

SAFETY

TREE LANDINGS
RESERVES
KARABINERS

COLLISIONS
TEST ZIPPY
SOFTLINKS



Mike Küng at one of his playgrounds, the summit of Wasserkuppe, on the 960 m Rhön mountain in the centre of Germany. It's a perfect site for soaring and has been a flying Mecca since 1910. The German army's radar dome is no longer in use.

SUMMARY

Translation by Ruth Jessop

This edition is principally about (passive) safety. In a future edition, we'll review new back protectors. As far as active safety is concerned, in other words, good pilot practice, this is always included in all our technical flying articles: next month, we'll talk about low speeds in thermals...

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TEST

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GIN



Sports Performance Wing

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.

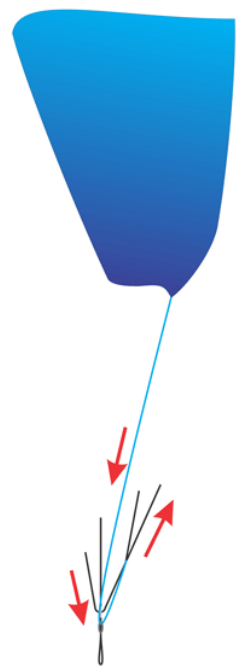
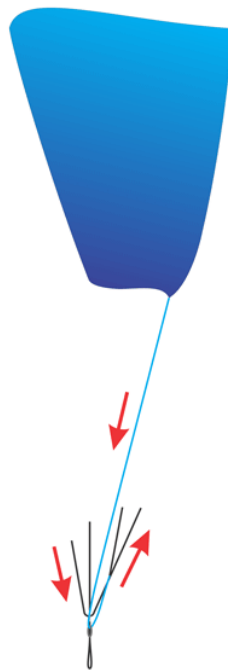
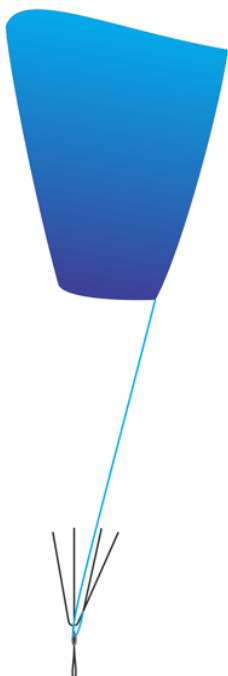
Share your experience #gingliders

APCO NRG XC 2

The Israeli manufacturer Apco present the paramotor wing, the NRG XC 2. NRG XC range represents wings aimed at travelling, developed from the slalom paramotor wing, the NRG PRO. The XC 2 version is now equipped with an Apco 'ABS' system: when the pilot accelerates (trimmers and foot accelerator), the 'tip steering' controls at the stabilos are automatically activated to stabilise the wing, especially in roll.

The goal: to be safer and more comfortable when cruising fast.

<http://www.apcoaviation.com/>



TREKKING BIRD HOMOLOGATION

Nicolas Brenneur is one of the manufacturers who, on principle, by philosophy and for safety reasons, never goes to the limit of a certification classification, but remains as much as possible in the upper middle part.

The new Bird is made following the same principle, in addition, Trekking have put on line videos of the most important stages of the certification.

Trekking YouTube:

<https://www.youtube.com/channel/UCPB2QX9foMzNGI-TUKO53Dw>

The table with the sizes and technical data is in a previous edition:

<http://www.free.aero/en/contentsHTML/trends2017E/?page=53>



SWING ARCUS RS

In our previous edition, we omitted the technical details for the new Arcus RS from Swing. Here they are...

ARCUS RS TECHNICAL DATA

Manufacturer: SWING Web : <http://www.swing.de/arcus-rs-en.html>

DATE	2017				
SIZE	XS	S	M	L	XL
CELLS	42	42	42	42	42
FLAT SURFACE AREA [m ²]	21	25	27	29	32
FLAT WINGSPAN [m]	10.50	11.50	11.90	12.30	12.96
FLAT ASPECT RATIO	5.25	5.25	5.25	5.25	5.25
ALL UP WEIGHT [kg]	55-75	70-95	85-105	95-115	105-130
WEIGHT OF THE WING [kg]	-	4.6	5	5.4	5.7
CERTIFICATION	EN-B*	EN-B*	EN-B	EN-B*	EN-B*



OZONE FREERIDE

The Freeride is a new model based on the Viper 4: with a reduced aspect ratio, this wing should be more accessible. According to Ozone, the Freeride also has technology used in the Speedster 2 and the Slalom.

Interesting...

FREERIDE TECHNICAL DATA						
Manufacturer : OZONE Web : http://flyozone.com/paramotor/fr/products/gliders/freeride						
DATE	2017					
SIZE	15	16	17	19	21	23
CELLS	56	56	56	56	56	56
FLAT SURFACE AREA [m²]	15	16	17	19	21	23
FLAT WINGSPAN [m]	9.21	9.51	9.8	10.36	10.89	11.4
FLAT ASPECT RATIO	5.65	5.65	5.65	5.65	5.65	5.65
ALL UP WEIGHT PPG [kg]	55 - 120	55 - 130	65 - 140	75 - 150	85 - 160	85 - 170
WEIGHT OF THE WING [kg]		4.01	4.18	4.5	4.82	5.12
CERTIFICATION	Pending					



ADVENTURE

Adventure have had these for a while now, but we haven't reviewed them: well thought out passive safety features such as the Bumper. This 'shock-proof foot' reduces the impact if the pilot lands on their bottom. Obviously, Adventure also offer 'airbag' protection under the harness. www.paramoteur.com

ULTRALEICHT- FLUG-FESTIVAL

23.-25.6.2017 &

DEUTSCHER MOTORSCHIRM POKAL 2017

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- Streckenflugwettbewerbe
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- Film-Award am Abend des 24.6.
- Rundflüge und Flugvorführungen, Vorträge

www.dulv.de/UL-Festival-DMP/K218.htm



PROTEGEAR ALIVE-TRACKER

Markus Schlittenbauer is head of the protegear system, <https://www.protegear.de/>, a service which integrates the Delorme system, obviously offers the Delorme Trackers in their new version made by Garmin. The instruments are now available.

In addition, Markus is working on a new instrument, perfectly adapted for their tracking service (Further information: <http://www.free.aero/en/contentsHTML/instruments-e/?page=34>) which goes further still: the Alive is an Iridium tracker (like the Delorme), which integrates internal sensors (shock) with external ones (opening an avalanche airbag, for example). If one of its sensors is activated, the device emits an acoustic signal, and it automatically sends an alert if the pilot doesn't prevent it from doing so by pressing a button. This sort of trigger following an accident is still missing from the classic Delorme trackers.

This project was financed by Kickstarter and IndieGoGo: <https://www.kickstarter.com/projects/1064275366/a-live-smartsafety-tool-satellite-messenger>

<https://www.indiegogo.com/projects/alive-first-smartsafety-tool-satellitemessenger-communication>



Alive (Price: Not given)



Le Garmin Inreach Explorer + (490 € approx).

SPOT GAINS HEIGHT


The SPOT GEN 3 tracker now transmits the pilot's altitude. Before the positions were only in 2D; obviously this is a big improvement in safety. On the other hand, the transmission from the SPOT tracker via Globalstar satellites will remain one-way, limited to sending the pilot's data outwards, without any possibility of receiving information.

www.findmespot.eu



Spot GEN3 179 €.



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NEW ADVANCE X-ALPS TEAM PILOTS

ADVANCE Team pilot and X-Alps runner up 2015 Sebastian Huber is to be joined by some reinforcements. No less than twice PWC Super Final winner Aaron Durogati and running legend and two-time X-Alps second place Toma Cocone complete the 2017 ADVANCE X-Alps Team. All three exceptional athletes will take on the hard adventure race with

the OMEGA XALPS 2 three liner and a made-to-measure LIGHTNESS 2 XALPS 17. At the moment Chrigel Maurer is deciding whether to fly a two or three liner wing. He has also decided on a LIGHTNESS 2 XALPS 17 harness. All the information on the pilots and their equipment can be found on: www.advance.ch

www.advance.ch



Aaron Durogati and Toma Cocone to the right.



Sebastian Huber.

Omega Xalps 2





Photo: Organisation



THE WORLD CHAMPIONSHIPS: SAFETY

The fifteenth World Championships will take place in Italy at Monte Avena from the 1st to the 15th of July 2017. At the site, the preparations are well under way. We asked Matteo Di Brina, President of the Organisation Committee, what 'safety' means when organising this type of competition.

MATTEO DI BRINA

Safety is, without a doubt, one of the aspects we will be paying most attention to when organising this World Championship. We have analysed scenarios based on previous experience [during regional championships organised here in the past], and have put in place procedures to quickly organise and coordinate a rescue if necessary. As for

the tasks, they are obviously planned and adapted every morning taking into account the weather conditions and possible problems caused by the configuration of the terrain. Moreover, once the task route has been set, we check as the day progresses, with the help of specialised software, the position of the turnpoints in relation to the weather and the terrain to give the pilots as much useful advice as possible to fly safely.

Thanks to livetracking, we can constantly follow the position and the trajectory of each pilot, as well as communicate possible safety warnings to them. [They use a Flymaster system which has been specially adapted for competitions]. We also intend to have pilot observers flying who will follow the pilots during the tasks

to give a more up-to-date view of how the competition is running. Finally, we have all the necessary personnel ready on the ground: coordination with doctors, paramedics and emergency vehicles. The safety backup comprises two ambulances who will follow the event, coordination with the SUEM (rescue helicopters), as well as a permanently present mountain rescue team. Every day, more than fifteen people are responsible for safety. If in doubt, obviously safety will always be the priority. We want to organise an interesting competition, but never an 'unscrupulous spectacle'. We have a 5 000 km² playground available, which will let us make the best use of the different weather conditions.

<http://www.monteavena2017.org/>



Fifteen years ago, the SevenUp by Independence surprised us with its geometry resembling a collection of giant bras and with its pendular stability. It was ahead of its time: the new 'square' models bring the same advantages in a simplified fashion...

Photo: Flugschule Achensee

RESERVES ON GREAT FORM!

Reserves are on form! For several years, the squares and triangles have proliferated. Here's the latest news...



Photo: Flugschule Achensee

Simple round parachutes have always been the models designed to be used by paraglider pilots: simple, easy to make, not too expensive, widespread and tried and tested by parachutists. Initially, they were the only thing available in our sport. By and large they worked fairly well.

Sometimes they took a little bit long to open: this technology comes from parachuting, the cuts and folding method were designed for opening at high descent rates. Another disadvantage: their lack of pendular stability can result in fast, violent landings.

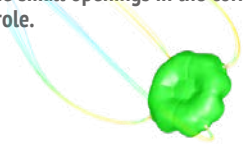
At the beginning of the nineties, Charly-Finsterwaler launched the 'Revolution': a double cupola parachute, which opened much quicker and with a lower sink rate. Nevertheless the 6.8 m/s authorised by the LTF norm and even the 5.5 m/s authorised at maximum load by the EN norm aren't negligible: on a damp green field this would be ok, but on rocky ground it would hurt. The manufacturers therefore always try to reduce the sink rate, but their research has its limits. It's tempting to increase the surface area, but

that isn't the miracle solution either: on one hand, it increases the volume and the weight of the reserve, whilst those using it want lighter and lighter equipment. On the other hand, a reserve which is too big takes longer to open and lacks coherence: according to the numerous trials done by one of the specialists from the outset, Eki Maute, turbulence deforms the leading edge of an insufficiently loaded reserve and can transmit pendular movements onto it which is even less favourable for a slow, stable descent.

Finally, the sink rate can be reduced by making the reserve 'glide', with a certain amount of horizontal speed. Even normal reserves travel forwards horizontally: there is always a certain minimum amount of asymmetry which makes the reserve travel in this way, thus reducing the sink rate. All the same, with a round or square reserve, it is difficult to get lower than 4.5 m/s.

And this horizontal trajectory, which is becoming increasingly common for square reserves, isn't necessarily welcomed by those using them when this speed is not steerable.

