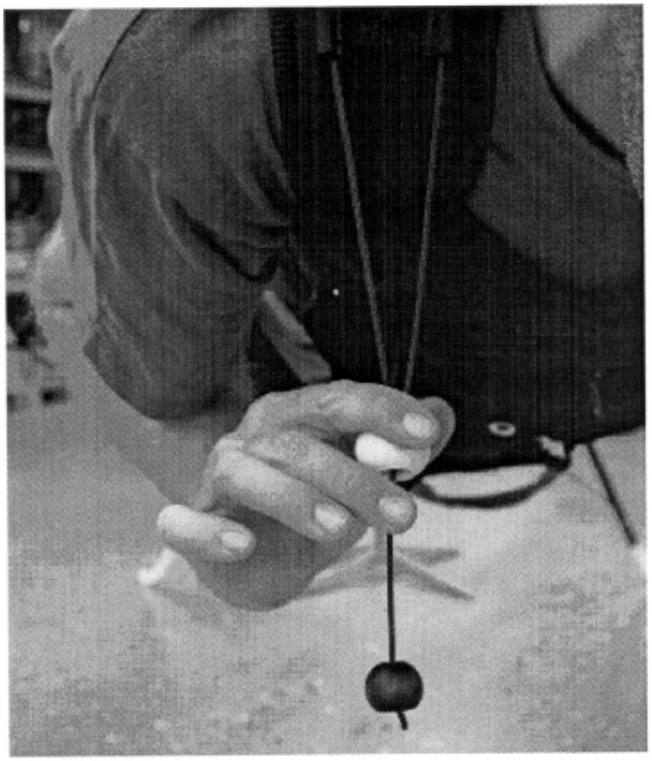
When going from head down to head up you use the same grip, but making small movements to push back the line.

Using a little bit more head down in the take off is good.

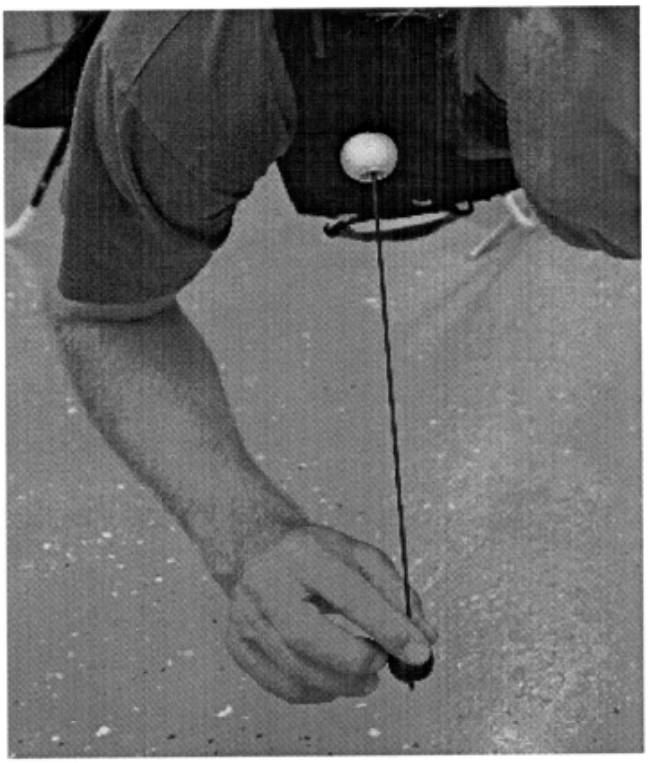


Do not let the rope go from this position when it might hook to the end of the leg.

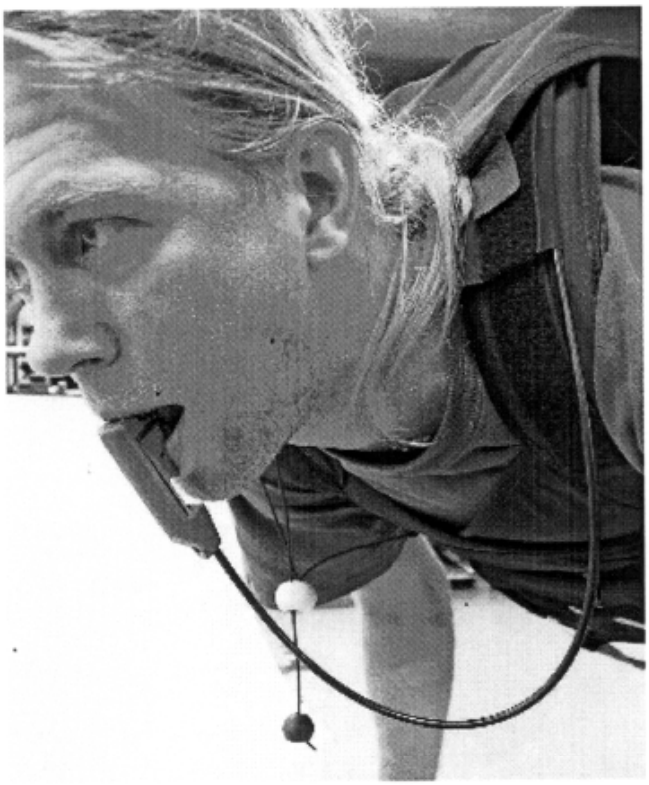
Throttle system



Idle position (Zero Throttle)



Full throttle



Mouth throttle. Strongly adviced during take off and test running engine on ground.

Slides easily into the harness when not in use.