



- Owner's Manual
- DHV Musterzulassung
- DHV Line data

Oktober 2005 / Revision 1.3

#### Copyright ©

2003 by U-Turn GmbH, all rights preserved. No part of this publication may be reproduced or developed further on in any way without written approval of the U-Turn GmbH  
Text and Graphics: Ernst Strobl, Stefan Preuß, EWS

All technical details in this manual have been carefully checked by U-TURN. However we like to mention that we don't take any liability for possible mistakes, neither in legal responsibility, nor in liability cases that derive from mistakable details. We preserve the right to change this manual in any way to achieve technical improvements.

## U-Turn Contact

---

The U-TURN crew congratulates you on buying a new U-TURN Paraglider. You made a supreme choice. We wish you long and enjoyable flights and many happy landings with your U-TURN U2.

Looking back at a long tradition in air sports, U-TURN provides state of the art technology, and with our unique concepts we are setting the standard for the market. The combination of top notch construction technology and the know-how of experienced test- and competition pilots provide the tools for our professional work.

Our customer's needs and demands are the guideline for our work; therefore we like to get your suggestions and critique. Should there be any open questions please feel free to contact your U-TURN dealership or our company. We are glad to assist you in any possible way.

To keep you in the loop of information about the latest technical improvements and innovations about U-TURN products, we ask you to fill in the questionnaire and send it back to:

**U-TURN GmbH  
Paragliders and Kites  
Esslinger Straße 23  
D-78054 Villingen-Schwenningen  
Tel. +49 (07720) 807111  
Fax: +49 (07720) 807112  
Internet: [www.u-turn.de](http://www.u-turn.de)  
E-mail: [info@u-turn.de](mailto:info@u-turn.de)**



Please read this manual carefully and understand the informations it contains before you operate your U2 for the first time. We wrote this manual for your safety and to enable you to easily operate you're U2.

# Answer sheet

---

Name:
First name:
Address
Telephone Nr.:
E-Mail:
U-Turn U2 Serial Nr:
Date of purchase:
Dealership:
Tested by:

Paraglider since:
Flying hours:
Club:

## Contents

---

Introduction	9
AFS system and new features	10-11
General Aspects Of Tandem Flying	10
Legal Aspects	10
Your Passenger	10-11
Equipment	11
Flying Site and Passenger	11-12
Clip-In And Check	13
Launch Position	14
Inflation Of The Glider	14
Flight	15
Landing	15-16
After The Landing	16
Technical Description Of The U2	16
Technical Specifications	17-18
Suspension System Of The U2	19
Lines	19
Risers	20
Unaccelerated State	20
Accelerated State	20
The Spreader Bars	21
Trimmers	21

## Contents

---

Technical Description Of The U2	9
Harness	22
Rescue System	22
Flying The U2	23
Operation	23
Aerobatics	23
Motorised Paragliding	23
Tandem Flying	23
Pre-Flight Check	23-24
Clip-In To The Spreader Bars	24
The Tandem Safety System	25
Takeoff	25
Turning	26
Thermals And Turbulence	26
Landing	27
Towing	27
Extreme Manoeuvres	28
Behavior In Extreme Flying conditions	28
Wingover	28
Front Tuck	28
Deep Stall	29
Full Stall	29
Negative Turn / Spin	29

## Contents

---

Extreme Flugmanöver	30
Canopy Deflation	30
Emergency Steering	30
Manoeuvres For Rapid Loss Of Altitude	30
Spiral Dive <b>WARNING</b>	30
B-Stall	30
Big Ears	31
Maintenance And Repairs	32-33
Some Closing Words	33
U2 Assembly drawing	34
DHV Luftsportgeräte-Kennblatt	35-36
Line Data	37-38
DHV Musterzulassung	39-40
Anhang	

## Introduction

---

A warm welcome at U-Turn. Thank you for taking stock in our products and the philosophy behind them.

The limits of physics are unbribable. To do the most practicable within this given frame is our goal. We concede: This is an ambitious and somehow immodest demand, but you`ll find U-Turn allways at the cutting edge of technology. Oscar Wilde once said in his very british understatement, his taste is just basic: Only the best is allways good enough. The U-Turn-team agrees with this attitude: We always want to deliver the best possible glider. Not more, but certainly not less.

Sounds at first glance not to become a mass-producer with this philosophy, but we are convinced: There is not only an existing market of those, who appreciate quality at reasonable prices this market is growing strongly. Our gliders are available only at selected flight academies that provide outstanding competence, high-quality service and tremendous customer care.

Products, designed by pilots for pilots with this basic taste: The best... This is U-Turn´s story. Test our newest gliders in our handpicked Competence-Centers. A well-educated team of flight-instructors and test-pilots will accompany you in finding the most suitable glider. Due to our close collaboration with our Competence-Centers, not only newcomer will be advised, but also experienced pilots: Beginning from speed-system finetuning as far as any maintenance procedures, in brief: From soup to nuts. And all in your flying region.

Thomas & Ernst

## AFS system and new features

---

To paraglide with lots of fun and have the highest level of security possible, this is the promise of the revolutionary AFS-System (Automatic Flight Stabilisation). It intervenes for the benefit of safety when an inexperienced pilot, or a pilot in trouble, enters turbulence and is unable to fly actively. AFS works like the Electronic Stability Programs known in the automotive industry, you could call it an “ESP for the air”.

By implementing many technical innovations, designer Ernst Strobl entered a new dimension in glider design, having invented both the Improved Stabilisation System (IST) and the Multiple Speed System (MSS). Strobl now presents a paradigm shift: For the first time a designer has managed to allow safety to happen automatically to a certain extent.

The core innovation of the AFS-system is based on the principle of pre-tensioning the undersurface at the trailing edge. “This idea I had during a flight”, Strobl recalls his sudden inspiration, “It must be possible to pre-tension the under-surface by making sure of an exactly calculated cut – so that on the one hand the canopy is neutral while there is enough pressure inside, but on the other hand any drop of pressure causes the system to react”.

