

# MacJet



USER MANUAL

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## Dear MAC PARA pilot

We congratulate you on your purchase of a MAC PARA paramotoring glider. Extensive development work and numerous tests make the MacJet a state-of-the-art paramotoring glider. The MacJet is a full reflex paramotoring glider and was designed for advanced paramotoring pilots looking for an easy glider with a wide speed range. The MacJet has easy launch and landing, performs better and flies faster than other wings with excellent stability and manoeuvrability. Please read this manual carefully before you start, this way you will get the most out of your glider, and enjoy many pleasant flights.

## Please read this manual carefully and note following details:

The purpose of this manual is to offer guidelines to the pilot in the use of the MacJet and is in no way intended to be used as a training manual for this or any other paramotoring glider or even a paraglider. Paragliding and paramotoring are a sport, which demands, besides the optimum equipment, a high degree of attentiveness, good judgement, and theoretical knowledge. Paramotoring can be a dangerous sport, which may lead to injury and death. You may only fly an aircraft of any description when qualified to do so or when undergoing training from an accredited school or instructor. The use of this paramotoring glider is solely at the user's own risk! The manufacturer and distributor do not accept any liability. Pilots are responsible for their own safety and their paramotoring glider airworthiness. The paramotoring glider carries no warranty! The author assumes that the pilot is in possession of a valid paramotoring licence for glider's category, insurance etc.

Before delivery, as well as during production, each paramotoring glider goes through a strict visual inspection, and is test-flown by your dealer. Stamps on the placard, together with a completed test-flight certificate, confirm this. Check that the paramotoring glider has been test-flown before your first take-off. If it has not, consult your dealer.

Any inadequate use or misuse increases the risks considerably. The MacJet must not be used outside the manufacturers recommended weight range. The MacJet must not be used during rain or snow-fall. The MacJet must not be used in high or gusty winds. The MacJet must not be used in cloud and fog. The MacJet must not be used by pilots without sufficient knowledge or experience. Any changes made to this paramotoring glider invalidate the certificate of airworthiness.

If, after carefully reading this handbook, you still have questions, suggestions or criticism regarding this product do not hesitate to contact your dealer or us. We will be glad to help and advise.

**MAC PARA wish you many pleasant flights with your**

**MacJet**

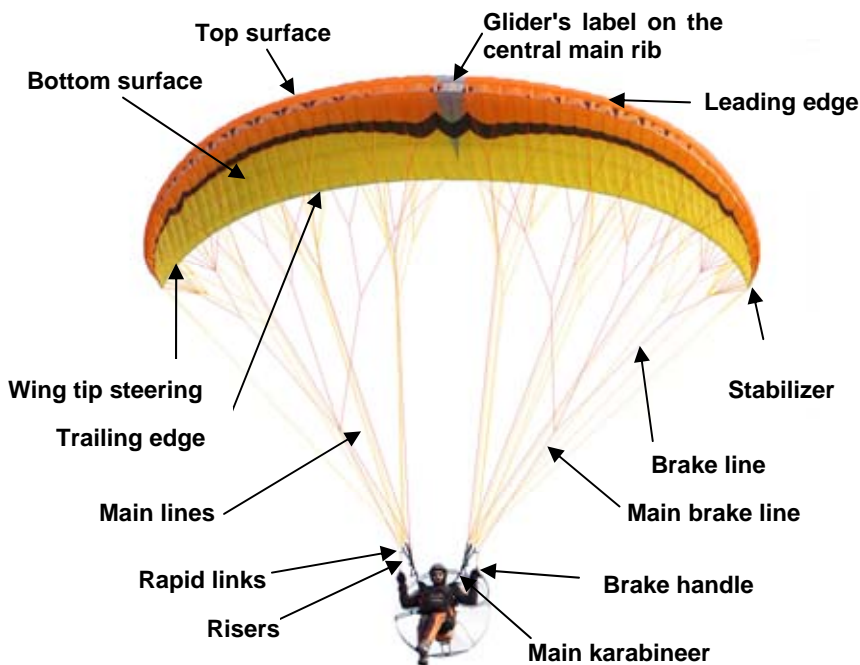
## PILOT LEVEL REQUIREMENTS

As pilots you practise paramotoring for some time and your skills are likely to continue growing. You know and appreciate the performance and safety of reflex gliders. We recommend that to fly the MacJet, a minimum level of pilot experience of at least 50hrs and one full year's season of flying paramotoring gliders with adjustable trim is desirable.

The MacJet can adapt to suit a full range of conditions and types of powered flying except acrobatic flying. Nevertheless, strong turbulence and gusting winds can lead to a partial or complete collapse of the canopy. Therefore never fly in such conditions.

Even though it is possible to use the MacJet for free flying, please note it is not EN certified. We have made a great paramotoring glider but do not want to deceive you with EN certification like some manufacturers do.

## DESIGN



### Construction of the canopy:

The canopy of the MACJET consists of 58 cells over the wingspan. The wingtips are slightly pulled down and this acts as a kind of stabilizer. The MacJet is a second rib diagonal-construction paramotoring glider. Every main rib is attached to 4 or 5 suspension lines. Between these main suspension ribs, intermediate ribs are suspended by diagonal segments. This construction ensures a smooth top surface and precise airfoil reproduction. The internal reinforcements maintain the precise form of the canopy and provide stability. The cell openings on the under-surface of the profile's nose provide airflow into the glider. Stretch resistant flares, integrated with diagonal ribs at the suspension points, ensure an even distribution of load throughout the canopy. A stretch resistant Mylar strip on the top and bottom panels alongside the openings and running the length of the trailing edge defines the wingspan, together with an optimized sail tension; this guarantees high form stability. Large cross ports allow effective airflow inside the canopy, providing good re-inflation without reducing the profile accuracy.

The MacJet is mainly made of the proven Nylon fabrics Porcher Marine Skytex Rip-stop 9092 E85A, 9017 E38A and 9017 E29A. Like any synthetic material, this can deteriorate through excessive exposure to UV.

### Rigging system:

The suspension lines are comprised of “cascaded top lines” (attached to the under-surface), “cascaded middle lines” (cascade 2 to 2 top lines together on middle main lines), and “main lines”. Main lines lead to the “quick link” (a Maillon which connects lines and risers). The “stabilizer lines” connect the upper stabilizer lines on the outer suspension points with the quick link. The “brake lines” are not load carrying suspension lines. They lead from the trailing edge of the canopy to the main brake lines and run through the pulleys on the D-risers to the brake handles. A mark on the main brake line indicates the position of the brake handle. This adjustment, on the one hand, allows sufficient brake to be applied during extreme flying situations and when landing, while on the other hand, this ensures that brakes are not permanently applied to the canopy (especially when fully accelerated). This trimming should not be altered. For differentiation purposes the A-lines are coloured red, the brake lines are orange, all remaining lines are yellow. Also the main suspension loop, on the bottom of the riser, is covered red. This is where the main karabiner should be hooked in, which then in turn connects the risers to the harness.

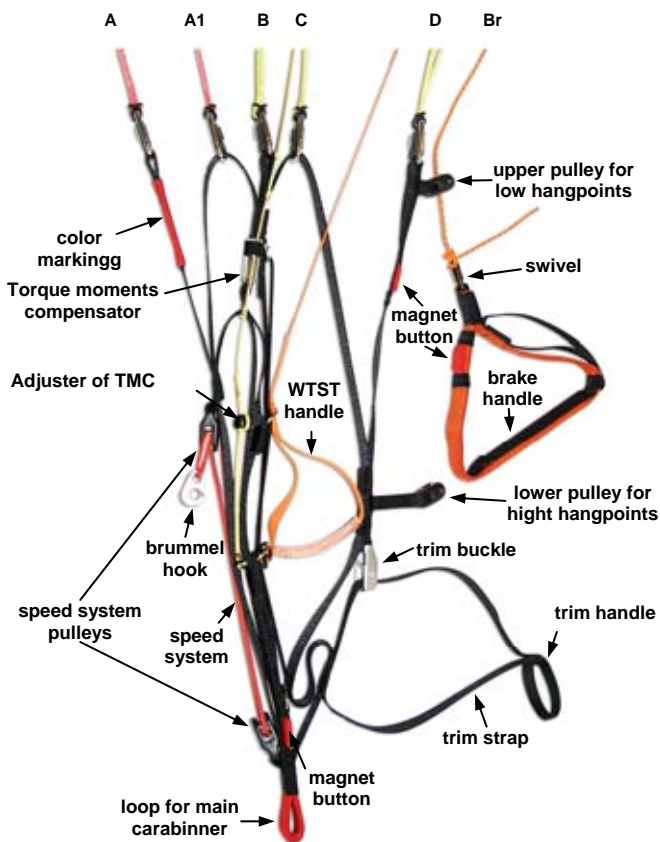
The lines of the MacJet are made of proven strong and stretch resistant Polyester HMA Aramid/Kevlar (yellow core) lines and PES/Dynema (white core) for brake lines. The entire rigging system comprises individual suspension lines looped and stitched at each end. The Aramid main lines have strengths from 140 up to 340 kg. The Aramid upper cascade lines have strengths from 60kg up to 120 kg. The Aramid middle cascade lines have strengths from 80kg up to 160 kg. The Dynema brake lines have strengths from 100kg up to 240 kg.

## RISERS

The MacJet is equipped with 5 risers per side (A, A1, B, C, D). The two central A-lines per side are attached to the main A-risers (colored in red) while outermost A main lines are attached to A1 risers. The 3 B-main lines and the B stabilizer lines are attached to the B-riser. The 3 C-main lines and the C stabilizer/compensator lines are attached to the C-riser and the 3 D-main lines to the D-riser. The main brake lines lead through the pulleys on the D riser. The higher one for low main karabiner attachment of the paramotor and the lower one for higher main karabiner attachment of the paramotor.

The line connections are made to triangular Maillons (quick links) fitted with a rubber "o- ring" in the form of a "figure eight" which prevents any slipping of the lines on the quick link.

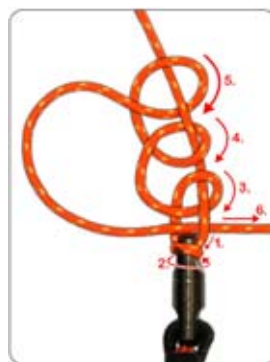
### Riser's scheme



## Brake handles:

Special MacJet brake handles are equipped with swivels, neodyme magnets and extending soft loops. The brake handle can be modified according to the pilot's wishes from soft to semi-rigid or to rigid using different inserts.

Strong neodyme magnets hold the brake handles perfectly to the D risers while attaching and releasing works very easily and quickly during flight. This minimises the danger of getting them into a running propeller. Controlling the canopy with extended soft loops is less tiring during long flights when retaining them with two fingers especially with opened trims.