A square SQR: a new generation of reserve with much sought-after aerodynamics, but which remains simple to use. Like all the square reserves, the small openings in the corners play an important role.



A first step towards more pendular stability: the Revolution by Charly in the 1990s.





A Rogallo: a lower sink rate, more horizontal trajectory and steerable, but a bit more complex than a simple round or square parachute.

Photo: Flugschule Achensee

Properly steerable reserves based on the Rogallo principle, which really glide to the point of sometimes being able to take off on a very steep slope, logically have the best sink rate: the 'Beamer 3' by High Adventure, for example, only descends at 3 - 4 m/s, which is very good for a reserve. Already ahead of its time, the pioneer of the Rogallos, the " Vonblon Papillon", (www.vonblon.com), only sank at about 3.1 m/s.

On the other hand, lots of professionals look at the Rogallo reserves, which are mainly designed for experienced acro pilots, and reckon that very few inexperienced pilots would really make use of the option to steer it, being overwhelmed by the heat of the moment. As a consequence, it would therefore be better to equip them with a simpler reserve which is less expensive and easier to use/maintain/repack (the Rogallos

require more time to repack). Nonetheless, the Rogallo Beamer, for example, is also designed to be used by 'normal' pilots: the main wing doesn't have to be jettisoned and the steering is optional. In any case, it is highly recommended to practice using a reserve within the framework of an SIV course over water. In particular, learn how to manage the paraglider: to avoid downplaning, it must be stalled and partially pulled in by the pilot. This type of training is also a good opportunity to familiarise yourself with how to repack it. Talking of which, a perfectly folded reserve at the factory sometimes opens a little bit later, because the panels superimposed without creases 'stick' slightly to each other. Once it has been repacked with imperfections and creases, it takes in air and opens even faster. In any case, the differences are minimal: according to the professionals, there are fewer and fewer

cases of reserves opening late. In the case of poor folding or fitting in the harness, it is nonetheless possible that opening it could be totally impossible, hence the importance of checking the compatibility of the harness/handle/container and of testing throwing it hanging from a door frame.

One last word about testing over water: as we've said, it's an excellent method for training and familiarising yourself with it. But unfortunately, according to very recent reports, some reserve fabrics don't like water, losing some of their qualities. Ask the manufacturer of your reserve for their advice.

THE NEW MODELS

On the following pages, we'll go through, without being exhaustive, some shapes and models of current parachutes...



ULTRALITE 4

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The 4th generation of the Ultralite series is a totally new design that is packed with new features and technology. The UL4 delivers a higher level of efficiency, increased glide performance, higher top speed, more agility, and even easier inflation behaviour. To top it off, the UL4 is a few grams lighter than any previous Ultralite, with even smaller pack volume!

WWW.FLYOZONE.COM



OZONE's Instagram feed is full of great stories from team pilots and stunning images from their adventures. Follow along and get a daily dose of flying inspiration!
[instagram.com/ozoneparagliders](https://www.instagram.com/ozoneparagliders)



photo: Rebecca Bredehoft pilot: Cade Palmer



INDEPENDENCE EVO CROSS

The pioneer of square parachutes. This reserve has been widely tried and tested. The instructor Eki Maute, from the school Achensee, has documented about 150 throws of this model. Its reliability, rapid opening and pendular stability are well known. A slight asymmetry in its geometry is part of the principle.

EVO CROSS - TECHNICAL DATA

Manufacturer: INDEPENDENCE

Web : <http://www.independence.aero/en/products/rescue-parachutes/evo-cross.html>

SIZE	100	120	160	235
AREA [m ²]	25.06	36.81	41.12	57
SINK RATE AT MAX. LOAD (LTF) m/s	4.9	4.7	5.6	5.5
MAX. TAKE-OFF WEIGHT (ACC. TO LTF)	100	120	160	235
MAX. TAKE-OFF WEIGHT (ACC. TO EN, SINK RATE 5,5 m/s)	100	120	155	235
weight [Kg]	1.5	1.9	2.4	3.1



ULTRA CROSS

The Ultra Cross is a different reserve to the Evo Cross, a much lighter evolution. It is made from Dominico Dokdo 10D, a fabric for which Independence/Skyman have the exclusive rights.

ULTRA CROSS - TECHNICAL DATA

Manufacturer: INDEPENDENCE

Web : <http://www.independence.aero/en/products/rescue-parachutes/ultra-cross.html>

SIZE	75	100	125	150	210
AREA [m ²]	21.5	25	33	40.3	54.81
SINKRATE AT MAX. LOAD [m/s]	5.5	4.61	5.1	5.3	5.45
MAX. TOWED LOAD [kg]	75	100	125	150	212
WEIGHT [g]	790	975	1195	1585	2300

HIGH ADVENTURE BEAMER 3 & 3 LIGHT



Beamer 3

On several occasions we have reviewed this steerable reserve, developed and marketed since 1995 by Urs Haari, with occasional help from Hannes Papesh, when they were finishing off the Beamer 2 version in 2010.

The Beamer 3 came out in 2013. It is made in two versions, classic, and lightweight; each comes in two sizes.

www.free.aero/en/contentsHTML/light_2016_e/?page=23

The reduced weight and volume are impressive. Because the standard size, with 41 m², is relatively large: the reserve shows great stability and that's even with the paraglider floating about like a flag in the air flow. The Beamer was designed for relatively simple use; it's very accessible for a lot of pilots and doesn't require them to jettison the main wing. Just after opening, it is in 'vertical descent' mode, with the controls fixed in a braked position. It's only if the pilot takes the controls that the wing accelerates horizontally in a significant manner.

Despite its large size, this reserve opens particularly fast.



Beamer 3 light

Beamer3 Light : Always amazing: 41 m² in this little container!

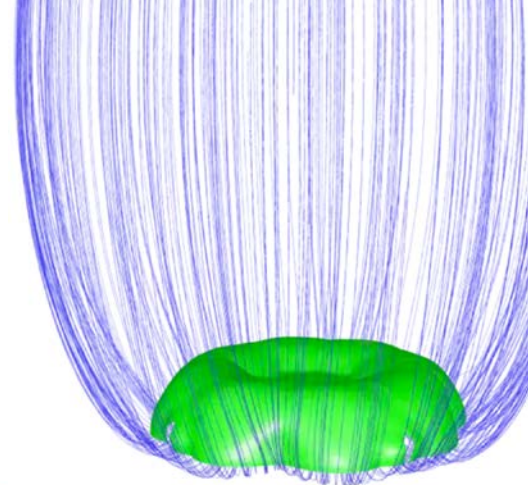
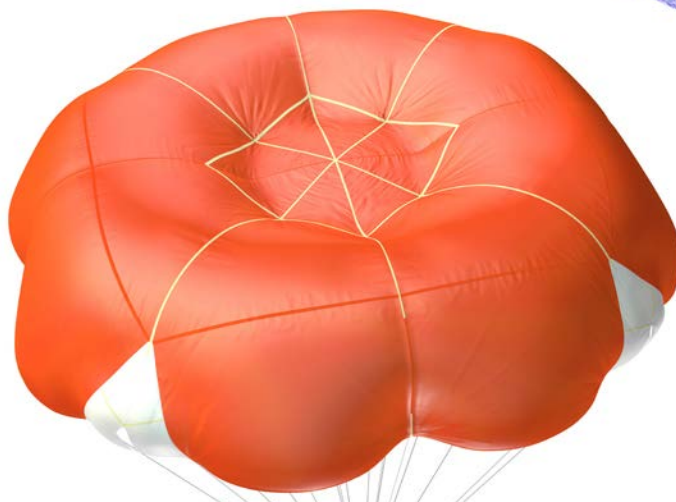


Photo: S. Burkhardt

ADVANCE COMPANION SQR 220

The new 'SQR 220' (Square Round) using Advance/Evotec technology is a mix of square and round parachutes. It's a very light tandem reserve. It weighs 2.37 kg for an all up weight of 220 kg and 61.9 m². The advantages of the SQR technology: it opens very quickly, has very good pendular stability, is simple to fold and the weight and volume have been reduced.

<http://companion.aero/>



COMPANION SQR - TECHNICAL DATA				
Manufacturer: ADVANCE				
Web : http://companion.aero/				
SIZE	100	120	160	220
AREA [m ²]	25.4	32.4	42.0	61.9
SINK RATE AT MAX. [m/s]	5.4	5.4	5.3	5.3
MAXIMUM LOAD [kg]	100	120	160	220
WEIGHT [g]	1258	1534	1927	2357
CERTIFICATION	EN/LTF	EN/LTF	EN/LTF	EN/LTF





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AIR DESIGN DONUT

In collaboration with Mike Küng, Air Design have developed a reserve called the "Donut" which combines the best of both square and circular parachutes. Folding it is, as a consequence, fairly simple (like a round parachute), but it has good pendular stability (like a square parachute) and a low sink rate.

Air Design have announced a certification of 4.6 m/s (compared to a maximum of 5.5 m/s authorized by EN and 6.7 m/s authorized by LTF).

There are two sizes for an all up weight of 100 kg/120 kg, weight 1300 g/1600 g.

A NOTE FROM THE EDITOR

Square parachutes are often a bit more difficult to fold as they have extra fabric to fold compared to the base. This Donut could, in fact, be a good response.



DONUT - TECHNICAL DATA

Manufacturer: AIR DESIGN		
Web : https://ad-gliders.com/fr/products/gliders/rescue-donut		
SIZE	100	120
AREA [m ²]	25.55	32.58
SINKRATE MAX LOAD [m/s]	4.8	4.6
MAXIMUM LOAD [kg]	60-80	80-100
WEIGHT [kg]	1.3	1.6
HOMOLOGATION	EN/LTF	

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 **Superfly360**



A high-angle photograph of a person skydiving. The person is wearing a blue jacket, light-colored pants, and a red helmet. They are suspended from a large, white, multi-cell parachute. The parachute is fully deployed and dominates the upper half of the frame. The background is a dark, textured surface, possibly a mountain slope or a field, with some faint tracks or lines visible. The lighting is bright, creating strong shadows and highlights on the parachute and the person's gear.

CHARLY
DIAMOND
CROSS

The Diamond Cross is a square parachute with even more asymmetry. It flies forwards with a glide ratio of about 1.5:1, according to the manufacturer.

The controls allow the pilot to steer this reserve which advances in the direction of the orange corner.

DIAMOND CROSS - TECHNICAL DATA

Manufacturer: CHARLY

Web : <http://finsterwalder-charly.de/en/rescue-systems/for-paraglider/diamond-cross.html>

MODELL	DC 100	DC 125	DC 160	DC 220
AREA [m ²]	25.2	30.7	41	59.2
WEIGHT (INNER CONTAINER)	1.170	1.390	1.780	2.520
MAXIMUM LOAD [kg]	100	125	160	220
DESCENT RATE [m/s]	4.7 - 100 KG 3.6 - 70 KG	4.5 - 125 KG 3.5 - 85 KG	4.5 - 160 KG 3.5 - 110 KG	4.5 - 220 KG 3.5 - 160 KG
VOLUME	3900	4700	5300	7300
CERTIFICATION	EN-LTF	EN-LTF	EN-LTF	EN-LTF
PRICE	798	848	948	1 298



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ICARO SQUARE

The Square 115 is the square reserve by Icaro Paragliders. Characterised by its small volume when folded and its light weight, combined with rapid opening and good pendular stability.



SQUARE 115 - TECHNICAL DATA	
Manufacturer: Icaro	
Web : http://icaro-paragliders.com/en/products/rescue/square/	
SIZE	115
AREA [m²]	36,2
WEIGHT WITH CONTAINER [kg]	1,3
SINK RATE WITH MAX. LOAD [m/s]	max 5,46
MAXIMUM LOAD [kg]	115
WEIGHT [kg]	1,40
GORE NUMBER	13

OZONE ANGEL



zone have also developed their own square parachute; the 'Angel SQ' is made from Porcher PN9 fabric.