Dozens of computer-based calculations with high-end software from the aviation industry allowed the break-through to be achieved. A special production process around the brake attachment points leads to the desired effect. Whilst the canopy is gliding through smooth air and there is enough pressure inside, the pre-tensioning is neutralised and the trailing edge stays aerodynamically perfect like a conventional glider.

When entering turbulent air with the U2 the system adjusts immediately, even the slightest drop of internal pressure allows the system to react. The pre-tensioning at the trailing edge is effectively like pulling the brakes.

A canopy featuring the AFS-system reacts without any steering or braking action from the pilot exactly in the way that the safety experts of the DHV recommend: It flies actively and therefore safely. Ernst Strobl recalls the fine-tuning, “Our computer-based calculations were impressively confirmed during our tests”.

The system is extremely responsive and top-quality manufacturing is necessary. U-Turn Co-founder Thomas Vosseler adds, “We will guarantee a strongly supervised manufacturing process”.

Andreas Schubert, of the “Rhöner Gleitschirmschulen”, who has taught 10 % of all new pilots in Germany over the last ten years confirms, “This is a major step as far as safety is concerned. The main reason for accidents, the full collapse of the canopy, is minimized dramatically”.

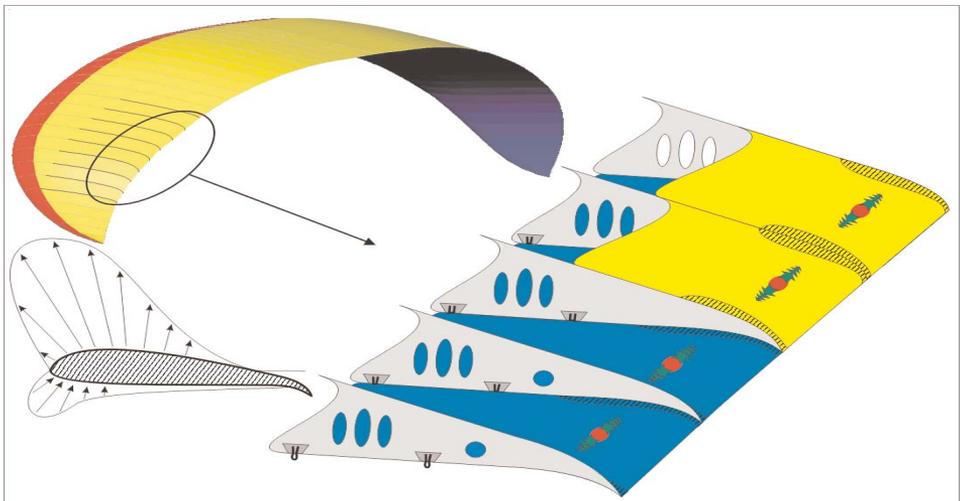
## AFS system and new features

---

The principle of the pre-tensioning of the canopy led Strobl to more design improvements. AFS works best in combination with the geometric setting of the profiles. This means that the profiles do not run lengthwise along the canopy (90 degrees to flight direction), but at an angle between 80 and 100 degrees, allowing every cell to perform in the optimal way. Furthermore, Strobl did not design the width of the cells uniformly; he used a very fine tuned asymmetry that also required lots of computer power to calculate. Strobl calls this dynamic cell-width reduction. In a third step the whole system works more efficiently by using a swept-back design of the wing tips.

Together these innovations lead to better characteristics under normal flight conditions. “First I have to mention the optimal start behaviour,” says Strobl, “The first glider providing the new system is called BODYGUARD; a DHV 1 glider that will set fantastic benchmarks. The BODYGUARD is easily to inflate in all kinds of wind; there is no need for pulling the A-risers or other tricks and it is impossible for the canopy to become stuck before the overhead position. Inflation is easy even for beginners and due to the AFS-System the canopy sits right above the pilot. If the canopy falls backwards, the BODYGUARD comes up immediately after releasing the brakes – even at angles where other gliders give up”.

The new construction principle also automatically improves the stall characteristics in flight. Pilots can slow down the BODYGUARD to very low speed without having to lose manoeuvrability. The newcomer will come to terms and feel comfortable with an AFS-glider on the first flight for another reason: “The wing tip comes slightly forward when the brakes are pulled”, Strobl explains, “the canopy sits right above the pilot and this effect can even be seen while Paramotoring, this is what inexperienced pilots will appreciate”.



## Legal Aspects

---

The pilot of a tandem flight takes on a heavy responsibility and it is absolutely necessary that he is familiar with all of the legal aspects. Knowledge of the rules and regulations are taught during the tandem pilots course. They are essential for correct and proper tandem flying. An extract of important decrees and statutes for tandem flying in Germany follows:

LuftPersV § 134

LuftBO § 57

LuftVG §§ 44-49, § 58 and § 20

LuftVO § 43

LuftVZO § 23



**Note:** The list above is just an abstract. It does not raise a claim for completeness. We alert you to inform yourself about the statutes effective in your country or the country you are flying.

## Your passenger

---

Be aware, that the first flight (especially from a high mountain) is a particularly exciting experience for every passenger.



**IN GENERAL: Do not feel under pressure or be in a rush to fly.**

During the ride to the launch site, you should be calm and confident to promote confidence in the passenger. Explain the weather conditions, tell about flight experiences and answer all questions, even if they concern difficult situations.

Choose a quiet launch site and inspect the conditions for the takeoff run. It is recommended that you do a warm up with the passenger and practice running, either in line or side by side, whichever you prefer. It is very important to inform the passenger that the start combines two stages: inflation and acceleration.

## Your passenger

---

Experience has shown that many passengers sit down in the harness too soon, when the initial run is slowed down by the glider. This results in a start-stop. You must explain that it is necessary to inflate the glider by doing slow steps (this allows corrections), then accelerate to give the glider flying speed.

EXEPTION: With a head wind, passenger and pilot have to push against the wind during in the inflation stage to avoid being pulled backwards.

