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WORLDWIDE PARAGLIDING AND PARAMOTORING MAGAZINE. FOR FREE.

# Light: hike, fly & bivouac

Photo: Markus Gründhammer


**Cover photo: Markus Gründhammer from Skyman flying back down to the valley after a night on the summit.**

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*Translation by Ruth Jessop*

P-Series

# KLIMBER P

## *Naturally competitive, designed for your adventure*

The result of our obsession to create the perfect balance between super-lightness and unrelenting performance.

Photo: Jérôme Maupoint/GIN

Stay high for the night...

*Lighter and lighter material is encouraging people to travel. Numerous paraglider pilots are lengthening their hike and fly outings to cover several days, sometimes even sleeping high up.*
*In this edition, we have brought together equipment, advice and human interest stories pertaining to 'light', hike and fly and vol bivouac.*
*We've also noticed that lots of classic wings like the Nova Ion 4 or the Gin Sprint 3 have been made lighter to the point where they have a legitimate place in this 'light' article.*
*We explain how the manufacturers have managed to reduce the weight of these wings which are nonetheless fairly robust.*

Photos : Markus Gründhammer/Skyman

# PORTFOLIO

# *Markus Gründhammer*

*If there is a specialist in hiking and vol bivouac, this is him: Markus Gründhammer, the founder of Skyman... He loves sleeping on the summit so that he can paraglide down in the morning, arriving in time for work. After almost every outing he brings us back some amazing photos taken with his Nikon.*

A mystical place, even for atheists: a typical summit with a cross. This is one of the places where Markus prefers to spend his nights, flying down in the first rays of sunlight.

Photos : Markus Gründhammer /Skyman

Photos: Markus Gründhammer/Skyman

**Markus spends lots of time on the summits, all year round. He's there so much that he had time to build a cairn of the Skyman logo...**

Over the last seven years, Markus has spent 511 nights on the summits, in both summer and winter. An example of a climb in the snow: https://vimeo.com/82761796. Once, it even went to minus 25°C, with a north wind of about 40-50km/h!

How do you survive the cold during a winter bivouac? We asked Markus to give us some advice:

- Between two and four in the morning the cold often becomes almost unbearable. At this point eating some chocolate starts your digestion system working, which heats your body up.
- No alcohol of course, that dilates the blood vessels and you lose more heat.
- Remember to take enough water.
- Wear duvet slippers. If your feet are warm, you will rarely be cold.
- Arriving at the summit at night time in the middle of winter with the wind and the cold, can be really frightening. 'I've seen big tough men panic, and want to go straight back down.' Yet it's simple: change out of the clothes that you walked up in so that you'll be dry, then get into your sleeping bag, five minutes later you'll be warm, whatever the weather.
- Take spare dry socks and gloves.
- In the morning, bear in mind that the night was less relaxing than it would have been lower down in the valley and that reaction times and the accuracy of movements will be different at take off. As a consequence, use greater safety margins than normal.

Photos: Markus Gründhammer /Skyman

Igloos provide a great form of protection during the night on wintery summits. But they take time: to build this sort of temporary dwelling takes two people at least 4-5 hours.


**After a night in this unique encampment and a morning on the summits, it's time to return to the valley !**


# Accessible, Versatile, Light Weight

The pinnacle of the GEO series! With pioneering OZONE SharkNose technology and all of the design features that have boosted performance in our intermediate class wings, the Geo 5 features performance that is in line with the rest of our XC range.

# GEO 5

WWW.FLYOZONE.COM

The Skyman tent. It is erected using walking poles, only weighs 400 g and only costs 180 €. We're looking forward to testing it when it's available again.

# LIGHTWEIGHT TENTS

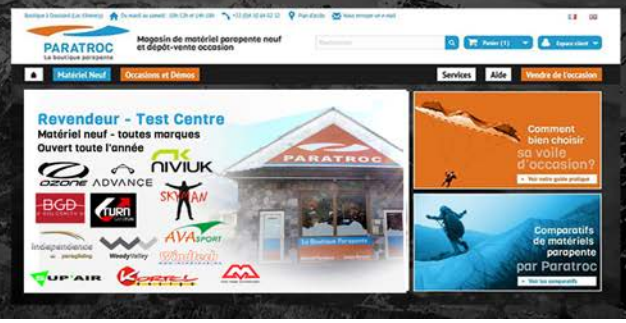
## TENTS FOR THE GENERAL PUBLIC ARE BECOMING COMPATIBLE WITH AIR SPORTS…

Tents which are specially designed for the paragliding bivouac have a long tradition. The pioneer of hike and fly, the late Pierre Bouilloux, made them more than twenty years ago, but Supair don't have them in their catalogue any more. Ripair offered the Ultralight model (on the left in the photo, 1370 kg), but the model isn't produced anymore. Skyman usually have a tent designed by Markus Gründhammer in their catalogue (pictured above), but since this autumn they have been out of stock.

Fortunately, the manufacturers of classic walking equipment are also becoming increasingly interested in lightweight. At Intersport, for example, you can find the McKinley Aero 2 (right, 1.3 kg), the details are given on the following page. Decathlon's Quechua brand makes the lightest tent of this type, the Quickhiker Ultralight 2, which all the same, weighs 1.96 kg.

This tent is lighter than advertised (only 1.2 kg), and yet, it has a double roof (two layers). The outer fabric is fairly reminiscent of Dokdo 20, and is in fact ripstop nylon 20D with a silicone coating on both sides. Putting it up is easy, once you know how. On the other hand, it's really important to plant the pegs to give the tent its shape.

# MACKINLEY AERO 2

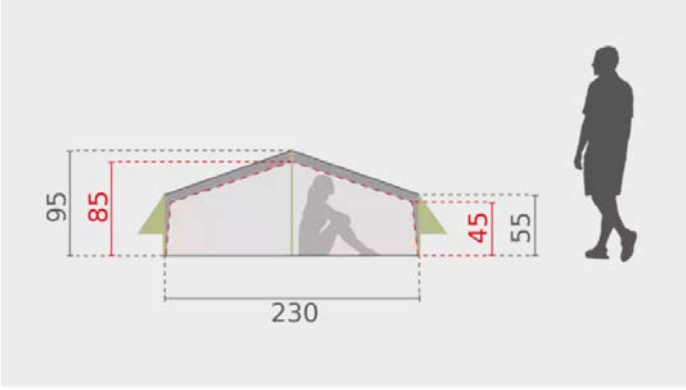


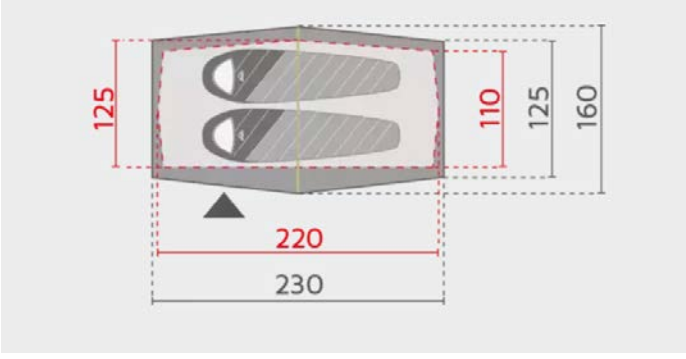

Details MacKinley Aero 2

Given the dimensions, it's small for two people with their equipment, but it's really light and easy to transport.

In addition, the Aero 2 is very affordable at 200 €.

http://www.mckinley.eu/equipments/tents/aero-2-p138335




The McKinley Aero 2 is also lighter and less bulky than the Ripair we used as a reference. Dimensions of the rucksack: 44 cm by 8 cm diameter approx.

One of the two air vents...

...seen here from the inside.

Classic: the pole fixes into an eyelet.

A strip of Velcro stops the door flapping in the wind.

The interior of the McKinley Aero 2. For one person plus equipment it's very good.

As a comparison, the interior of the former Ripair tent. Even with two plus equipment, it's spacious.

Reminder, this tent with a single skin roof was made by paraglider pilots for paraglider pilots. It was very spacious compared to the McKinley, and the floor was better insulated, being made from material similar to a survival bag.

The tent really was self supporting, no need to plant the pegs and it cost about 260 €.

It would be great if Ripair started making it again, but lighter if possible...

# THE OLD RIPAIR TENT

The components of the tent. Below, the ultra light pegs. Their effectiveness depends on the ground but, if there isn't much wind when you're inside the tent, there is no need for them.

The ventilation system at the top of the dome: nicely done.

It stays open thanks to a velcro-ed on baton.

The ground sheet: a survival blanket strengthened at the corners.

When travelling by paramotor here's a home that's easy to put up!

The ingenious X-Country-Tent by Oscar Mistri is almost perfect for travelling by paramotor. It's made from Skytex 45 and doesn't need poles because it uses the paramotor's cage. The only drawback is that the paramotor then stays outside with little protection. This will change in a future version which will be heavier and more expensive (Spring 2017). In the meantime, this tent, which weighs barely around 600 grammes, is very practical and nice for one person.

Dimensions (manufacturer's figures): 2.35 m by 1.40 m, height about 1.30 m. Folded, approximately 25 cm x 10 cm. Price: 250 €
http://xgeneration.beepworld.it/articoliecodici.htm

# X-COUNTRY-TENT BY OSCAR MISTRI


GIN
A lightweight sports performance wing for experienced XC pilots. Agile yet well-balanced handling and class leading performance in a compact wing weighing under 4kg.
Share your experience #gingliders
www.gingliders.com
Explorer

# POLINI 190 LIGHT REVISITED

Polini have updated the Thor 190, which will now be called the Thor 190 Evo, to further improve the carburation, reliability and weight (13.6 kg). Amongst other things, the piston has been redesigned, the carburettor modified to be more linear and the exhaust pipe divided into two parts so that it will wear better.
It's available in four versions:
- Hand starter (Flash-Starter) 2 180 €
- With an electric starter 2 450 €
- With clutch 2 520 €
- With clutch and electric starter 2 720 €.

www.polini.com


# ICARO: LIGHT, STRONG, UNIVERSAL SPREADER BARS

There are lots of ultralight tandem straps just in Dyneema. On the other hand, these straps don't separate the passenger from the pilot, which isn't great for in flight comfort. Icaro Paragliders sell spreaders which offer a very good compromise. They are relatively thin straps, with a plastic tube in the middle. The latter can easily be removed if one day it's really necessary to save extra weight for a serious hike and fly. These spreaders have everything necessary: three positions for the passenger depending on their weight, a loop for the reserve… The only thing that's missing: a second position for the pilot which could help balance the whole thing when he takes a light child. Weighing 232 g each and less than 500 g in total, they are nice high performance spreader bars which can be used equally well for a heavy tandem as for hike and fly. Price: 135 €

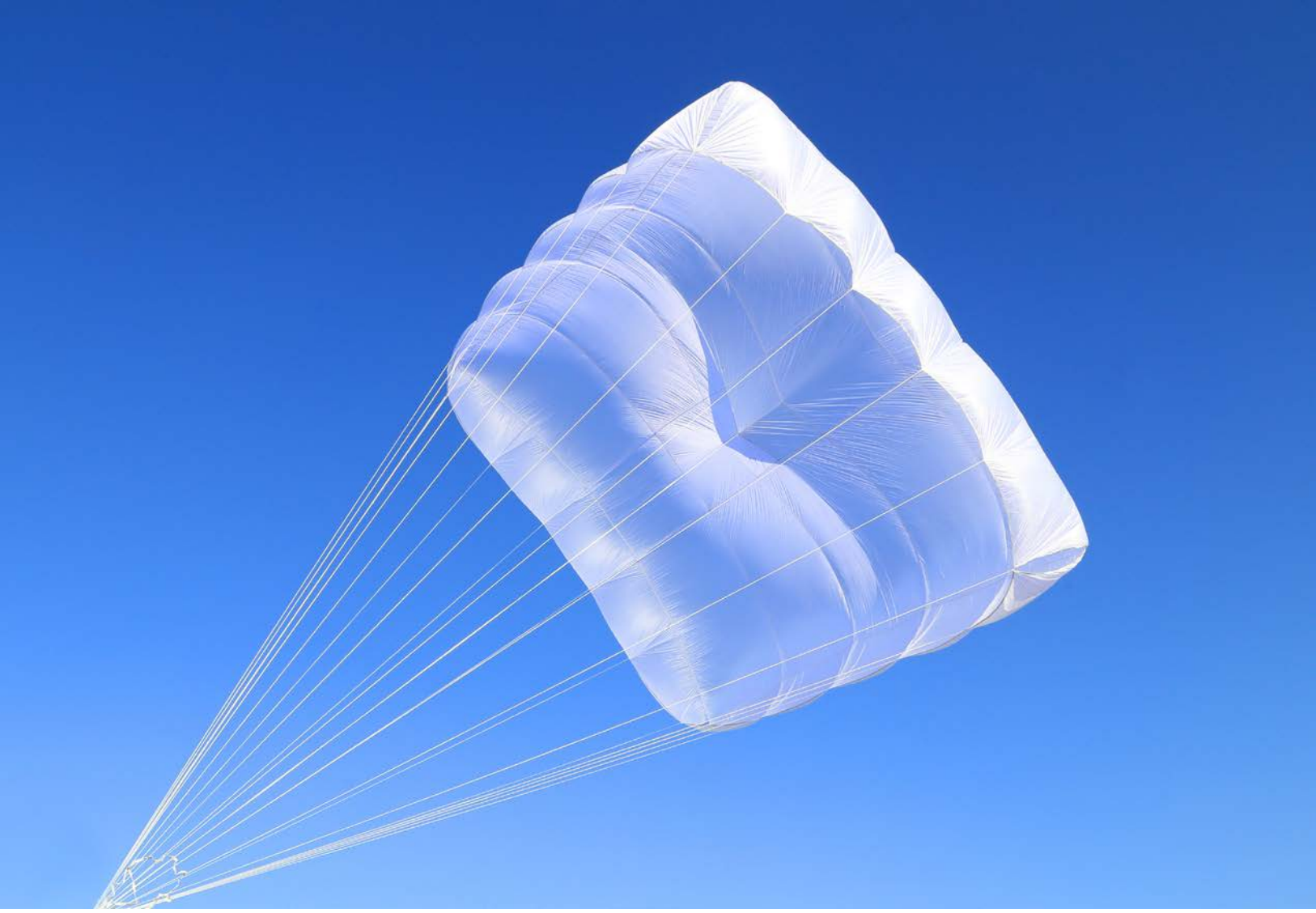
http://icaro-paragliders.com/en/products/accessories/tandem-spreader/

# THE BIRD WOMAN HAS LANDED

Australian Sacha Dench, who left Russia on the 19th of September on a Dudek Universal paramotor, has finished her several thousand kilometre journey by crossing the Channel on the 5th of December. After almost three months accompanying Bewick Swans during their migration to raise awareness about the species' decline, she landed in England, finishing her adventure in style. Initially, the plan was to fly a foot launch paramotor, but an injury forced her to continue using a trike. Motor: Fresh Breeze. Wing: a slightly modified Dudek Universal.

When she arrived in England, she was surrounded by the press. What a remarkable achievement to raise public awareness about birds and nature – mission accomplished on all levels. Well done Sacha Dench!

For more information:
https://www.flightoftheswans.org/

# YETI CROSS

With the Yeti Cross, Gin offer a reserve which is totally in keeping with the times: it isn't just very light, between 1.3 and 1.7 kg, but also more stable than classic parachutes. In fact, it's one of the advantages of square reserves. The sink rate is also a little bit less, and they generally open quickly. According to Gin, it is, in addition, very gentle.



| YETI CROSS - TECHNICAL DATA | | | |
|---|---|---|---|
| Manufacturer: GIN - Web: http://gingliders.com/parachutes-de-secours/yeti-cross/ | | | |
| SIZE | 26 | 32 | 38 |
| FLAT SURFACE AREA ($m^2$) | 26.07 | 31.62 | 38.08 |
| LINE LENGTH (m) | 5.26 | 5.79 | 6.35 |
| CENTRE LINE (m) | 5.34 | 5.88 | 6.45 |
| WEIGHT (Kg) | 1.3 | 1.5 | 1.7 |
| SINK RATE AT MAX. LOAD (m/s) | 5 | 4.8 | 4.8 |
| MAX. LOAD (Kg) | 86 | 104 | 126 |

# BEAMER 3 LIGHT

The Beamer 3, steerable reserve from the company High Adventure, is the current version of a model whose first specimens were flown in 1995. It was at this stage that ex-competitor Urs Haari started to make steerable reserves based on the Rogallo principle. Encouraged by this experiment, he developed the Beamer 3 light. In size small it only weighs 1.23 kg, which is little more than a round ultralight reserve.

But above all, it's amazing how small it packs away when folded up. All the more so considering that they are big wings compared to the normal round parachutes: between 35 $m^2$ and 42 $m^2$. Understandably the manufacturer can promise very low sink rates of around 3.8 m/s compared to 5.5 m/s for numerous round domes. It takes barely two seconds to open, which is also an important factor...