ANGEL - TECHNICAL DATA

Manufacturer: OZONE
Web : <http://flyozone.com/paragliders/en/products/reserves-chutes/the-angel-sq/info/>

SIZE	100	120	140	220
AREA [m ²]	29.1	34.8	40.7	63.8
SINKRATE MAX LOAD [m/s]	4.7	4.7	4.7	4.7
SPAN	5.82	6.37	6.89	8.63
WEIGHT [kg]	1.35	1.5	1.85	2.9
CERTIFICATION	EN/LTF	EN/LTF	EN/LTF	EN/LTF



DUDEK GLOBE LIGHT

The shape of the Globe Light seems at first sight fairly classic, but a specific cut and the use of different fabrics give it high pendular stability and a good sink rate.

GLOBE LIGHT - TECHNICAL DATA				
Manufacturer: DUDEK				
Web : http://www.dudek.fr/parachute-de-secours/				
SIZE	90	110	135	Bl
AREA [m ²]	22,50	26,30	32,50	55,90
OPENING TIME sec	<5			
SINKRATE MAX LOAD [m/s]	<5,5	<5,5	<5,5	<5,5
MAXIMUM LOAD [kg]	90	110	135	210
WEIGHT [kg]	1,40	1,55	1,85	2,80
GORE NUMBER	13	14	16	20



Flying, that's all.



Paramotors



Trikes

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PARAMOTORS
WWW.KANGOOK.CA 



Accessories

GIN 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 reserves.

YETI CROSS - TECHNICAL DATA

Manufacturer: GIN
 Web: <http://gingliders.com/>

SIZE	26	32	38
AREA [m ²]	26.07	31.62	38.08
WEIGHT (Kg)	1.3	1.5	1.7
SINKRATE MAX LOAD (m/s)	5	4.8	4.8
MAX. LOAD (Kg)	86	104	126



VONBLON PAPILLON THE PIONEER OF THE ROGALLOS.

In 1996, Elmar Vonblon launched his first steerable reserve: the Papillon. It has been used in anger on numerous occasions: for a long time almost all the famous acro pilots such as Raoul Rodriguez flew with a Papillon. The Belgian pilot Christophe Gaber, for example, threw it during his trip through the horrible cumulo-nimbus which also sucked up Ewa Wisnierska. Under his reserve he continued to climb involuntarily up to 2700 metres, before finally landing unharmed.

<http://www.vonblon.com/dt/papillon.htm>

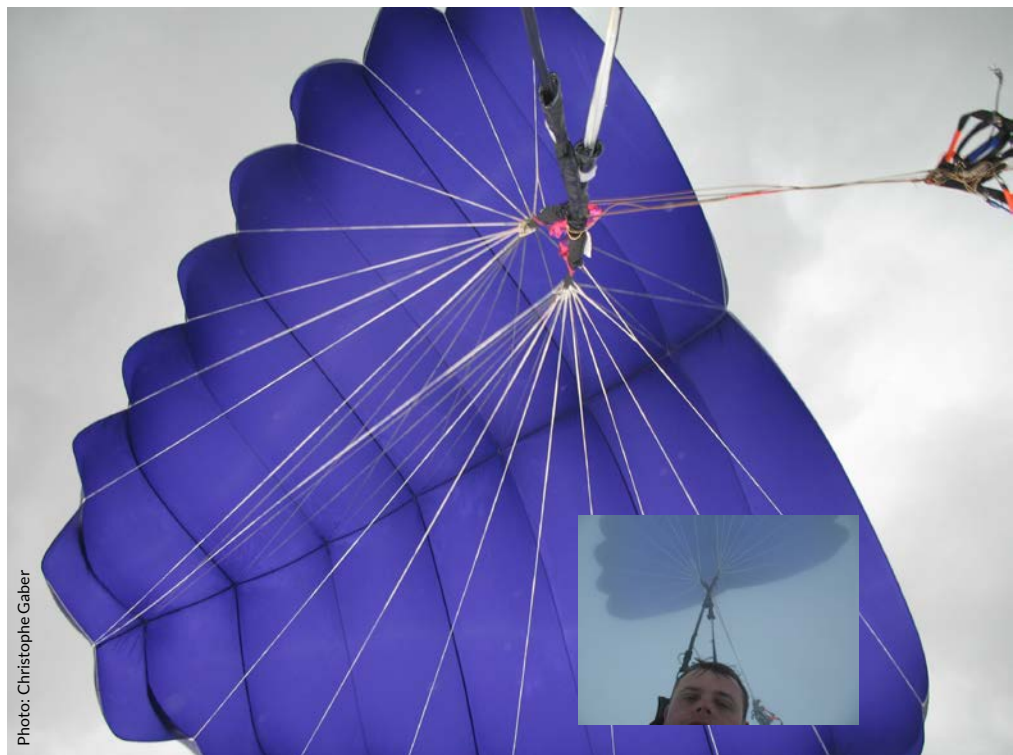


Photo: Christophe Gaber

X-DREAM FLY X-TRIANGLE

A reserve developed by Dani Loritz is positioned half way between the Rogallo and a square reserve. Once open, it goes down vertically and only after the pilot activates the controls does it start to 'glide' and become steerable. The pilot will therefore have the choice, depending on what he is capable of doing and what is necessary. The wing can remain attached. It's triangular shape lets it open very fast, gives it lots of pendular stability and makes it easy to fold.

X-TRIANGLE-TECHNICAL DATA

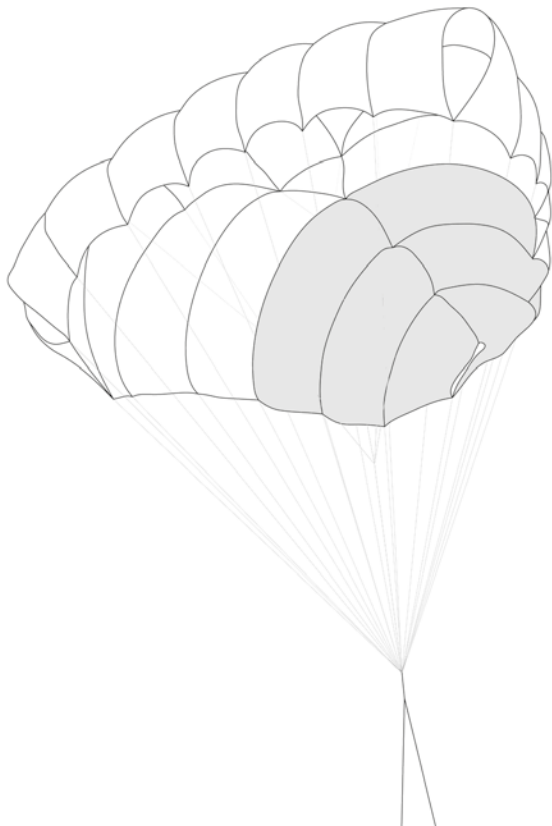
Manufacturer: X-DREAM FLY

Web: <http://www.x-dreamfly.ch/x-triangle/>

SIZE	125
AREA [m ²]	35.9
SINKRATE MAX LOAD [m/s]	5.43
MAXIMUM LOAD [kg]	125
WEIGHT [kg]	1.45
GORE NUMBER	21



Photos: Dreamify





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SKYWALK PEPPER CROSS LIGHT

The new very light weight square reserve from Skywalk. Made symmetrically, its horizontal speed is very low. Nevertheless, its sink rate is also very low. According to Skywalk, it opens very quickly and has exemplary stability.

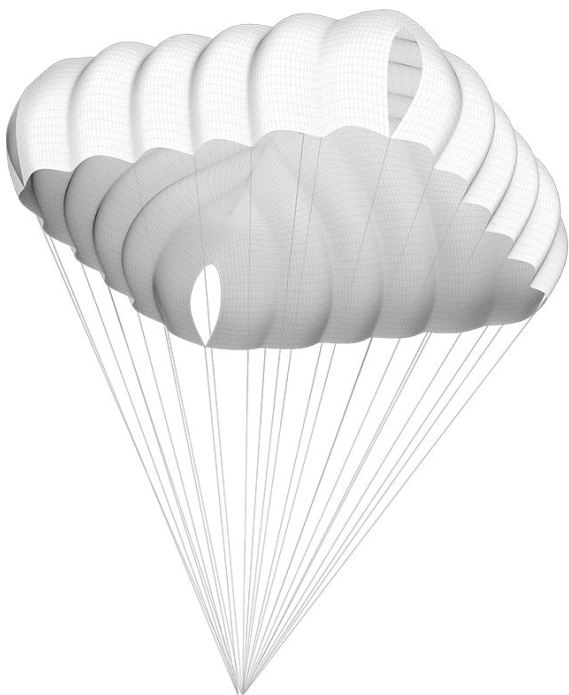


Photo: Skywalk

PEPPER CROSS LIGHT TECHNICAL DATA

Manufacturer: SKYWALK
Web : <https://skywalk.info/fr/>

SIZE	90	110	135
AREA [m ²]	26.90	32.50	40.10
GORE NUMBER	20	20	24
SINKRATE MAX LOAD [m/s]	5.2	5.2	5.2
WEIGHT [g]	990	1140	1440
CERTIFICATION	LTF/EN		

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Photos: Niviuk



Octagon



With the Cires, Niviuk also offer a classic lightweight reserve, with a low sink rate of 4.6-5.2 m/s.

NIVIUK OCTAGON

With the Octagon, Niviuk also offer a new generation square reserve. According to the manufacturer, the pendular stability will be particularly low: 0-5° compared to 10°-15° with a normal system. The sink rate with a maximum load is also very low: 4.9 m/s.

OCTAGON - TECHNICAL DATA

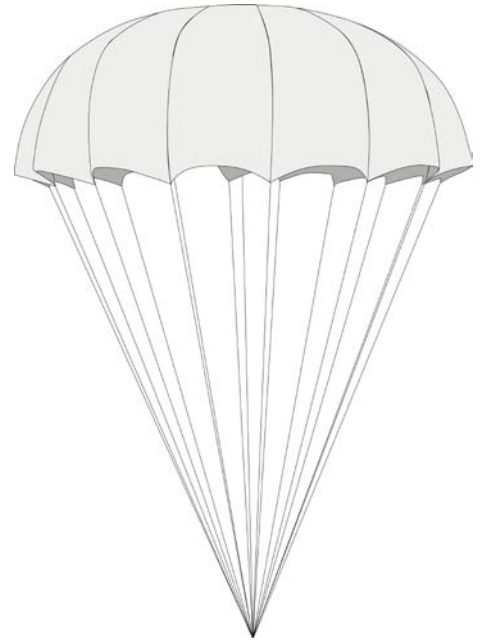
Manufacturer: NIVIUK Mail : info@niviuk.com						
Web : http://www.niviuk.com/accessories.asp?id=JNKRDQL8						
SIZE	S	M	L	XL	XXL	TANDEM
AREA [m ²]	26	32	38	45	55	67
OCILLATION	0-5°					
SINKRATE MAX LOAD [m/s]	4.9					
LOAD RANGE [kg]	60-80	80-100	100-120	120-140	140-170	170-215
WEIGHT [kg]	1.1	1.3	1.5	1.725	2.480	2.920
HOMOLOGATION	EN 12491:2001					

SUPAIR

PARACHUTE SHINE

The 'Shine', the new range of solo reserves is now available. This range replaces the Lite and X-tralite ranges, except for the tandem (which is anticipated in the medium term). The Shine is a hemisphere shaped classic round reserve, but made with the most modern technology. As a consequence, it is very

light, with better performance and at the same time less expensive. It is made from a 20 decitex fabric and has Dyneema lines. Its weight and volume will be very close to those of the X-tralite model and clearly better than those of the Light model, for an almost identical recommended retail price to the lightweight model



SHINE - TECHNICAL DATA

Manufacturer: SUPAIR

Web : <http://www.supair.com/produit/shine/>

SIZE	S	M	L
AREA [m ²]	28,1	31,15	38,94
WEIGHT [kg]	1,10	1,25	1,54
MAXIMUM LOAD [kg]	85	105	125
GORE NUMBER	14	16	18
VOLUME (max)	2,9	3,8	4,7

FLUID

For two years, Supair have also been offering a square reserve in their 'Fluid' range. It opens very fast (in less than three seconds). In addition to its low sink rate and very high stability, Supair emphasise the reduced length of the line cone.