## Equipment

---

The passenger´s clothing should be suitable for the conditions. He must wear ankle-high boots with non-slip soles and a helmet. Gloves are recommended. Integral helmets are safer, however, they should be equipped with a wide removable chin piece. Please inform the passenger about the required equipment in time.

## Flying Site and passenger

---

Choose the appropriate launch site with the special requirements of tandem flying in mind. It should also be absolutely obstaclefree. You have to consider the possibility of a longer run off and limited correction possibilities. For the takeoff run the following calls are arranged:

- go (better: 3-2-1 go)
- run
- stop
- right
- left

With the call "go", the passenger should help to pull the glider up. In case of a launch stop the pilot calls "stop". Corrections of direction are done by announcing the change of direction. Agree upon the direction of a possible launch stop before beginning the launch sequence. Due to the higher wing loading tandem flying usually requires a longer run and a higher flight speed.

Talk to your passenger about further flight stages. Never force a reluctant passenger to launch. To overcome fear, ask your passenger not to look down, but to pay attention to other aspects of the flight. Although only the pilot is responsible for the control of the glider, let your passenger participate in all activities. After the canopy is laid out and the lines are arranged, the pilot helps the passenger to put on the harness. It is recommended that you perform a seated test, lifting the passenger with the help of another pilot and adjusting the harness as necessary.

## Flying Site and passenger

---

Proper adjustment of leg loops and chest strap is very important. Many passengers tend to sit down on landing and harnesses equipped with airbag or back protector are recommended.

## Clip-In And Check

---

The passenger is clipped in to the longer or shorter (if available) loop of the spreader bar depending on height. If the passenger is shorter than the pilot he is clipped into the lower loop. This prevents the passenger being lifted up too soon.

After you are clipped in to the spreader bar including risers, and the carabiners are connected, the passenger stands in front of you to be clipped in properly. Ask your passenger to visually follow the process. Do not forget: double check that all connections have been fastened securely.

During all flight stages the passenger is in front of or next to the pilot. Safety reasons do not permit a position behind the pilot!

## Launch Position

---

Launch position is either "in line" (passenger in front) or "side by side".  
a) "in line"

A positive aspect of this method is that the passenger does not swing forward. During acceleration he can more easily be pushed in the right direction. Also an additional nudge with the knee can prevent him from sitting down too early.

b) "side by side"

With this method you have better running possibilities and more room to move. For a reverse launch this position is also favorable. A disadvantage, that is often mentioned, is that the passenger swings forward after takeoff. This can be prevented if the passenger holds on to the chest strap or to the cross bracing of the pilot. This launch position is difficult in strong winds, as the passenger cannot help to push against the wind and aid the inflation stage. In this case a reverse launch is recommended. (or assisted launch by two experienced pilots).

With the "in line" method, the passenger should hold on to the loop of the spreader bar, just above the carabiners. With the "side by side" method hold on to the hip or the chest strap of the pilot.

**CAUTION: Perform the 5-point-check just before launch: both harnesses, carabiners, suspension (spreader bar), lines including brakes and the proper position of the glider.**

## **Inflation Of The Glider**

---

The pilot inflates the glider as described in the instructions. With the "in line" method the passenger can help to raise the glider by holding on to the spreader bar above the carabiners. This offers the advantage of the passenger taking part in the launch process.

You must check that the glider is properly inflated and not over-flying. If there are any problems, stop the launch. If the glider is properly inflated and the lines are untangled, "run" is the call for an aggressive run until the takeoff point.

## **Flight**

---

After take-off ask the passenger to look up to the inflated glider. This builds confidence in the aircraft (and calms him down). Ask your passenger, if he is comfortable in his harness.

If his knees hang downwards, he is not yet in the right position. If his knees clearly point upwards, the passenger has already slipped into the harness. If necessary, the pilot should help the passenger to slip into the harness properly. Only then, the pilot himself adjusts his own harness.

Please always be aware that the turning circle of a biplace needs more room, steering is slower than with your familiar solo glider and generally needs stronger steering. However, handling can be decisively improved by weight shifting.

When you sit behind your passenger, you cannot look in his eyes. So talk with your passenger to encourage him and to judge how he is feeling. Advise the passenger to look at the horizon and not to look down. In general: the more relaxed the pilot is, the more confidence the passenger will have and the more he will enjoy the flight.

## **Landing**

---

Landing preparations should only be made during the flight. Explanations before the launch would be too much information at one time. Especially for the preparation of the landing after long flights, it is recommended to stimulate blood circulation in the legs.

Check wind direction at the landing field, height and air traffic before flying into position with sufficient height. This is very important, due to the higher approach speed and the limited flexibility of tandem flying. A downwind landing brings a high risk of injury and should be avoided! If possible, allow more room on approach than is usual with a solo glider.

## **Landing**

---

Avoid corrections close to the ground. Experience has shown, that despite the order to keep on running, many passengers sit down on landing. To avoid injuries, pilot and passenger should be side by side in any case. Tell the passenger not to put out his hands on landing, due to the injury risk. On final approach, use one leg to push the passenger to the side and give the signal to slip out of the harness into an upright position. Then then get ready to start running! It is your responsibility to check the passenger's position.

For a safe, easy landing make the final approach with good speed and apply the brakes gradually and firmly. The perfectly executed landing will be slow and gentle.

## **After The Landing**

---

Offer the passenger the opportunity to describe his experiences or to ask questions.

## **Technical Specifications**

---

The profile of U2 has been specially developed by U-Turn to meet all possible requirements of a fast and safe tandem with Intermediate character and gives high performance combined with optimum safety. The U2 is constructed of nylon cloth which is particularly stretch-stable, durable and is specially treated for UV resistance.