The Beamer 3 light is incredibly compact: right, the large version, 42 m² folded into a volume of 3.8 litres!

With its new GStar front container, it weighs 1.57 kg. This container has been well thought out, amongst other things it has:

2 handles, 2 little windows to check the nylon pins, space for instruments...

Photo: Burkhardt/voler.info

| TECHNICAL DATA | BEAMER 3 | | BEAMER 3 LIGHT | |
|---|---|---|---|---|
| SIZE | | Small | light | Light Small |
| MAX LOAD (kg) | 130 | 90 (100 ) | 130 | 90 (100 ) |
| FLAT SURFACE AREA [m²] | 41.75 | 35.47 | 41.75 | 35.47 |
| PACKING VOLUME [cm³] | 4 959 | 4 432 | 3 837 | 3 324 |
| WEIGHT (Kg) | 1 765 | 1 590 | 1 370 | 1 180 |
| WEIGHT WITH POD (g) | 1 835 | 1 640 | 1 420 | 1 230 |
| SINK RATE [min/sec] | 3.8 | 3.7 | 3.8 | 3.7 |
| OPENING TIME | 2 s | 2 s | 2 s | 2 s |
| CERTIFICATION | EN/LTF | EN/LTF | EN/LTF | EN/LTF |

# SLEEVES

*The manufacturer, Windsriders, known for their lightweight down jackets which are warm and compact, now offer down filled sleeves.*

To have warm hands, gloves are often not enough. Sleeves protect hands against the air flow and retain the warm air. In the Windsriders' "Hand's hot" sleeves, there is even a little pocket which allows you to add a chemical warmer. As a general rule this isn't necessary, these sleeves create a very thick cushion around your hands. Like the down jackets from the same manufacturer, the down is top quality. During transportation, these sleeves compress into a very small volume, but once they are unpacked, the feathers expand to a considerable volume and thus create a high performance protective cushion of air.

In the autumn, you can have bare hands inside the sleeves, and in winter you can add gloves.

The advantage of the sleeves compared to gloves, even thick ones, is that the protective layer is greater, and you can easily take your hands out, to operate instruments for example.

**Whether on a paramotor or on a paraglider, these Windsriders' duvet sleeves keep your hands warm. You can even put the throttle inside (here partially out for the photo).**

**Antoine Girard, during his flight over Broad Peak, had 'home made' sleeves. It's relatively easy to cut the sleeves off an old down jacket for example. Problem: as the sleeves flap in the airflow, the feathers all go to one side, leaving the into wind side empty. With the Windsriders' sleeves, which are firmer, this is hardly ever the case. During his next expedition, Antoine will be taking Windsriders. Note: like all acro pilots, Antoine doesn't have the brakes going through the pulleys, amongst other things to make self portrait shots easier. This makes it necessary to fix the brakes to the risers using an elastic cord.**

When you let go of the controls, to prevent the sleeves being blown back too much behind the pilot by the airflow, you can jam them between the riser straps.

On a paramotor, the sleeves are equally useful; you can fit your hands plus the throttle inside, no problem. On the other hand, you need to make sure that the propeller can't suck the sleeve in when you release the controls: that would lead to a violent spiral to the ground.

CONCLUSION
A very useful accessory to keep your hands warm. Weighing 152 grammes, the pair tested were pretty light compared to normal gloves (about 260 g) but, as they are generally used with gloves, you need to take this into account for hike and fly.

In theory you can make this type of sleeve yourself from an old duvet jacket but, as Antoine Girard pointed out, the result isn't necessarily the same.
60 € the pair, www.windsriders.fr


Pass the brakes through the opening at the top of the sleeve...


...and tighten the band.


Thus the sleeve can't go lower down than the brake handle.


On the other hand, you can slide it upwards, during take off for example.


P-Series

# BI SKIN 2 P

## *Double delight*

The first single-surface lightweight tandem (EN-B 3.3 kg) designed so that the pilot and passenger can undertake hike & fly and vol-biv adventures together.

Photo: Burkhardt / voler.info

# FABRIC: LIGHT COMING OF AGE ?

The fabric is a major part of a paraglider; as a consequence, its grammage plays a key role in the weight. On a 27m$^2$ wing, the lower surface and the upper surface together comprise about 55 m$^2$ of fabric. Then there are the cell walls and the diagonals which can, on a classic wing, represent an additional 40 to 50 m$^2$ of fabric.

Understandably the manufacturer:

- uses the lightest fabric, including for the internal structure.
- makes cell walls and diagonals which are more open.

The latter technique is being increasingly used by manufacturers; we'll talk more about that on the following pages. As far as lighter fabric is concerned, on some models which are, strictly speaking, identical but made with different fabric, you can easily see a real saving: Trekking economise nearly a kilo on the Senso Sport (4.7kg for the M) compared to the Senso (5.7 kg for the M), mainly by using 32 fabric instead of 38 for the rear upper surface and Porcher Skytex 27 instead of 38 for the lower surface. (The lines are the same).

In 2005, when Porcher launched the first Skytex 27, numerous pilots and manufacturers referred to it as 'cigarette paper', which didn't give a lot of confidence. Over the last eleven years, the fabric has been put to the test; numerous wings which are more than five years old still fly very well. Today, some manufacturers even claim an identical life expectancy; that's a bit optimistic. Others talk of a life expectancy which is shorter by 30 or 40 % for Skytex 27 compared to the 38. There was more on this in our Light 2015 article: http://free.aero/en/contentsHTML/Free_aero_Light_E_150/index.html?page=46. The main problem remains the mechanical abrasion which obviously has a greater consequence on 27 than on 38 or 32.

Certainly, with a good coating, the fabric can be better protected: Skytex 27 is available with a simple coating, or a coating on both sides. In this case, the weight is a little bit more: 29 g/m$^2$, but the life expectancy is, no doubt, better. But, probably for weight reasons, most manufacturers seem to use the single layer.

At any rate, over the last few years, the manufacturers have followed the 'rush' for lightweight, and have integrated Skytex 27 g/m$^2$ into more and more models. In this category of fabric, most manufacturers use Porcher. This is the case even if, for the heavier fabric, they work with Dominicotex. As a consequence Porcher took on four times more orders than in 2015 and had to put customers on a waiting list for several months, which has delayed the development of some models. Daniel Costantini from Porcher assures us that the waiting list is in the process of being diminished and that the time delays announced in the middle of the year will be respected.

At the same time, Dominicotex now sell Dokdo D10 (previously exclusive to Skyman and Independence) to all the manufacturers. It will be used in the new Ozone Ultralite 4 and the Ozone XXLite 2, for example. It weighs about 25 g/m$^2$ and seems to be coated on both sides. Remember, at Dominicotex, the number after the 'D' doesn't give the weight of the fabric, but the mass of the thread. 1 kilometre of thread, called a décitex, weighs 100 milligrammes.

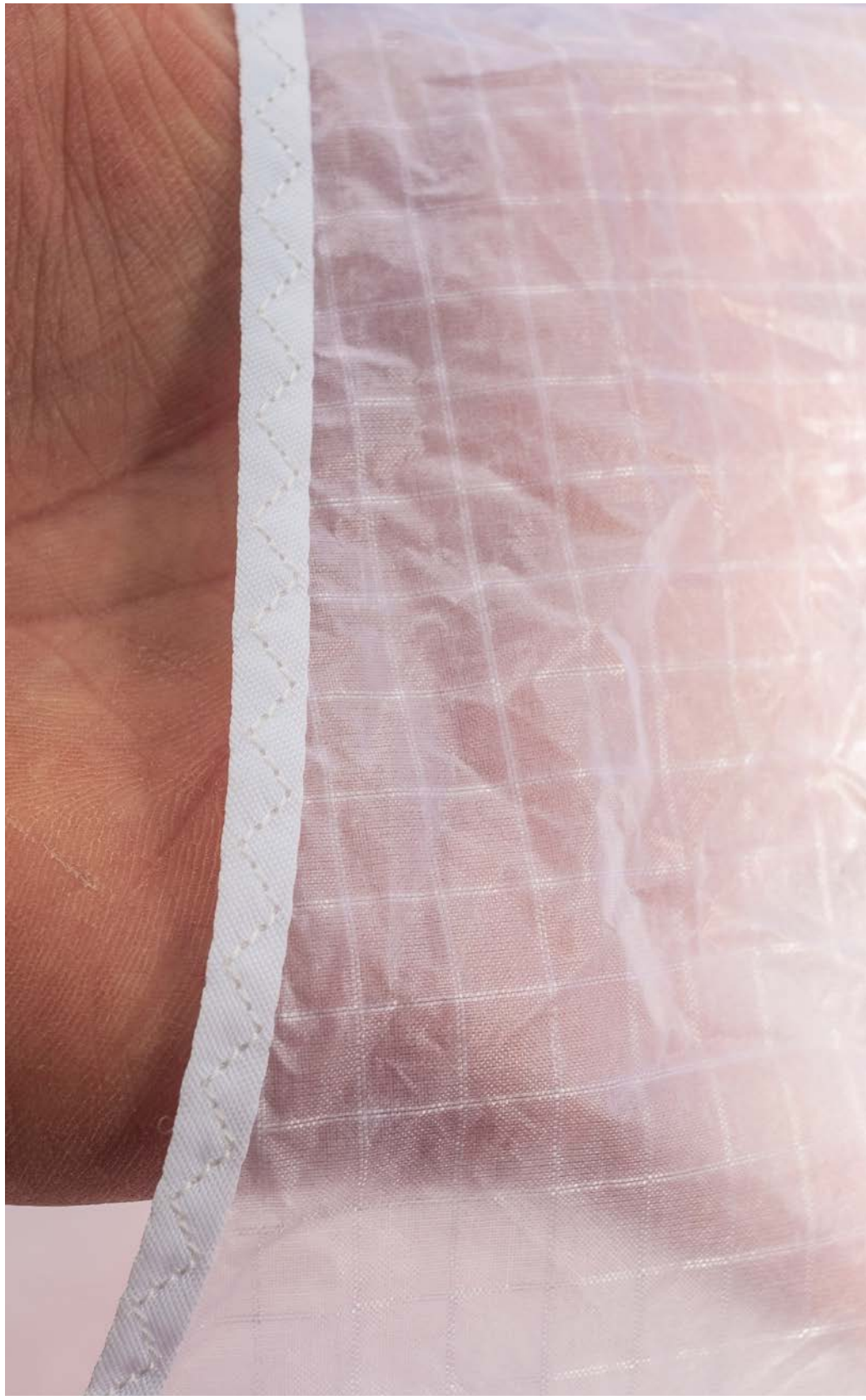
The fabrics are made as follows :

- Porcher Skytex 21 m$^2$: thread 11 dtx (prototype)
- Porcher Skytex 27 m$^2$: thread 22 dtx
- Porcher Skytex 32 m$^2$:thread 33 dtx and 22 dtx
- Porcher Skytex 38 m$^2$: thread 33 dtx
- Dominicotex 10D : thread 10 dtx, weight about 25 g/m$^2$
- Dominicotex 20D : thread 20 dtx, weight about 34-35 g/m$^2$

Apparently Dominicotex uses more thread and more coating per cm$^2$.

Porcher anticipate having the Skytex 21 ready for Saint Hilaire 2017. It's very complicated to make: such a fine thread requires, for example, a constant humidity during manufacture, and it can't be woven on the same machines as other fabrics…

What is certain is that the progression of 'light' hasn't finished yet.



Porcher Skytex 27 g/m$^2$ on an Advance Pi 2. Photo: S. Burkhardt

Photo: Andreas Busslinger

# ADVANCE PI 2

*For the PI 2 23 that we tested, Advance used at least three features to make it lighter: the size, the materials such as the fabric and new technology such as Sliced Diagonals.*

Almost exclusively unsheathed lines in Edelrid Aramid, which are very stretch resistant.

The famous Sliced Diagonals. Instead of just one piece of fabric for the diagonals, these ones are made up of thin bands orientated in the direction of the force. This makes the wing lighter and can give the profile a longer life expectancy. Photos: S. Burkhardt

The PI (1) came out in 2012 in two sizes, 19 and 23. The PI 2 has been available since 2016, but came out straightaway in 4 sizes: 16, 19, 23 and 27. The pilots have a choice of size depending on their programme: from a mini wing to a small paraglider for thermalling well, even during hike and fly.

Reducing the weight of the internal structure has allowed the addition of other technology, for a slight improvement as far as weight is concerned (2.75 kg for the PI 2 23 instead of 2.9 kg for the PI 1 23). The Advance SharkNose could be the main reason for two positive developments: the brake travel seems greater and the lowest speeds are perhaps a little less.

In exchange, a natural progression of the same shark, we have controls which seem a lot firmer.

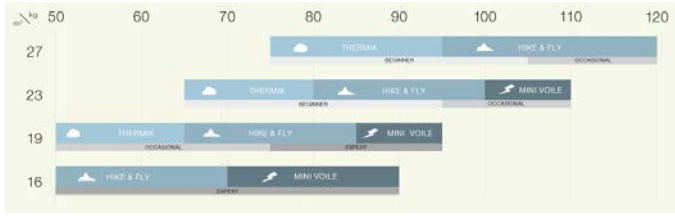
Other internal details: sophisticated and light, with an Advance style SharkNose.


The inflation is second to none, as it has to be for a very good mountain wing.
Like numerous wings with unsheathed lines, you need to check carefully that there are no knots in the lines when you inflate.
Fabric used: Skytex 27 g/m2 almost everywhere except on the leading edge (32).
Photo: S. Burkhardt

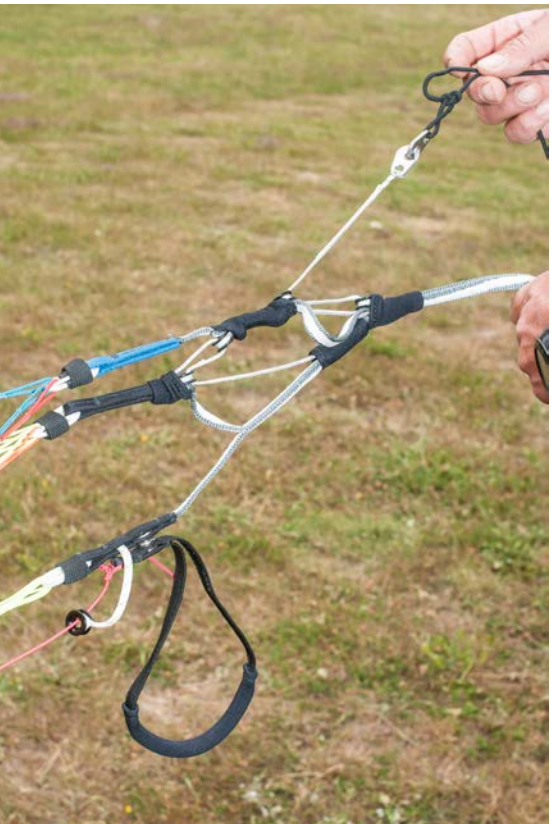
The performance is very good for a wing with this surface area; the 3D-Shaping must be part of the reason. It's true that by staying with an all up weight below 80 kg, it's a real little all purpose paraglider.

We weren't able to test the speeds during this quick test, but it gave the impression of flying very well at trim speed. In addition, it has an accelerator.

QUICK TEST CONCLUSION:
This PI 2 is very different to the first version, it plays in the same field as the 'grown-up paragliders' despite it's small size and dream weight...




The table shows the type of usage compared to the weight of the pilot.




The light risers save 150 g thanks to Softlinks and straps which are a lot thinner.
Photos : S. Burkhardt

## PI 2 - TECHNICAL DATA

Manufacturer: Advance
Web: http://www.advance.ch/fr/produits/parapentes/pi-2/

| DATE | 2016 | | | |
|---|---|---|---|---|
| SIZE | 16 | 19 | 23 | 27 |
| CELLS | 39 | 39 | 39 | 39 |
| FLAT SURFACE AREA [m²] | 16 | 19 | 23 | 27 |
| PROJECTED SURFACE AREA [m²] | 14 | 16.7 | 20.1 | 23.6 |
| FLAT WINGSPAN [m] | 8.5 | 9.2 | 10.2 | 11 |
| PROJECTED WINGSPAN [m] | 7 | 7.6 | 8.4 | 9.1 |
| FLAT ASPECT RATIO | 4.5 | 4.5 | 4.5 | 4.5 |
| PROJECTED ASPECT RATIO | 3.5 | 3.5 | 3.5 | 3.5 |
| ALL UP WEIGHT [kg] | 50-90 | 50-75 | 65-95 | 75-105 |
| WEIGHT OF THE WING [kg] | 2.05 | 2.35 | 2.75 | 3.10 |
| CERTIFICATION | C | B | A | A |

Photos: Burkhardt / voler.info

# ADVANCE: COMPRESS BAG AND PIPACK

Advance deliver the PI 2 with a specific compression bag, the Compress bag (right). Thanks to a zip, this bag can pack very small. Therefore the wing fits easily into the rucksack of a reversible harness, or into the Pipack carrying bag, perfectly adapted to hike and fly (above).