FLUID - TECHNICAL DATA

Manufacturer: SUPAIR

Web : <http://www.supair.com/produit/fluid-solo/>

SIZE	S	M	L
AREA [m ²]	26.70	33.30	38.80
WEIGHT [g]	1 490	1 660	1 960
PTV MAX [kg]	85	100	125
OPENING TIME sec	2.5	2.5	2.5
VOLUME [L]	4	5	6



Photo: William Pestrinaux



TREE LANDINGS

An incident which seems to be happening increasingly often: pilots 'landing' in trees. Here's some advice for landing 'correctly' in a tree and for getting out...

An intentional tree landing. Photo: Christian Feil, Burkhard Martens. Pilot: Felix Wölk. Taken from the book "Thermikbuch". <http://thermikwolke.de/>



In the Alps or the Pyrenees, very often we fly over fairly dense forests. When there is an incident, this can even be an advantage compared to ground without vegetation. In the absence of lakes or sea, some pilots even voluntarily chose forests for doing SIV manoeuvres. Photo: Sascha Burkhardt

A tree landing is the result of numerous incidents. In the accidents/incidents analysed by the DHV in 2016, they represent almost a fifth. The real percentage should be a lot higher because tree landings often have a happy ending and aren't reported by the perpetrator.

Trees, conifers in particular, are often good shock absorbers: they brake the pilot's fall in a progressive fashion, thanks to the elasticity of their branches (amongst other things). This is true as long as the pilot aims correctly for the middle of the tree, in

which case the vast majority of pilots walk away without serious injury. On the other hand, if the pilot just brushes the tree, the accident is generally worse because the wing turns and the pilot is thrown violently to the ground.

So, if a tree landing is unavoidable, you need to:

- Choose a tree which isn't too high.
- Try to end up facing into wind.
- Aim for the middle of the tree.
- Flare, as you would for a normal landing.
- Don't brake the wing too much, so that it lands in the tree: ideally the lines will support the pilot and avoid him falling.

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Our colleague Sylvain Dupuis almost always chooses forests as a 'back drop' for 'more risky' manoeuvres. If there is big problem, a likely tree landing is, in the majority of cases, preferable to hitting the ground.

Soufflez, Inspirez



François Gomez SDIS LOT

A well thought out combination: this little cord allows you to hoist up a rope brought by the rescue services on the ground. Whilst you wait for them to find you, you can use the whistle which serves as a weight. This saves the lead weight which is normally used...

30m long cord, strength 70daN, 13.90 €.

<http://free-speed.com/?product=rettungsschnur-mit-signalpfeife>

Rescue exercise by the GRIMP (Groupe de Reconnaissance et d'Intervention en Milieux Périlleux) team from the Lot fire brigade in France.





Photo: Sascha Burkhardt

As far as this last 'function' is concerned, leafy trees are often better than conifers. Once in the tree, the main priority is to secure yourself so that you don't fall:

- Hold onto the trunk or a strong branch.
- Try to get secure by tying knots with the lines or, better still, with a sling carried in the harness.

In fact, a sling, (a loop of webbing used for climbing), only costs a few euros, only weighs a few grammes and fits easily into a harness pocket. An extra karabiner, in addition to the harness karabiners, can also be very useful for this safety operation.

All that remains is to contact the emergency services by telephone or radio and wait for them to arrive. Without any equipment and specific training, as described on the following pages, it's very dangerous to climb down a tree on your own; this is the point when most accidents happen.



A 120 cm climbing sling weighs less than 80 g and costs less than 6 €. https://www.simond.fr/anneau-tubulaire-x-120cm-id_8324694



The Spider karabiner: very useful for quickly securing yourself, 12.99 €. We can confirm its light weight of 69 g. https://www.simond.fr/mousqueton-hms-spider-compact-simond-id_8058330

On the other hand, for pilots who regularly fly from sites with a high risk of tree landings, and who want to be as self sufficient as possible during such an incident, it's very useful to take equipment for abseiling down.

But it's essential to train at least once under the watchful eye of a friend who is an experienced climber.

A 30 m lightweight rope weighs less than 1300 grammes and will fit into the back pocket of a harness.

This rope, used with a Munter hitch in the harness karabiner, is enough to let you abseil down. Used in conjunction with a sling, another karabiner and a descender which costs a couple of euros, getting down almost becomes easy.

If the branches of the tree are sufficiently far apart, a paramotor pilot can use the same techniques, although the motor on the back of the harness, which becomes a climbing harness, makes the operation much less comfortable.

We'll explain the techniques over the following pages. On the other hand, getting the wing out of the tree is an entirely different matter...



A lightweight 7.5 mm, 30m walking rope weighs less than 1300 g. For flying at sites with a high risk of a tree landing, this extra weight is worth it. Price: 40 €. https://www.simond.fr/corde-rando-75mm-x-30m-id_8338026



The Simond Tubik 2 descender: 15 €, 64 g. Certified for use with 7.5 mm double rope.



A braking device (descender) like the ATC-XP from Black Diamond (22 €) lets you abseil down. It only weighs 64 g. eu.blackdiamondequipment.com/



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ABSEILING DOWN USING A MUNTER HITCH (without an auto block safety device).



Photos: Sascha Burkhardt

First step: attach the pilot using the climbing sling.



Attach the rope to a sufficiently strong branch or directly around the trunk. Knots used: either a figure of eight or bowline knot.

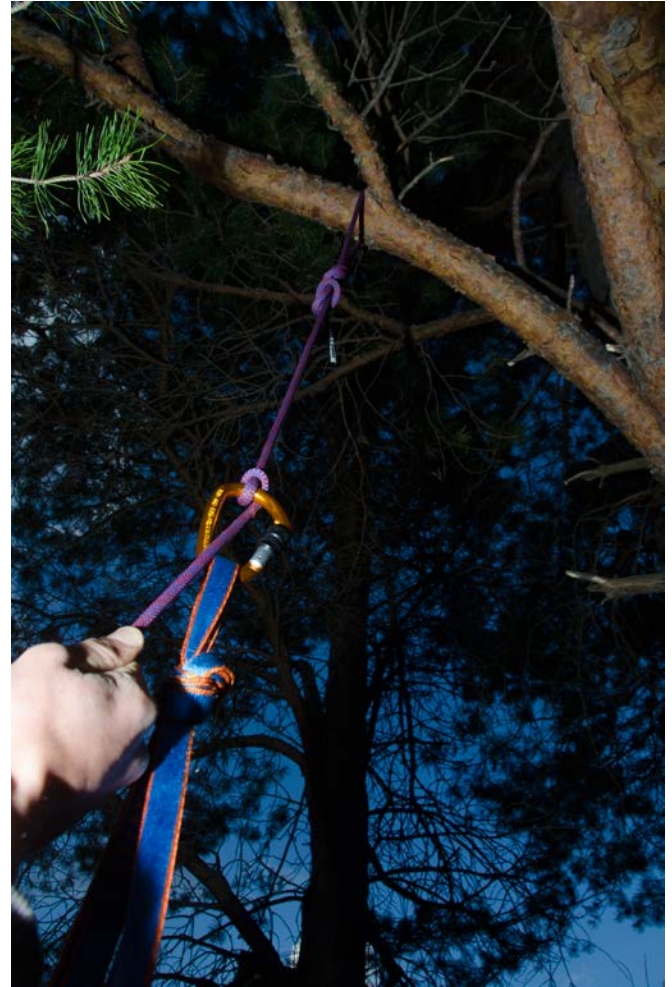
If the pilot is sufficiently stable on a branch, he can undo the sling, make a simple knot to shorten it and attach the descent karabiner in the middle. Thus he will be suspended symmetrically by the two harness karabiners.





Photos: Sascha Burkhardt

A Munter hitch on the karabiner: it's simple, but you need to practice so that you remember how to do it properly. You need to open the karabiner to insert the loop. The 'slack' part of the cord is pulled upwards here just so that it isn't in the way of the photo.



The descent: little by little, the pilot releases allowing a gentle descent. If he pulls strongly on the rope, the device brakes. On the other hand, if the pilot lets go completely, he'll fall. Therefore, if possible, add the safety measure, that we describe two pages further on.

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ABSEILING DOWN WITH A DESCENDER (without an auto block security device).

Here, the rope is doubled around the branch. If it is too short, you can also descend on a single length. The two ends of the rope (which go to the ground) are knotted together.

The pilot passes both lengths of rope through the descender and passes them through one of the harness karabiners (below left). If possible, it's best to attach both karabiners together so that you are suspended symmetrically (below right).

Careful: the loop (green) of the descender has no belay function, it just serves to attach the device so that you don't lose it when the rope isn't threaded.

To descend, the pilot reduces the tension on the rope below the descender. To stop the descent, block the rope sliding through by applying more tension so that it jams in the mouth of the descender.

It's a technique which works well and is easy to learn (essential to practice it beforehand) but, here, it still lacks a safety back-up: if the pilot lets go of the cord, he could fall. On the following page, we'll see how to use it like the 'pros'.



Photos: Sascha Burkhardt

ABSEILING DOWN USING A DESCENDER (with an automatic safety blocking device).



Photos: Sascha Burkhardt




A simple loop made from a climbing cord constitutes a safety measure against the risk of falling, even if the pilot lets go of the rope by mistake. It is made, thanks to a double fisherman's knot, with a small 7mm diameter cord (not Dyneema, as there is a risk of over heating). After having put in place the descent system, whether with a descender or even a simple Munter hitch, the pilot wraps the loop several times around the abseiling rope(s), from below upwards.

Next, he passes the lower part of the loop through the upper loop, and connects it to the karabiner. Untensioned you can easily slide the ring on the rope, so that it follows the descent. But if the pilot releases the rope and falls, the loop comes under tension and automatically jams on the rope, thus stopping the fall.



Furthermore several variations in the knot exist: 'Klemheist', here versus 'Machard' versus 'Prussik'. With each one, make sure you practice first!

This full abseiling system isn't just useful for tree landings, but also for 'hike&fly', when you need to descend a short, very steep slope or a small cliff. The ensemble, including the rope, weighs less than 1.5 kg, which is manageable when planning a 'hike&fly' outing in the mountains with difficult sections. 



Photos: Sascha Burkhardt

full range of freeflying & paramotor wings





For 'hike&fly', taking the equipment described on the previous pages, can be particularly useful when two pilots cross an exposed section during the walk in. We'll describe some basic techniques in a following issue. Photo: Ulrich Grill
Here Paul Guschlbauer and Aaron Durogati (behind) train for the 2017 X-Alps, crossing a vertiginous arête, but without a rope...

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FLY WITH ONLY ONE KARABINER?

In a German pilot's video, a karabiner wasn't correctly closed when he was towed up on a winch. Fortunately the pilot was already at 250 m when the riser finally came out of the karabiner and he had enough time to throw his reserve. It's impossible to fly attached by just one karabiner, isn't it? No, not necessarily. In 1993, the acro pilot André Bucher continued to fly after having lost a riser during his "Half Way Kill" manoeuvre and the instructor Eki Maute also tested this configuration on a wing of the time: after automatically recentering the pilot under the remaining part of the wing, it was no longer flyable, but it descended in moderate turns at 10m/s. Too fast to land without causing damage, but it could still glide!