## Technical Specifications

U2	TECHNICAL DATA	
Take off weight	140 - 210 kg	
Wing area flat	42,0 m <sup>2</sup>	
Wing area project	37,83 m <sup>2</sup>	
Wing span flat	14,92 m	
Wing span project	12,68 m	
Aspect ratio flat	5,3	
Aspect ratio project	4,25	
Numbers of Cell	51	
V-Trim	37-39 Km/h (depending on start weight)	
V-Min	21-26 Km/h (depending on start weight)	
V-Max	42-45 Km/h (depending on start weight)	
Feature	V-Tapes, stabilization strap, separate A-Riser	
Accelerator / Trimmer	Trimmer Riser	
Numbers of riser	5	
Numbers of lines storey	2	
Sewing Top / Bottom	inside	
Glider weight	8,9 kg	
Certification DHV	Tandem DHV 1-2	
<b>Materialensatz</b>	<b>Hersteller</b>	<b>Bezeichnung</b>
Obersegel	Porcher Marine, NCV, France	9092 - E85A Water-repellent
Untersegel		9017 - E38A
Profile		9017 - E29A : Firm
V-Tape		9017 - E38A
Verstärkungen	Porcher Marine	P260
Verstärkungen Mylar an Öffnung	Dimension-Polyant	W420
Kaskaden, Bremsleinen, Stammleinen	Teijin Limited, Japan	1,1 / 1,3 / 1,6 / 1,9 / 2,3mm
Tragegurte	Techni Sangles, France	22mm / 1100kg BS / 25g/m
		High Tenacity Polyester Yarn
		Polyester
		Gewicht 182 g/m <sup>2</sup>
		Technora
		PA 6.6 High Tenacity
		Gewicht 40 g/m <sup>2</sup>

Minimum sink / glide ratio:

Our products belong in each performance class to the best ones in the market. We want you to forget the adds with the fantastic glide ratio declarations. go out! Try and compare!

## Technische Daten

---

More construction details including line lengths of the U-Turn FAT WILLIE can be obtained from the certification specification sheets which form part of this manual.

At the time of delivery this glider conforms to DHV and AFNOR (SHV and ACPUL) requirements (see certification information as part of this manual).

Any changes made to the glider by the purchaser invalidate its certification.

Use this paraglider at your own risk. Each pilot is responsible for his / her own safety.

Perform a careful pre-flight check of the glider before each flight.

## Suspension System Of The U2

---

### Lines

---

The U2 lines are made of 1.1, 1.3, 1.6, 1.9 and 2.3mm Tai-Gu lines with a specially twisted Co-Aramid-heart. This high tech line is extremely tear-resistant and stretch-stable. This is essential to avoid changes of flight behavior due to differentialstretching.

The suspension line system is formed of single lines, looped and sewn at both ends. Suspension lines and brake lines bifurcate in the upper area.

The lines of one wing are collected to 5 groups:

A: A1-A2

A: A3-A4

B: B1-B5

C: C1-C4

D: D1-D4

The lines are coloured to support easy identification, handling and control. Special line collectors on the maillons prevent slipping of the lines.

The main brake lines go thorough pullies at the D-risers.

They are marked with a black dot at the point where the brake handle is fixed. This adjustment allows enough travel in extreme flight situations and for landing and should not be changed .

## Risers

The A- and B-risers are differently coloured, to guarantee clear identification during launch and fast descents with B-Stall. Additionally, to ease B-Stalls, the B-riser is made longer and features a pulley system.