The Compress bag on the right comes with the wing. Its shape is slightly conical.
Photos : S. Burkhardt


The Pipack carrying bag costs about 120€. It was designed as 'a particularly light mountain rucksack but without any compromises'. It's actually very comprehensive, with lots of pockets and generous padding, which makes it nice to carry. It comes in two sizes, 31 and 37. The small one weighs about 500 g.
www.advance.ch


# AIR DESIGN VITA 2 SUPERLIGHT

The very recent super light version of the EN B Vita 2 only weighs 3.1 kg in size XXS, compared to 4.5 kg for the 'classic' in the same size.

The reduction in weight has been achieved thanks to, amongst other things, the optimisation of the internal structure, as well as by using Porcher Skytex 27.

Air Design chose the double coated version of Skytex 27. This makes it an extra 2 g/m2 heavier, but increases the longevity, to the point where it corresponds to that of a classic fabric, according to Air Design.

The Vita 2 SL is situated at entry level EN B, near an EN A. The reduction in weight further mellows the behaviour of the wing, making it very easy to handle.

www.ad-gliders.com

Photos : AirDesign

Photos : AirDesign

Photo: Jérôme Maupoint /GIN

Clearly visible: the inside of this mid range EN B is very sophisticated.

# GIN SPRINT 3 S

*The new Gin Sprint 3 is one of these classic paragliders where the weight has been so reduced that it can be considered light!*

The Sprint 3 succeeded the Sprint Evo, which came out five years ago. In the meantime, there has been the Carrera (and its evolution, the Carrera +): a top of the range EN B, very or even too lively for pilots who want to keep away from EN C wings. We tested it and explained all that in a review which is still available. The Sprint 3 is supposed to remain in the space a bit higher up the EN B range. But given the almost aggressive look of its leading edge as well as its sporty silhouette, some would perhaps imagine it to be even more sporty than anticipated. Since the Sprint Evo, enormous progress has been made. The weight has dropped from 5.5 kg to 4.3 kg for the S. It has become a real 'light' without having the name. An impressive reduction in weight, despite being very sophisticated in every respect. To achieve this, GIN worked on several levels: the fabric is Skytex 38 and 32 for the upper surface and Skytex 32 for the lower surface. The cell walls are in Skytex 40, but they have been carefully opened up.


Photos : Véronique Burkhardt

Other details played a big role in the whole thing: for example, in the sewing, there is no longer 10 mm of unnecessary overlap at the seams; instead there is now only 6 mm.

Typical of a lightweight wing, it moves a bit more in the air, but remains very gentle and damped. Even too gentle for some pilots who prefer more direct steering. But for a middle of the range EN B, the precision is totally within the norms.

It's without a doubt a good idea to choose a size which puts you at the top of the weight range.

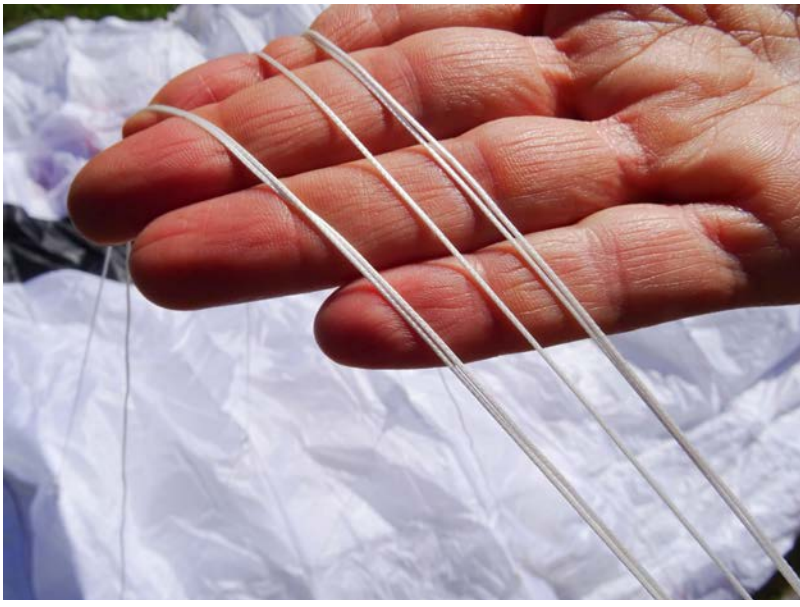
When flying straight, it willingly attacks the thermals and quickly gains height. On this level, it actually more resembles a top of the range EN B.

In turbulence, it gives a nice feeling of safety, even when accelerated and it remains very stable in pitch and when going into thermals.

**QUICK TEST CONCLUSION:**
In addition to all the new technology integrated into the Sprint 3 at a very sophisticated level, the reduction in weight in this wing gives it extra elements to fulfil its specifications: It's even more universal and is very suitable for hike and fly, whilst bringing good performance to a stable and reassuring wing.

**An interesting detail in this pronounced SharkNose: GIN use several types of leading edge rod depending on the position and the constraints; this is particularly visible on a white Sprint 3.**

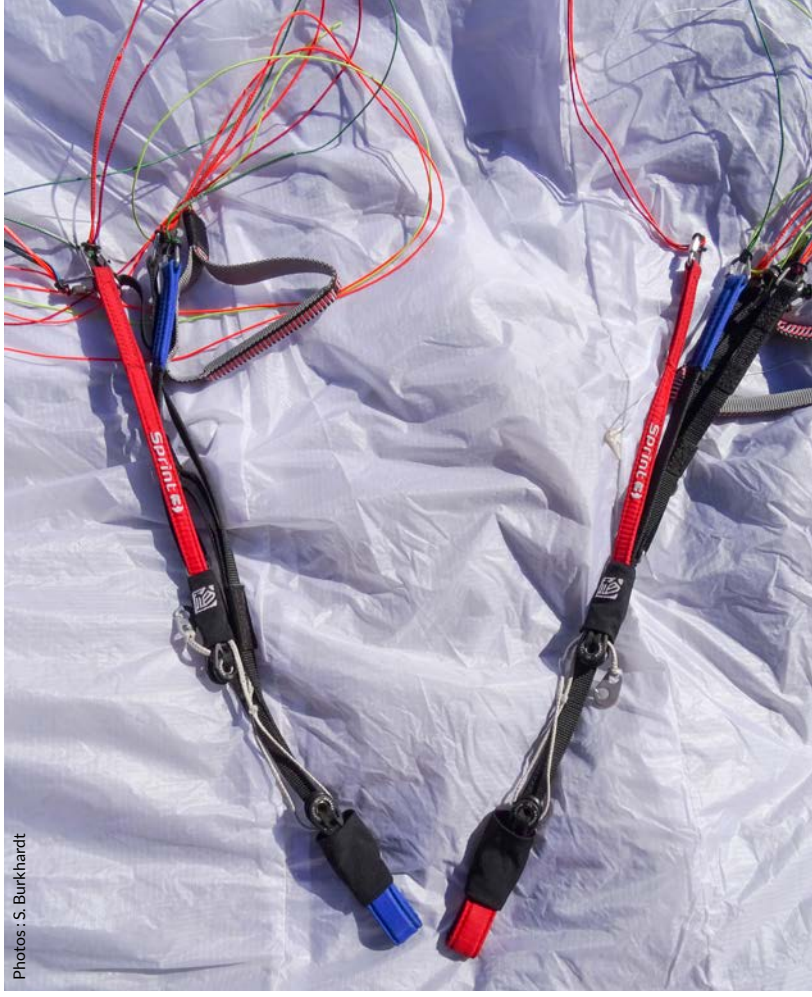
**Black rods would be more expensive, but give a better stability to the profile. The orange rods are more flexible. The constraints on the lower surface during inflation require stronger rods.**



Take off is exemplary: it comes up quickly and evenly. In any case it is becoming more and more difficult to find a lightweight wing which doesn't inflate well...

Sheathed lines in the lower part and unsheathed in the upper part. Despite their great number and the mix of sheathed/unsheathed, they don't seem to get particularly knotted up.

Photos : Jérome Mautpoint/Gin



Photos : S. Burkhardt

Accounting for a possible lack of precision in the controls mentioned by certain pilots, all you have to do is load it correctly to find a wing which conforms to its classification of middle or high middle EN B.

The ease with which it inflates also comes, no doubt, from its light weight. It's also worth mentioning its good behaviour at low speeds which increases its safety as well as its performance in light conditions. It's probably a result of the SharkNose...

## SPRINT 3 - TECHNICAL DATA

**Manufacturer:** GIN **Web:** http://gingliders.com/parapente/sprint-3/ **Tel : +82-31-333-1241**

| | | | | | | |
|---|---|---|---|---|---|---|
| **DATE** | 2016 | 2016 | 2016 | 2016 | 2016 | 2016 |
| **SIZE** | XXS | XS | S | M | L | XL |
| **CELLS** | 54 | 54 | 54 | 54 | 54 | 54 |
| **FLAT SURFACE AREA [m²]** | 21.05m² | 22.85m² | 24.88m² | 27.00m² | 29.20m² | 32.08m² |
| **PROJECTED SURFACE AREA [m²]** | 17.85m² | 19.37m² | 21.09m² | 22.89m² | 24.76m² | 27.20m² |
| **FLAT WINGSPAN [m]** | 10.95 m | 11.41 m | 11.91 m | 12.41 m | 12.90 m | 13.52 m |
| **PROJECTED WINGSPAN [m²]** | 8.61 m | 8.97 m | 9.36 m | 9.75 m | 10.14 m | 10.62 m |
| **FLAT ASPECT RATIO** | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 | 5.7 |
| **PROJECTED ASPECT RATIO** | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 | 4.15 |
| **ALL UP WEIGHT [kg]** | 52-75 kg | 65-85 kg | 75-95 kg | 85-105 kg | 95-115 kg | 110-137 kg |
| **WEIGHT OF THE WING [kg]** | 3.8 kg | 3.95 kg | 4.3 kg | 4.5 kg | 4.9 kg | 5.3 kg |
| **CERTIFICATION** | EN-LTF B | EN-LTF B | EN-LTF B | EN-LTF B | EN-LTF B | EN-LTF B |
| **MATERIAL** | **Uppersail:** Porcher Skytex 38 E25. Skytex 32 E3W - **Bottom Sail:** Porcher Skytex 38 E25. Skytex 32 E3W<br>**Rips:** Porcher Skytex 40 E29. Skytex 32 E4D<br>**Lines**<br>Hautes/Intermédiaires/Basses: Liros PPSL 120. 200. Edelrid 8000 - 050. 090. Liros CD60. PPSL120. PPSL160. PPSL200 | | | | | |

# GIN SPRINT 3

# GIN EXPLORER

Photos: Jérôme Maupoint

GIN have brought out their new Explorer. Its name makes no reference to 'light', but yet it's a very light wing (3.7 kg), amongst other things, thanks to the use of Porcher 27 on the lower surface and 32 on the upper surface.

It's a top of the range EN B aimed at a very universal usage: travelling, hike & fly and XC.

It's characterized by very good handling and very good performance.

The difference between this top of the range EN B and the Sprint 3 (mid range EN B) is clearly evident in the technical information: The sizes S of the Sprint and the Explorer are both for an all up weight of 75-95 kg, but the Explorer is smaller (23.6 m2 instead of 24.88 m2), it has got a higher aspect ratio (6.1 vs. 5.7), it's lighter (3.7 kg instead of 4.3 kg) and it has slightly more cells (59 instead of 54).

We'll look at it in more detail in a future issue.

# NOVA ION 4

*The Ion 4 is a great example of general reduction in weight: the previous model, the Nova Ion 3, existed in a classic version and a lightweight version. The Ion 4 'classic' is so 'light' that there won't be a light weight version.*

Photos : Véronique Burkhardt

# NOVA ION 4

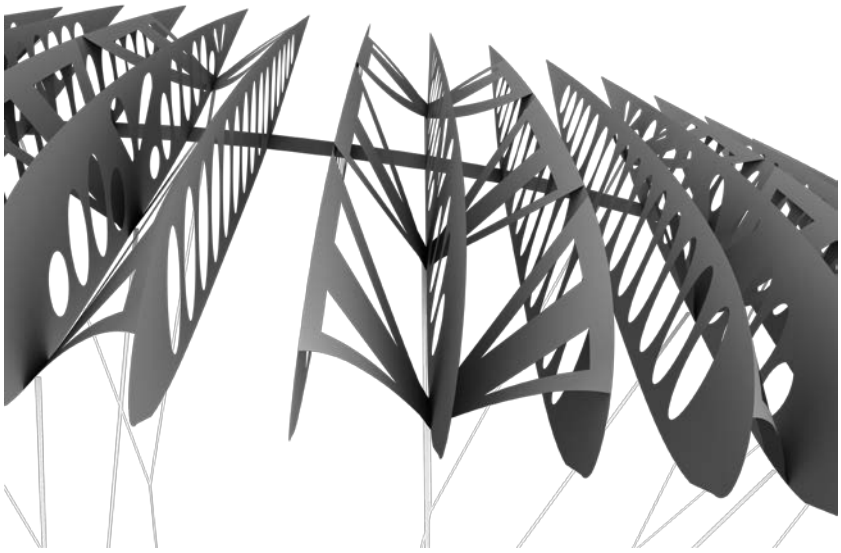

The Ion 4, size S: 4.65 kg for 26.7 m2. That's very good for a wing made from fairly normal fabric: Dominico 30D 41 g/m2 on the leading edge, Dominico 20D 35 g/m2 on the upper and lower surface.The cell walls are in Porcher Skytex 40 Hard, 40g/m².

# NOVA ION 3 LIGHT

The Ion 3 was made from Dokdo 41 g/m2 (upper and lower surfaces), whilst the 3 Light was made in Dominico 20D 35 g/m2 on the upper surface and Skytex 27 on the lower surface. The Ion 3 light in size S weighs 4.05 kg for 27m2. The Ion 3 weighed 5.7 kg in the same size; that's a big difference.

Photos : Véronique Burkhardt / voler.info

# NOVA ION 4



With the Ion 4, Nova saved weight by making the internal structure even more airy. On one hand with big holes in the cell walls, but also, and this is what's new, by putting holes in the diagonals, as you can see in the diagram above on the left as well as on the photo of a diagonal on the right. On the other hand, according to Nova, using thin bands of fabric (like Advance's Sliced Diagonals) for these diagonals, instead of the triangles, isn't worthwhile for this model which isn't intended to be super light.

Photos : Burkhardt/voler.info

On the Ion 3 light, the saving in weight by increasing the size of the openings in the walls was already clearly visible. On the other hand, the diagonals were still fully intact.

# NOVA ION 3 LIGHT

Photos: Véronique Burkhardt

Classic maillons and risers, with classic but narrower straps. The advantage compared to the Dyneema risers which are lighter still: the classic ones are easier to use. Photos : Burkhardt

## ION4 - DONNEES CONSTRUCTEUR

Manufacturer: Nova
Web : https://www.nova.eu/en/gliders/ion-4/
Mail : info@nova.eu Tel : +43.5224.66026

| DATE | 2016 | 2016 | 2016 | 2016 | 2016 |
|---|---|---|---|---|---|
| SIZE | XXS | XS | S | M | L |
| CELLS | 49 | 49 | 49 | 49 | 49 |
| FLAT SURFACE AREA [m²] | 22.06 | 24.31 | 26.69 | 29.12 | 31.71 |
| PROJECTED SURFACE AREA [m²] | 18.65 | 20.65 | 22.57 | 24.62 | 26.81 |
| FLAT WINGSPAN [m] | 10.65 | 11.21 | 11.72 | 12.24 | 12.78 |
| PROJECTED WINGSPAN [m²] | 8.02 | 8.44 | 8.82 | 9.22 | 9.62 |
| FLAT ASPECT RATIO | 5.14 | 5.14 | 5.14 | 5.14 | 5.14 |
| PROJECTED ASPECT RATIO | 3.44 | 3.44 | 3.44 | 3.44 | 3.44 |
| ALL UP WEIGHT [kg] | 55-80 | 70-90 | 80-100 | 90-110 | 100-130 |
| WEIGHT OF THE WING [kg] | 3.95 | 4.30 | 4.65 | 4.95 | 5.30 |
| CERTIFICATION EN/LTF | B | B | B | B | B |
| MATERIAL | Leading edge:Dominico 30D, 41 g/m²<br>Top surface: Dominico 20D, 35 g/m²<br>Lower surface: Dominico 20D, 35 g/m²<br>Profile ribs (suspended): Porcher Skytex 40 Hard, 40g/m²<br>Profile ribs (unsuspended):Porcher Skytex 40 Hard, 40g/m²<br>Main lines: Liros PPSL 191 / TSL 140<br>Gallery lines: Edelrid U-8000 series<br>Brake lines: Cousin 85<br>Risers: Kevlar 12 mm | | | | |


Photos: Véronique Burkhardt


Photo: Nova

# NOVA MENTOR 4 LIGHT

The 2015 Mentor 4 is made from Dokdo 41 g/m² and Dokdo 35 g/m², and there are only certain diagonals which are in Skytex. The size S (26 m2, 80-100 kg all up weight) weighs 5.3 kg. The Mentor Light in the same size only weights 3.75 kg; it is made entirely in Skytex 32 g/m² and Skytex 27 g/m².