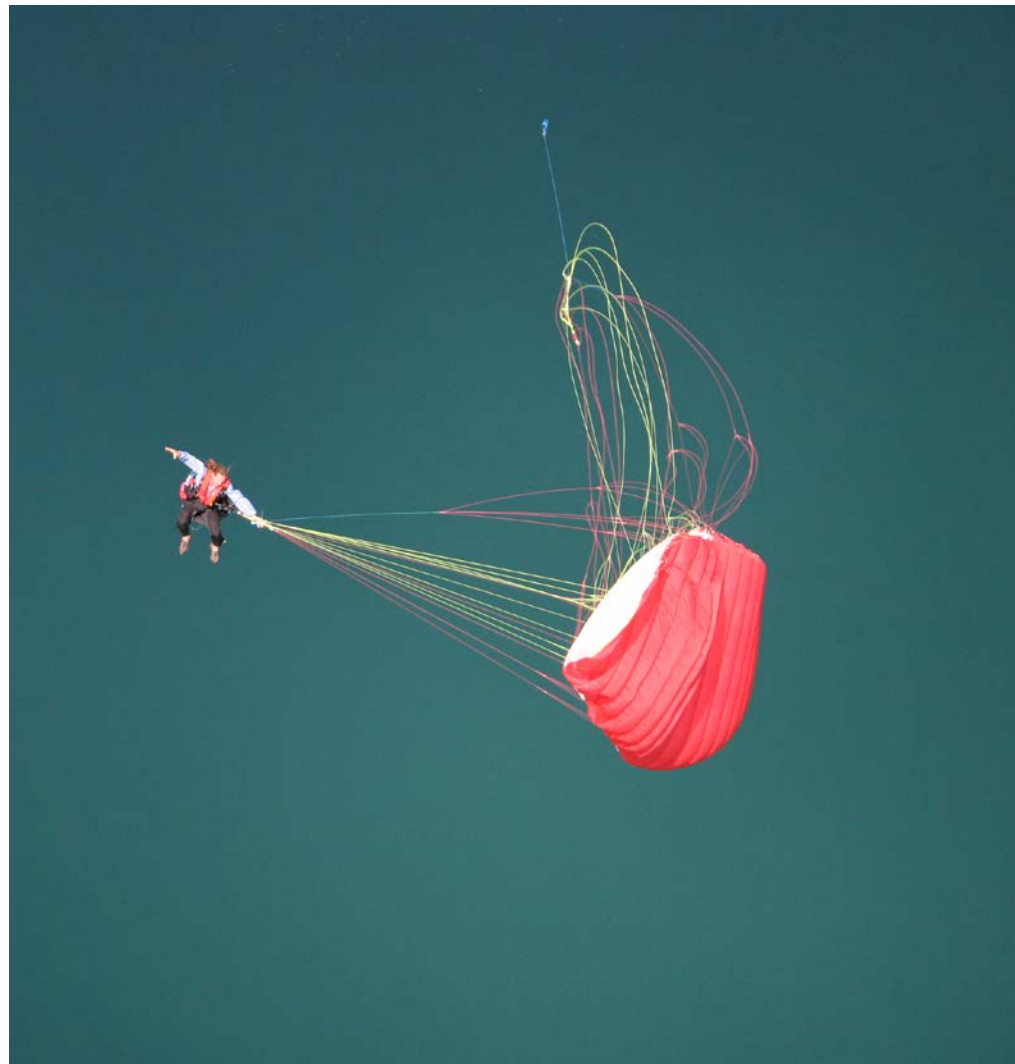
In 2006, Eki Maute retried the experiment with several very well behaved wings, amongst others, the Skywalk Mescal and the Nova Philou. The conclusion from this test (see photo on the right): even these very accessible wings go immediately into a very violent spiral.

To avoid the type of incident documented in the video, good preflight checks suffice: after attaching the wing and closing the karabiner, don't forget to press it with your finger to check it's properly closed.

For paramotor pilots in particular, or those being winched, this incident should be an incentive to always position the karabiners with the opening facing forwards. Thus, as the wing pulls backwards when the cable is under tension or the motor pushes into your back, the riser buckle goes further away from the opening if it starts to slide. This also reduces the risk of flexing the gate of the karabiner. Even closed, this is the most fragile point! 



The incident is caught so well in this film that you would think the video is a fake.
<https://www.youtube.com/watch?v=3KloqNLhuao>





Modern karabiners should no longer hold nasty surprises – the equipment has progressed.
Photo: S. Burkhardt

KARABINERS

A POSSIBLE WEAK LINK?

Nowadays, *paraglider karabiners* are reliable components, as long as they are used correctly. But first, the technology had to mature...

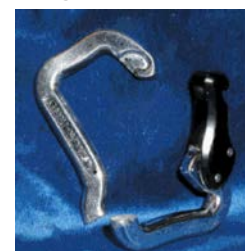
In October 2001, an 'Austrialpin Parafly' karabiner in aluminium chrome gave way: it broke completely at the one of the lower corners. This mishap happened to Mike Küng during take off. With Mike Küng, between looping, barrel rolls and SATs, the components inevitably become worn. An isolated case of an isolated karabiner, used to death by 'Mad Mike'? Unfortunately

not. In February 2002, another chromed aluminium karabiner broke in half on an Austrian site, also during take off, under a load of a few dozen kilograms.

The experts finally realised that karabiners were being weakened by the rigid layer of chrome on this model. The cracks in this layer were identified as the origin of the failure.



The problems fifteen years ago started on the Parafly chromes (left). The karabiners broke during take off.



Photos: DHV

A Hero gently turning in a thermal: a situation where the karabiners are subject to a high frequency of load and unload cycles.

But above all, they quickly realised what wore the equipment out prematurely: frequent load and unload cycles, which typically happen on paraglider and paramotors. Unlike climbing, where the karabiner is either heavily used or virtually not at all, during a paraglider flight, the load on each karabiner oscillates constantly between 25-80 kg in turns and thermals, with very short cycles, sometimes several per second.

If the gate of the karabiner has a lot of play on it, it doesn't transfer the force, and the karabiner works almost exclusively on the closed side. It's as if you are flying with the karabiner constantly open, and thus with less strength (700 kg instead of 2200 kg, for example). The karabiners in question all broke at the lower angle of the closed side, which is the pivot of the oscillating movements.

Later, the non-chrome karabiners and those of other makes also broke: if the chrome layer had played a role, the essential problem was the wear caused by the oscillations.

A Gin Vantage turning: on a paramotor, the load which is obviously higher, can accelerate the aging of the karabiners.



As a consequence, the manufacturers reacted:

- They increased the number of models made in stainless-steel, which is much stronger.
- They prohibited the chrome layer.
- They reduced the play on the gate to lower values, for example 0.4 mm.

The problem with stainless-steel: it's very heavy. Today, we happily use karabiners in aluminium or rather Zicral (an aluminium zinc alloy which is stronger), but the manufacturers have learnt to make karabiners specially designed for flying, with gates which close effectively which greatly reduce the effect of oscillations. In addition, they recommend changing them regularly, for example every five years. On certain models, the manufacturers engrave the date of manufacture.

It's easy to now understand why the use of climbing karabiners isn't recommended for flying: when climbing, depending on the current norms, the karabiner must be able to be opened under an 80 kg load (if a climber is hanging and needs to unclip). Often this goal is reached by having a lot of play on the gate.



A stainless steel Para-fly: these karabiners were a good answer to the problems encountered at the time. Disadvantage: the weight is nearly three times higher than an aluminium karabiner (about 140 g). They are also very well suited to paramotor trikes.

A good initiative: the date of manufacture is engraved on this Zicral karabiner by Supair. Its breaking strength is 20 kN (2000 kg) length wise and 7 kN across.




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LOCKING GATES, ANTI ROTATION PROTECTION.

The manufacturers of flying karabiners have also improved the gates from a safety point of view to prevent them from opening unexpectedly: fifteen years ago, some models could come open in specific situations, when ground handling in strong conditions, for example.

Even more important still is the adaptation of new models to the riser and harness loops which are becoming increasingly thin: with light weight material being used more and more, the risk is high that a normal square karabiner will twist during take off. In this situation, its strength is greatly reduced. New karabiners such as the Austrialpin Rocket have a shape which is adapted both to very thin risers and to thicker ones: they always have a good tendency to correctly centre themselves in the correct position.

The use of wide karabiners with thin loops and risers can increase the likelihood of it turning, as in the photo on the right. If this happens (as a member of our editorial team found out), the breaking strength of the karabiner changes from 2200 kg to 750 kg.

If this happens, in 'normal' conditions it isn't necessary to do an emergency landing, but it would be best to limit the loading. No spirals!

Here, we were able to sort it out in the air: the pilot passed the controls to the passenger and totally unloaded the left karabiner by lifting himself up with his left hand. After that, with the other hand, he managed to turn the karabiner back round to its normal position.



Photos: Sascha Burkhardt

One of the advantages of softlinks: these fabric connections never turn (read more on the subject in this edition).



With karabiners like the Grivel or the Rocket, the probability of this type of mishap is a lot less.

The Rocket by Austrialpin (right) has been specifically developed for paragliding usage.

The Grivel on the left is normally used for climbing, but according to Eric Roussel from Neo, who sell this karabiner as an option with certain harnesses, special tests carried out in a laboratory show it isn't affected by oscillations.

Eric has also taken part in the development of the Austrialpin Rocket: the latter can be used both for flying and climbing.





Production and tests of the Austrialpin Rocket: past experience has been fully taken into account in the development of new products. The locking mechanism on the Rocket means that it is unaffected by oscillations whilst, for the EPI fall arrest norm, a deliberate opening of this multi-usage karabiner is still possible when loaded.



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The lock on the Rocket is obviously also protected so that it doesn't open unexpectedly; the small latch is well protected inside the gate. To open it, you have to press on it and slide it slightly down. This is possible with gloves on.

When it is being closed, the latch blocks with an audible 'click'.



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A karabiner with a triple lock like this Air Xtrem by Apco can't come open by itself:

- you need to push the collar upwards,
- then turn it 90°,
- then press on the gate.

All these flying karabiners are equipped with a triple lock on the gate.



Another new karabiner by Austrialpin and Neo: the Stratus (two versions) for 20 to 30 mm risers.

A rectangular geometry avoids the karabiner rotating. The autolock system limits the phenomenon of the aluminium wearing out.

Strength: 18 kN
Weight: 58 g



This Apco model which came out five years ago can withstand three tonnes. It is made in a double and triple safety lock version.





At 65 g, the new Rocket is a bit larger and heavier than the others: 59 g for the Air Xtreme (right), 37 g for the ultra-light Grivel.

Nonetheless, you really do see the Rocket on ultralight harnesses with thin straps. It is specified at 22 kN/8 kN. On the testing benches, it only gave way at 27.5 kN according to Austrialpin.

The Grivel (left) looks flimsy, yet it is specified at 22 kN/7 kN, therefore even a bit more than the Air Xtreme (20 kN/7kN). Unfortunately we didn't manage to find much information about it's manufacture.


CONCLUSION

The difficulties experienced by the karabiner manufacturers have raised awareness: for paragliding and paramotoring, you need specific karabiners which take into account the oscillations of the load.

But even for karabiners which have been specially designed, replacing this safety component every five years at most, for forty to fifty euros a pair, is advisable. Some professionals even recommend changing them every two years.

If the numerous karabiners in aluminium offer good enough breaking strain for main tandem attachments, as well as for acro and paramotor trikes, karabiners in stainless-steel seem better adapted: 50-60 € the pair. Their breaking load isn't necessarily bigger, but this equipment can be more resistant to wear.

Always choose a karabiner suited to the width of the risers and the harness which is normally used.

Before the flight, obviously, carefully check that the gate of the karabiner is properly closed, then pull the riser upwards to check that the karabiner is properly lined up and not rotated. 

As Peguet reminded us at the Coupe Icare: a maillon, another component which connects the lines to the pilot, still keeps its promise of having great breaking resistance. Except if you don't screw it up correctly!



BUCKLE UP!