## Wing tip steering (WTST):

Wing tip steering handles (small-two finger-brake handles) allow easy turns with a small radius by providing higher drag on the wing tip. When steering with the main brakes in the reflex mode (trims open) they become too heavy and the canopy loses the stability advantages of a reflex airfoil. When applying wing tip steering the pilot can steer the glider whilst keeping the reflex profile in the main part of the canopy. Note: Sharp turns are easily possible.



### Torque moments compensator (TMC):

The yellow line (equipped with small plastic ball) on the outer side of each riser is connected to the line of C-line stabiliser. With the torque compensator you correct engine torque moments and keep your wing flying in a straight direction without using brakes for corrections. Especially powerful paramotors with heavier propellers tend to turn your wing in the opposite direction to that the propeller is turning. The compensator is very useful during long navigation flights. The compensator line with two knots leads through a plastic tube with a groove. According to the trims position and adjusted propeller turns you can use the lower or higher knot. Before take off you can adjust the position of each knot according to your needs.

### Speed system:

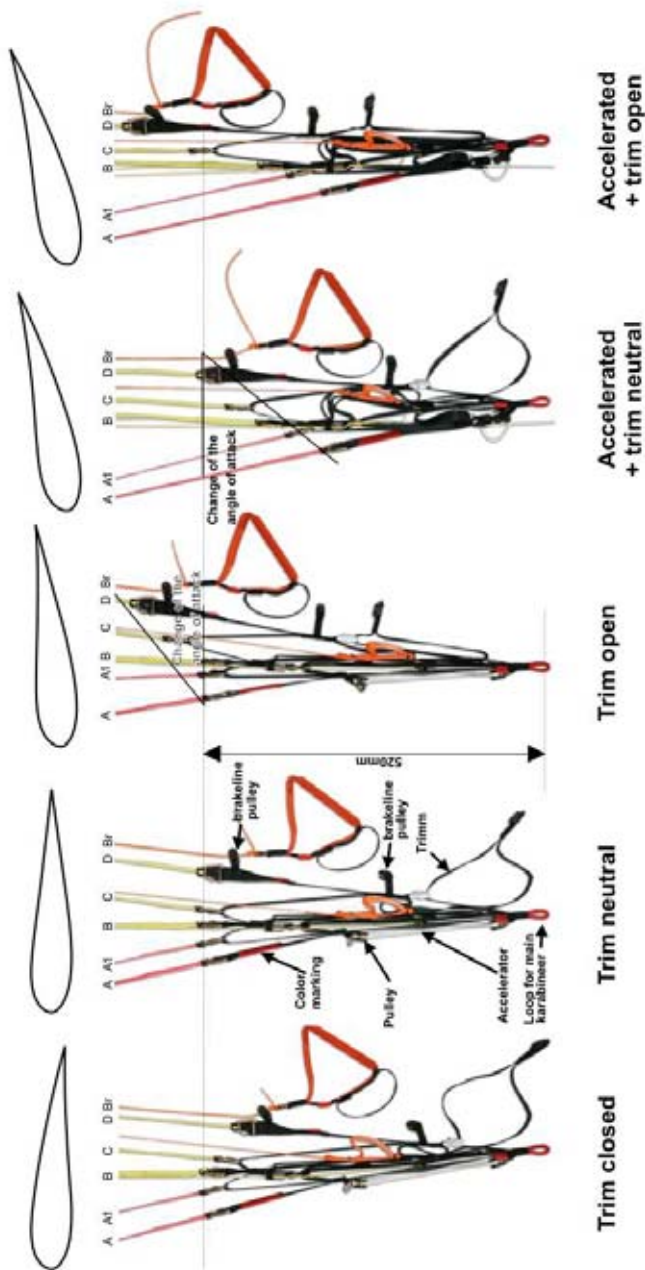
The MacJet is equipped with a stirrup operated speed-system, which returns automatically to the normal position when the stirrup is released. The speed system affects the A-, A1-, B- and C-risers and changes the angle of attack. In normal flight all risers have an overall length of 49 cm without quick links. When the stirrup is pushed out the A-risers are shortened by up to a maximum of 20 cm, the A1-risers are shortened by up to a max of 15 cm, the B-risers by up to a max. of 10 cm, the C-risers by up to a max. of 9 cm, the D-risers retain their original length.

### Trims:

The MacJet has a wide speed range in flight thanks different trim settings. The MacJet trims have a deceleration range of 6 cm and 12 cm of acceleration. On the faster setting (trims fully open or accelerated) the wing's speed increases. The wing is less sensitive to turbulence and the stability improves. On slower settings (neutral or trims pulled down), sink rate improves and handling becomes lighter and the wing is more sensitive to turbulence.

The speed with closed trims is around 40 - 43km/h with a relatively low effort of the engine. With additional pressure on the brakes the cruise speed is around 34 37 km/h with the best sink rate and an effortless thrust from the motor. This position is ideal for economy navigation tasks. The neutral trim position is marked with a white line on the risers and it is the position where the risers are level. (The most useful configuration for navigation and for precision ground tasks). The MacJet still turns very well, and restores plenty of energy flying around 49-52 km/h. It requires a little more RPM than with closed trims! This is the position we recommended for using the speed system. With the trimmer fully open you reach around 52-54 km/h. The main brakes are getting hard. Control the MacJet with the wingtip steering. In this configuration the canopy is solid. Fully accelerated the speed increases to around 60-63km/h with high fuel consumption. (Risers lengths on page 30).





## Tissue

(PORCHER SPORT, Rue du Ruisseau B.P. 710,38290 ST. QUENTIN FALLAVIER, FRANCE)

Top Sail - Leading Edge - SKYTEX 45 E85A - 100% nylon 6.6 , 33 Dtex, 45 g/m<sup>2</sup>

Top Sail - Trailing Edge - SKYTEX 40 E38A - 100% nylon 6.6 , 33 Dtex, 40 g/m<sup>2</sup>

Bottom Sail - SKYTEX 40 E38A - 100% nylon 6.6 , 33 Dtex, 40 g/m<sup>2</sup>

Main ribs, Diagonals - SKYTEX 40 E29A - 100% nylon 6.6 , 33 Dtex, 40 g/m<sup>2</sup>

Ribs - SKYTEX 40 E38A - 100% nylon 6.6 , 33 Dtex, 40 g/m<sup>2</sup>

Reinforcement Main Ribs - Grille Polyester 200 g/m<sup>2</sup>

Reinforcement Ribs - W382 Polyester 180 g/m<sup>2</sup>

## Lines

(EDELMAN+RIDDER+CO. Achener Weg 66, D-88316 ISNY IM ALLGEAU, GERMANY)

Upper lines - Aramid/Polyester A-6843-060, Breaking Load 60 kg

Upper lines - Aramid/Polyester A-6843-080, Breaking Load 80 kg

Upper lines - Aramid/Polyester A-6843-120, Breaking Load 120 kg

Brake lines - Dynema/Polyester A-7850-100, Breaking Load 100 kg

Main lines C1,D2,D3 - Aramid/Polyester A-7343-140, Breaking Load 140 g

Main lines C2,C3 - Aramid/Polyester A-6843-160, Breaking Load 160 g

Main lines D1 - Aramid/Polyester A-6843-080, Breaking Load 80 g

Main lines A1,B1 - Aramid/Polyester A-7343-190, Breaking Load 240 kg

Main lines A2,A3,B2,B3 - Aramid/Polyester A-7343-230, Breaking Load 340 kg

Wing tip line - Aramid/Polyester A-6843-060, Breaking Load 80 kg

Main brake line - Dynema/Polyester A-7850-240, Breaking Load 240 kg

## Attachment straps

(STAP a.s., 407 80 VILEMOV, CZECH REPUBLIC)

STAP-POLYESTERBRIDLE 13 mm, Breaking Load 70 kg

## Risers

(MOUKA TISNOV Ltd, Koráb 133, 66601 Tišnov, Czech Republic)

Polyester 367 040 020 912 25x1,5 mm Breaking Load 800 kg

## Thread

(AMANN SPONIT Ltd, Dobronická 635, 148 25 PRAHA 4, CZECH REPUBLIC)

Lines-SYNTON 60, Main lines-SERABOND 60, Canopy-SYNTON 40, Riser-SYNTON 30

## Rapid links

(ELAIR SERVIS, CZECH REPUBLIC)

NIRO TRIANGLE 200 - Max. Load 200 kg

## TECHNICAL SPECIFICATIONS

Paramotoring (reflex) glider		MacJet 22	MacJet 24	MacJet 26	MacJet 28	MacJet 31
Size						
Zoom flat	[%]	88,0	92,5	96	100	104,5
Area flat	[m <sup>2</sup> ]	22,02	24,33	26,21	28,44	31,06
Area projected	[m <sup>2</sup> ]	19,06	21,06	22,68	24,61	26,87
Span flat	[m]	10,73	11,28	11,71	12,20	12,75
Span projected	[m]	8,54	8,98	9,32	9,71	10,15
Aspect ratio flat	-	5,23	5,23	5,23	5,23	5,23
Root cord	[m]	2,45	2,57	2,67	2,78	2,91
Cells	[kg]	58	58	58	58	58
Weight	[kg]	5,8	6,0	6,3	6,6	7,0
Weight range *	[kg]	77-100	85-110	100-130	115-147	140-180
Min.speed	[km/h]	24-26	24-26	24-26	24-26	24-26
Speed Trimmers closed	[km/h]	40-43	40-43	40-43	40-43	40-43
Speed Trimmers open	[km/h]	49-52	49-52	49-52	49-52	49-52
Top speed (accelerator)	[km/h]	60-63	60-63	60-63	60-63	60-63
Glide ratio	-	8,2	8,2	8,2	8,2	8,2
Min. Sink rate	[m/s]	1,3	1,3	1,3	1,3	1,3

\* powered pilot equipped = weight naked + cca. 35 - 40 Kg

## CHECKS ON A NEW PARAMOTORING GLIDER

Before delivery, as well as during production, each paramotoring glider goes through a strict visual inspection. Additionally we recommend that you check your new glider in accordance with the following points. Additionally we recommend that you make this check after flying extreme manoeuvres or after tree landings or similar.

- Inspection of the canopy for tears or damage, especially the seams which join the ribs to the upper and lower surfaces, but also the area of the attachment tapes and brake-line connections.
- Inspection of the lines for damage to the stitches. The line lengths must be checked after 50 hours flying time and whenever the flight behaviour of the glider changes
- Inspection of attachment tapes for damage to the stitches. It is also important to check the attachment tapes and brake-lines for tangles.
- Inspection of the risers for faultless condition. Rapid links must be secured.