A very interesting detail: it's only in the 'Light' range that Nova brought out an XXS, measuring 21.5m². No doubt that is helped by the more damped behaviour of wings in lightweight fabric: they move a bit more, but dive forward a lot less, for example. This helps maintain more gentle behaviour in the small sizes which, due to the viscosity of the air, are often less well behaved than the large sizes, and that's even if the wing loading is absolutely identical.

## MENTOR LIGHT - TECHNICAL DATA

**Manufacturer:** Nova
**Web:** https://www.nova.eu/en/gliders/ion-4/ **Mail:** info@nova.eu

| DATE | 2015 | 2015 | 2015 | 2015 |
|---|---|---|---|---|
| SIZE | XXS | XS | S | M |
| CELLS | 55 | 55 | 55 | 55 |
| FLAT SURFACE AREA [m²] | 21.48 | 23.78 | 26.09 | 28.39 |
| PROJECTED SURFACE AREA [m²] | 18.36 | 20.33 | 22.30 | 24.26 |
| FLAT WINGSPAN [m] | 10.80 | 11.36 | 11.89 | 12.41 |
| PROJECTED WINGSPAN [m²] | 8.53 | 8.97 | 9.40 | 9.80 |
| FLAT ASPECT RATIO | 5.43 | 5.43 | 5.43 | 5.43 |
| PROJECTED ASPECT RATIO | 3.95 | 3.95 | 3.95 | 3.95 |
| ALL UP WEIGHT [kg] | 55-80 | 70-90 | 80-100 | 90-110 |
| WEIGHT OF THE WING [kg] | 3.25 | 3.5 | 3.75 | 4.0 |
| CERTIFICATION EN/LTF | B | B | B | B |
| MATERIAL | Leading edge:Skytex 32 universal, 32g/m²<br>Top surface: Skytex 27 classic, 27g/m²<br>Lower sail: Skytex 27 classic, 27g/m²<br>Profile ribs (suspended): Skytex 32 hard, 32g/m²<br>Profile ribs (unsuspended): Skytex 27 classic, 27g/m²<br>Main lines: Liros PPSL 160<br>Gallery lines: Edelrid U8000 series<br>Brake lines: Edelrid 8000 U-50<br>Risers:Aramid 12 mm | | | |


Photo: Nova


Photo: Nova

Skywalk's Poison X-Alps has been talked about a lot. We have one to test which was supposed to be published in this issue, unfortunately the weather decided otherwise, so it'll be in a later edition.

# SKYWALK POISON XALPS

## POISON X-ALPS - TECHNICAL DATA

Manufacturer: Skywalk
Web: https://www.skywalk.info/
Mail: info@skywalk.info Tél : +49 (0) 8641 6948 40

| DATE | 2016 | 2016 | 2016 |
|---|---|---|---|
| SIZE | XS | S | M |
| CELLS | 80 | 80 | 80 |
| FLAT SURFACE AREA [m²] | 21.50 | 23.00 | 24.40 |
| PROJECTED SURFACE AREA [m²] | 18.54 | 19.83 | 21.04 |
| FLAT WINGSPAN [m] | 12.27 | 12.69 | 13.07 |
| PROJECTED WINGSPAN [m] | 10.00 | 10.35 | 10.66 |
| FLAT ASPECT RATIO | 6.99 | 6.99 | 6.99 |
| PROJECTED ASPECT RATIO | 5.40 | 5.40 | 5.40 |
| ALL UP WEIGHT [kg] | 65-90 | 85-105 | 95-115 |
| WEIGHT OF THE WING [kg] | 4.0 | 4.2 | 4.4 |
| CERTIFICATION | EN-D | EN-D | EN-D |

NEWS GIN

# GRIFFIN

Initially the Griffin was designed as a pure mountain wing. It has a lot of the design features of the famous Yeti from the same manufacturer. Constructed integrating lots of new technology such as the Gin 'EPS', version of the SharkNose, it has turned out to be more flexible than anticipated and can also be used as a mini wing as well as on the dunes. It's one of the models with the biggest wing loading in the Gin range: 16m$^2$ for 55- 105 kg, giving 3.44 kg/m$^2$ to 6.56 kg/m$^2$.


Photo: Gin

Photos : Gin

Clearly visible against the light: a mini wing integrating all the modern technology.

Made mainly from Skytex 27 g/m$^2$, except for the leading edge which is in Porcher Skytex 32 g/m$^2$, it only weighs 2.1 kg. It has classic risers, but can, as an option, be ordered with Dyneema risers and Softlinks.

| GRIFFIN - TECHNICAL DATA | |
|---|---|
| Manufacturer: Gin - http://www.gingliders.com/paragliders/griffin/ | |
| DATE | 2016 |
| SIZE(M$^2$) | 16 |
| CELLS | 36 |
| FLAT SURFACE AREA [m$^2$] | 16 |
| PROJECTED SURFACE AREA [m$^2$] | 13.89 m$^2$ |
| FLAT WINGSPAN [m] | 8,76 m$^2$ |
| PROJECTED WINGSPAN [m] | 7.07m |
| FLAT ASPECT RATIO | 4,8 |
| PROJECTED ASPECT RATIO | 3.59 |
| ALL UP WEIGHT [kg] | 55-105 |
| WEIGHT OF THE WING [kg] | 2.1 |
| CERTIFICATION | EN/LTF C |

**Obviously a lovely toy.**
**Photos: Jérome Maupoint/GIN**

# OZONE JOMO

Photo: Véeronique Burkhardt Pilot: Sascha Burkhardt

The Mojo 5 is Ozone's top of the range EN A wing; suitable for school use and also for intermediate pilots. It came out in 2015 and is made in a fairly classic fashion, like other wings in this category: no SharkNose, no miniribs and no 3D-Shaping. A few months after it came out, Ozone brought out the lightweight version of the Mojo 5, the Jomo. Ozone saved 1.2 -1.3 kg compared to a wing with an identical geometry by working on several aspects.

The fabric: the Mojo is made from Dominico 30D for the lower and upper surfaces, whilst the Jomo has Dominico N20D for the upper surface and Porcher Skytex 27 for the lower surface, an interesting mix. Bigger openings in the cells. The diagonal cell walls have been redesigned. The plastic reinforcements in the leading edge have been sewn directly into the seam. The tabs attaching the lines have been made lighter. A total saving of 1.2 – 1.3 kg depending on the size (Mojo 5 M: 5 kg, Jomo M: 3.8 kg).

**Thanks to the reduction in weight, the Jomo is a bit easier to handle than the Mojo 5. In the first part of the brake travel, it's fairly damped, but it becomes very playful if the pilot goes beyond that.**

Photo: Véeronique Burkhardt Pilot: Sascha Burkhardt

One of the ways of reducing weight: open up the cell walls.

The Jomo is therefore a real lightweight wing, but with an upper surface which is still relatively robust. The Jomo is therefore a real lightweight wing, but with an upper surface which is still relatively robust. The difference between the Mojo 5 and the Jomo is tangible. At take off, logically, the Jomo comes up slightly better.

As far as its behaviour in turbulence is concerned, the same observation as for most lightweight wings: less weight, less inertia, therefore a wing which is slightly livelier, which communicates more, but where the surges forward stop a bit earlier and are gentler. The handling has also been slightly improved. Which is good because, compared to other modern EN A wings like the Swing Mito, the Mojo 5, and to a lesser extent the Jomo, is perhaps a bit too damped at the beginning of the brake travel, where there is a little time lag. After that, they become more reactive, with good handling and very efficient in the middle of thermals. Between two thermals, the wing flies a good stable trajectory. It is clearly efficient in the intermediate category too.

Ozone have also economised in weight at the attachment points, as well as sewing the rods directly into the seam.

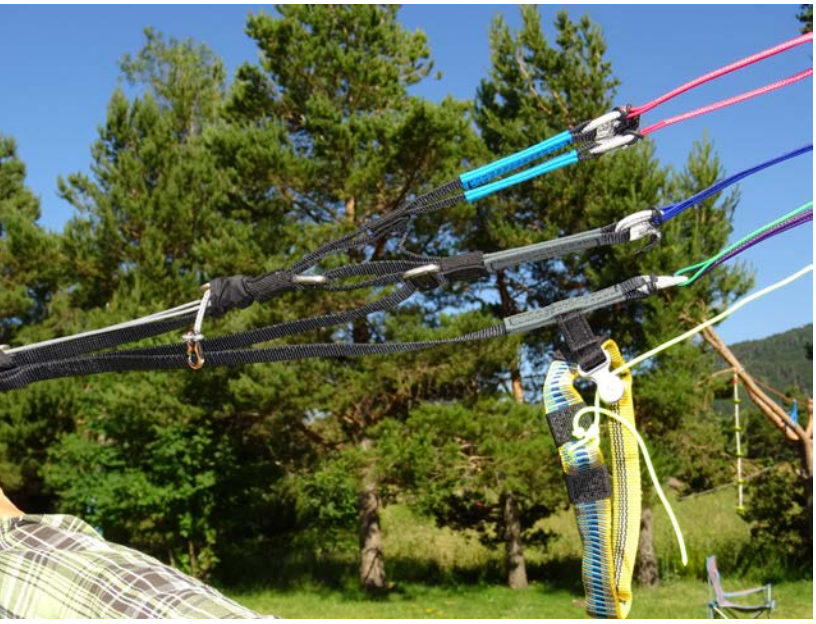
Porcher Skytex 27 seems to be naturally more fragile but, placed on the lower surface, it isn't exposed to much abrasion.

A mix of Dominico and Skytex fabrics. The Porcher Skytex 27 can be recognised by its coarser mesh than that of the Dominico N20D.

## JOMO - TECHNICAL DATA

Manufacturer: Ozone Web: http://flyozone.com/paragliders/en/products/gliders/jomo/info/ Mail: team@flyozone.com

| DATE | 2015 | 2015 | 2015 | 2015 | 2015 |
|---|---|---|---|---|---|
| SIZE | XS | S | M | L | XL |
| CELLS | 40 | 40 | 40 | 40 | 40 |
| FLAT SURFACE AREA [m²] | 22 | 23.9 | 26 | 28.3 | 30.7 |
| PROJECTED SURFACE AREA [m²] | 18.7 | 20.3 | 22.1 | 24 | 26.1 |
| FLAT WINGSPAN [m] | 10.39 | 10.83 | 11.29 | 11.77 | 12.27 |
| PROJECTED WINGSPAN [m] | 8.05 | 8.39 | 8.75 | 9.12 | 9.51 |
| FLAT ASPECT RATIO | 4.9 | 4.9 | 4.9 | 4.9 | 4.9 |
| PROJECTED ASPECT RATIO | 3.46 | 3.46 | 3.46 | 3.46 | 3.46 |
| ALL UP WEIGHT [kg] | 55-70 | 65-85 | 80-100 | 95-115 | 110-130 |
| WEIGHT OF THE WING [kg] | | 3.6 | 3.77 | 3.98 | |
| CERTIFICATION | EN A | EN A | EN A | EN A | EN A |



A lighter riser, but not by too much to remain practical.

Despite the light weight of the Jomo, the lines are sheathed and therefore well protected.

A tribute to light: softlinks replace the maillons.

The speed range (we weren't able to measure it precisely in our quick test) seemed to go high and low enough. You can apparently stretch it out without the SharkNose as well...

QUICK COMPARISON CONCLUSION

The Mojo 5 is already a very good wing for beginner pilots up to intermediate pilots. The Jomo brings, in a subtle way, all the advantages of being lighter, whether at take off, when flying or on your back during a walk in. As the longevity shouldn't suffer too much due to this mix of materials, it is virtually all positive, except the price: the Jomo sells for about 3 300 € compared to the Mojo 5 at 3000 €.

## News Niviuk

# KLIMBER P

Niviuk are bringing out 'P' for 'Plume' (feather) versions in all the categories. For the first time, the designer has developed an ultralight machine certified EN D aimed, amongst other things, for top level hike and fly pilots to win races on. All Niviuk's knowhow in lightweight, such as the use of Nitinol rods for example, has been used to produce a 66 cell wing which weighs 3.4 kg. It will be interesting to check to what extent the lightweight manufacture softens the behaviour in turbulence of this racing machine, with an aspect ratio of 7...

Despite its design as a top of the range wing, Niviuk promise that the Klimber P takes off very easily in any situation. In accelerated flight, the maximum speed is around 60 km/h.

Klimber P on Niviuk's Website

A large aspect ratio for this Klimber: almost 7...
Photos : Niviuk

| KLIMBER P - TECHNICAL DATA | | |
|---|---|---|
| Manufacturer: Niviuk - Web: www.niviuk.com | | |
| SIZE | 22 | 24 |
| CELLS | 66 | 66 |
| FLAT SURFACE AREA [m²] | 22.5 | 24.5 |
| PROJECTED SURFACE AREA [m²] | 19.24 | 20.95 |
| FLAT WINGSPAN [m] | 12.5 | 13.05 |
| PROJECTED WINGSPAN [m²] | 10.08 | 10.52 |
| FLAT ASPECT RATIO | 6.95 | 6.95 |
| PROJECTED ASPECT RATIO | 5.28 | 5.28 |
| ALL UP WEIGHT [kg] | 70-90 kg | 85-110 kg |
| WEIGHT OF THE WING [kg] | 3.4 kg | nc |
| CERTIFICATION | EN-LTF D | D en cours |

FIRST TESTS

# NIVIUK BI SKIN 2 P 31

## THE LIGHTEST TANDEM IN THE WORLD

*31m², single surface, 3.3 kg feather weight: we were able to do the first quick tests with the new 'lightest tandem in the world'. Our unanimous verdict: amazing…*

Photo: Véronique Burkhardt Pilot: Sascha Burkhardt

Most certified ultralight tandems on the market at the moment weigh about 5.5 kg. When the first ultra light single skin wings such as the Niviuk Skin Plume 1 (1.6 kg) and the Air Design UFO began to fill the skies above the foot paths, we all started to dream: and if we could have the same thing as a tandem?

A sizable problem was the flare: with a first generation single skin wing, you sometimes arrived a bit fast at the landing field. Air Design quickly worked on a UFO tandem and got the prototypes to fly, but the definitive version was delayed for various reasons.

It was at Niviuk that the small revolution in the world of tandems became official at the end of the summer of 2016: a 31m$^2$ tandem, weighing 3.3 kg and certified EN B!

It's a real little sensation, as for all paragliders, the small sizes are not easy to certify, and especially if it's a single skin!

Well made single skins can behave very nicely during an incident in flight (read more on this subject in our comparative test), but their stall point, which is often very abrupt, can be a trap for not very experienced pilots as well as for the certification.

Niviuk therefore waited to have the tandem Skin certified, in the EN B category moreover, before launching their whole new range of second generation single skins: following this successful certification, the solo Skin 2, will be out soon.

The most visible difference between the Skin 1 and the Skin 2: the rare 'full' cells that there are, have a SharkNose. The performance of the single skin wings seems to be closely linked to the performance of the cells. One can thus suppose that even six openings with SharkNoses play a big role.

The second visible difference: there are trimmers for extra speed before landing. Of course, if a wing pitches backwards fairly well, arriving with a lot of speed, paradoxically, allows a gentle landing. We were able to do a few short flights on a tandem Bi Skin P with different all up weights and noticed that, in fact, the trimmers allowed very gentle landings. At the bottom of the weight range, it isn't even necessary to activate them, even in nil wind!

Photo: Sascha Burkhardt
Pilot: Esteban Bourroufies

Here the Bi Skin P is being flown by Esteban Bourrofies (from the village of Font Romeu in the Pyrenees). One of his remarks: 'Nice glide in the turn despite being a stable wing which doesn't tilt at an angle in the roll and which is capable of keeping this same glide in a small radius turn'.

A very nicely done promotional video.
https://www.youtube.com/watch?v=Q13wu0aG4fI

# NIVIUK SKIN 1P

**Is the secret in the detail? The new generation of Niviuk Skins, of which the tandem has a SharkNose held nicely in place by Nitinol rods in the six cells. The good shaping of the leading edge is visible along the whole wing span.**

Photo: Véronique Burkhardt
Pilot: Sascha Burkhardt

# NIVIUK SKIN 2 (BI P)

Photo: Sascha Burkhardt
Pilot: Esteban Bourroufies

Photo: Sascha Burkhardt
Pilot: Esteban Bourroufies

With an all up weight in the top part of the range, the load take up is average, but it's compensated for by the time that you save during the inflation: the distance to run, therefore, remains fairly short.