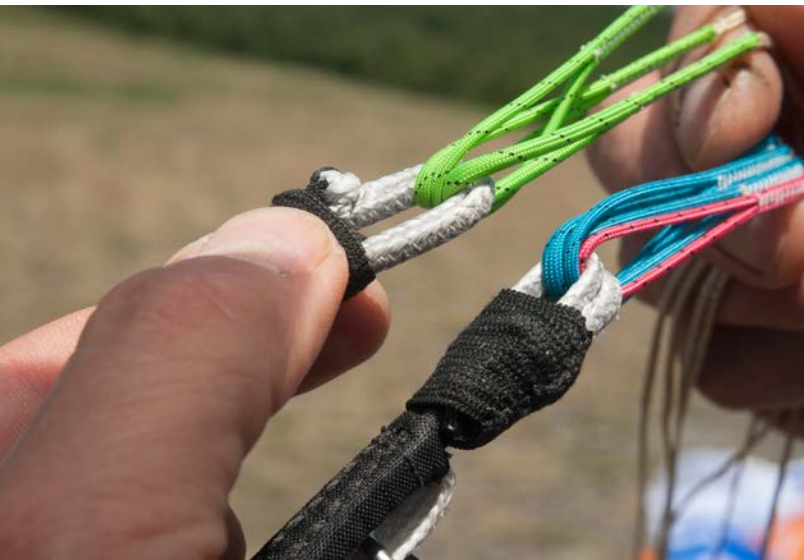


Softlinks are replacing traditional metal karabiners or maillons more and more, but they don't just save a lot of weight. Here's what you need to know to use them correctly...

Fastening a softlink connecting the harness and the riser. Practice and remember the technique before you go up to launch.

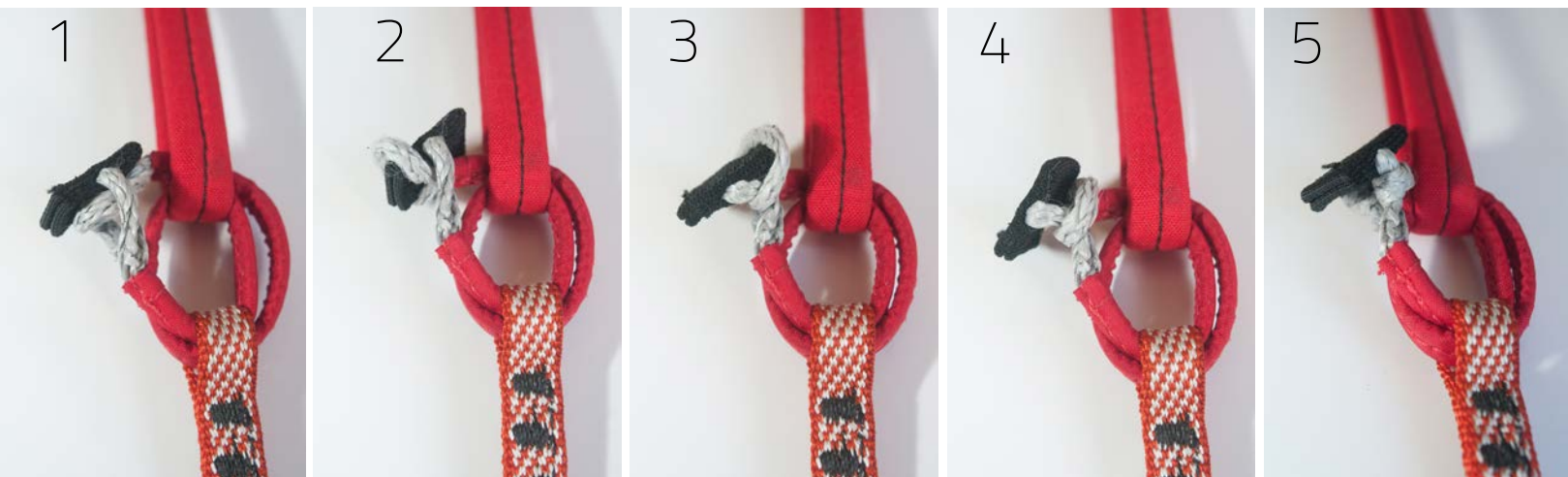
A riser/lines link on an ultra-light wing: from time to time, check for possible wear and tear.

A softlink will remain closed if you leave it alone. Normally they can't come undone.



Whether connecting the risers to the lines or replacing karabiners, softlinks can theoretically be attached in several different ways. A novice in the art of light weight connectors could easily come unstuck. Needless to say, there are dangerous ways of using this type of equipment. Here's how to use them, and

on the following page, what you definitely shouldn't do... In the five photos below, you can see the normal, recommended way of attachment. Important: The softlink must go through the straps of the riser/ harness twice to double the strength. And as far as the correct order is concerned, one thing to remember: The loop **WITHOUT** the tab must go through the loop **WITH** the tab, **UNDERNEATH** the tab.



1 After the softlink goes twice through the loops to be connected together, the end of the loop **WITHOUT** the tab goes through the loop **WITH** the tab...

2 ...it then goes over the tab...

3 ...right to the end, it's a bit fiddly sometimes...

4 ...the loop without the tab tightens around the loop with the tab.

5 Clearly this is not going to come undone by itself!

A close-up of the end result in 5. As we saw in 1, the loop without the tab only passes over the top of the loop with the tab at the very end, thus closing the softlink, but there is a variation...

...equally acceptable: By the second time that the softlink goes through the straps of the riser/harness, the loop of the softlink without the tab on it could already be looped through the one with the tab on it. The only problem according to Kortel Design; it's narrower and more difficult to do.





Not good: The softlink has been fastened correctly, but the strap has only been looped round once. Its resistance has therefore been halved: 1150 kg instead of 2300 kg. (Admittedly, it's still better than a poor quality maillon...)

Very bad: The softlink has been correctly looped round twice, but not correctly fastened: The loop without the tab has just been put OVER the loop with the tab. It hasn't gone THROUGH the loop with the tab first. It may hold once under tension, but coming undone unexpectedly can't be completely ruled out.



Not good: It is fastened correctly, but the softlink hasn't been correctly looped round twice. The same result as on the left: The resistance is halved.

This is really bad: The softlink has only been looped round once, it has been incorrectly fastened, and the tab is about to come out of the other loop...Not good, not good at all...




CONFIDENCE?

Initially it certainly isn't easy to have confidence in these little fabric loops on which our lives depend. But when you look at them closely, you can see that their breaking strength is often better than that of a little aluminium karabiner! And those who parachute have been jumping for decades with 'softlinks'. Apart from the less straightforward application, the softlink in theory only has advantages, such as the guarantee that it'll never turn sideways.

However, it isn't possible for a pilot to easily judge the quality of the manufacture. If the splice hasn't been made correctly and stopped by stitching, the softlink could be dangerous. On the other hand, for the karabiners, it's the same: you can't spot a possible fault just by looking at them. Therefore you need to buy the links from a reputable manufacturer.

Another possible problem is the connection between the softlink and the other components: a small diameter Dyneema link could cut through a heavily loaded polyester riser and thus reduce the maximum load from two tonnes to one. This has already happened during a test (not representative). The PMA are going to look into it.

In the meantime, a Dyneema loop/ Dyneema softlink/ Dyneema riser connection seems almost indestructible, which is just as well: this is exactly the configuration used for ultra light 'hike&fly' with a string harness and Dyneema risers... 



One of the first flexible connectors for paragliding: Bertrand Maddalena, then owner of Ripair, designed it twelve years ago. Most paraglider pilots were fairly sceptical. However, this connector only weighs 12 grammes, and has a breaking resistance of 2.2 t. It is more resistant than a typical aluminium karabiner (about 1.6-1.8 t for 70 grammes) and just as resistant as a stainless steel karabiner (130 grammes, 2.2 t).



An alternative: This light weight aluminium karabiner. Grivel, its manufacturer, claims an astonishing breaking resistance of 2.2 t for a weight of 37 grammes. It's great, but still three times heavier than the softlink on the left.

Photos : Sascha Burkhardt



A Dyneema/Dyneema/Dyneema connection: very strong and reliable if the softlink is of good quality.

Here, the link is even long enough for a triple loop, which increases its strength to much greater than necessary...



A 3 mm softlink by Kortel Design: not even 6 grammes for 2300 kg of breaking strength...



LARK'S HEAD REVISITED?

At least two tragic accidents (a hang glider and the paraglider pilot Yann Espinasse), more than ten years ago, have resulted in numerous professionals prohibiting connecting the reserve to the bridle on the harness via a lark's head. In Yann Espinasse's case, after having a full line breakage, the pilot opened his reserve in free fall. The lark's head which wasn't centred in the loop burnt and severed the latter, after which, the pilot was once again in free fall.

It was an extreme case. The PMA wanted to know if there really was a big risk because numerous pilots or professionals prefer not to use a metal link, albeit a good quality one (e.g. a maillon made by Péguet) because it also has disadvantages: it's an extra element in the chain of transfer of forces and, if you forget about it when you are setting up, it can remain open. A karabiner which turns sideways is also a weak point (loaded in a way it wasn't designed for).

Some pilots prefer not to have bits of metal in their back.

In collaboration with Advance and Edelrid, Guido Reusch, working for the PMA, tested more than 100 connections which use lark's heads in modern bridles, particularly in Dyneema.

On Edelrid's testing benches, the connectors were subjected to a simulation of a 15 G shock with a 120 kg mass. The connectors which weren't centred, and with a slippage of up to 15 cm, generally resisted without any major consequence. The equipment thus tested was then retested with a static load to discover any possible non visible weaknesses. The result: losses of up to a maximum of 5%, therefore within the permissible margin of error.

This result is all the more interesting as Dyneema is known for being sensitive to heat: one would imagine that it would burn more easily. But according to Guido Reusch, Dyneema is so smooth that the friction and heating remain minimal. On the other hand, the protection sheaths made from other materials, sometimes present on Dyneema loops, were marked by the heating. Therefore they could even be considered counter productive!

The conclusion of the PMA's test: a lark's head connector, properly centred and blocked on the other loop, is at least as resistant as a connection via a karabiner.

www.p-m-a.info

A connection sling/maillon/sling also isn't 100% infallible: during the tests, in an atypical configuration and with a load slightly above the maximum authorised load, a Dyneema loop was severed by the karabiner.



During tests with Dyneema/Dyeema connections, lark's heads which weren't centred were subject to about 15 G for 120 kg and slid on the other strap almost without consequence.

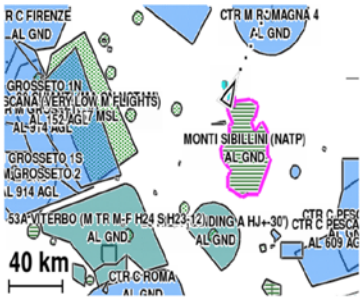


Potos : Bruno Häubi/Team Advance



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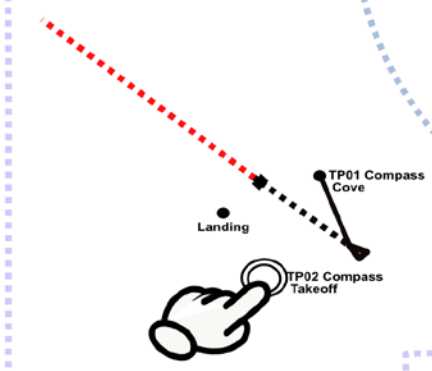
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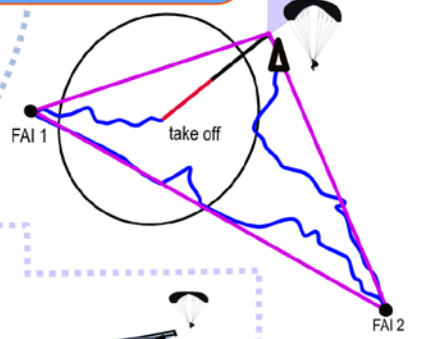


XC ASSISTANT & TRIANGLES



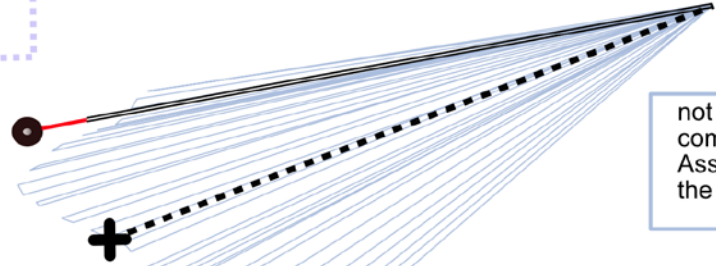
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A Canadair flying low over a mountain lake (Matemale, 1 500 m). Photo: S. Burkhardt.

COLLISIONS

RISKS AND SOLUTIONS

Collisions are a worry for a lot of paraglider and paramotor pilots. Here's a summary of how to avoid them...