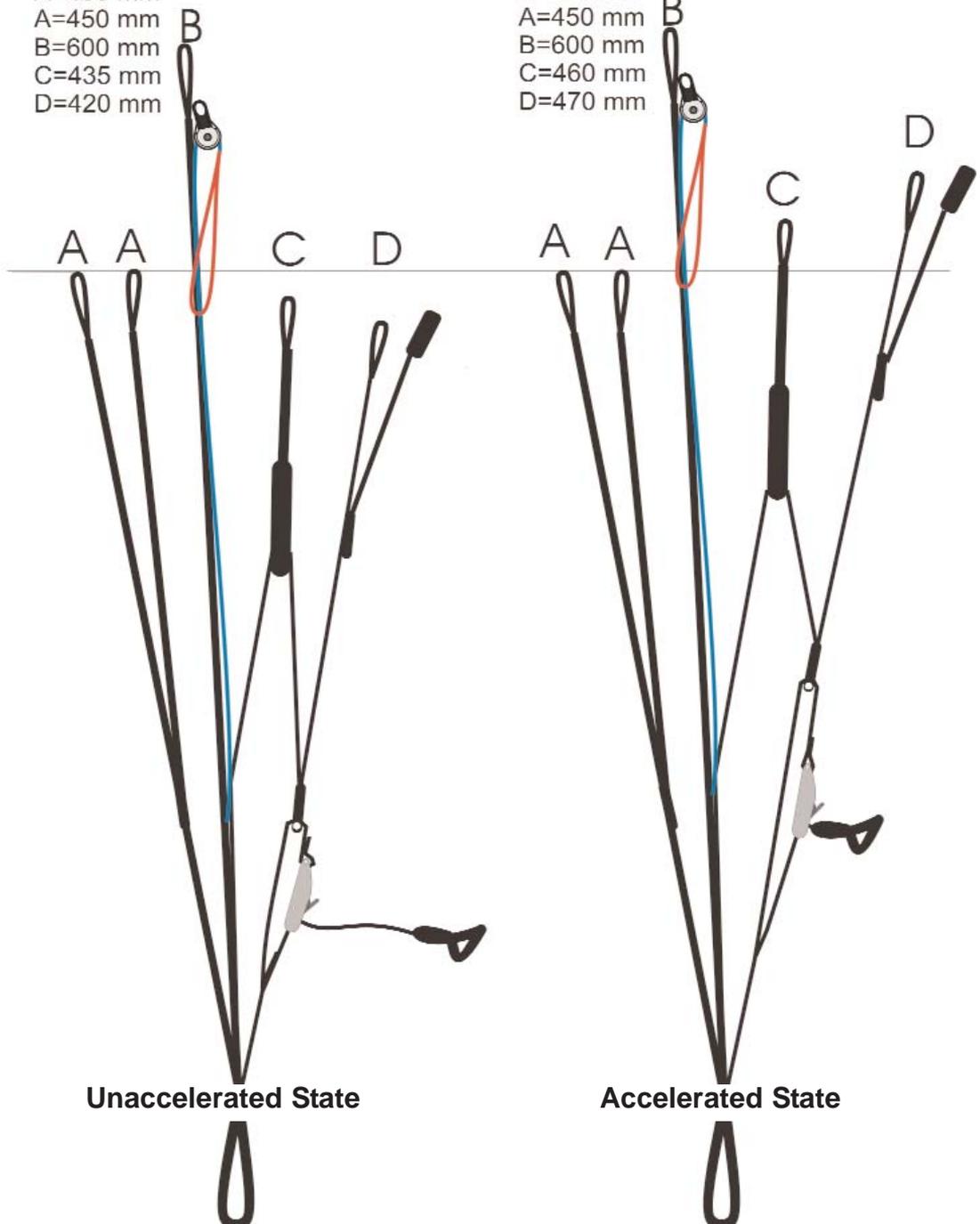
### TRIMMER RISER U-TURN U2 2004 REV 1

Measurements trimmer closed:

A=450 mm  
A=450 mm  
B=600 mm  
C=435 mm  
D=420 mm

Measurements trimmer open:

A=450 mm  
A=450 mm  
B=600 mm  
C=460 mm  
D=470 mm

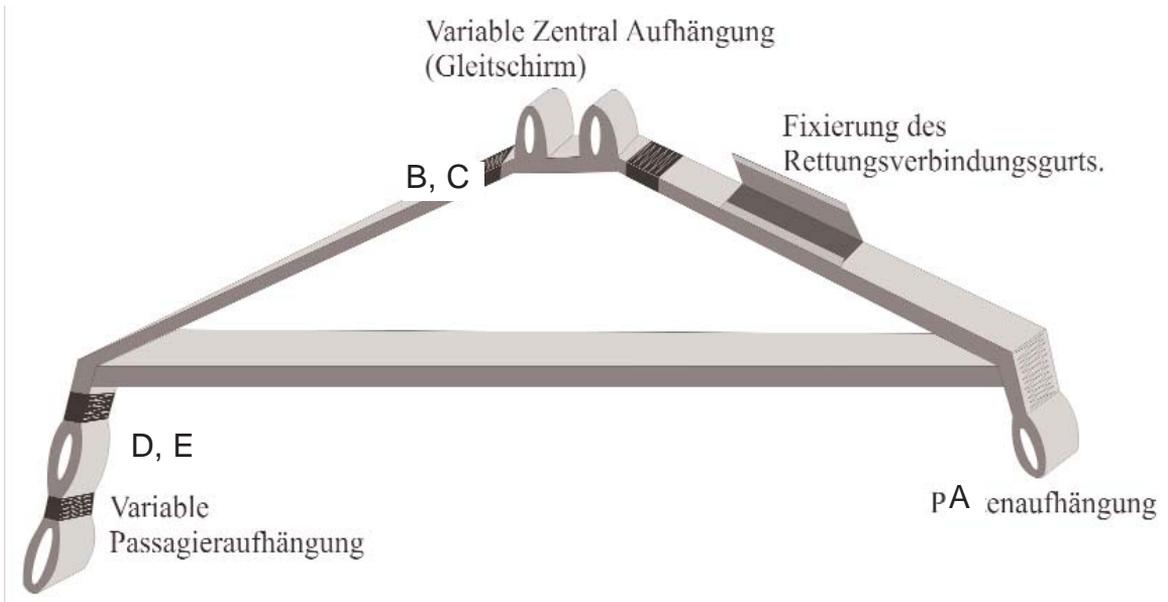


## The Spreader Bars

---

The U2 is equipped with a special spreader bar. It serves to keep the distance between pilot and passenger, which guarantees comfortable and fatigue-free flying.

For a detailed description of this set-up, have a look at the "Flying The U2 / Clip-In To The Spreader Bar" chapter.



## Trimmers

---

The U2 is equipped with Trimmers, which attach to the C-D-risers. The Trimmers adjust the trim speed. Slightly opening the trimmers eases takeoff under bad conditions.

If you fly the U2 at the lower load limit, it is also recommended to slightly open the trimmers during takeoff and flight. Handling and behavior in the turn is positively influenced by a slightly higher trim speed.

The U2 is designed to retain optimum stability at a wide range of speeds. Despite its high performance this tandem is very easy to fly. The U-Turn U2 allows the pilot to concentrate on the flight.

## Harness

---

Any harness with hang points near chest height can be used. The lower the hang point of the harness, the better the pilot can steer the U2 with weight shift.

A DHV or ACPUL certified harness is recommended. For the pilot, a special tandem harness has proved effective, guaranteeing optimal room to move during takeoff, flight and landing. For the passenger a simple harness with a shockabsorbing back protector is recommended. Too many adjustment points can confuse the passenger and make him feel insecure.

Note that the height of the hang point also affects the brake line length. If you have any questions about the harness with the U2, please contact your dealer or U-Turn.

## Rescue System

---

Carrying a rescue system is not only mandatory, it is also extremely dangerous to fly without it.

When you choose a safety system, make sure that it is certified and suitable for the planned takeoff weight.

For example the U-Turn Protekt Bi. The safety system should be mounted to the harness of the pilot where an accidental deployment by pilot or passenger can be avoided. It is important, that the bridle(s) of the safety system are hooked to the main suspension of the spreader bars.

(If it is mounted to the pilots harness the passenger would hang about 1 meter lower, bringing a high injury risk when landing!) It is advisable to perform training for the proper handling of the safety system. Today's biplace gliders with more than 40 sqm area develop high loads and are extremely difficult to take in after parachute deployment.

## **Operation**

---

The U2 has been developed and tested exclusively for foot and winch launch operation. Other operations are not allowed.

## **Aerobatics**

---

The U2 has not been developed and tested for aerobatics. It is also neither suitable nor certified for aerobatics. Aerobatics with the U2 are seriously dangerous. Doing aerobatics can induce flying configurations where you enter non controllable manoeuvres. It can also overload material and ask too much of the pilot.