With even slight damage the glider loses its airworthiness!

## SETTING UP THE CONTROLS

### Brakes adjustment and brake handles:

We strongly recommend the following actions be supervised by a paramotoring instructor. Very often improper brake line adjustment can lead to different reactions of your glider or loss of flight comfort or speed. With a brake line adjusted too short the canopy will lose its easy take off behaviour. On the risers diagram you can see there are two brake line pulleys on each riser, higher and lower.

Before flying the glider please check the setting of the brake lines and adjust them in accordance to your hang points. When flying paramotors with lower hang points (main karabiner 50-60 cm from seat plate) the brake lines should lead through the higher pulleys only and the brake handles should be adjusted on the higher marks of the brake lines. When flying paramotors with higher hang points (higher than 70 cm or trikes) the brake lines should lead through the lower pulleys and the brake handles should be adjusted on the lower marks of the brake lines.

Check the set up by inflating the glider on the take off site with a constant breeze 2-3 m/s with the engine off. When the canopy is stabilised above your head, check that the trailing edge of the wing is not being pulled down. When you gently pull the brakes you should have only a 5-10 centimetres of movement before the brakes start to pull down on the trailing edge of the wing. Make sure it is the same length on both sides.

It is safer to have this adjustment a bit longer than too short. When free flying the wing should be set up though the top pulley and with the shorter lines

**Note!! All new gliders leave the factory rigged for lower hang points!**

### Fitting the speed-system:

Most modern paramotoring harnesses have pulleys attached for speed system fitting. The MacJet speed system, including the Brummel-hooks supplied, must be assembled as per instructions.

The speed system cord is firmly attached (use bowline or other non sliding knot) to the foot stirrup (webbing or alloy bar). The other end of the cord is run through a pulley on the harness and then in an upward direction to be then firmly attached to the Brummel-hooks!

The length of the cord leading to the stirrup should be adjusted so that it is easy to put your feet into the stirrup in flight but still short enough to allow full speed system travel. (Use of 2 stirrups in a ladder fashion can enable you to reach the full range if your legs are not long enough.) Ensure both cords on the stirrup are of equal length, to avoid putting a turn in the glider.

Test your speed system for the correct length of cord on the ground first (simulating flying position), with your harness and risers, before flying with it! The full range is reached when the 2 pulleys join together. Before launch, attach the glider's risers to the harness with the main karabiners. Ensure that the speed system is untangled and operates freely before flying! There should be a spare inch or so before they activate. Remember that it is always safer to set the margin of play too big than too small.

**The following information must not under any circumstances be taken as a manual for practising paramotoring. We would like to advise you of the MacJet features and important information for your flying and security.**

### **Preparing for take off:**

As for any aircraft a thorough pre-flight check must be made prior to each flight on the MacJet!

Before every launch check lines, risers and canopy for damage! Do not launch with even the slightest damage!

Also check the maillons connecting the lines and the risers. They have to be closed tight.

Put on the harness with maximum care and check the handle of the safety system and that all the flaps of the outer container are fastened securely and correctly. The main karabiner must also be checked carefully. Replace it if any damage is visible, or generally after 300 flying hours. Finally connect the risers to your harness with the main karabiners.

Check carefully that they are properly closed.

**Attention! Never fly with an open main karabiner! Do not take off if you find any damage on your equipment!**

Having unpacked and laid out the paramotoring glider in a slight horseshoe pattern the following checks must be made:

### **Checklist before every flight:**

Preparing the wing:

- canopy without any damage
- risers without damage
- maillons (quick links) closed tight
- Stitching of the main lines near the risers are o.k.
- all main lines run free from the riser to the canopy, brake lines are free

Before putting on the harness:

- warm up your engine and stop the engine before clipping in the risers
- rescue handle and deployment pins secure
- buckles (leg- ,front riser) closed
- main karabiners attached and properly closed

Before takeoff:

- the helmet is on and locked
- speed-system mounted and connected properly
- risers not twisted
- the trims are properly set
- brake handle and brake lines are free and not twisted

## FLYING THE MACJET

- nothing will get in propeller's way
- pilot's position relative to the wing (centred: all lines same tension)
- the engine delivers full power
- wind direction
- obstacles on the ground
- free airspace

When laying out the glider, the wind direction should be observed. The canopy should be deployed into the wind so both sides of it are loaded symmetrically. The paramotoring glider should be arranged in a semicircle against the wind. This ensures that the A-lines in the centre section of the canopy will tension before the ones at the wing tips. Thus the canopy inflates evenly and an easy launch in the desired direction is guaranteed. All lines and risers should be carefully untangled and arranged in a way that they do not catch on anything. It is equally important to untangle the brake lines so that they are clear and can not catch on any thing during launch. The brake lines should run freely through the pulleys to the trailing edge of the canopy. Make sure the risers are not twisted; this can prevent the brake lines from running freely through their pulleys. It is often impossible to untangle lines during flight. It is important that no lines are looped around the canopy. Also called a "line-over", this may have disastrous consequences during take off. Finally connect the risers to your harness by using the main karabiners. Check carefully that they are closed properly.

### Launch

The MacJet is easy to launch but with a very weak or zero wind it requires appropriate launch technique. Before take off, recheck the canopy and trimmer setting, the direction of the wind and the air space around you! When the pilot is ready to take off he/she holds all A-risers and the brake handles in each hand. To facilitate differentiation between the risers, the A-lines, including the sleeves on the A-risers, are coloured red. Before take-off, place yourself centrally at the gliders axis. Let the B-, C- and D-risers fall into the crook of your arm and hold the A risers with arms outstretched behind you. Pull up the canopy dynamically using the A-risers. (The stronger the headwind the less run-up you need to pull the canopy up). After the initial effort of inflation, keep applying forward pressure on the A-risers (pushing them forward, not pulling down):

**1. Paragliding technique** - Once the pressure on the A risers eases. The canopy should now be directly over the pilot's head. As soon as the glider is above you, stop pulling on the A-risers. A good progressive run ensures your MacJet will inflate and come up equally and quickly. Should the canopy surge forward, control it by gently braking. Now, do a visual check upwards, to ensure the canopy is completely open (otherwise, abort the take-off). Only then is the final decision to continue the launch taken! If anything is not completely safe the launch should be aborted! Now accelerate continuously until you lift off. It is easier to take-off in a light headwind, if after reaching minimum flying speed you apply the brakes slightly. After the take-off, gently release the brakes again. The canopy should be braked gently to stabilize the glider and possibly correct for drift. Moving the pilot's body to the centre of the glider is the best method of correction, if there is sufficient room.

**2. Paramotoring technique – Once the canopy is up to the angle of 80° open up full power and lean back to counter the engine thrust, so that it can push you forward rather than towards the ground. Continue to run in this position. When you approach take off speed gently apply the brakes (max 30% of the brake range). The faster the trim setting is, the more brake input is required to take off. Once you have safely taken off, continue heading into the wind with released brakes to gain enough height.**

Paraglider pilots, especially those who are used to flying, usually have a tendency when running to lean forward with already slightly applied brakes. When taking off with a paramotor the pilot needs to stand up straight and allow the thrust of the engine to push pilots body horizontally forward rather than diagonally down. Paraglider pilots starting paramotoring therefore need to learn how to stand up straight while continuing to move forward into wind. Don't try to get into the seat when you leave the ground as you are still relatively low and in the event of an engine failure you will be back on the ground very quickly. Instead, climb to a safe height, into wind, and then gently throttle back before getting into the seat. Properly fastened leg straps before take off makes getting into the harness much easier. If you need to use your hand be sure to put the brake toggle on the magnet first to avoid it being sucked back into the prop.

**WARNING!!** Do not jump or lift your legs immediately after taking off! This could have dire consequences when done with a paramotor if the wing has not reached the proper take off speed.

**WARNING!!** Do not attempt to get into the seat while holding the toggles.

**WARNING!!** Do not use the forward launch in very strong winds. Make sure you don't pull the risers too much towards yourself or downwards as this can result in a frontal collapse, or in an asymmetric take-off

## Reverse launch

The MacJet is easy to reverse launch. When doing a reverse launch or when launching in strong winds the paramotoring glider can possibly surge forward more quickly or lift off sooner than desired. To avoid this, walk uphill following the canopy during inflation. We recommend pulling the trims down 2-3 cm. As this launch technique can be difficult and turning the wrong way can result in the pilot taking off with twisted risers. It is recommended to practice reverse launching on a training hill or slight slope first. When on the flat with your paramotor then only with the engine off. The most important thing is ground handling. You need to be able to keep the wing directly into wind while taking off on flat ground. When deflating the canopy in strong winds, or aborting a launch, use the C- or D- risers, not the brakes. Using the brakes in strong wind will cause more lift, lifting the pilot up and dragging him/her much further back. A good way to launch the MacJet in reverse with a stronger wind is using the A lines in the left hand, along with the left brake toggle and the throttle (if you have it on the left side), and the D lines in the right hand along with the right toggle (and the throttle if you have it on the right side). It is better to start to learn this A and D reverse technique without the paramotor and once you practise a bit you can start with the paramotor. Using this technique the pilot can build a wall directly into wind with the pilot in centre of the canopy.

## FLYING THE MACJET

Launch the canopy over your head and use the D lines to stop it over shooting. This stops you from applying both brakes (as when using standard reverse launch method) and pushing your hands back towards the propeller. Once the canopy is above your head you release the A and D straps and turn for 180 degrees into wind and accelerate. Once you are safely airborne, continue heading into the wind to gain enough height. Do not try to climb too steeply by applying too much brake. The additional drag caused by brakes decreases actual climbing rate. If there are no obstacles present, it is safer to fly level for a while after take-off and gain some speed before converting it to height. Don't try to get into the seat when you leave the ground as you are still relatively low and in the event of an engine failure you will be back on the ground very quickly. Instead, climb to a safe height, into wind, and then gently throttle back before getting into the seat. Another reason not to try climbing too steeply is the risk connected with engine failure at low altitude. Golden rule! For any aircraft the most important thing on take off is a proper amount of speed. High angles of attack and a low speed are more likely to cause a stall. You should always be able to land safely in case of engine failure. Therefore note! Too much brake input during take off is risky. Depending on the design and power of your paramotor unit, it is possible that you will notice torque moments while not sitting properly in your harness. So be ready to counter-steer with a brake input to correct turning tendency and keep flying straight. You also can compensate torque moments by adjusting cross bracing if present on your harness or by adjusting torque compensator on the opposite riser of the turn tendency. Different settings of trims on each riser and shifting your weight to the opposite side of the turn tendency will help to keep the glider in a straight direction after take off.