Possible collisions amongst paragliders and paramotorists can't really be avoided by using technical measures such as FLARM (see lower down): as a general rule, when there is a risk of collision due to there being too many people in the house thermal, pilots are already so close together that only visual vigilance really works.

A gaggle approaching the landing field: as a general rule, given our low speed, it's enough to keep your eyes open. But the rare collisions that occur amongst paragliders or paramotors often happen at this point.
Photo : S. Burkhardt



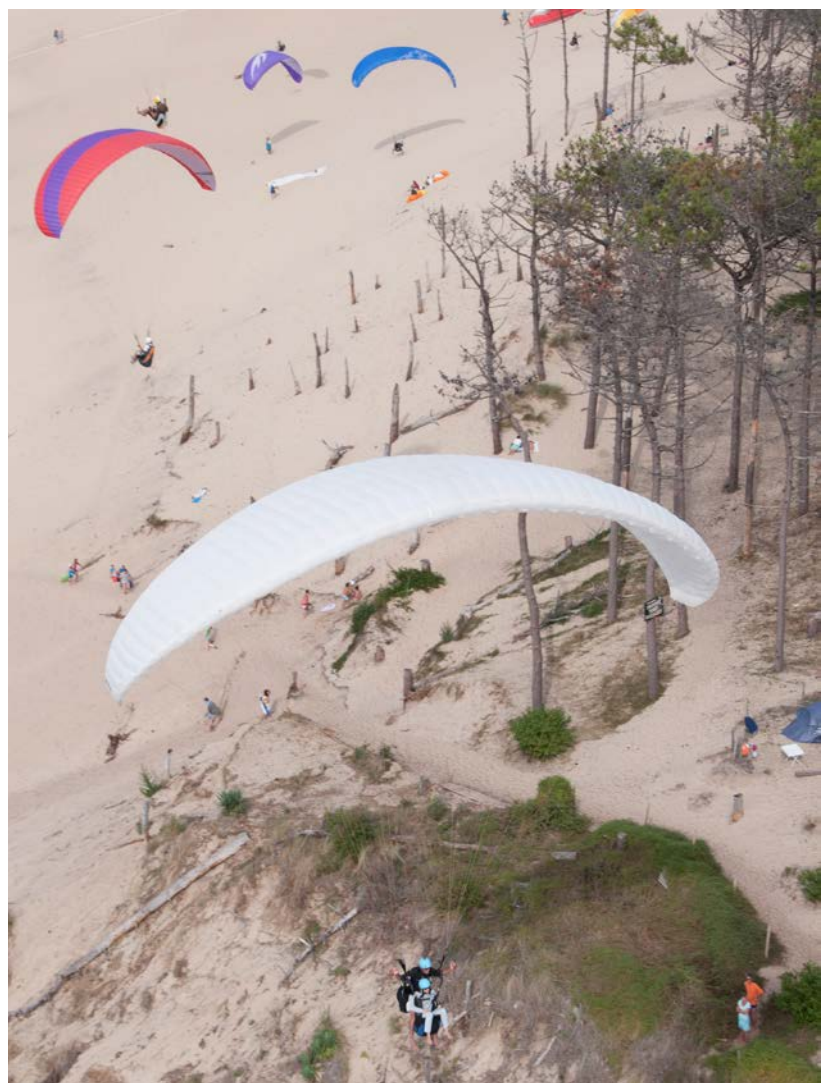


Considering the number of wings in the gaggles, the number of collisions in thermals and during competitions, remains low.

Fortunately collisions amongst paragliders and paramotors remain rare. In Switzerland, for example, in the accident statistics for free flying in 2016, only one mid air paraglider collision was recorded. In Germany, every year, 4-8 collisions are recorded.

One of the biggest risks: soaring along a dune. Narrow thermals and numerous pilots all fighting to stay up. At Dune de Pyla for example, numerous pilots underestimate the wake from other wings, especially the big tandems: they can put a pilot on the deck even without direct contact.

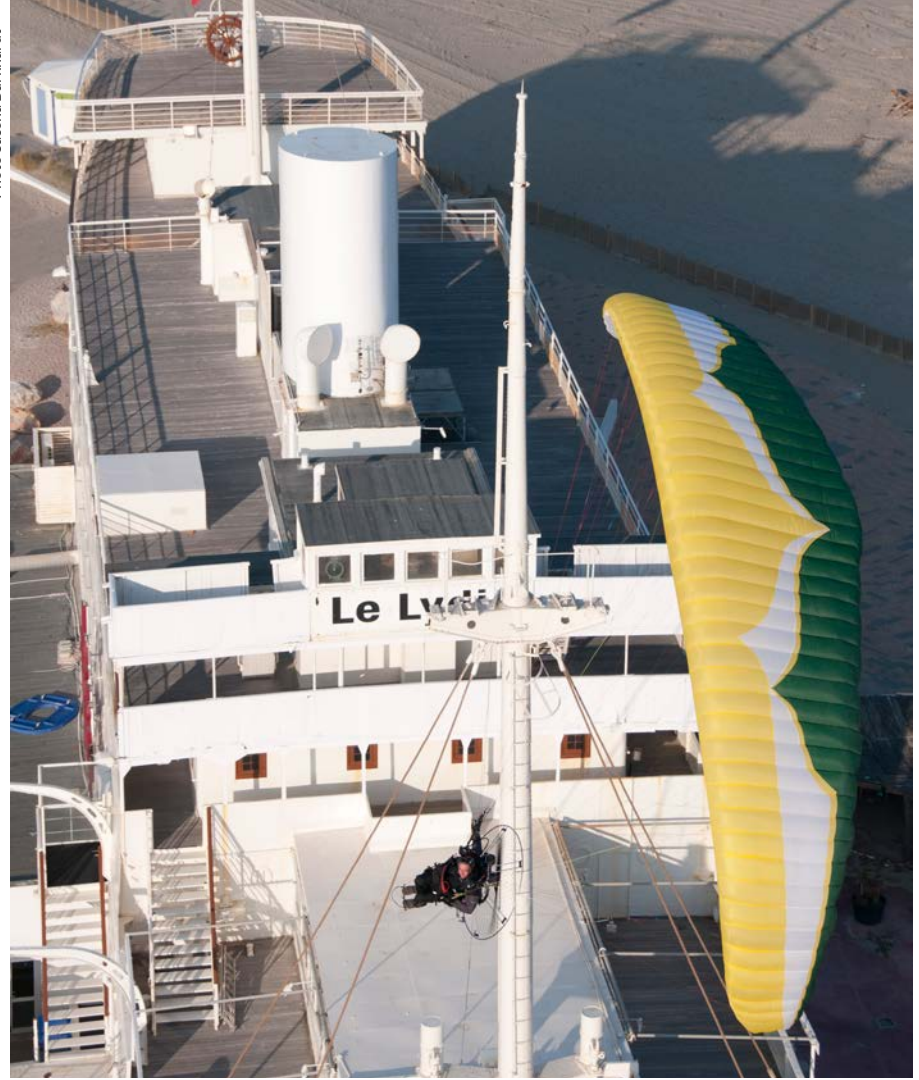
A tandem at the Dune de Pyla: the wake alone can be formidable.



SAFETY

In the Swiss report, there were, all the same, sixteen collisions with fixed obstacles, particularly when landing. If these are often a consequence of poor trajectory appreciation and piloting errors, there were also two collisions with cables which were difficult to see and hung high up. For this type of risk, the FLARM system can be a useful weapon: see further on.

Photo Sascha Burckhardt



Flying near the terrain on an unknown site: watch out for cables. Photo: Tristan Shu.





Apfelweile - Fotolia

A perspective that we wouldn't wish on anyone...



The pilot and the co-pilot of this Tiger can see forwards fairly well.
Photos : S. Burkhardt

A real risk, but relatively unlikely, worries lots of pilots, especially when flying XC far from well known sites: a collision with a military aircraft.

Unfortunately in 2004, the collision between a ULM and a Mirage 2000 showed that it isn't non-existent. These planes sometimes fly at 150 m-300 m above the ground, at speeds of around 800 km/h.

At the same time, these pilots are very vigilant: by carefully watching the sky, they can see a paraglider or paramotor at ten kilometres away. Even at 800 km/h, the pilot has about 47 seconds to react, taking into account human reaction times and that of the aeroplane.

Unfortunately we don't have any other option than to have confidence in them: military jet aeroplanes don't have anti collision systems such as FLARM.



And even resorting to a radar reflector, such as this one sold for 25 € in a ship's chandler, isn't a solution: radars on fighter planes, flying at ground level, are adjusted to recognise targets on the ground. In addition, in these circumstances, the pilots visually scrutinize the horizon and not the screen. On the other hand, questioning aeroplane pilots about their experiences clearly shows that, for a paramotor pilot with a 12 V socket, attaching a stroboscopic light can be useful: aeroplane or helicopter pilots would therefore see us a bit earlier, especially when flying under a covered sky. However, that implies owning an engine with a 12 V socket. And as adding something onto the cage complicates assembling and dismantling it, the use of this type of light is more realistic on trikes.

Barely bigger than a propeller blade and thus compatible with being mounted on a paramotor chassis: a radar reflector. Unfortunately it is useless.



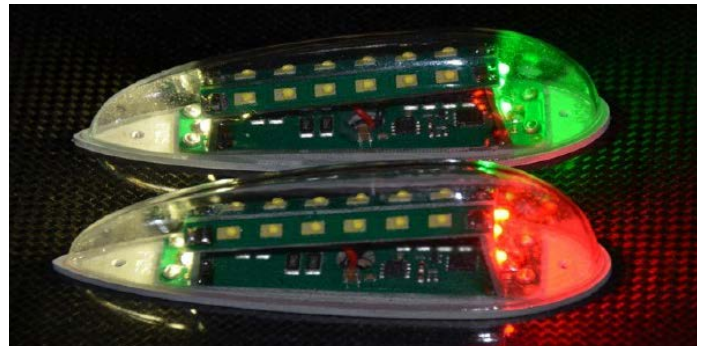
This SC103 (149 €) flashes forty two times per minute. At dusk, the visibility is about 5 km. Consumption: about 500 mA. It must be mounted so that it is protected from vibration: the more modern strobes (using LEDs), on the other hand, are less sensitive.



The whole ensemble mounted onto a foot launched paramotor: no doubt a bit over the top but nonetheless useful. Photos : S. Burkhardt



45 g each, 115 x 35 x 35 mm, 299 €, consumption 700 mA: a LED-based combination of navigation lights and strobe lights. For paramotor trikes, this gives a certain amount of security. They can also be mounted on a foot launched paramotor. www.piloten-zubehoer.de



Sailplanes present a risk especially for paragliders: they often share the same sites, coming from afar for a top up in our house thermals. They fly at 200 km/h, some even at 300 km/h. The visibility from the cockpit isn't bad for the pilots, but is nevertheless restricted compared to ours, for example. 90% or more of sailplanes in Europe are equipped with

the FLARM system which has been on the increase since 2004. These little boxes which communicate amongst themselves, contain a GPS and a radio transmitter which exchanges once or twice a second the position of the aircraft as well as a forecast of its trajectory for the next twenty seconds.



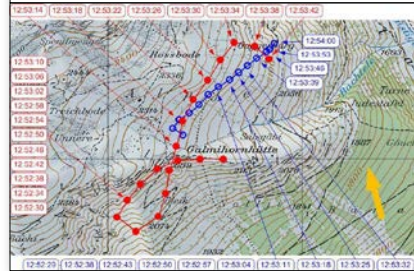
Segelflugzeug rammt Gleitschirm: Schweizer Piloten getötet

Samstag, 7. August 2010, 15:13 Uhr

Im Goms im Oberwallis sind am Samstagnachmittag ein Segelflugzeug und ein Gleitschirm zusammengeschlagen. Dabei kamen laut der Polizei die Piloten, die beide aus der Schweiz stammen, ums Leben.