## **Motorised Paragliding**

---

The U2 has not been tested or certified for use with any kind of engine. If you want to fly the U2 motorised, please get in touch with the manufacturer of the engine and U-Turn to check on certification and suitability of this configuration.

## **Tandem Flying**

---

The U2 is developed for biplace operation. It is not certified for single or multiplace (more than 2 persons) operation. All persons have to be authorized and equipment must be certified specially for biplace flying. This is necessary for pilot, passenger, harness, safety system and tandem suspension.

## **Pre-Flight Check**

---

As for any aircraft, a pre-flight check is required for the U-Turn U2. Tandem gliders are often used by different pilots, if you are not the only one who uses the glider, please perform the check thoroughly. If you let someone else use the glider, please remind him to do the pre-flight check. Also make sure that he knows the operation limits of U2 and is authorized to fly. Prior to each flight check spreader bar, risers, lines and canopy for damage - if any is detected, don't launch. Remember - one faulty component can cause the whole structural stability of your glider fail. Unpack your glider in a semi-circle shape. This ensures that the centre cells begin flying before the tips. When unfolding your glider, consider the wind direction and arrange your glider so that your takeoff run is directly into the wind. Once the glider is free and untangled, check to make sure that all lines come directly to the riser. The lines must be arranged so that there are no tangles and the A-lines are on top.

## **Pre-Flight Check**

---

Double check for a "line over", launching with a line over can be dangerous! Let the passenger take an active part in the pre-flight check, to make him familiar with the glider.

## **Clip-In To The Spreader Bar**

---

The U2 has been tested and certified together with the delivered tandem spreader bars. Other tandem suspension systems can considerably change flight behavior as well as behavior in extreme flight conditions.

The spreader bars (see illustration, page 34) is equipped with a loop for the pilot (A), two loops for the glider risers (B + C), and two loops for the passenger (D + E). The pilot always clips himself in loop A. For passengers with normal weight the glider riser is clipped in loop C, for light passengers loop B is used. Loop E is for shorter passengers, loop D for taller passengers. Clip in symmetrically!

## **The Tandem Safety System**

---

The compulsory biplace safety system has to be mounted beyond the reach of the passenger and according to the manufacturers instructions.

Usually the connecting line of the parachute is lead over the back of the pilot to the spreader bars. There it is hooked in to the carabiners to connect with the main risers.

## Takeoff

---

Front Launch: With the A-risers and the brakes in your hand, have another look at your unfolded glider. Inflate the glider with a steady, aggressive run and remember to hold your arms so that they are a continuation of the A-risers. (Note: with a head wind of more than 5 km/h only the inner A-risers are used to pull up the glider, both A-risers are used when there is less or no wind.) As the glider comes above your head, you should glance up to see that the entire canopy is inflated and flying. U2 has low surge, so there is usually no need for braking to stop the glider from over-flying you. Directional control with the brakes should only be attempted when the glider is above your head. After checking that the wing is properly inflated, apply very slight brake pressure and accelerate rapidly down the hill. Excessive braking will cause the wing to fall back. After a few steps the glider becomes airborne as it accelerates to flying speed.

Reverse Launch: To do a reverse launch, lay out the glider and do all the checks as before. After clipping in both yourself and the passenger, turn to face the canopy, at the same time lifting one set of risers over your head. The passenger is now standing beside you, still facing forward. Inflate the glider with a steady pull on the A-risers and as it comes overhead, turn and begin your takeoff run. (Note: as with the front launch, use only the inner A-risers in stronger winds).



**NOTE:** Remember the care and assistance of the passenger during takeoff, you can find the chapter "passenger company" in the introduction section of this manual.

## Turning

---

The U2 is an agile glider and reacts immediately to pilot input. By using weight shift and light braking, the U-Turn U2 makes flat turns with minimum loss of altitude. Increasing the amount of brake pressure decreases the radius of the turn. It is important to continually feel the changing pressures in both sides of your canopy when turning. If you can motivate your passenger to assist you with weight shifting, it will be even easier to turn.

When brake pressure is increased on one side, the U2 begins a fast and steep turn, which can be made into a spiral dive. The spiral dive must be induced and finished slowly. Bank is adjusted by pulling/releasing the inside brake.

**WARNING: Continuous extreme braking may cause a spin!**

## Thermals And Turbulence

---

Especially during thermal flight, U2 demonstrates its strength.

In turbulent air, U2 should be flown with a little brake to increase the angle of attack and provide greater stability. While flying in strong thermal conditions, the pilot must maintain the glider's position above his head by letting the glider fly fast while entering the thermal, and by braking the surge of the canopy when exiting the thermal. U2 possesses high stability due to its construction and design. However, an active flying style in turbulence helps increase safety by preventing unnecessary collapses and deformation of the glider.

## Landing

---

The U-Turn U2 is easy to land. While pointing into the wind, the pilot should fly the wing fast until he is at 2 m above the ground, at which point he should apply both brakes evenly and completely. When landing in stronger wind, less brake is required. Landing from steep turns must be avoided, due to the risk of strong pendulum.

## Towing

---

Towing with U2 is allowed as long as the following rules are considered:

- Before towing contact AiREA with a description of your tow system if there is any non-standard equipment or towing procedure to be performed.
- Tow on flat ground
- Towing pressure must be lower than 150 kg
- People involved with towing must have the required authorization.
- Equipment used in towing should be certified, safe and in good operating condition

## Behavior In Extreme Flying Conditions

---

Although FAT WILLIE is characterized by very high aerodynamic stability, turbulence or pilot error can result in an extreme flight condition. Proper behavior in extreme flight conditions is best taught in SIV courses.

Every pilot who flies in turbulences or makes a mistake, can find himself in these flying conditions.

All extreme manoeuvres and flight conditions that are described here are dangerous if they are executed without adequate knowledge, without enough altitude and / or without proper instruction.

Wrong execution of the described manoeuvres and flight conditions can risk your life. Never intend to fly extreme manoeuvres with a passenger!