Wind	Trim settings	Launching technique & additional settings
under 1 (m/s)	Neutral position  (on the white line) or  released for 1-2 cm.	<b>Forward launch</b> <ul style="list-style-type: none"> <li>- start with loose lines. 2 steps back toward the canopy to increase the speed of the run.</li> <li>- start with full help of the thrust</li> <li>- try to minimize use of the brakes.</li> <li>- correct position of the wing by moving toward in appropriate direction rather than by using brakes</li> </ul>
1 - 3 (m/s)	Neutral	<b>Forward launch</b> <ul style="list-style-type: none"> <li>- start with lines under tension</li> <li>- you can use brakes to correct the position of the wing during the run, but moving in the appropriate direction during the run is most effective technique.</li> <li>- use of full thrust when canopy at 80°</li> </ul>
over 3 (m/s)	Neutral or closed for 1-2 cm	<b>Reverse Launch</b>



## Flight

Once in the air after take off at a higher angle of attack it some gliders may have a tendency to roll under full power. The torque and gyro moments lift the pilot to one side; you then drop back only to swing up again. Generally such roll oscillations usually occur with greater engine output and propeller diameter, lower wing loading. The more brake input the bigger the roll tendency. In this case the safest way to deal with this is to throttle back a bit and release the brakes. Novice paramotoring pilots tend to be especially prone to overreacting. Do not forget - release the brakes.

The MacJet can reach speeds of 39-43 km/h on neutral setting depending on the weight of the pilot. Always fly with sufficient clearance from the terrain. With power off the MacJet glides best with open brakes, descends best with lightly applied brakes and trims closed. We recommend that, to give yourself the chance to get used to it, your first flights should be made on or just below the neutral range of trim settings, where, the glider will feel more familiar, like a conventional wing. With this trim, try to fly with a small amount of brake - at the point where they just begin to feel heavier. In turbulent air fly with brakes lightly applied (10-15 cm) to maintain some internal pressure and avoid canopy collapse. If the canopy pendulums forward, this should be corrected by prompt application of the brakes. A pendulum movement of the canopy backwards is corrected by easing the brakes in good time. When you have become fully confident in your wing, try experimenting with slower and faster trim-settings, weight-shift and speed bar and enjoy the extra speed and security the MacJet offers you.

## Different trim settings

The MacJet has a wide speed range in flight by virtue of the different trim settings. This may demand higher pilot attention in flight. Anyway once used to it you will appreciate the abilities of the wide speed range.

With the trims fully open (trim buckle over the white line) the wing's speed increases (good for long transitions). The canopy becomes stiffer and is less sensitive to turbulence and its stability improves. On faster trim settings or when flying on speed bar the brake forces rapidly increase and the handling decreases. When the trims are fully opened and you are not flying close to the ground we recommend steering with the wing tip steering handles. It is the special feature of the reflex profile - the faster you fly, the safer your glider is. Some pilots with free-flying experience may have a tendency to keep the brakes slightly applied at all times. Such a technique, while quite reasonable on a free-flying wing, is not advisable for reflex gliders. When you apply the brakes with released trims, the wing loses its reflex characteristic (and the advantage of stability) and may be more prone to collapse.

On the slower settings (trim buckle under the white line), sink rate improves and handling becomes lighter, whilst giving you an improved climb rate for thermaling and shorter and slower take-offs and landings. Do not hesitate to use thermals in order to gain some altitude and save fuel.

Note!! If trims are asymmetrically adjusted, the wing will turn. Therefore trim setting is an important part of the checklist before every flight!

### Accelerated flight (speed bar applied)

When flying with the speed system applied the angle of attack is lower and the glider increases flight speed. In contrast to most paragliders it does not decrease wing stability; in fact the reflex gliders seem to counter turbulence even better.

To use the speed system, simply place your feet on the stirrup and push forward in a horizontal plane. If a loss of back pressure of the stirrup on your legs is noticed, this is a warning that the canopy is probably about to collapse. Release the stirrup and thus the speed system immediately. Do not use the speed system in very turbulent conditions, close to the ground or near other airspace users. Always fly with sufficient clearance from the terrain and always keep the brake handles in your hands!

**Warning!! Do not apply brakes when fully accelerated! Braking increases lift near the trailing edge. The main lift point moves backwards. Due to this the wing can lose stability and can lead to frontal or side collapse on accelerated flight. When fully accelerated (maximum speed bar and trims open) using full thrust and you rapidly decrease the thrust (e.g. close the throttle completely) you can cause the "pendulum effect" and then the glider can surge forward which automatically decreases the angle of attack. This also can easily lead to collapse in turbulent air.**

At maximum speed-bar and fully open trims we strongly recommend steering with wing tip steering handles. At first learn to fly using the speed system with the trims in neutral position. It is advisable to use the speed system with neutral or half opened trims. Turns executed in this way will be slightly wider, but the strength needed to initiate the turn is smaller than with brakes.

### Steering - turns:

The MacJet is a very responsive paramotoring glider and reacts very directly and instantly to any steering input. Weight shift input quickens turns and ensures minimal height loss.

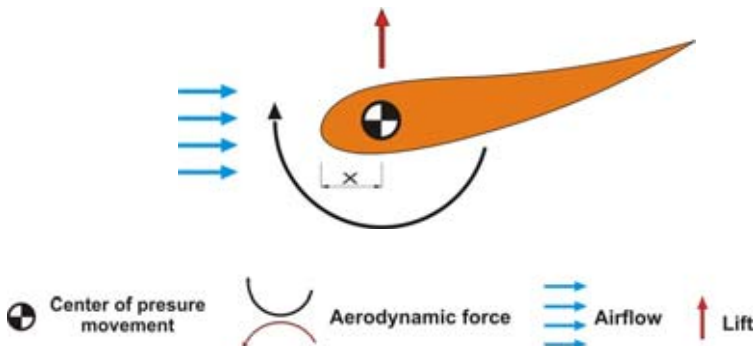
From neutral to closed trim settings the turns can be done much tighter and are more effective using a combined technique while steering with serial brake together with wingtip steering brake. This technique is very useful for slalom competitions. Turns can be much improved by additional use of throttle weight shift etc. With growing experience you will be able to master these techniques and to make fully coordinated and effective turns.

In case it is impossible to control the MacJet with the brake lines the D-risers may be used to steer and land the canopy. Attention! Pulling brake too fast or too hard can result in the canopy entering a negative spin.

Study the following drawings of different trimmer setting and speed-system use and their influence to the wing stability.

## Released trims without brakes

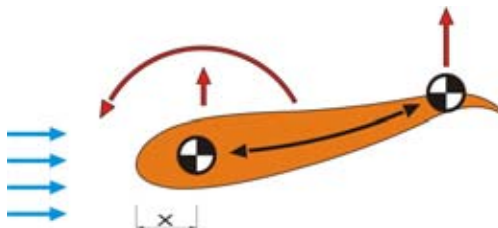
Preferred setting for fast and safe flying. The centre of gravity of the airfoil is moved forward, the wing has higher resistance to collapses. Pitching moment decreases.



## Released trims with brakes applied

The MacJet uses a flap system in the centre of the wing on the trailing edge for improved take-offs and landings. This provokes more lift in the centre of the wing and also increases the pitching moments. Even slight brake input (especially on full speed bar) produce lift close to the trailing edge. The centre of gravity of the airfoil is moved back and the higher pitching moment significantly decreases the stability.

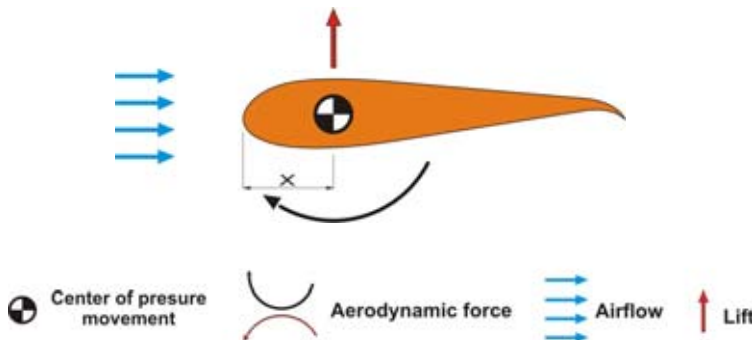
**Warning!! Especially in turbulence this can lead to a collapse on full speed with trims released! Therefore we recommend pilots only use the wing tip steering system.**



# FLYING THE MACJET

## Closed trims

Using this trim setting serial brakes are the normal and predefined steering system. Additional use of the wing tip steering system combined with serial brakes can execute sharper turns. Slower trim setting is used for landing and thermaling. The canopy behaviour is similar to that of classic paragliders.



## Approach and Landing:

To avoid excessively demanding situations on the approach to landing, it is important to initiate the process at an adequate altitude. This leaves you enough time to observe and appropriately deal with wind direction and any other aircraft in your vicinity.

The MacJet is easy to land. The final leg of the landing approach must be into the wind. There is a choice of two methods of landing with a paramotor. One without power (this minimises the risk of propeller damage) and the second with power.

## Power off landing

When approaching the landing spot check the wind direction and your height. Power off your engine at about 30m and glide like a paraglider with trims in the neutral or closed setting and brakes released. During this final glide the glider should be decelerated slowly with regard to conditions, converting your excess speed into lift. The pilot should flare the canopy with his feet just 0,5m over the ground before the touchdown. If too much brake is used too early the glider may climb again, gaining height,. Strong wind landings require correspondingly less brake. Every pilot should practice landings without power, because one day your engine will fail and you will need this skill.

### Power on landing

Make a flat approach at a shallow angle. While flaring the wing and losing speed switch off the engine immediately after touchdown. In nil wind conditions you should run a few steps after touchdown and pull the brakes few times dynamically (like a fluttering bird).

This stops the canopy over your head and gives you time to turn and put the glider gently on the ground. Do not apply full brake before the pilot is safely on the ground. Do not turn before the propeller stops turning.

The advantage of this method of course is that if you get it wrong you can power up and go round again at any time. The disadvantages are the increased risk of (expensive) propeller/cage damages if you stuff it up, the dangers involved in falling over with the engine running and getting your lines in the propeller if you forget to switch off before the wing deflates.

Attention! The final glide during the landing approach should be straight and not marked by steep or alternating turns as these can result in a dangerous pendulum movements close to the ground.

Attention! Do not allow the canopy to fall onto the leading edge with energy. This can destroy the material and affects the life of the ribs at the leading edge!

Note!

- If possible, get to know the landing field before the approach.
- Check the wind direction before planning the approach.
- Landing with power off requires much less space.
- Training makes the master, practice the landing until you feel totally safe.