There must be other big differences, but more hidden. Perhaps the large amount of tension in the wing, clearly visible in the leading edge, is something to do with it, as almost all those who try this tandem ask: where does this little piece of 31m2 cloth get its performance, even when fully loaded?

In thermals, it often holds up just as well as a 'full' tandem with two surfaces. In weak conditions, the Skin can even be better because, with its impressive handling, it lets you play with the thermic bubbles almost as if you were on a solo wing.

When you use the brakes, with very little effort, it starts to turn immediately in a small radius, by advantageously mixing the yaw with a light roll. It's very nice! On the other hand, if you want to lean it further, the force in the controls increases a lot before the wing increases the roll.

All this is very efficient and very safe. Unfortunately, we weren't able to measure the speed correctly due to a broken instrument, but we'll publish them in a future special edition about tandems.

It isn't just in the air that this tandem is surprising and has great performance, but also on the ground. The inflation is impressive: the wing really does come up all by itself. To the extent that Michael Georges from Niviuk France warned: 'Be careful, once you are clipped in, in a gust, it can take off all on its own'. As if the wing was an animal ready to pounce and throw you into the air.

Ah yes, it's true that in certain conditions, you do need to watch out, as any breath of air will lift it up.

Moreover, for the inflation, some Niviuk pilots don't even take the front risers in their hands…

Once it's overhead, there's another surprise: even in a light breeze, the wing floats above your head and waits patiently for the signal to take off.

With a large all up weight, the load take up takes a bit more time, but given the weather and the run that you save during the inflation, it isn't a problem.

**A wing which turns 'like a bicycle', although the solo skin wings obviously remain a bit easier to handle.**

In flight, as with all single skins, it moves a lot in turbulence, but they are micro-movements whose size is very limited.

The wing tips can close a bit, but that's of no consequence. You really feel very safe under this little bit of fabric! In accelerated flight, a fold can appear along the wingspan.

A note concerning the fabric: although it has the name 'P' for 'Plume' (feather), this wing isn't made in Skytex 27, but in Skytex 38 (leading edge) and Skytex 32 (upper and lower surface). It's an intelligent compromise in weight versus longevity; 3.3 kg is enough really.

**CONCLUSION FROM THE FIRST TESTS**

This tandem is a real revolution. Perhaps not for professional tandem pilots, who would find it a shame to work this little gem every day. It's no doubt a real work of art and it appears to be simply made, but in reality is very high-performance and sophisticated.

We've never seen a tandem as light and compact before...


Below right: the 'maillons' are Dyneema softlinks which contribute to making it lighter. The unsheathed lines are in Aramid and fairly smooth to untangle.

The risers are made up of thin straps. The trimmers are for the take up of speed before landing.

The six cells, with the Niviuk SharkNose held in place by Nitinol rods, no doubt, part of the secret recipe of this wing.

But for private tandem pilots who want to climb mountains on foot with the minimum amount of weight for the maximum amount of pleasure, the Bi Skin 2 P opens up new horizons. In addition, those who travel by car will always find a little space to take the lightest and least bulky tandem in the world. In a future edition, we'll also publish the speed measurements, so that you can judge the XC abilities of this unusual tandem.

Sascha Burkhardt

## BI SKIN 2P - TECHNICAL DATA

Manufacturer: Niviuk Web: http://www.niviuk.com/ Tel: +34 972 422 878

| | |
|---|---|
| CELLS | 39 |
| FLAT SURFACE AREA [m²] | 31 |
| PROJECTED SURFACE AREA [m²] | 26.17 |
| FLAT WINGSPAN [m] | 13.06 |
| PROJECTED WINGSPAN [m²] | 10.39 |
| FLAT ASPECT RATIO | 5.5 |
| PROJECTED ASPECT RATIO | 4.12 |
| ALL UP WEIGHT | 130 - 190 |
| WEIGHT OF THE WING [kg] | 3.3 |
| CERTIFICATION | EN/LTF B |

We flew with a full tandem, including reserve and harness, which only weighed 7.6 kg. And in addition, you could save a few hundred more grammes by choosing accessories which are lighter still and by not using the spreader bars. However you do it, it's amazing!

## THE LIGHTEST TANDEM IN THE WORLD

| | |
|---|---|
| Niviuk Bi Skin | 3.3 kg |
| Supair X-tralite tandem reserve | 3.0 kg |
| 1 Neo String harness | 0.3 kg |
| 1 Nervures String Expé 2 harness | 0.2 kg |
| Lightweight Icaro spreaders | 0.5 kg |
| 6 lightweight karabiners | 0.3 kg |
| **TOTAL** | **7.6 kg** |

**Unusual: the wing comes up almost by itself in the slightest breeze and floats nicely above the pilot and passenger.**

# POLES:

## A GREAT HELP FOR HIKE AND FLY.

*Once you've tried them, you'll become a convert. Poles are an incredibly efficient aide for hike and fly.*

## WHY USE POLES?

Almost all hike and fly pilots have turned to poles. It's no coincidence that during the X-Alps all of the pilots had them. When you look closely, there are enormous advantages :

- They reduce the effort. With poles, it isn't just your legs which propel you, but also your arms. This helps in an unexpected fashion, especially going up hill.

- It is healthier and more satisfying to work your arms as well, and with them, all the muscles in your chest and abdominals.

- They improve your balance and avoid you falling. They increase your speed both going up and down hill.

- Poles also cushion the impacts, particularly going downhill. This preserves, amongst other things, your ankles, knees and also your spinal column.

## HOW DO YOU USE THE WRIST-STRAPS?

The wrist-straps play a part in reducing the effort, because the pilot doesn't need to clench his hands to hold the baton.

They work in two ways:
1- Either you put them on over your hands.
2- Or under, like skiing.

Opinions diverge about the efficiency of one method or the other. You have to try them! If the wrist-straps are correctly adjusted, the second method seems more efficient. In addition, it is easier to push from time to time, with your palm on top of the pole.

## ADJUST THE LENGTH OF THE POLES CORRECTLY

Adjust the height: always have your elbow at a 90° angle, whether going up, down or on the flat.

You therefore need to frequently readjust them during a walk. This is where it is important to choose reliable, practical mechanisms.

Photo right: the mechanism for adjusting Leki Micro Vario poles.


An important factor when choosing poles: the ease and reliability of the folding system so that you can pack them into your rucksack when flying.

On the other hand, don't forget that solid poles in your rucksack are dangerous if you have an accident.

## USE WHEN ASCENDING

When ascending, either place the poles in front of you to pull you up (1), or adjust them to be longer, and plant them behind you and push up (2). Try both methods!

## USE ON THE FLAT

On the flat, place them beside you. Ideally the movements cross, left foot and right arm in front, right foot and left arm behind, then alternate. This allows you to keep up a good rhythm.

## USE WHEN DESCENDING

It's simple: going downhill, place them in front of you, in parallel or alternately and push on them to hold yourself.

One technique consists of putting the poles in front of you in parallel, and descending by leaning almost exclusively on your arms. It's also handy for getting over obstacles.

It is very useful to push with the palm of your hand on top of the pole, this can be good when going up as well.



# TEST: 3 PAIRS OF POLES FOR HIKE AND FLY

*For this article, we compared three lightweight fold up poles:*
*- The Komperdell Carbon Ultralite Vario 4 Compact*
*- The Leki Micro Vario Carbon Lady*
*- The McKinley Migra 07.*







**ADJUSTING THE WRIST-STRAPS.**
On the Komperdell Ultralight Vario 4 (1a and 1b, a bit unusual), on the Lekis (2, easy), and on the McKinleys (3, easy, they block all by themselves).

Very positive point on the Komperdells: these are the only padded wrist-straps in the comparison, and logically they are the most comfortable (1c).

# FOLDING



The Komperdells are made up of three linked poles, which screw together.

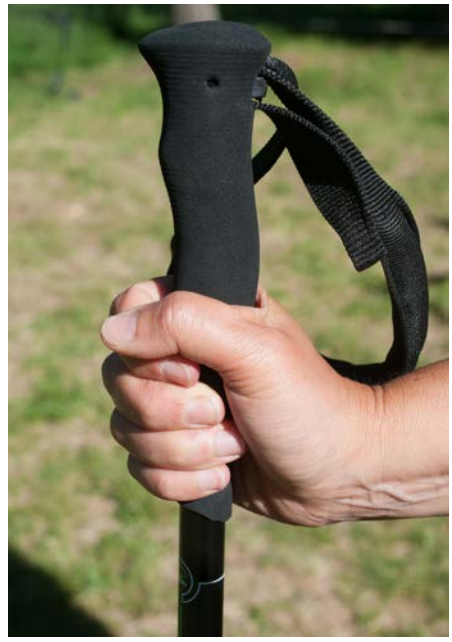
The three linked sections of the Leki poles slide into each other and are blocked by a pushpin after they have been extended.


The three unattached sections of the McKinley poles slide into each other and are blocked by a locking lever.

**SLEEVE**
Most poles have a sleeve below the handle. It's handy for holding the uphill pole a bit lower down when traversing. Or if you encounter a short steep slope, it avoids having to alter the length of the poles for just a few metres.

The sleeves on the Komperdells are the shortest (which is a shame) and those on the McKinleys are the longest.

Komperdell

Leki



McKinley


# LEKI MICRO VARIO CARBON LADY

**LEKI MICRO VARIO CARBON LADY**
**Weight per pair: 424 g approx**
**Length 100 - 120 cm**
**Material:**
**Mainly carbon**
**Price approx: 159.95 €**


These poles are very sophisticated and robust with their carbon/metal mix. They are however still quite light.

Unfortunately, at 120 cm, they really are a bit short for going down hill, even for a 'little lady'.

Otherwise they perform well on the ground and are very quick to adjust and fold up.


**KOMPERDELL CARBON ULTRALITE VARIO 4 COMPACT**

Weight per pair: **404 g approx**
Length **120 – 145 cm**
Material: **mainly carbon except for the third section (metal).**
Price: **195 € approx**

One of the best: the lightest, impressive maximum length (145 cm), robust, pleasant, padded wrist-strap. Two minor problems: the sleeve is too short and the adjustment (rarely necessary) to tighten the lever needs a screwdriver.

The baskets for skiing are easy to put on and take off.



**MCKINLEY MIGRA 07**
**Weight per pair: 430 g approx.**
**Length 105-135 cm**
**Material: mainly carbon**
**Price: 69.99 € approx.**


A real surprise: these poles, which are available through Intersport, are by far the cheapest, but they are amazingly high performance. 430 g, isn't heavy for a pair of poles which adjust up to 135 cm long.

The only annoying problem, which is perhaps due to a choice of material influenced by a concern about the cost: these poles vibrate slightly with every pole plant. They aren't as nice to use as the others.

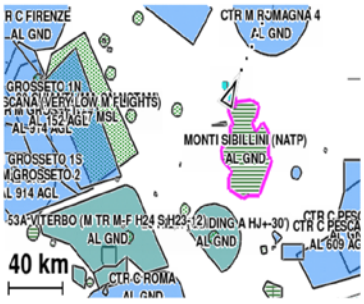
**The rubber shock absorbers can't be used in the mountains, but they can be easily taken off.**


COMPASS

The more you know the less you take risks

IMPROVED SOFTWARE

IMPROVED MAPS



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AIRSPACES

NEW TOPOGRAPHIC VECTORIAL MAPS

Cities, rivers, lakes, names and altitude of mountains

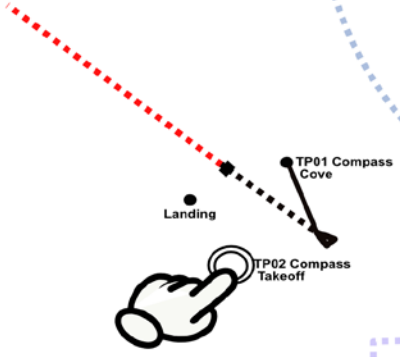
LONG LIFE BATTERY

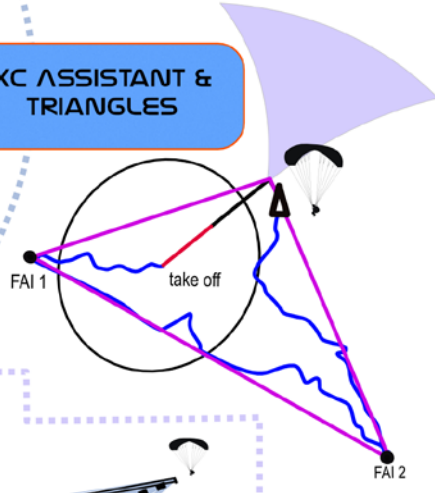
XC ALL-IN-ONE

NEW HARD GLASS


NAVIGATION BY TOUCH

XC ASSISTANT & TRIANGLES

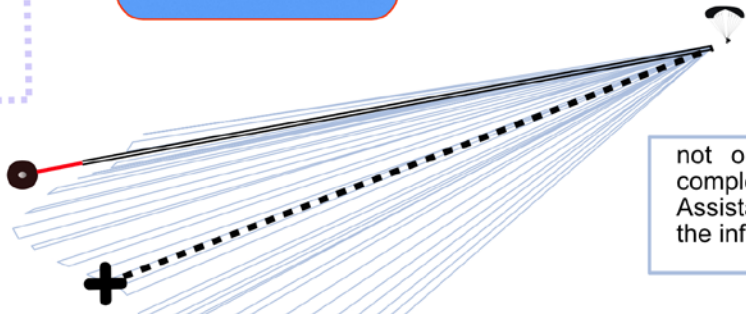



ALL-IN-ONE XC COMPASS

GLIDE OVER TERRAIN

choose a "goto" by a simple touch in the map. Move and zoom the maps



not only triangles ... a complete XC flight Assistant to give you all the informations needed

watch in real time where and at what altitude your transition will end considering the terrain: crossing is much more easy!

# The XC - Instruments

## Designed for the Cross Country Pilot

## We give you all the data to let you take the best decisions

# MERRELL CAPRA SPORT GORETEX

According to Merrell, the Capra Sport Goretex shoes were designed for 'climbing to the top of mountains whilst allowing a maximum amount of feeling', and weighing 398 g for the medium sizes and 460-472 g for a pair in size 46. The Capras are therefore a lot lighter than other shoes made for the mountains. With their 3 mm studs in the central part of the sole, they have very good grip.


Photos: Burkhardt/voler info magazine

Photos: Burkhardt/voler info magazine

The shock absorbing part of the sole is mostly under the heel to make going down hill easier, however this is of less interest to us.

The breathable Gortex fabric and the gusset tongue make them relatively waterproof.

They are a very good lightweight alternative to heavy hill walking boots, obviously without any ankle support, but with good foot support.

You can equally well wear them in everyday life.

In the 'Capra' (which means mountain goat) range, there are also heavier models.

Merrell Capra Sport Goretex, 398 g per shoe in the medium sizes.
http://www.merrell.com/UK/en_GB/capra-sport-gore-tex/17564M.html?dwvar_17564M_color=J35321#cgid=mens-featured-gore-tex&start=1

Price: £100 - £120

AQUATIC SHOES

In the editorial team, for walking as light as possible, we'll always be fans of water sports shoes. Bare foot (without socks) they breathe properly thanks to the mesh fabric and it's possible to cross a river and then let them dry out during the walk. Obviously the mesh which is very open doesn't protect as well against sharp sticks and if it's chilly during the flight, your feet will be colder. But their hold on different types of terrain is just as good with the shockproof profiles of their soles, without being a 'real' heavy mountain shoe. You can equally well wear them in town. The shoes we reviewed two years ago are still available in the shops, sometimes with a large discount.

**Salomon Techamphibian 3, from 54 to 90 €.**
**The knotless lacing mechanism is nice.**
**Weight: 342 g-352 g per shoe in size 44 2/3.**
**http://www.salomon.com/fr/product/techamphibian-3.html**


**Merrell Waterpro Maipo, price 70 – 100€**
**A bit more enveloping and protective, but they also have an 'open' mesh fabric so that water can go through in both directions.**
**365 g - 380 g per shoe in size 45**
**www.merrell.com/FR/fr_FR/homme-chaussures-voir-tout/16227M.html**

# TREKKING TRAVELLING BELT

Very practical for travellers: The company specialises in leather goods for trekking, but has nothing to do with the paraglider manufacturer of the same name. For decades they have been making their famous travelling belts comprising numerous pockets (including hidden ones). Surprisingly enough there isn't a serous competitor on the market if you're looking for a belt with big pockets to keep everything near your body (as opposed to a classic bumbag). The quality of manufacture is average to good for the different models available in polyester and leather. After a few years the zips and stitching may naturally wear out.