### Wingover

---

To do a wingover, the pilot flies S-turns with increasing roll, until the desired roll is achieved. Wingover with U2 is usually only possible with a very extreme roll.

**CAUTION: It is prohibited to fly with a roll of more than 60 degrees.**

### Front Tuck

---

A front tuck is the result of a negative angle of incidence (due to turbulence or quickly released brakes). Usually U2 unfolds quickly and without assistance. The recovery process can be supported by even and symmetrical braking.

### Deep Stall

---

A Deep Stall is the result of too much pulling of the brake lines or the rear risers, or a B-Stall that is recovered from too slowly. The U2 has no tendency to Deep Stall. Usually it ceases a Deep Stall without assistance, if you let up the brakes or the rear risers.

In case of a Deep Stall, symmetrically "push" the A-risers "forward" on both sides. Always check you have enough altitude if you try a Deep Stall and never brake unevenly when you are in a Deep Stall.

## Full Stall

---

**CAUTION:** The forces, that affect a tandem glider of this size during a Full Stall are very high.

To force a Full Stall, pull both brakes all the way down. Depending on the arm length of the pilot, it might be necessary to take wraps of the brake lines. The U2 does not deflate completely. It's very heavy to keep the it in Full Stall.

Stabilize the canopy before recovering the Full Stall, then symmetrically and slowly release the brakes to refill the canopy.

## Negative Turn / Spin

---

When the pilot applies too much brake on one side, a spin can begin. To recover from the spin, the lower brake has to be released to let the glider accelerate.

## Canopy Deflation

---

The U2 is characterised by a very high stability.

Nevertheless, as can happen to all gliders, stronger turbulence can lead to a canopy deflation.

Usually this is not a difficult situation, as the canopy inflates quickly and reliably.

You can support reinflation by correcting on the open side and using a long, steady brake action to pump out the closure.

## Emergency Steering

---

If, for any reason, the U2 cannot be controlled with the brakes, it can be steered and landed with the rear risers.

## Manoeuvres For Rapid Loss Of Altitude

---

**NOTE: Never begin any manoeuvres without having informed your passenger!**

### Spiral Dive

---

It is very easy to begin a Spiral Dive with the FATWILLIE. The Spiral Dive results in very high sink rates. For its proper use in extreme situations, the Spiral Dive should be practised in easy conditions. However:

- usually the steering pressure is markedly higher,
- centrifugal forces can be very high, due to the higher wing loading and higher speed,
- it is possible, that the passenger will not be able to bear the centrifugal forces as well as the pilot.

### Spiral Dive WARNING

---

The agile and dynamic handling of the U2 leads to very high possible sink rates when the pilot decides to do a spiral dive. Simultaneously pilot and passenger have to bear increasing forces due to high speeds while turning. The U-Turn GmbH expressly warns that even at sink rates about 12m/s the capacity of pilot and/or passenger may be affected, in worst case to the point of insensibility. According to harnesses configuration, the pilots' position and the sink rate the glider will keep spiral-diving until it is steered out actively. The U-Turn GmbH therefore recommends special diligence and accuracy in carrying out this manoeuvre.

### B-Stall

---

The B-Stall begins with a symmetrical continuous pulling of the B-risers. The aerofoil is deformed and the glider loses forward speed.

The surface is reduced and the sink rate can be increased by pulling down further on the B-risers. Recovery involves a quick, continuous and symmetrical release of the B-risers.

## Big Ears

---

The one or two outer A lines are pulled on both sides, causing the tips to collapse, allowing the glider to achieve a 3-4 m/sec sink rate. The glider remains controllable through braking and weight shift. Releasing the A lines allows the collapsed cells to open by themselves. If this does not happen, reinflation can be helped with the brakes.

**WARNING: Never use Big Ears and a Steep Spiral together. You might overload glider, pilot and equipment.**

Full Stalls and Spins should be avoided, as incorrect recovery with any paraglider can be dangerous. Descent manoeuvres should be practised in a safe manner so that proper technique can be applied in extreme situations.

## Maintenance and Repairs

---

U-Turn Paragliders will retain their performance and handling characteristics best if routine care and maintenance are performed. If cleaning is necessary, use warm water and a soft sponge. If you must use a soft cleaning fluid, rinse the fabric thoroughly. Always store your glider in a dry and safe place away from chemicals. Extended exposure to UV light tends to increase permeability and fading of the material. Make every effort to limit the amount of time that your canopy remains in the sun. Have your glider thoroughly checked by the manufacturer / dealer after no more than two years or earlier if your glider is used extensively in rough conditions or terrain. Repairs should be performed by authorised personnel only.

## Some Closing Words

---

The U2 leads the way in paragliding research and development. We wish you many long and safe flights on your U-Turn U2.

Remember to treat your canopy properly and always fly with respect for conditions and your capabilities.