## TOWING, JUMPS FROM AIRCRAFT, AEROBATICS

**WARNING!! The MacJet is not suitable for towing.**

**WARNING!! The MacJet is not suitable for jumps from aircraft.**

**WARNING!! The MacJet is not designed to be used for aerobatics.**

## EXTREME FLYING MANOEUVRES

**WARNING!! All the critical flight conditions described here require thorough knowledge. They should only be carried out during safety training courses (SIV) under proper guidance. Under any circumstances the present descriptions can not be taken as manual for practising the manoeuvres.**

This section describes flying conditions which can be deliberately induced, or which can develop unintentionally due to turbulence or pilot error. Any pilot who flies through turbulence is sure to be faced with these special flight conditions at some point. So be aware of these flight manoeuvres and prepare for them by SIV (safety training over water). We expect you are an advanced paramotoring pilot and you already have the proper experience. Mastering these flying conditions significantly improves your active flight safety. Bear in mind that all disturbances of the canopy can increase the sink rate by 2 - 10 m/sec, depending on the degree of disturbance. Carrying out these manoeuvres wrongly may lead to a crash.

### Asymmetric collapse

A negative angle of attack can cause all or part of the leading-edge of the MacJet to collapse (e.g. in very turbulent air). The MacJet will re-open spontaneously from closures of up to 50%. The time this takes, and the associated height loss, can however be noticeably reduced by appropriate action by the pilot. Apply opposite brake on the inflated side, the outside of the curve, to stop the turning movement of the canopy. If you react immediately, 30% brake on the open side should suffice to hold the canopy on a straight course. In the event of a big collapse, this braking should be applied very carefully to avoid stalling the remaining inflated wing. The pilot's correction for direction can be aided by a pumping out the deflation; a slow, long pumping action of the brake of the deflated side of the wing helps the canopy to re-inflate. If the pilot does not correct, the canopy can enter a stable spiral dive.

### “Cravat” / Line-over:

In the event of some lines becoming tangled during flight (caused by whatever), the following action is recommended:

The pilot stabilizes the glider by gently applying the opposite brake. Please be aware that in this condition the brake pressure can be higher and the brake travel shorter.

Without pilot input a line-over will result in a stable spiral dive.

Here are the various options to untangle a line-over:

- pumping the collapsed side.
- pulling the stabilizer line or a sharp pull on the D riser can solve the problem.

Attention! If these manoeuvres fail or if in any doubt, the pilot should instantly use their emergency parachute system!

## Frontal Collapse:

When flying with a paramotor the reflex profile makes it practically impossible to induce a front tuck, except with trim closed setting using special techniques. Such collapses provoked at higher speeds can lead to extremely deep collapse and its recovery requires short and equal application of both brakes.

When experiencing a very large front tuck, a frontal rosette can occur (the wingtips move forwards: forming a horseshoe shape). Short and gentle braking can avoid this deformation.

A quick recognition of the situation and a quick reaction by braking on both sides for as long as the collapsed wing is behind the pilot helps the recovery and limits the altitude loss.

## Parachutal stall (deep stall):

A parachutal stall can be caused by, among other reasons, turbulence at too slow a speed trim or too much brake application when a power unit is added. Porous canopies (UV influence) or canopies out of trim (stretched or shrunken lines) are much more susceptible to a parachutal stall and therefore should not be flown. These are some of the reasons regular checks should be carried out on your glider. A wet canopy or temperatures below zero centigrade (0°C) may also cause a stable parachutal stall.

When releasing the brakes the MacJet will usually spontaneously recover from a parachutal stall within 2-3 seconds. If the canopy remains in a parachutal stall, it is sufficient to release trims or to push the accelerator.

Attention! If brakes are applied while in a parachutal stall, the glider may suddenly enter a full stall!

## Full-stall:

Practically does not occur, may happen only as a result of serious neglect or intentional action of the pilot. You have to be careful when flying at low speeds until fully familiar with brake operation. The wing recovers spontaneously in the initial phase of stall, otherwise use standard procedures.

To recover from a full stall, smoothly release both brakes simultaneously until 90% of leading edge reopens, then release brakes rapidly. The glider ends the full stall on its own without surging forward.

**WARNING!!** If the brakes are released rapidly and asymmetrically, the glider may surge almost 90° and suffer an extensive asymmetric collapse.

The danger of overcorrecting and overreacting exists during all extreme flight manoeuvres. Thus, any corrective action must be gentle and controlled and done with feel for the glider!

## EXTREME FLYING MANOEUVRES

### Spin (or negative spin):

Normally it does not occur. You have to be careful when flying at low speeds until fully familiar with brake operation. Pulling brake on one side too fast or too hard can result in a negative spin. During a spin the canopy turns relatively fast around the centre section of the canopy while the inner wing flies backwards (hence the term negative).

### There are two usual reasons for an unintentional spin:

- One brake line is being pulled down too far and too fast (e.g. when inducing a spiral dive in slow setting)
  - When flying at low speed the opposite brake to torque moments is applied too hard
- To recover from an unintentional spin, the pulled down brake line should be immediately released as soon as a spin is suspected. The canopy will accelerate and return to its normal straight and stable flying position, without losing too much height. If the spin is allowed to develop for some time, the glider surges a long way forward on one side and a dynamic asymmetric collapse or a line-over can occur. Gently apply the brakes to avoid side or central collapse of the canopy and the possibility of a cravat (one of the tips becoming entangled in the lines).

**WARNING!!** If you are LOW and are in an unintentional spin, or if the canopy is caught in a cravat USE YOUR RESERVE.

### Wingover:

To induce a wingover the pilot flies consecutive alternating turns to gradually steepen the angle of bank. During wingovers with a high bank angle, the outside wing begins to unload. Further increase of the angle of bank must be avoided, because any possible resulting collapse may be quite dynamic!

**WARNING! Full-stall, spin and wingover (over 90 degree angle of bank) are prohibited aerobatic manoeuvres and may not be performed during normal flying. Incorrect recovery procedures or overreaction of the pilot may have dangerous consequences! Attention! The MacJet is not designed to be used for aerobatics.**

### Alternative (emergency) steering:

If for some reason it becomes impossible to control the MacJet with the brake lines the D-risers may be used to steer and land the canopy. Attention! Of course the range is much shorter (10-15 cm) than with the brakes. It is also possible to control the direction of the flight by pulling on a stabilizer line or by weight-shifting.



## Spiral dive:

**Attention! Trim setting in slow or neutral and the power off when executing spiral dive.**

A spiral dive is the fastest way to lose altitude, however, the very high G-forces make it difficult to sustain a spiral dive for long and it can place high loads on the pilot and glider. By tensing ones abdominal muscles and a higher body tension you can to some extent resist the high G-forces. Don't forget proper breathing! As soon as any, even slight, light dizziness or impaired vision is noticed the spiral should be exited immediately.

The MacJet has a very effective spiral dive. This allows rapid descent without stalling. To enter a spiral dive the pilot should weight-shift on one side while slowly pulling the brake gradually on the same side as weight-shifting. During a spiral dive the angle of bank can be controlled by increasing or reducing the amount of inside brake. When spiral diving the MacJet it is recommended that the outside brake is lightly applied. This helps stabilize the wing and enables an easier and safer exit from the spiral. To exit, release the inside brake slowly. The MacJet did not show a tendency to remain in a stable spiral during testing. At high sink speeds or if the pilot keeps his weight on the inside, the wing can stay in a continued deep spiral and has to be actively exited. This is done by weight shifting to the outside and gentle braking of the outside wing.

**WARNING!!** Nearly all gliders will have a tendency to stay in the spiral if the sink-rate exceeds around 15-m/s, depending on weight-shifting, wing loading and G-force. In fact most gliders need a counter-input to end a turn.

**Attention!** Due to energy retention, the glider will climb a lot after a deep spiral-dive release. If you apply inner brake and decelerate the glider for two or three turns, big pendulum effects can be avoided.

**WARNING!!** Practise spiralling with caution and lower sink-rates to get a feel for the gliders behaviour. A pilot who is dehydrated or not accustomed to spiralling can lose consciousness in a steep spiral dive!

**WARNING!!** Never do big ears in spiral! In this manoeuvre a smaller number of lines is carrying an excessive load multiplied by the centrifugal force, what can lead to damage of the lines or even the paraglider itself.

## Big ears:

As there is a lot of load on the "A's" especially on the faster trim settings as we do not recommend using big ears as descent technique under power. With a hard pull on the outermost A-lines there is higher risk of collapse. A spiral may be a more efficient way to get down.

When in big-ears without power, the horizontal speed is higher than the sink rate, unlike a spiral dive or a B-line stall. This rapid descent technique is used to quickly and horizontally exit a dangerous area in the desired direction. In order to collapse the outside wing, pull the outside A-lines.

## RAPID DESCENTS

When the pilot holds the outside A1-risers on both sides and pulls them down, the MacJet easily tucks the outside wings and enters a stable descent mode. The pilot keeps hold of the brake handles along with the outside A1-risers in his hands. By braking on one side and weight-shifting, the canopy remains steerable.

In order to increase the sink rate as well as the horizontal speed, this manoeuvre should be done together with use of the speed system. Apply the speed system after big ears are induced (step into the speed-bar before you grab the outer A1-risers). Big-ears substantially reduce the risk of canopy stability problems in turbulent air. To exit Big-ears release the A1-risers. The canopy does slowly self-recover. If not, or to quicken the recovery, the pilot can gently apply brakes to the glider.

**WARNING!** Never do big-ears in spirals, as this may drastically reduce the number of lines taking the already high loads, causing structural failure.

### B-line stalls:

As there is a lot of load on the “B’s” as we do not recommend using B-Stall as descent technique under power.

To induce a B-line stall without power, symmetrically pull down slowly on both B-risers, until the canopy folds (parallel to its long axis). The airflow over the top surface is almost fully detached and the canopy enters a vertical descent flight mode without forward movement. Further pulling of the B-risers reduces the surface area more and increases the sink rate. (Up to 8 m/s) Be careful, pulling too far or too rapidly may cause a frontal horseshoe to form. To exit from this flight mode release the B-risers at first rapidly but then gently (1 sec). The canopy surges forward re-attaching the airflow over the top surface and resumes normal flight. When the B-risers are released, the brakes should not be activated. This will give the canopy the chance to gain speed and resume normal flight. On exit from a B-line stall on no account just release the B-risers, as this can cause overloading. If canopy does not recover apply both brakes gently to recover or pull the A-risers, until the canopy regains forward speed.

### Summary:

For all extreme manoeuvres and rapid descents please note:

- first practise manoeuvres with an instructor during safety training!
- before inducing any manoeuvre the pilot must check that there are no other airspace users below him!
- during the manoeuvre the pilot must have the canopy within his view!