**In the secondary pocket on the 1150 model, there is just enough space for a smartphone 5.5. In the one on the 1160 model, which actually appears bigger, this wasn't possible.**

**We recommend the model 1150 in polyester at 50 €.**
**http://trekking.fr/bagage/ficheProduit.php?recordID=1**


# NERVURES
## EXPE2 HARNESS

The Expe2 is one of the lightest 'string' harnesses. We weighed it at barely 202 g in size M, which is even less than advertised! Therefore it is nearly 100 g less than the other 'strings' which have more padding, so the comfort potential is less. But in practice it is far from uncomfortable. There is, all the same, foam underneath, in the place where most pressure is applied during flight.

Skytex fabric and Dyneema: the typical formula for an impressive reduction in weight.

Two adjustment systems allow it to be adapted to fit the pilot, see photos on this page. There are also rings to attach an accelerator.

A nice harness not just for hike and fly but also for speedflying/speedriding, bearing in mind that, given the materials used, one would, all the same, hesitate to use it much in terms of rubbing.

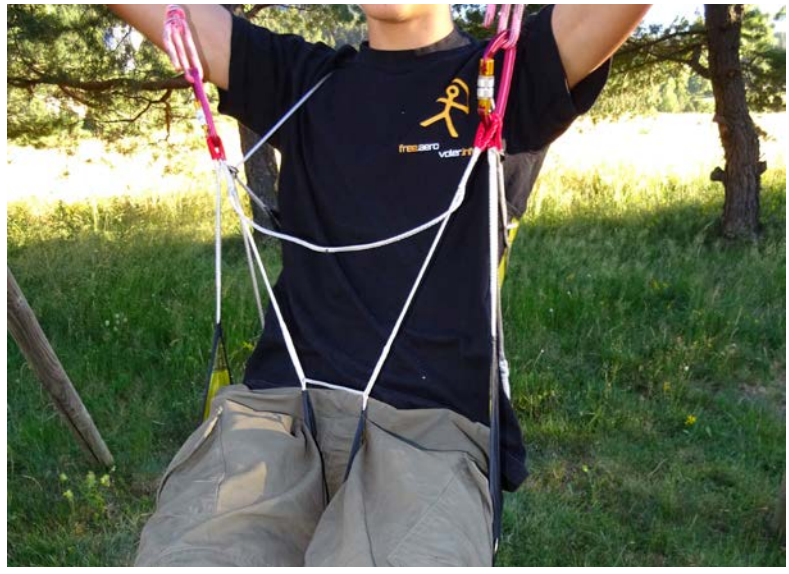
As far as initial resistance is concerned, there is no problem, it has been certified in tests to 15 000 N (about 1500 kg).

Size S: 205 grammes, pilot 1.60 m
Size M: 216 grammes, pilot 1.60m-1.85 m
Size L: 235 grammes, pilot > 1.85 m
Price: 280 €

www.nervures.com

This buckle can be clipped into the main karabiner and thus reduce the depth, so it has two positions of adjustment.

A classic 'string' but relatively comfortable.



Adjusting the length of the harness: there is a buckle which lengthens or shortens it thanks to a sliding splice.

It can be used either with softlink buckles or with lightweight karabiners like these Grivel ones. Behind the two attachment points which also serve to close it, a friction ring lets the cord run freely from the shoulder to the back of the seat, allowing you sit up more easily.

Drawings: Maria Edlbaur

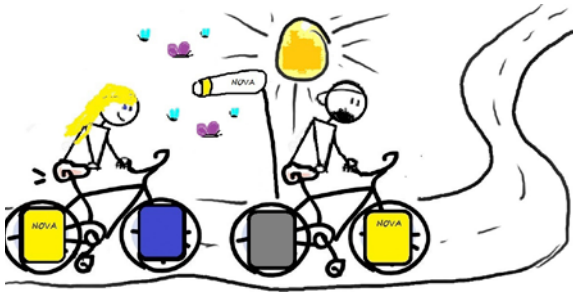
TRAVEL

# BIKE AND FLY

*Maria Edlbauer and Christian Rankl combined their bikes and paragliders for a six month long journey between Austria and Georgia, with 4000 km by bicycle and cloud bases of 5200 metres…*

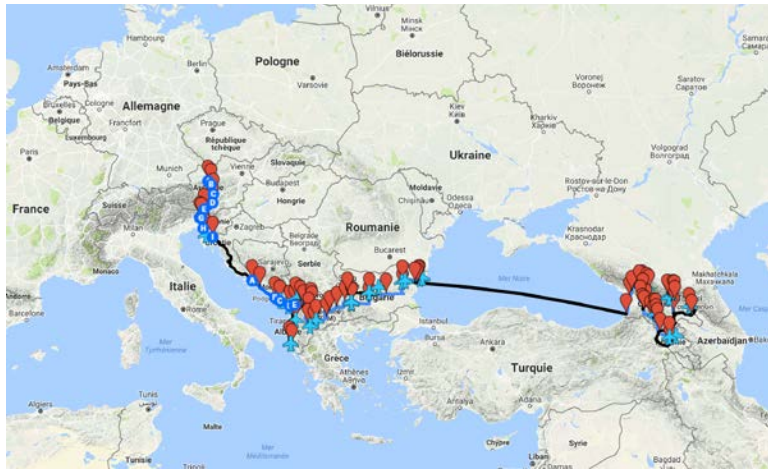
**After 1h30 of climbing on foot to take-off, they climbed to more than 5000 metres… In the distance, Mt Elbrouz (5 642 metres).**

Everything was carried by bicycle, including their 'pocket planes'. Here, Maria and Christian are going into the Valbona valley in Albania. They climbed on foot up to a take-off, slept there and then flew the next morning.



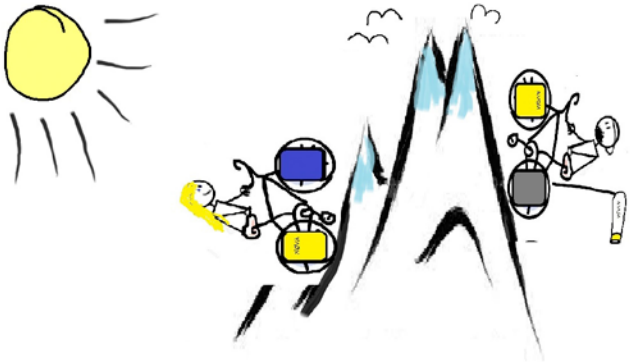

Arrival in Georgia at Ushguli at an altitude of 2100m.

They flew in the Mont Chkhara (5 058m) range; regions which are almost virgin to paragliding.




The couple's blog shows the stages on Google Maps.

Their 'mobile home', a lightweight tent, transported by bicycle and put up in a few minutes; here they are in Croatia.



Setting off by bicycle, with two 'pocket planes' on their luggage racks, flying wherever it's possible: a great programme for travelling.

Obviously this means setting off with the minimum, and as light as possible. Although Christian and Maria didn't make a very radical choice, their equipment remained fairly light.

On bikes weighing about 12.5 kg each, they loaded 23 kg for Christian and 16 kg for Maria. The bikes, classic old mountain bikes, aren't particularly sophisticated nor specially adapted, apart from the addition of mudguards.

**In the Albanian Alps looking for a place to take off. Total freedom in wild countryside.**

**The bikes are left at the landing field. After a night at take-off, Maria and Christian do a little XC along one of the valleys.**

Moreover, during the 4000 km long journey, their "Schwalbe Marathon" tyres didn't have a single puncture...

For Christian and Maria, this slow means of travelling was the best way to make the most of the countryside and the people they met en route. And thanks to good weather, they were able to fly almost everywhere they wanted to.

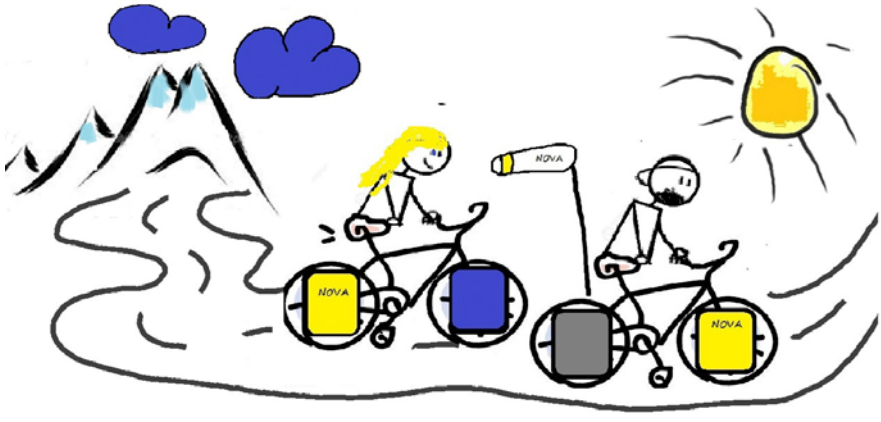
As for the bikes which stayed at the landing field every night, there were no nasty surprises either, no thefts or damage to report.

One day when they were looking for a take-off in the alpine meadows, the couple were invited into a shepherd's hut to taste some cheese and yogurt 'made at altitude'.

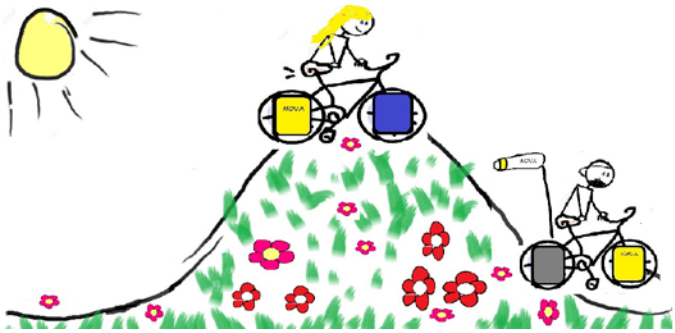
An XC in the Caucase near Gudauri. To take off, the couple hitched up to a col.

The generous thermals had high ceilings of 5200m.

The flying material that the adventurers used was adapted to 'hike and fly' travelling and to bivouacking: two Nova Ion 3 Light wings (less than 4 kg each), an Advance Easiness harness for Maria and an Advance Lightness 1 for Christian.



Bivouacing on a solitary beach in Albania, after a beautiful XC along a 2000m high coastal chain.



Flying above the village of Ushguli in Georgia with a view of the country's highest mountain (5 068 m). According to a local mountain guide, Christian and Maria were the first pilots to fly there for at least fifteen years. The couple's blog: http://salaam-aleikum.blogspot.co.at/.

This type of journey is available to everyone: take some time, try and make your flying equipment as light as possible, then do two or three practice weekends of 50 km.

Then off you go, on a journey fuelled only by your muscles and the wind...


**The privilege of being able to fly every day from another wild, unspoilt site...**

# FLYING BICYCLE

'Light' gives an interesting marriage between two sports: cycling and flying. Stéphane Chevalley from the school Flyriviera (http://flyriviera.ch/) regularly uses his bicycle to get up to launch.
With his featherlight single skin wing on his back, he can, for example, get up to the Sonchaux take-off at 1400 metres above Lac Léman, no problem at all. From there he takes off with his bike attached to his shoulder...

https://youtu.be/JYQZruv5BV0

# ANOTHER MARRIAGE BETWEEN BIKE AND WING, BUT NOT AS 'LIGHT'.

Folding bikes stored in a special bag for flying down as in this publicity film by Vaude, great idea!

This has been done for years; on the other hand, don't forget that if you fall on your back, the bike could cause serious injuries.

But the principle is attractive and could give good ideas for short journeys.

A nice film. It's just a shame that the 'old film' filter, which is in fact very modern, is poorly applied here and thus counter productive in our opinion.

https://www.youtube.com/watch?v=o9zE5Xp6Psw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# ICARUS TROPHY

*The Icarus Trophy is a paramotor race across the United States: snowy Montana to the Nevada deserts. Photos of an adventure experienced by Miroslav Svec, manufacturer of Scout paramotors.*

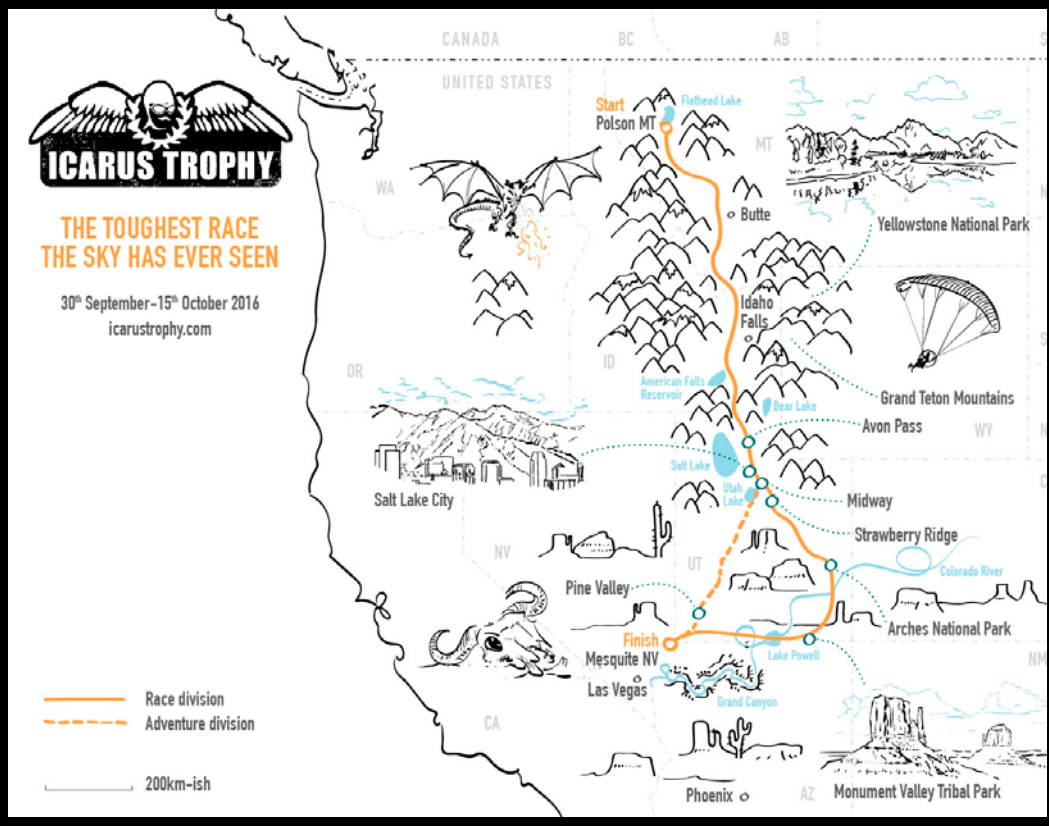
**THE TOUGHEST RACE IN THE WORLD**

Miroslav lived an amazing adventure, flying more than 1900 kilometres, from the mountains in the north to the deserts in the south.

1900 km is a similar distance to flying from Copenhagen to Barcelona, flying every day no matter what the weather and turbulence.

Mirsolav and his team mate Byron flew in the 'Adventure' category with no ground support. They took all their equipment with them, and were autonomous. The decision making was also done completely autonomously, only the start and finish points were fixed.

As far as everything else was concerned, it was up to the pilots to decide depending on the weather, their physical capabilities, fuel…



The Icarus Trophy has more and more fans: this incredibly varied race could become the paramotor X-Alps.

Photos : The Adventurist/ Organisation Icarus Trophy


Miroslav Svec

"Team Biro" was made up of Byron Leisek, Scout dealer in the USA and Miroslav Svec. Most of the time, they flew the same route, but at different speeds (Byron had a Niviuk Dobermann 2 size 20, and was therefore faster, Miroslav was on an Ozone Viper 3 size 22). They met up at the petrol stations and to bivouac each night.

| WEIGHT IN FLIGHT MIROSLAV (KG) | |
|---|---|
| Paramotor | 25 |
| Parachute Kortel Krisis Rogallo II | 1,8 |
| Additional tank 6 l | 5 |
| Oil 2T 5 l | 4 |
| Tent, sleeping bag | 3,5 |
| Photo gear | 1.5 |
| Water | 1 |
| Pilot | 88 |
| Clothes and helmet | 3 |
| Wing Ozone Viper 3 Size 22 | 4,55 |
| TOTAL | 137,35 |

Miroslav tells us about his experiences on the Ozone Viper 3 22:

*"I had never encountered such strong turbulence as during certain sections of this journey. The Viper 3 moves and rolls a lot and requires constant input. But I also learnt that it's very solid: despite the movements, I didn't have a single collapse, and it was very pitch stable. After making this observation, I had total confidence in it. Advantages: very good lift, and also very efficient at all speeds. Take off and landing were easy and the stability was surprising. Disadvantages: it could inflate a bit better, and I would like a bit more speed. I'll need to see if the Viper 4 is perhaps the answer I'm looking for..."*

Byron Leisek

Contrary to the X-Alps, the competitors must take everything with them when flying: their tent, their sleeping bag, everything. They are totally autonomous and can set up their bivouac anywhere.