Beide Piloten kamen ums Leben. Alpo vs



This collision between a paraglider and a sailplane on the 7th of August 2010 was fatal for both pilots and shows that these aircraft represent a real danger. In the conclusion of the report by the Swiss authorities (above), it's clearly stipulated that, had the paraglider pilot had a FLARM system, this accident could have been avoided.

When the conditions are good for an XC: our flying friends in their sailplanes probably won't be far away... Photo: Niviuk





Photo: Martin Scheel / FLARM

The other FLARM instruments nearby can deduce if there is a risk of collision or not.

In that case, each FLARM which is potentially threatened emits a warning, perhaps even a symbol on a 'radar' screen in the case of more sophisticated instruments. That works really well, and during our tests, the instruments were very good at knowing the difference between a 'real risk of collision' and a 'simple approach on parallel trajectories'.

The system is more than just a mutual warning device: the administrator of the FLARM system also offers a database of obstacles, including cables and lines, in particular for the Alps.

The pilot equipped with a FLARM will therefore be warned of a possible collision with such an object when he approaches it.

More and more aircraft are thus equipped. FLARM estimate that their system can be found in half of the aeroplanes in Europe. The company claim they are in about 35,000 planes and helicopters, and used by a surprising 2500 parachutists, paragliders and hang gliders. Amongst others REGA (Swiss), DRF and ADAC (German) rescue helicopters are almost all equipped, as are the planes of the British RAF, with 350 systems, and all the Pilatus and Porter PC6 aeroplanes in the Swiss air force.



One of the first portable FLARMs, tested by [free.aero](#). You had to take a 12 V block of batteries.

FLARM in a sailplane. Photo: S. Burkhardt



The first instruments were too big for practical use in the cockpit. Then Flytec integrated, as an option, small FLARM modules in their instruments. The disadvantage: they were only passive FLARMs, the pilot can be spotted by 'real' FLARMs, but his can't display others.

Recently, things have changed: the company LXNAV offer a little module, the FlarmMouse, which can be used as a passive FLARM, but which can, as an option, be connected to a little screen to make a real FLARM, weighing 122 g, which fits in the cockpit. But you always need to carry a 12 V supply.

Better still: the little FAT 201 box from the company Somax. 175 g with an aerial, giving a full FLARM, including a battery (16 hours of battery life). The device raises the alarm via 8 LEDs indicating the direction the danger is coming from. In addition, via Bluetooth, it can be connected to a smartphone and thus display other aircraft on a map using the XCSoar application, for example!

But the success of the FLARM system goes much further. Just over a year ago, it also became a tracking system: about 700 stations on the ground receive signals and transmit them to live tracking servers such as: <http://live.glidernet.org/>.

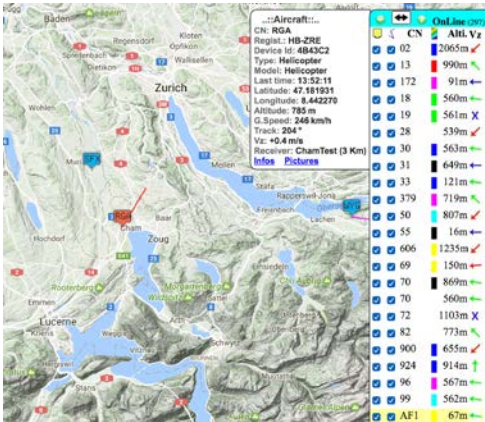


The FLARM option for Flytec instruments. www.volirium.com



The FlarmMouse: a small FLARM instrument with an integrated flight recorder, from 700 €. <http://www.lxnav.com/products/flarmmouse.html>

Totally new: a FLARM specially designed for paragliders and hang gliders, with an integrated battery. Price: about 410 € with aerial. <http://www.fat201.de/produkt/fat-201/>




All this is becoming like the FANET network that the German vario manufacturer Skytraxx hopes to integrate into their instruments.

A quick reminder: it's a "peer to peer" network for pilots for exchanging information about thermals and also for relaying calls to the emergency services.

In April 2017, Skytraxx signed a cooperation agreement with FLARM: the FANET system will integrate FLARM and will therefore be more comprehensive with respect to anti-collision.

Therefore, the new Skytraxx 2.0 and Skytraxx 3.0 can, as an option, for an extra 30 € and from the summer of 2017 onwards, become fully-fledged FLARMs.

The instruments which are already in circulation can be quickly modified in the Skytraxx workshops, at a cost of about 100€ (the circuit board is totally replaced). A very interesting development: Livetracking, anti-collision and communication between pilots with a single instrument.

Obviously, we'll test this option as soon as it comes out... 



We've already spoken about Fanet in a previous issue: <http://www.free.aero/en/contentsHTML/trends2017E/?page=34>



The Skytraxx 3.0: from this summer, a FLARM&FANET version will be available.

At the moment, we are testing both solutions, the SOMAX FAT 201 and the LXNAV FlarmMouse in real conditions, we'll let you know how we got on.



GIN Falcons flying: FLARM, as far as a system combining anti-collision and livetracking, could become as widespread in paramotoring as it in paragliding. Photo: Jérôme Maupoint.



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WITHOUT THE AIR-BRAKES



WITH THE AIR-BRAKES



INDEPENDENCE ZIPPY PT

The EN A Zippy from Independence lets you deploy the air-brakes before flying if the conditions are strong or if the pilot wants maximum stability during their first flights. An extra safety measure?





The idea behind the Zippy: lots of modern EN A wings have almost too much performance for beginners. Their glide is often too good for the pilot to be able to aim correctly into a difficult landing field and to be able to get down more quickly when it is 'going up everywhere'.

The goal: if necessary, reduce the performance, in a controlled and constant fashion, without having to do big ears, for example. For this, Independence added air-brakes on to the Zippy PT, four sausages on to the upper surface, inflated by the air flow. When the pilot wants to revert back to the higher performance model, he folds the sausages back into their pockets on the upper surface and closes them with zips (hence the name 'Zippy'). It is therefore only possible to do this on the ground and not in the air; the decision needs to be made before flying.

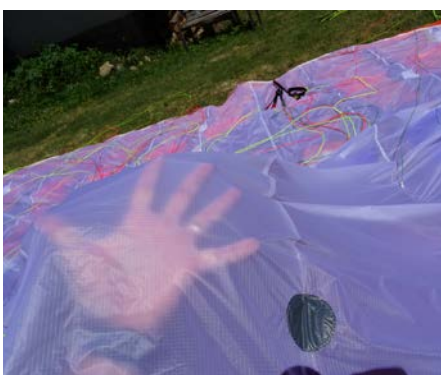
According to Independence, when the air-brakes are totally deployed they reduce the glide ratio by 2.5:1 and the sink rate increases by 0.4 m/s. As a compromise, you can also activate just two sausages to limit the effect of the air-brakes.

With the four sausages out, the pilot can obviously also do small or large big ears.





A leading edge with openings which suck up the air by themselves and made from very strong materials: a solid wing.



It's a very solidly made wing, in keeping with school use. It weighs nearly 6 kg, so it's not a lightweight wing. This doesn't stop it scooping up very quickly and coming up nicely. One of the reasons for this are the openings on the leading edge which are very heavily strengthened and already largely held in place thanks to leading edge rods; all they want to do is breathe.

Preparation is very easy thanks to the simplified lines.

After inflation, it doesn't have a tendency to over-fly, which is normal as it's a wing designed for beginners (but not exclusively).

The goal of our test was to, in particular, identify the difference between the two configurations as far as in flight comfort is concerned, as well as when flying at the limits.

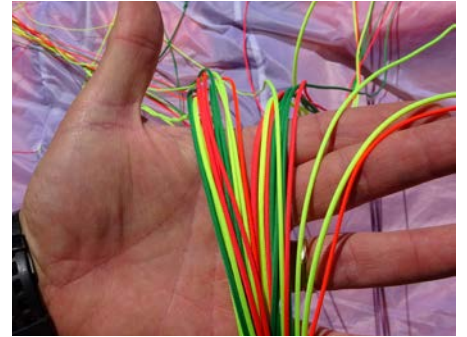
We gave the latter job to young acro pilot Axel Jamgotchian, who did two 'runs' with it: see further on.

Contrary to what we thought when we first looked at this system, we couldn't detect a real difference; during inflation, with or without the air-brakes, the wing always inflated well and took off easily.

During the take off run, with the air-brakes deployed, the reduction in power also surprised us; the difference didn't feel massive. Certainly it didn't lift quite as well, but it was hardly noticeable. It was far from the launch on a speedflying wing that we had expected!

Perhaps even more astonishing was its behaviour when soaring in weak to moderate conditions, the wing flew amazingly well, even with the air-brakes.

The fabric used for the lower and upper surface, despite its transparency, is Dominico 30D. It's obviously strong.



Relatively few lines, risers which are very simple to understand and, in addition, clearly marked (A,B,C...)



The air-brakes fully deployed: even so, this wing doesn't become a 'bus', far from it. Moreover, its handling is good, for an EN A. For wingovers, you obviously need to apply strong inputs.

The difference is that, apart from a slight loss of performance, the wing gives a feeling of being more compact and more robust in turbulence (whilst with the air-brakes packed, it's already a stable, reassuring EN A, as it should be).

With the air-brakes deployed, the wing lets beginners use thermals with more ease and confidence, whilst enjoying a feeling of increased safety. Having this extra confidence will help them to use the thermals better. When landing (very simple and classic), there was very little difference in the two configurations.

It's therefore worth noting that when in normal flight, the 'Zippy' sausages are hardly a drawback at all. When flying straight at trim, they are almost identical.

OUTWITH NORMAL FLIGHT

Axel Jamgotchan reported on the differences during a stall: 'very good behaviour, very gentle; moreover this wing lets you really understand what's going on during this type of manoeuvre. The air-brakes apparently don't interfere at all; the behaviour in both configurations seems similar.'

This observation may seem surprising, as you would expect a more moderate pitch forwards with the air-brakes.

But in the end, as the speed over the trajectory hardly changes in either configuration, it's the same with the speed of the dive, which is, in any case, very moderate, as it should be for an EN A. On a higher performance wing, it would undoubtedly be more visible.

Photos: Véronique Burkhardt





In the thermals, it was very reassuring and nonetheless pretty efficient for a wing designed for beginners. Surprising: with the air-brakes, it was always as efficient when trying to climb.

CONCLUSION

The Zippy PT is a good EN A which is fairly versatile and can be used by a pilot for quite a bit of their flying career. The air-brakes reduce the glide ratio and the sink rate, thus making first flights easier for beginners. More experienced pilots can also take them out before a flight in strong turbulent conditions: the extra drag from the Zippy sausages stabilises the flight, but nonetheless lets the pilot use thermals normally. Its behaviour outwith normal flight is very good, in line with its classification and hardly changes when going from one configuration to another. 🪂

We noticed that in both configurations it's a wing that you can play with as well. Here, the air-brakes (not visible) are totally out, therefore in 'brake' mode.



ZIPPY PT TECHNICAL DATA				
Manufacturer: INDEPENDENCE				
Web: http://www.independence.aero/en				
DATE	2016			
SIZE	XS	S	M	L
CELLS	34	34	34	34
FLAT SURFACE AREA [m ²]	23	26	29	32
FLAT WINGSPAN [m]	8	8,51	8,99	9,44
FLAT ASPECT RATIO	4.77	4.77	4.77	4.77
ALL UP WEIGHT [kg]	55-80	70-95	85-115	105-135
CERTIFICATION	A	A	A	A
PRICE [€]	2 500	2 500	2 500	2 500

The Zippy PT can also be used for paramotoring; as an optional extra, the corresponding risers can be delivered with it.

Photo: Véronique Burkhardt



Axel Jamgotchian (axeljamgotchian.com) is a young acro pilot who spends his spare time doing acro in the sky above Annecy. He tested some manoeuvres with the Independence Zippy in both configurations, with and without the air-brakes, and noted that the behaviour outwith normal flight was similar. Just for fun, he also tested the Zippy's acro capabilities, something which obviously isn't in its specifications. However, he noticed that it was very well behaved during spirals and Misty Flips because it doesn't build up lots of energy, which is perfect for getting the initial sensation.

Photo: Axel Jamgotchian



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