- Always carry out full pre-flight checks before launching.
- Never place your paramotor downwind of the glider.
- Check that there is no fuel leakage. Do you have enough fuel for the flight? It is always better to have too much than to need an emergency landing.
- Check for any loose articles that could trail or fall into the propeller while flying and fasten them securely.
- If you spot a problem, no matter how small, fix it at once!
- Always put on and secure your helmet before getting into the harness.
- Do not ask for trouble - do not fly over water, between trees or power lines and other places where engine failure will leave you helpless.
- After landing, control the wing facing the direction of flight to keep the lines out of the propeller. You should only turn to face the glider to avoid falling backwards onto your paramotor.
- Do not take a risk - do not fly over water, between trees or power lines and other places where engine failure will leave you helpless.
- Keep in your mind the turbulence caused by other powered gliders, especially heavy trikes.
- Keep in mind the turbulence caused by yourself, especially when flying sharp turns, spiralling or flying low.
- It is unwise to fly hands-off below about 100m, because a possible power unit malfunction may require immediate attention.
- Unless it is absolutely necessary (e.g. collision avoidance), do not make tight turns against the torque moments. During steep climbs you easily can enter a stall under power and consequent negative spin.
- Never trust your engine! It can stop at any moment. Always fly the wing prepared for this, especially at low altitudes.
- Avoid downwind low flying. It drastically reduces your options!
- Do not wait for the problem to grow. Be sensitive and ready to listen. A noticeable change in engine tone or a new vibration may indicate trouble. Land and check it out.
- Be certain of your navigation
- Not everyone is a friend of your paramotor noise. Keep within the rules and the laws. Care must be taken when flying near livestock and animals.

## LOOKING AFTER YOUR GLIDER

Looking after your canopy correctly will prolong the life of your paramotoring glider.

### **Deterioration: a few tips!**

- The canopy is mainly made of NYLON, cloth which, like any synthetic material, deteriorates through excessive exposure to UV. Hence, it is recommended that you reduce UV exposure to a minimum by keeping the paramotoring glider packed away when not in use. Even when packed in the bag do not leave it in the sun.
- Keep the canopy and lines clean as dirt may penetrate into the fibre and damage the lines or the cloth.
- Ensure that the lines are not folded tightly. It's extremely important to avoid any sharp bending of the lines, especially the main lines. Pay careful attention to the lines to avoid damaging them. Any over stretching of lines apart from the strain imposed during normal flight, should be avoided as over stretching is irreversible.
- Be careful, not to allow snow, sand or stones to enter inside the canopy's cells: the weight can change the angle of attack, or even stall the glider; additionally the sharp edges can destroy the cloth!
- Check line lengths after tree or water landings. They can stretch or shrink lines.
- Never drag the wing over rough ground! This will damage the cloth on the wear points. When preparing the wing on a takeoff with rough ground, don't pull the wing over it (i.e. by pulling the brakes). Please try to pack the wing on soft ground.
- Uncontrolled strong wind takeoffs or landings can result in the leading edge of the canopy hitting the ground at high speed which may cause rips in the profile and damage the rib material.
- Clean the paramotoring glider with fresh water after contact with salt water. Salt water crystal can reduce line strength, even after rinsing in fresh water. Replace lines immediately after contact with salt water. Also check canopy material after water landings, as waves can place uneven forces and cause cloth to distort in specific areas. Always remove gliders from the water by holding only the trailing edge.
- Prevent lines from catching on anything as they may be over stretched. Do not step onto the lines. Although the lines were tested with a bending test they can be damaged if stepped on whilst on a hard surface, or if they come into contact with sharp objects.
- Do not always fold the canopy symmetrically to the centre cell as this can cause constant stress on the centre cell (centre cell always to the outside).
- Clean the paramotoring glider with water and a soft sponge. Do not use any chemicals or spirits for cleaning, as these can permanently damage the cloth.

### Storage:

- Store the paramotoring glider in a dry space at ambient temperature away from chemicals and UV light.
- Never pack or store the glider wet. This shortens the life of the cloth. Always dry glider thoroughly before any packing or storage.
- During transport it has to be considered, that some materials of the paramotoring glider are temperature sensitive. Avoid subjecting your wing to high temperatures (e.g. the luggage space of a parked car in the sun)!
- Keep it lonely. Insects, such as grass-hoppers and ants will simply eat their way out if rolled up with the wing. Grazing cattle can literally lick the coatings off the fabric and mice love to make homes in canopies! Therefore hang up your wing in its bag during long term storage.

When sending your wing as a parcel, take extra care with packing.

### Repairs and checks:

- Tears in the canopy must be professionally sewn. Adhesive patches are only adequate for very minor damage.
- Repairs should only be carried out by the manufacturer, distributor or authorized workshops. Only original spare parts may be used!
- The lines must be checked after every 50 hours flying time and whenever the flight behaviour changes
- Any changes to the canopy lines or risers, except those approved by the manufacturer, will void the certificate of airworthiness.
- The MacJet must be checked as a minimum, after two years or after 100 flying hours by the manufacturer or authorized workshops.

### Disposal:

- The synthetic materials used in a paramotoring glider need professional disposal. Please send disused canopies back to us: we will dismantle and dispose of it.

### In Conclusion:

The MacJet is a modern paramotoring glider. You will enjoy many safe years of flying with your MacJet if you look after it correctly and adopt a mature and responsible approach to the demands and dangers flying can pose.

It must be clearly understood that all air sports are potentially dangerous and that your safety is ultimately dependent upon you. We strongly urge you to fly safely. This includes your choice of flying conditions as well as safety margins during flying manoeuvres. We recommend once more that you only fly with a certified harness, reserve parachute, and

## LOOKING AFTER YOUR GLIDER

helmet. Also the certification placard must be present on the glider. Every pilot should be suitably qualified, have a valid license and 3rd party insurance.

The MacJet is delivered with a stuff-sack, Velcro compression strap, MAC PARA backpack, repair kit and user manual.

### Warranty

MAC PARA guarantees free of charge repairs caused by the material or production faults according to the following scheme:

For powered flying the warranty covers 24 months (2 years) or 200 flight hours (whichever comes first).

Warranty does not cover:

- canopy colour fading
- damage caused by chemicals or salt water
- damage caused by incorrect use
- damage caused by emergency situations
- damage resulting from accidents (airborne or not)

Warranty is only valid if :

- every flight is correctly registered in the logbook of the wing
- conditions, temperatures of each flight are registered in the logbook
- the paraglider is handled in accordance with the operating manual
- the purchaser has not carried out any repair by him/herself (excl. minor repairs with self-adhesive patches)
- carried out any modifications
- the paraglider has been inspected according to prescribed timetable.

If you have bought your paraglider second-hand, ask the previous owner of the paraglider for a copy logbook (total of flying hours since the date of first purchase and details of any checks).

## TREATING NATURE WITH RESPECT

Finally the call to practise our sport with respect for nature and wildlife! Not everyone is a friend of your paramotor noise. Follow the rules and the laws. Care must be taken when flying near livestock and animals.

<b>Riser lengths - MacJet</b>	<b>A</b>	<b>A1</b>	<b>B</b>	<b>C</b>	<b>D</b>
<b>Trims in neutral position</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>520</b>
<b>Trims closed ( slower )</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>495</b>	<b>480</b>
<b>Trims open ( faster )</b>	<b>520</b>	<b>520</b>	<b>520</b>	<b>580</b>	<b>640</b>
<b>Accelerated + trims in neutral</b>	<b>320</b>	<b>370</b>	<b>420</b>	<b>470</b>	<b>520</b>
<b>Accelerated + trims open *</b>	<b>320</b>	<b>370</b>	<b>420</b>	<b>530</b>	<b>640</b>

The lengths are measured from main attachment point to the lower edge of rapid links.

\* Read more on the page 19.

## Line descriptions:

The following printed line plans show the line configurations and line lengths.

## Line strengths in colours

Background color at a length determines line material it is made.