It was also a journey with great gastronomic contrasts: from fast food, or even American junk food, to dried fruit during the flight.

## A VARIETY OF DESERTS

# NOT A LANDING IN SIGHT

*"You had to be able to rely on your motor. A lot of areas had absolutely no decent places to land. And if you were able to land, it was often in the back of beyond, with no houses or roads."*

*'We got a great welcome at most of the airports. There was almost always a heated room for the pilots, sometimes even with a kitchen and a bathroom. To enter, the code was often the radio frequency of the airport. There was sometimes even a courtesy car.'*

## AIRPORT WELCOME

## WEATHER

*'I learnt one thing: all weather is flyable, but not necessarily very nice.'*

*At the beginning, we flew with snow and negative temperatures. Then later on, it was tropical. We had to slalom between cells of rain storms, sometimes between two before they merged into one.*

*And then in the desert, there was so much wind that I only went forward by flying skimming two metres above the ground.'*

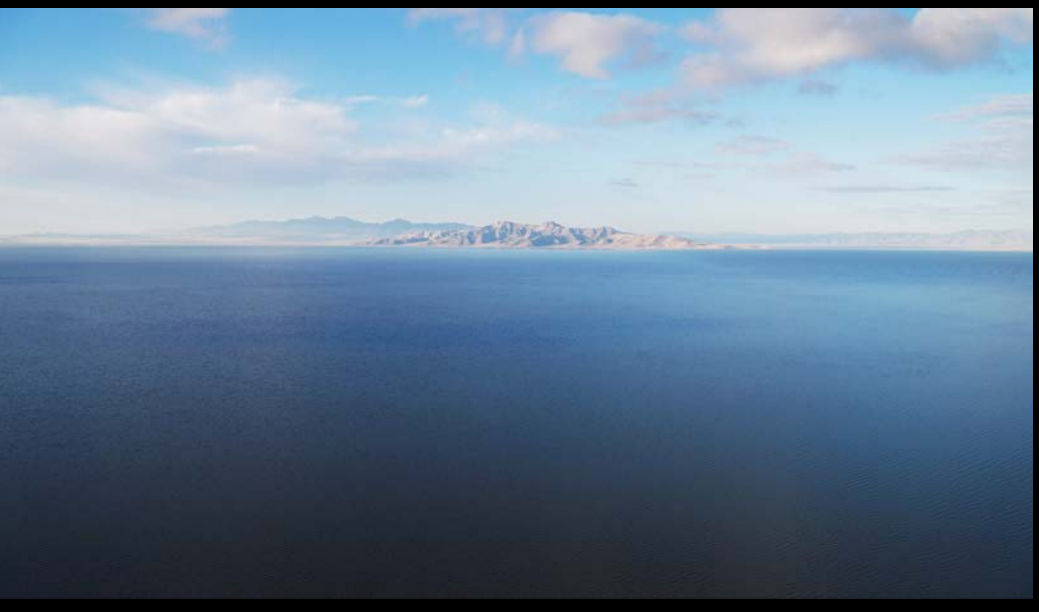
*Whenever possible, I followed the valleys, but there were lots of places where it was completely flat with no bearings.*
*No roads, no rivers, nothing.*

*A good navigational application was therefore important. In the air, I used ForeFlight on my iPhone. For the initial planning, I used the Skyvector.com air maps. All the pilots were equipped with satellite trackers so that their tracklogs could be followed live.*

## NAVIGATION

## ABOVE WATER

*'On the route covered by the Icaro Trophy, there is also water. I even crossed the Great Salt Lake. But upon reflection, it was a very dangerous thing to do and I wouldn't do it again.'*



## CONTRASTS

*I flew over an amazing variety of landscapes. And each region had its own weather and aerology.*

## UNUSUAL

*'Sometimes we saw some really strange things, like this boat in the middle of the desert'*

## RELAXATION

## THE WINNERS

*Together with Byron, we won the 'Adventure' category. But above all, we gained an enormous amount of experience as far as being pilots is concerned: tackling all types of weather, reading the terrain and navigating as a result.*

*In the Adventure category, the organiser won't even bring you a drop of water, otherwise you'd be disqualified.*

*But without them, I could never have taken on this adventure: their advice at the beginning was invaluable, and during the race, they watched over us by satellite…'*

# THE SCOUT CHASSIS

Miroslav Svec, owner of the make Scout, was obviously flying one of his machines. Numerous versions exist, from the Scout Basic (5533 €) to the Scout Ultimate (9564 €). They are all based on the carbon Scout chassis and a Vittorazi 185 (Classic or Plus) motor with various options. They are all equipped with a special "Safestart" box, developed by Miroslav, which prevents the motor from starting with full throttle to avoid accidents whilst the machine is being prepared.

The pretty carbon cage on these machines is characterised by the aerodynamic spin of the radial rods: Miroslav Svec is said to be the inventor of this technique which is supposed to compensate for the torque effect which has a tendency to turn the paramotor due to the rotation of the propeller. Other manufacturers have since started using the system.

For the Icarus Trophy, Miroslav's machine also had a kit for regulating the carburettor in the air, as well as an instrument for monitoring the EGT and CHT temperatures of the motor.


| MOTOR 185 PLUS - TECHNICAL DATA | |
|---|---|
| Manufacturer: Vittorazi Motors<br>Web: http://www.vittorazi.com/fr/moteur/motore/11/ | |
| Cycle | 2 stroke |
| Stroke | 54 mm |
| Swept volume | 184.7 $cm^3$ |
| Bore | Ø 66 mm |
| Power | 25 hp at 7.800 rpm |
| Cylinder | Single cylinder in aluminum Nicasil chromed |
| Piston | HQ diamond profile, graphite coating, 2 rings chromed |
| Intake | Silencer air-box - Walbro carburetor<br>Reed valve intake |
| Cooling | Extraction from propeller |
| Starter | Manual pull start - 3S (Soft Starter System) |
| Clutch | New CNC machined centrifugal clutch |
| Reduction drive | ratio 1/2.68 - 1/2.87 - PolyV belt |
| Ignition coil | INDUCTIVE IDI |
| Spark-plug | NGK BR9ES |
| Temperatures max | EGT 550° - CHT 250° |
| Exhaust pipe | Hand-made with carbon "Db-Killer" silencer |
| Fuel | Unleaded gasoline - Synthetic oil 2.5 % |
| Consumption | 3.8 - 4.2 liters/hour at 30kg of static thrust, propeller 125cms at 5600 RPM |
| Weight | 14.2 kg (Pull start) |

The total weight of the Scout is about 25 kg.
For more information: www.scoutparamotor.com

# ICARUS TROPHY 2017

**The Icarus Trophy will take place once again in 2017 from the 22nd of September to the 5th of October, once again from Montana to Nevada.**

**For more information and to register:**
**http://www.icarustrophy.com/**

Photos : The Adventurists/Icarus Trophy


# THOR 80

## THE LIGHT ROBUST LITTLE MACHINE WAS PUT TO THE TEST...

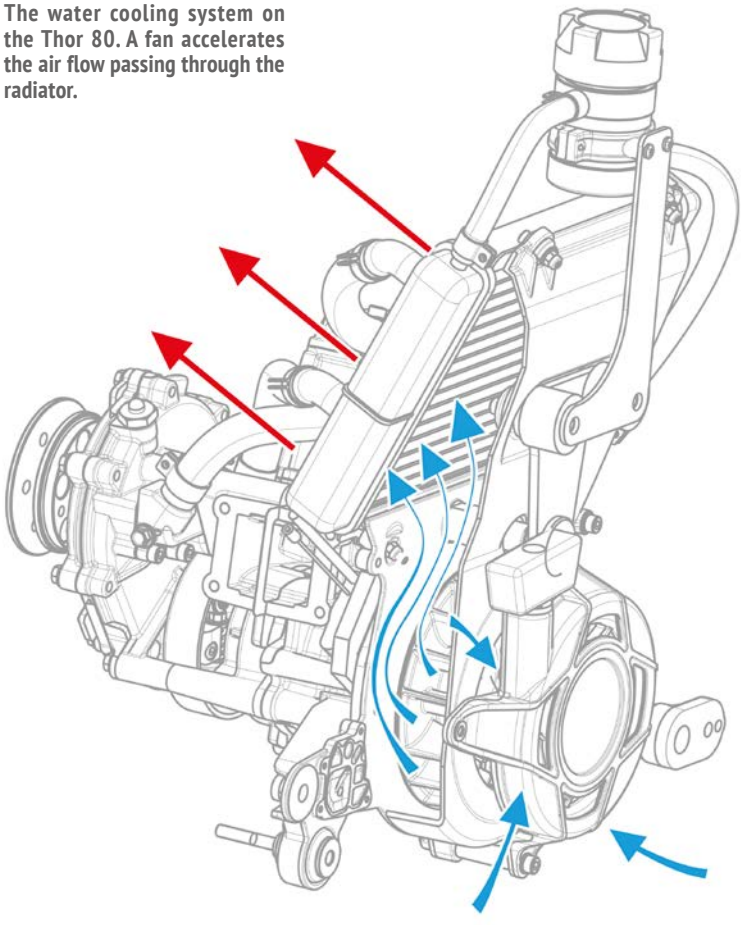
Photos : Burkhardt/voler.info

For a little over a year Polini have been marketing the definitive version of the Thor 80. A small, but very powerful motor, which is water cooled. This type of cooling is more efficient and therefore allows the motor to be more powerful without it over heating.

Another advantage of liquid: the temperature remains more constant. In addition, with a thermostat, the ideal temperature of the motor is reached more quickly (less than one minute compared to 4-5 without) but, for the moment, the Thor 80 doesn't have this.

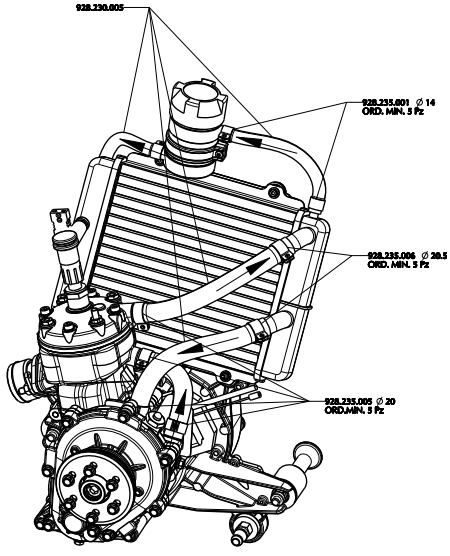
A water pump attached to the reduction gear of the Thor 80 improves the circulation of the water when the propeller turns. This is unusual, because on my Thor 250, the pump works constantly, even when ticking over. The Thor 80 doesn't have an electric starter; instead it uses the "Flash-Starter" hand starter. It's very efficient and restarts first time, even in the air.

The water cooling system on the Thor 80. A fan accelerates the air flow passing through the radiator.



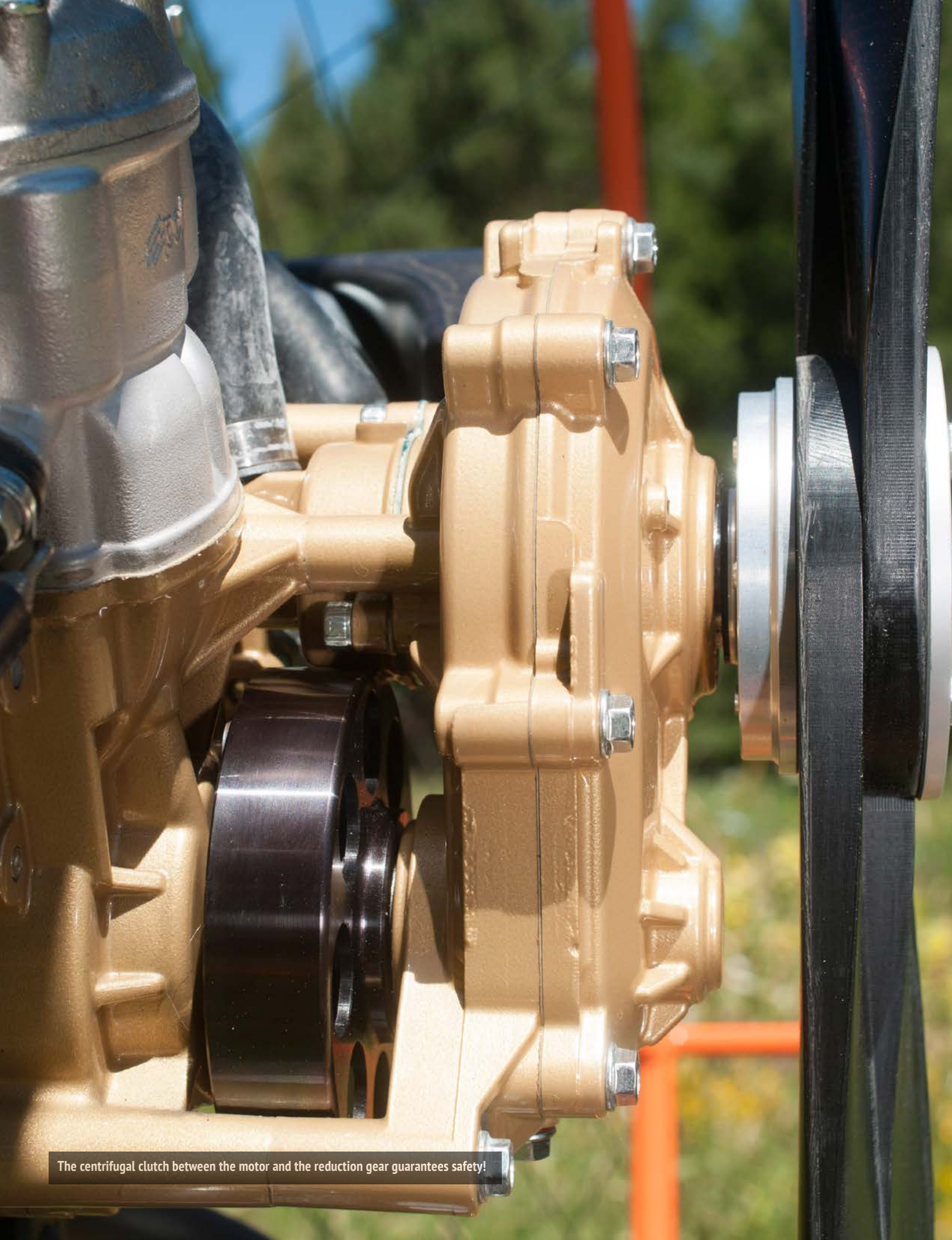

As a comparison, a Sky motor which is also water cooled. The big differences: the radiator is less integrated and it doesn't have a pump at all. It's only the temperature difference which maintains the circulation (thermosiphon principle).

The Thor 80 with the circulation managed by a pump when the propeller turns.

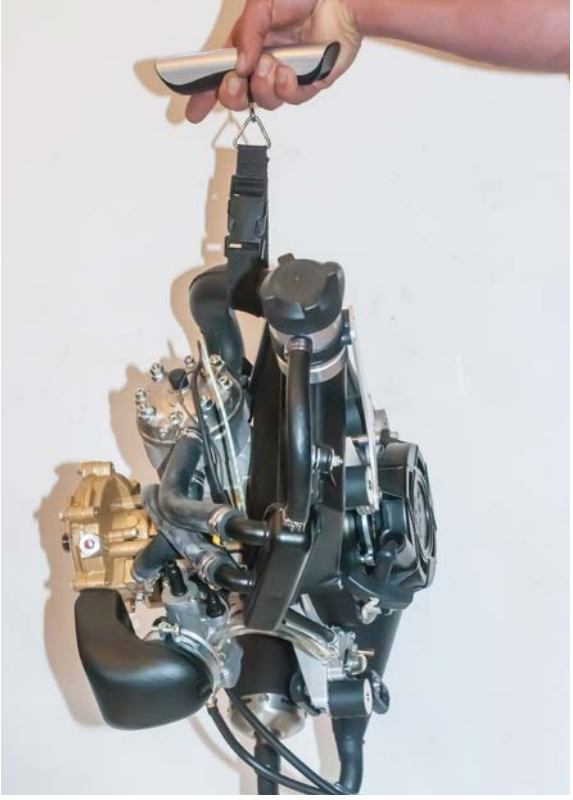



Contrary to the Polini Thor 190 and the Thor 200, which had lots of 'growing pains' when they came out, the Thor 80 started very well and very reliably. We tested a model which came out of the factory in the summer of 2015.

Of course, you need to change the bushings on the radiator according to a directive from Polini, so that you don't risk breaking them. The exhaust pipe discharges a bit of oil: on the new models, this isn't the case. They also come with a new, more robust exhaust in two parts.