**Aramid/Polyester A-6843-060**

**Aramid/Polyester A-6843-080**

**Aramid/Polyester A-6843-120**

**Aramid/Polyester A-7343-140**

**Aramid/Polyester A-6843-160**

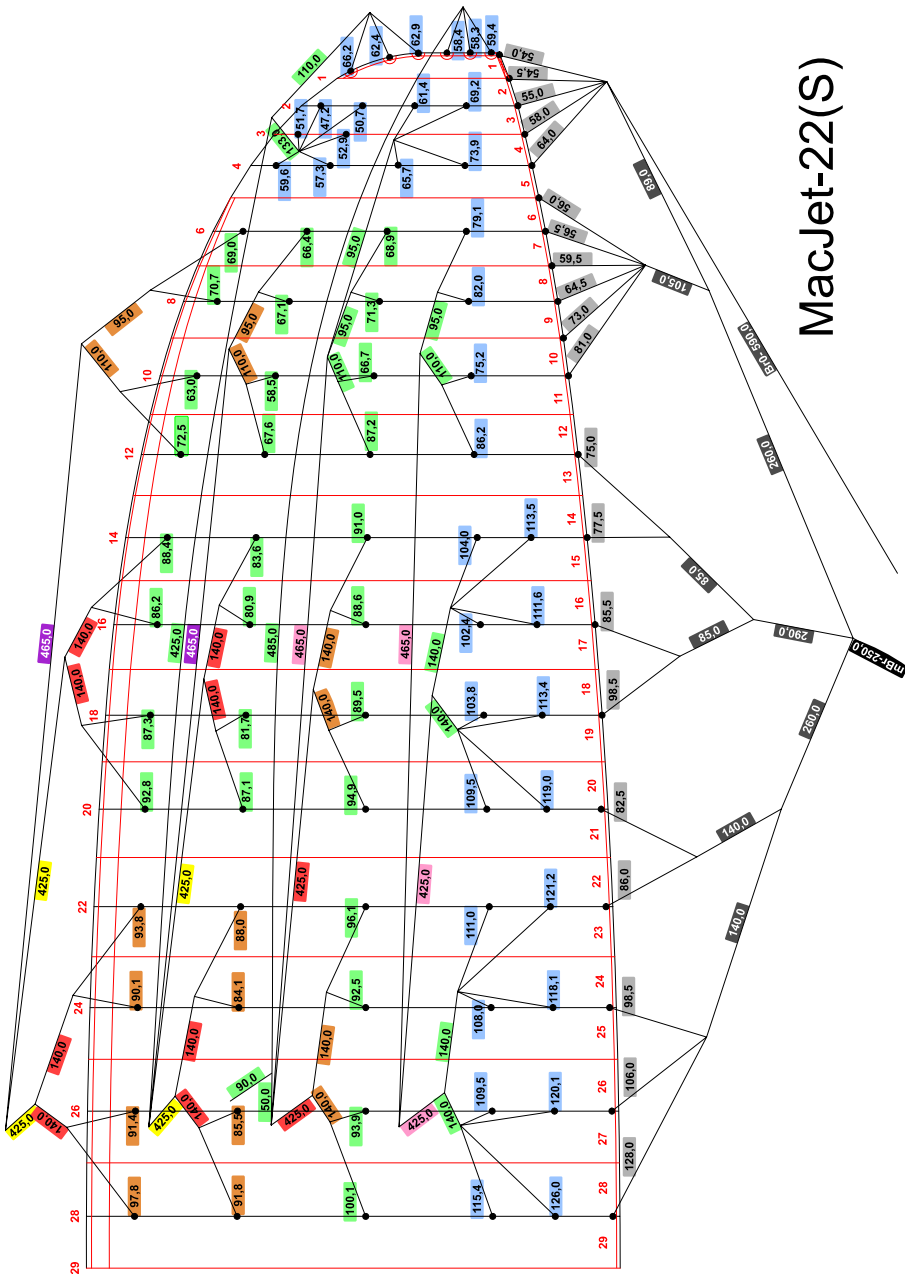
**Aramid/Polyester A-6843-240**

**Aramid/Polyester A-6843-340**

**Aramid/Polyester A-7850-080**

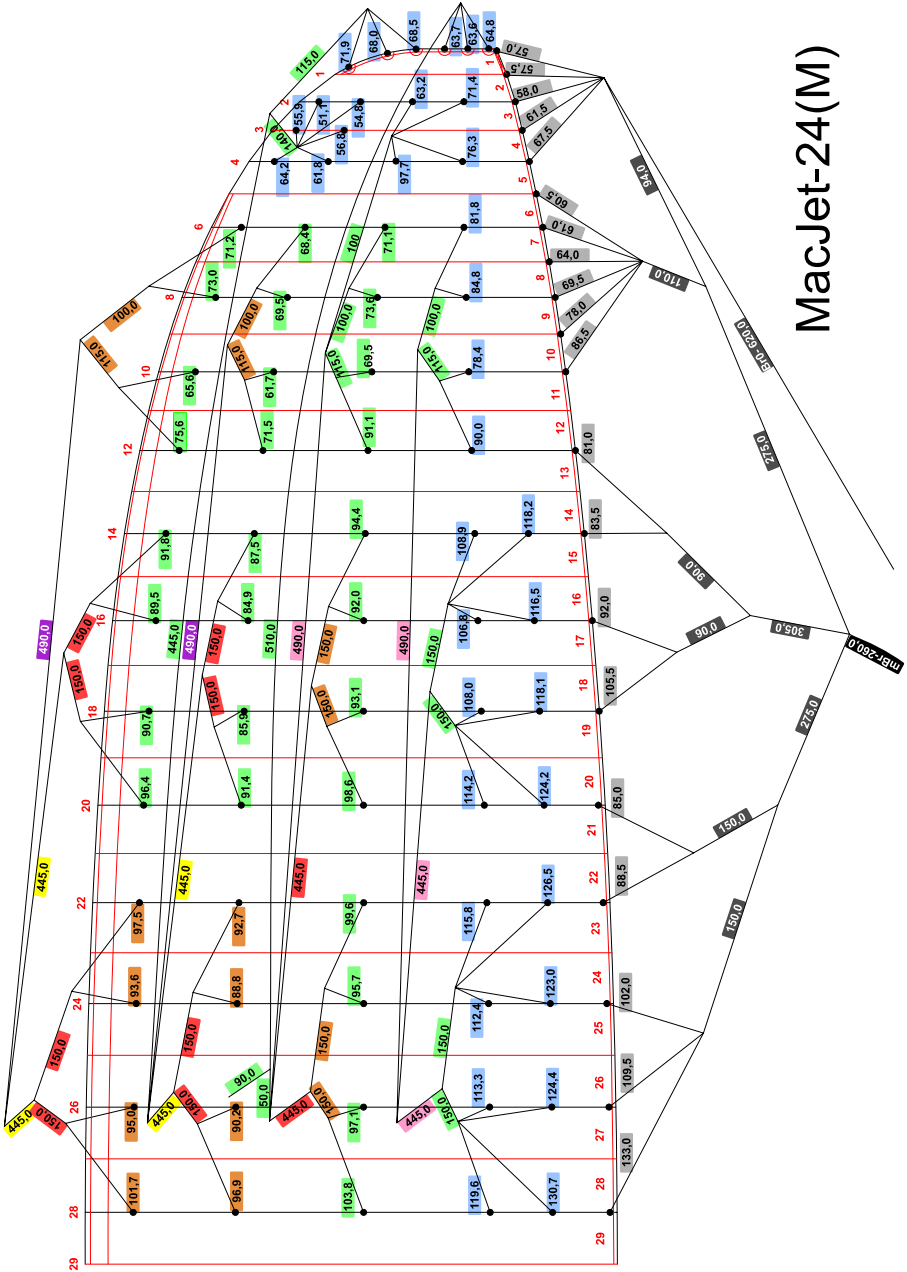
**Aramid/Polyester A-7850-100**

**Dynema/Polyester A-7850-240**

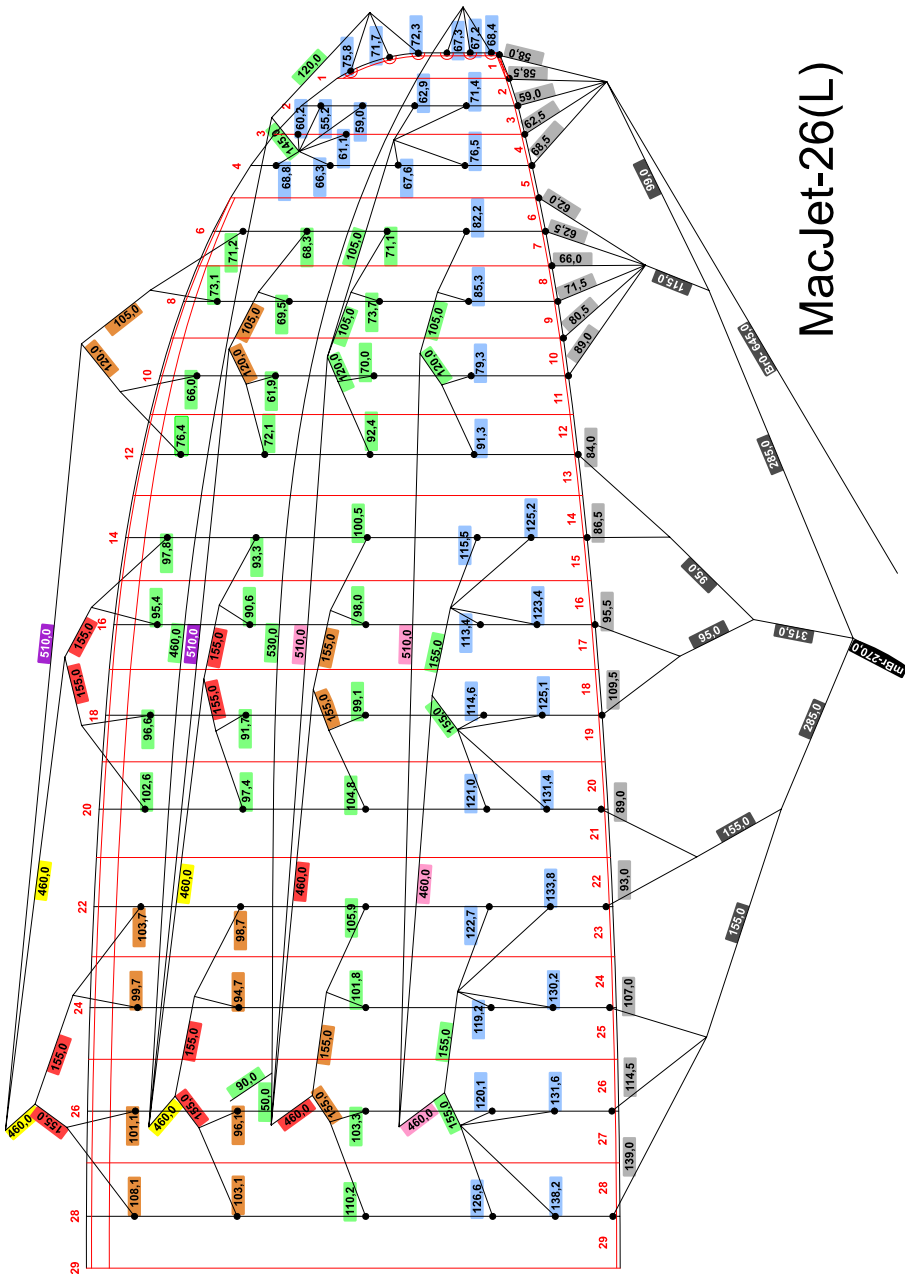


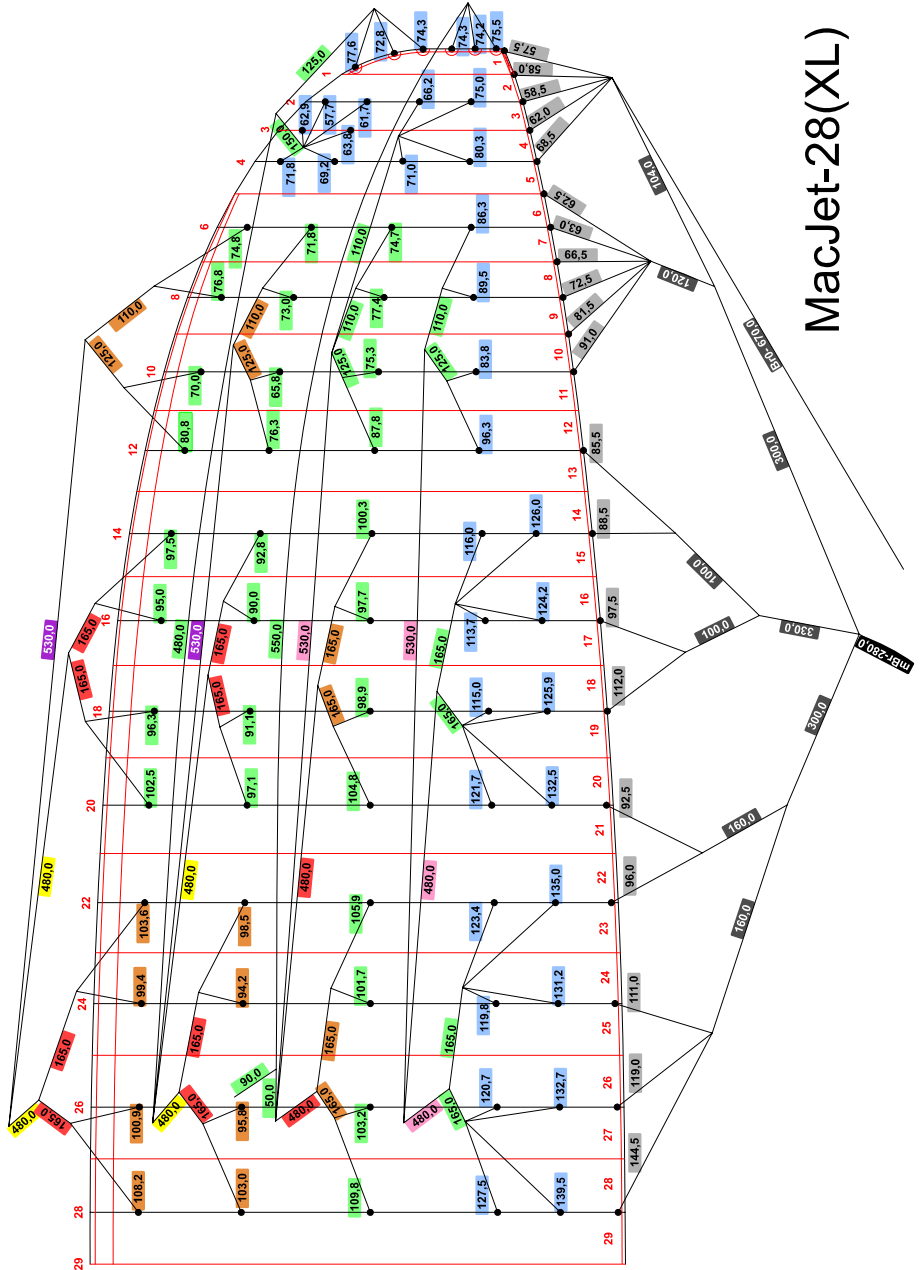
MacJet-22(S)



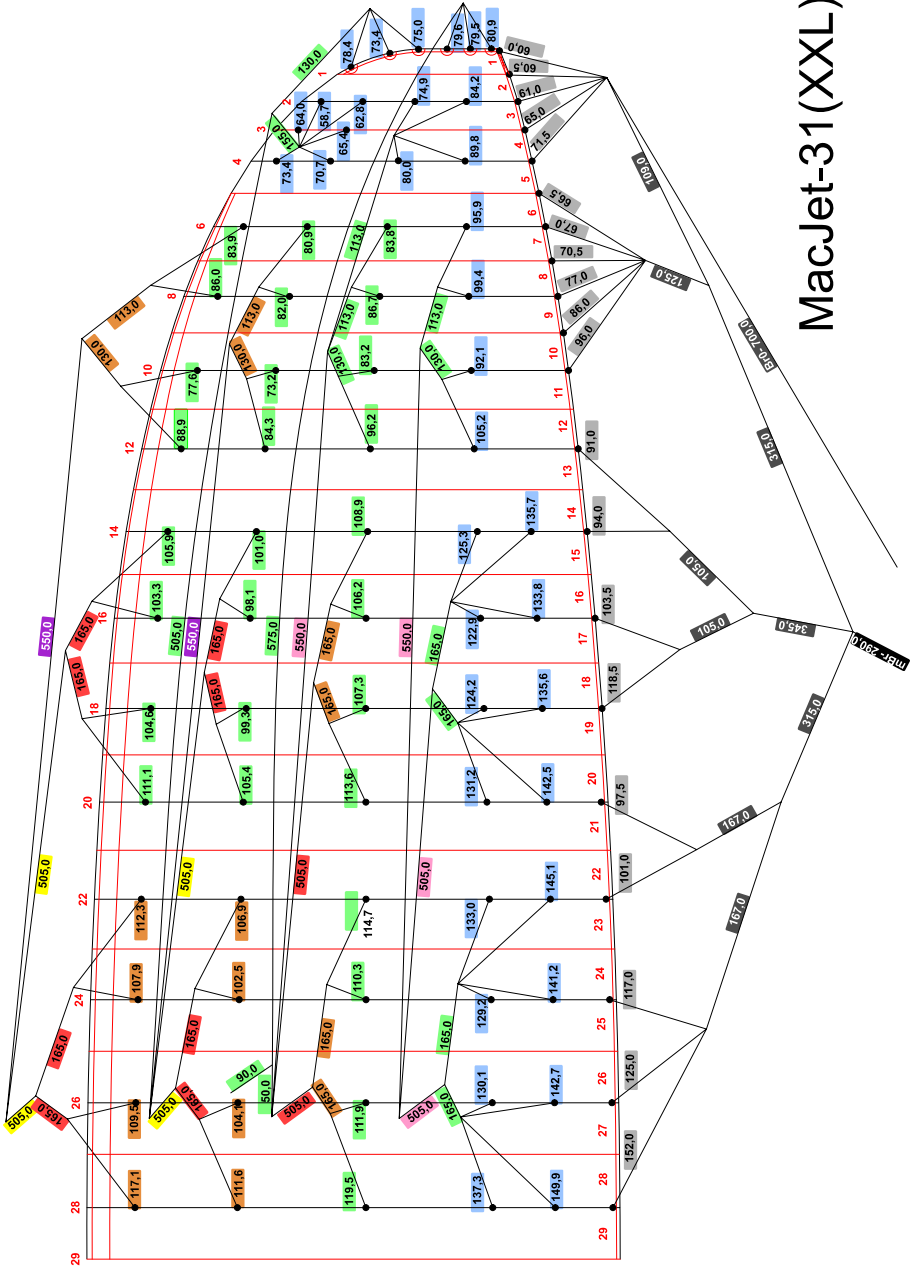


MacJet-24(M)





MacJet-28(XL)



MacJet-31(XXL)

## Check-intervals

All paramotoring gliders used in flight must be checked at least every 24 months. For paramotoring gliders used by paramotoring schools the period is 12 months.

## Personnel authorised to carry out checks

A valid flying license and training course by National association are the basis for permission to carry out paramotoring glider checks

## Identification of glider

An identity sticker with details of certification and serial number is attached to the glider.

## Components of the check

### Porosity

The porosity should be checked with a porosity meter (JDC). Compare the resultant data with the producer's manual.

Porosity measures should be taken on at least three points of both the top and bottom surface. The first point should be placed 20-30 cm from leading edge in the middle of canopy. Second and third points are placed left and right from first measure point at 25% of the span. One additional measurement should be made on the top surface of the wing tip.

The identified time should be higher than 30 second (JDC). In the event of the result being less than 30 seconds, the result of the check is a fail.

### Overall strength check

The check of canopy strength should be made with a Bettsometer (B.M.A.A approved Patent No. GB 2270768 Clive Betts Sales). On the top and bottom surfaces make small holes with a needle at the A-line attachment points. The exact verification should be made in accordance with the Bettsometer user manual.

### Line strength check

Line strengths should be as specified in accordance with the certification requirements. One main line should be taken from each array and have its strength checked with a tension-meter.

Required strengths should be higher than:

- A + B main lines x measured value > 8 x maximum take-off weight and higher then 800 kg for the A + B arrays.
- C + D mean lines x measured value > 6 x maximum take-off weight and higher then 600 kg for the A + B arrays.

Replacements for damaged lines must be with new original lines. Line lengths are taken from the lines data page.

## Line length measurement

Lines should be separated and each line measured under a tension of 5 kg. Measurement is made from the line karabiner to the canopy according to the method of certification. Rib numbering begins in the middle of canopy and leads to the wing tip.

Measured full lengths should be documented in the inspection record and are compared with certified full line lengths protocol. Lengths should not differ by more than 20 mm. The opposite sides should be checked for symmetry.

## Canopy line-attachment points check

Attachment points should be checked for damage and stretching. Defects, loops and flares should be repaired.

## Canopy fabric check

Ribs, diagonal ribs, top and bottom surface should be checked. Any damage to sewing or tears to the fabric, which could influence flying characteristics must be repaired.

## Lines

All lines should be checked for tears, breaks any damage to the sheath or signs of wear. Special attention should be paid to the sewing of the line loops. Damaged lines must be replaced.

The results should be documented in the inspection record.

## Connector check

All line carabineers, trims (if used), speed systems and pulleys should be inspected for visible damage. Open or improperly secured connectors should be secured in accordance with the producers recommendations.

## Risers

Both risers should be checked for tears, signs of wear or any damage and measured with a pull of 5 daN strength. Measured data should be documented in the inspection record. The difference must not be higher then 5 mm when compared to specified lengths.

## Final check

The glider sticker and check sticker must be inspected for readability and correctness. The check must be documented with date, signature and stamp on the canopy and in the user manual.

## TEST FLIGHT CERTIFICATE

Paramotoring glider type: **MacJet –**

Serial number: \_\_\_\_\_

Test flown on: \_\_\_\_\_

by

**MAC PARA TECHNOLOGY**

Confirmation by dealer: \_\_\_\_\_

## TECHNICAL SPECIFICATION

Paramotoring (reflex) glider		MacJet	MacJet	MacJet	MacJet	MacJet
Size		22	24	26	28	31
Zoom flat	[%]	88,0	92,5	96	100	104,5
Area flat	[m <sup>2</sup> ]	22,02	24,33	26,21	28,44	31,06
Area projected	[m <sup>2</sup> ]	19,06	21,06	22,68	24,61	26,87
Span flat	[m]	10,73	11,28	11,71	12,20	12,75
Span projected	[m]	8,54	8,98	9,32	9,71	10,15
Aspect ratio flat	-	5,23	5,23	5,23	5,23	5,23
Root cord	[m]	2,45	2,57	2,67	2,78	2,91
Cells	[kg]	58	58	58	58	58
Weight	[kg]	5,8	6,0	6,3	6,6	7,0
Weight range *	[kg]	77-100	85-110	100-130	115-147	140-180
Min.speed	[km/h]	24-26	24-26	24-26	24-26	24-26
Speed Trimmers closed	[km/h]	40-43	40-43	40-43	40-43	40-43
Speed Trimmers open	[km/h]	49-52	49-52	49-52	49-52	49-52
Top speed (accelerator)	[km/h]	60-63	60-63	60-63	60-63	60-63
Glide ratio	-	8,2	8,2	8,2	8,2	8,2
Min. Sink rate	[m/s]	1,3	1,3	1,3	1,3	1,3

\* powered pilot equipped = weight naked + cca. 35 - 40 Kg



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