The centrifugal clutch between the motor and the reduction gear guarantees safety!



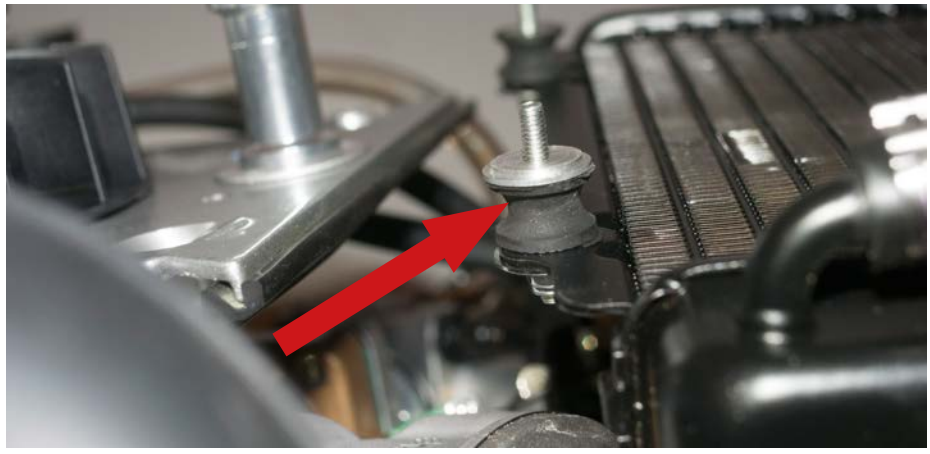
In the office, the Polini Thor 80 weighed 11.6 kg. It isn't ultra light, but very good for a motor this powerful! The radiator is integrated with the motor, making it very compact.

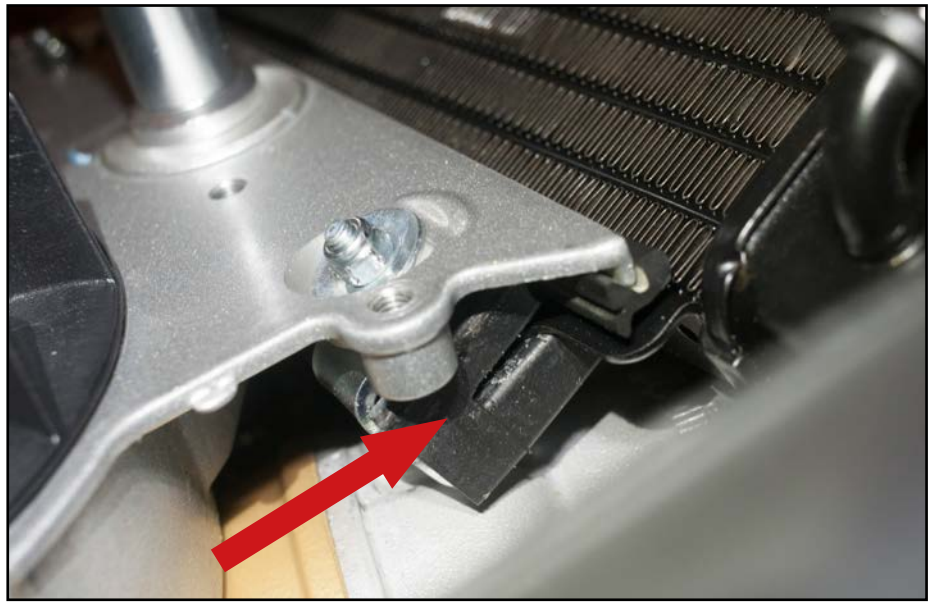
To change the radiator attachment due to an upgrade advised by the manufacturer, we had to take off the Flash-Starter...

...as well as the cover for the fan (right).
Below, the old bushing, further below, the improved attachment which lasts longer.

In short, apart from that, the Thor 80 has been put to the test and is being offered by more and more manufacturers with their chassis. The undeniable advantages of the Thor 80: it has the power of a 125 cc type motor, whilst being fairly light and compact. Christian Reuter in Germany measured it as having 60 kg of thrust with a propeller of 130.

We'd love to believe it: that's a lot of thrust! The vibrations are average and the noise seems to be too. The power curve is typical for a little motor: you need to give it a lot of revs to reach full power.

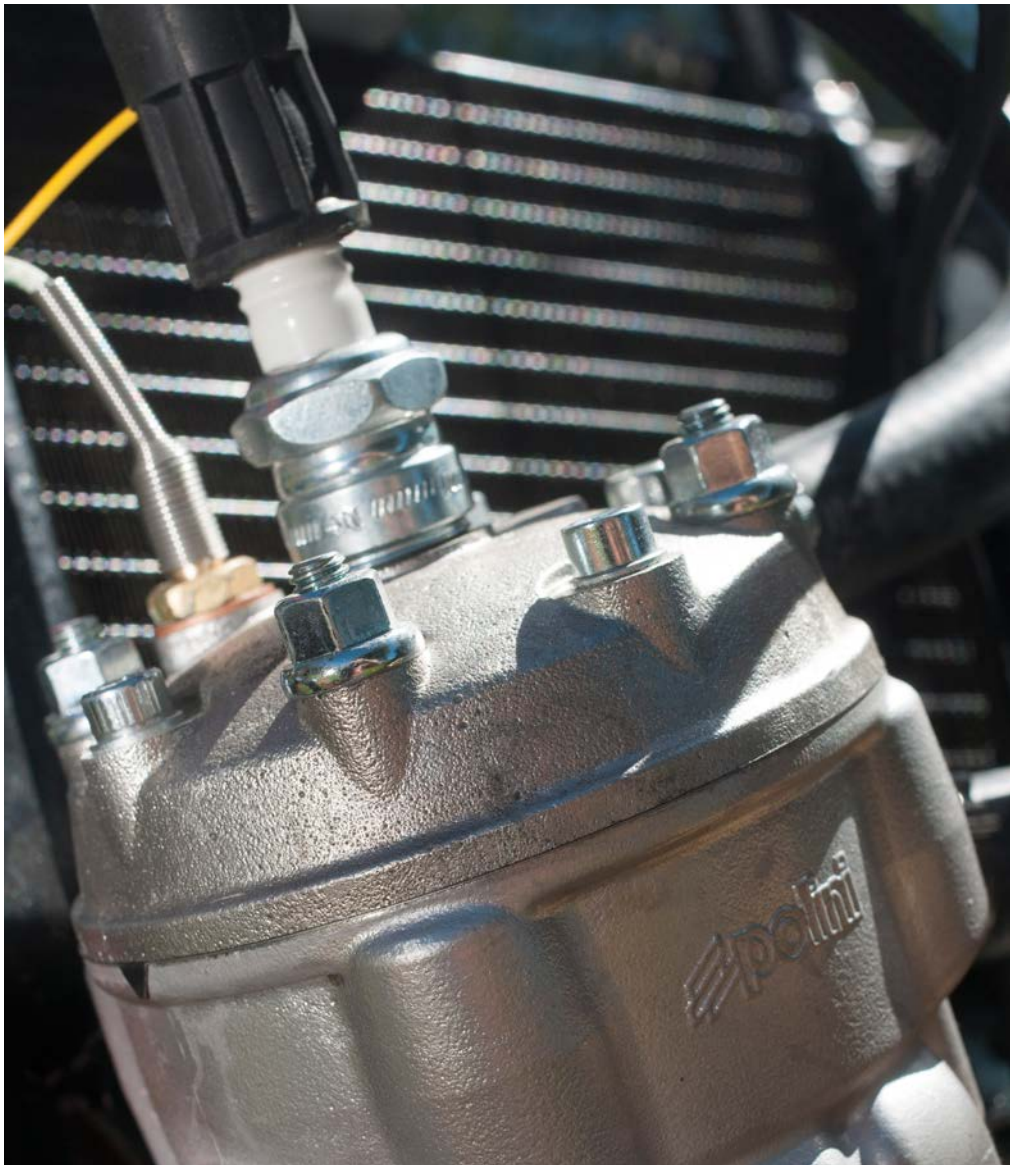




Above, the pipes to the cooling pump are clearly visible.

Even if it isn't an ultra light motor, it's one of the best compromises between power and actual weight. The water cooling should give it good reliability and longevity. For cold countries, we advise attaching a thermostat to increase the temperature more quickly.

The instrument for monitoring the motor (optional) is compact and easy to attach, but it failed on occasions during our test.

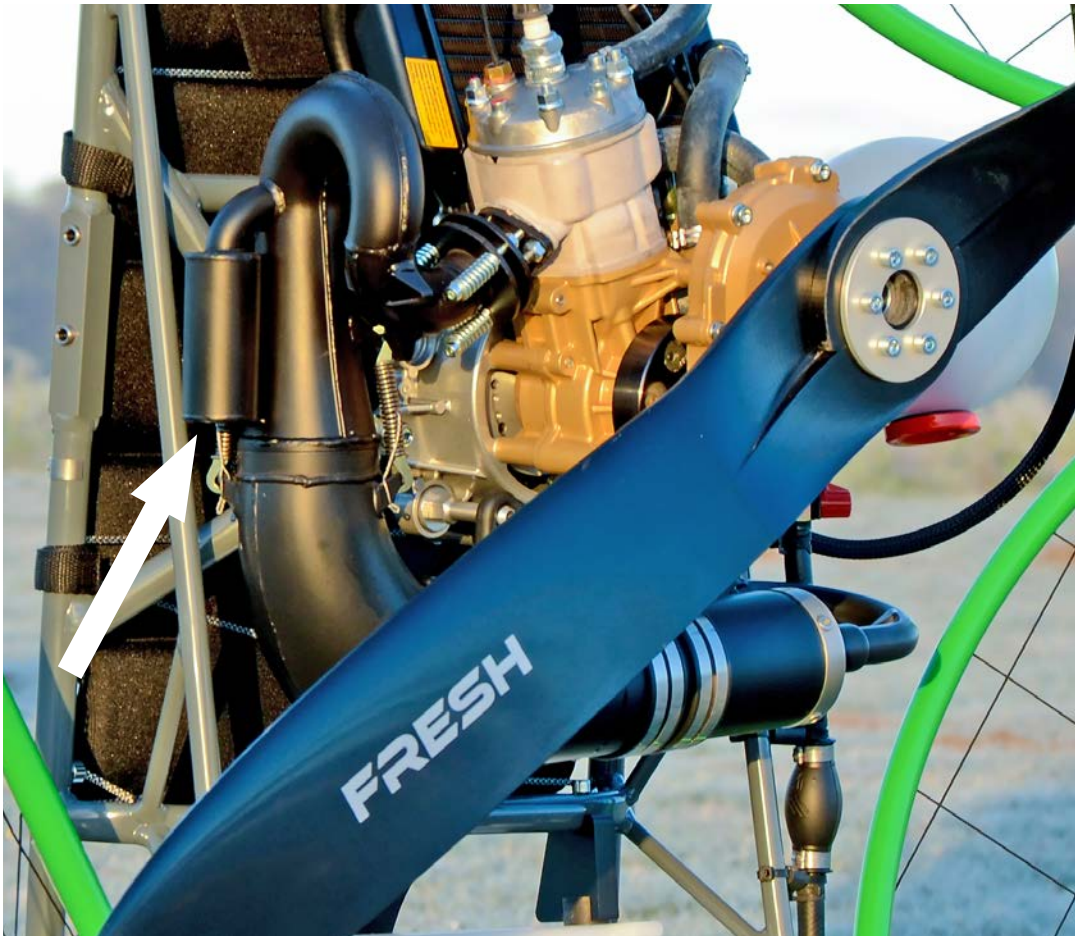



At PAP, the Thor 80 has found a good niche, for example in the titanium PAP 1250 TH803 and in the PAP 1400 TH803 (5600 €) chassis.


Another ambassador for the Thor 80: the make McFly. Price 5900 € with this titanium chassis.


Photos: Elona Müller / Fresh Breeze

The make Fresh Breeze integrates this motor in their Thorix 80, but with some modifications: WB37 membrane carburettor as well as an exhaust equipped with a "Helmholtz" attachment to improve the linearity of the power curve. Price: 5400 €.



Photos : Burkhardt/voler.info

| POLINI THOR 80 | |
|---|---|
| MANUFACTURER: Polini www.polini.com | |
| Type | 2-Stroke |
| Cooling | Liquid cooled |
| Bore | 50 X 44 mm |
| Displacement | 86 $cm^3$ |
| Compression | 14/1 |
| Carburetor | Polini 21 ou Walbro WG8 |
| Ignition | Electronic |
| Fuel | Mix 2% |
| Transmission | Clutch/reduction oil bath 3,58 |
| Starter | Pull (Flashstarter) |
| Propeller | Clockwise 110 cm, 115 cm, 125 cm, 130 cm |
| Weight | 11.4kg |
| Power | 17HP @ 10450 RPM |
| Price | 2 748 € |


# KANGOOK TREKK II
# THE TRAVELLING CHASSIS

*The travelling chassis from Trekk has been completely rethought: more practical and a lot more robust with a double arc. Here's a photo review of it...*

The volume when disassembled is still fairly low. Photos: Burkhardt/voler.info

There's no doubt about it: the Kangook travelling cage is fully perfected in its second version. All the faults on the first version have disappeared. The cage is heavier (3000 g instead of 1816 g), but it still folds into a greatly reduced volume: it's super for travellers. The strength of the double cage is impressive and putting it together is very quick and practical. The only hitch is the technique for tensioning the net. It could, without a doubt, be very easily improved.

The bars on the cage are clearly marked (S = "Side", T = "Top)".

Different diameter tubes save weight.

Assembly is easy and intuitive.

The only minor criticism: the tension of the net in the lower part could be a bit better.

At the top, the tension is very good. This is done by a strap across the pilot's back. This would perhaps be more practical on the sides. Photos: Burkhardt/voler.info

We also took advantage of this test to try the tubular arms (below), which are a new alternative to the classic ones (above). The unanimous verdict from all the testers: no, we much prefer the lighter classic ones (533 g per arm instead of 600 g), better and nicer. Photos : Burkhardt/voler.info

In addition, the tubes have prominent pointed corners.


# REUTER FLEXIBLE TANK: IDEAL FOR TRAVELLERS

The first time that we tested a flexible tank was fifteen years ago on an ultra light travelling Neurajet engine. The idea: this type of tank, which looks like a drip bag, weighs almost nothing and can be easily emptied and refilled. It isn't expensive and you can carry a brand new one on a plane, where used petrol tanks, even empty ones, are banned.

The company Reuter put this principle top of their list of priorities, but in a more sophisticated fashion: an outer protection cover to stop it being pierced and a plastic base to increase safety. It's an accessory which is compatible with Kangook machines but, no doubt, also with other chassis.

The result of our test of an advanced prototype: despite the protection, it's a very light tank (635g), therefore half the weight of a normal tank. It's quick to put together.

Other advantages: it doesn't need any more ventilation, because the pocket shrinks as it empties. The whole thing is therefore better sealed, so you smell less petrol.

On the prototype there was just one fault: if you did the cap up too much, it could undo the internal locknut, which could lead to a fault in the sealing. It will be very easy for the manufacturer to find a solution for the final mass produced version.

It holds 12 l, the pocket is made by a supplier to the Russian army, and therefore, as a consequence, robust.

Price: 140 € for the ensemble, 60 € for a spare internal pocket.

http://www.reuter-fluggeraete.de/


The Reuter tank can be put together in a few minutes. All you need to do is rivet a board to the bottom. Photos : Burkhardt/voler.info

The 'transfusion bag' from Neurajet in 2002. A pioneer of the travelling machine...


Reuter's solution in 2016: still light, but a lot more robust.

Recommended accessory: a quick connector (about 19€) between the tank and the motor. Also available from Reuter.

The fuel collector at the bottom of the bag.

The tank is attached with straps. The outer sides of the bag are transparent, to show the fuel left.

It's easy to take out the internal bag, for example to replace it with a new one for travelling by plane.


# APCO AIR BAG

For about 70 €, the manufacturer Apco offers an airbag which can, as an option, attach under the Split Legs harnesses. The airbag quickly takes shape when flying; its volume seems substantial and, its ability to shock absorb should be correct, or even pretty good (there are no official measurements). Obviously an Airbag of this size will slightly increase the drag on a paramotor, but the safety for the pilot is worth it!

**It is attached using straps and zips designed with this in mind. These zips also allow you to attach, in addition to the air bag, a very practical storage pocket, see following page.**

The pocket has a mirror which lets you check the fuel level. The mirror is stored in the small pocket under the Apco logo and fastened with a little cord with an automatic winder.

http://www.apcoaviation.com/

Below left, another nice detail on the pocket: a hole for the nozzle of a drinks bladder. Below right, there isn't space to store an enormous amount, but a lightweight fabric paraglider bag will fit in.

Photo: Tristan Shu

Paul Guschlbaur (Skywalk) training in Ölüdeniz (Photo by Tristan Shu)

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