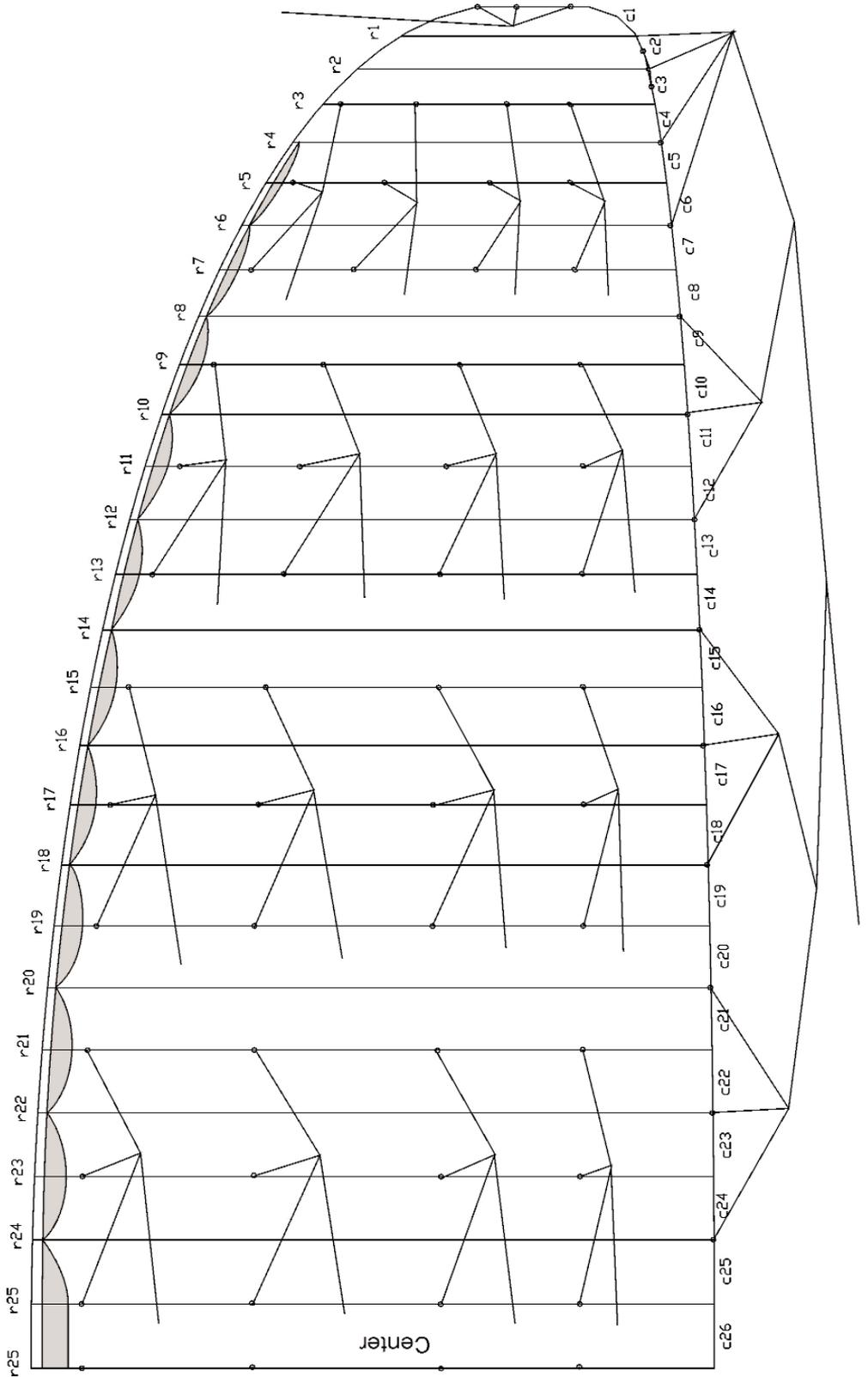
Remember that all flying is potentially dangerous and that you must take responsibility for you own, and your passengers safety.

Fly conservatively with respect to conditions and use ample altitude for manoeuvring.

Be aware of the responsibility you carry, if you fly with a passenger. Be even more careful when you check flight conditions.

We also strongly recommend, that you use a certified harness with a back protection, a certified reserve parachute and a helmet.

# U2 Assembly drawing





**Deutscher Hängegleiterverband e.V. im DAeC**  
**DHV/OeAeC-Technikreferat**

LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel  
 Beauftragter der österreichischen Luftfahrtbehörde

**GS VERMESSUNG U-TURN TANDEM U2**

Prüf-Nr 013666-GSDetVerm-206-ines

Prüfdatum 17.12.2004

Muster U-Turn Tandem U2

Prüfungsart GS Vermessung

Auftrag Auftrag GS Musterprüfung U-Turn Tandem U2 (U-Turn GmbH)

Auftraggeber U-Turn GmbH

Prüfrichtlinie Lufttüchtigkeitsforderungen für HG und GS

Prüfer Sattler

Ergebnis positiv

Fakturieren zu: 100%

Besonderheiten (technisch)

31.01.05 J. Sattler

Datum / Unterschrift (Sattler)

**Sonstiges**

Gerätengewicht [kg] 8.7

Beschleuniger? Nein

Trimmer? Ja

**Tragegurte (Längen in mm)**

	A	A2	B	C	D	E
unbeschleunigt	450	450	600	435	420	0
beschleunigt	450	450	600	460	470	0

Besonderheiten Tragegurte

**Leinen**

Leinendaten

	A	B	C	D	BR
1	8780	8505	8675	8835	1060
2	8680	8410	8580	8735	9675
3	8695	8415	8600	8755	9415
4	8630	8360	8555	8690	9265
5	8515	8250	8450	8585	9050
6	8515	8260	8465	8590	8835
7	8430	8205	8370	8500	8770
8	8305	8095	8285	8390	8620
9	8300	8095	8285	8390	8520
10	8240	8015	8220	8290	8525
11	8120	7925	8120	8195	8515
12	8095	7900	8095	8140	8490
13	7665	7650	7690		8390

Besonderheiten Leinen

**Übereinstimmung mit den Prüfrichtlinien**

Ergebnis Vermessung In Übereinstimmung mit den Prüfrichtlinien

Ergebnis Verarbeitung In Übereinstimmung mit den Prüfrichtlinien



## Deutscher Hängegleiterverband e.V. im DAeC DHV/OeAeC-Technikreferat

LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel  
Beauftragter der österreichischen Luftfahrtbehörde

### GS SCHOCK U-TURN TANDEM U2

**Prüf-Nr** 013714-GSSchock-86-reiner

**Prüfdatum** 07.12.2004

**Muster** U-Turn Tandem U2

**Prüfungsart** GS Schock

**Auftrag** Auftrag GS Musterprüfung U-Turn Tandem U2 (U-Turn GmbH)

**Auftraggeber** U-Turn GmbH

**Prüfrichtlinie** Lufttüchtigkeitsforderungen für HG und GS

**Prüfer** Brunn

**Ergebnis** positiv

**Fakturieren zu:** 100%

**Besonderheiten (technisch)**

07.12.04

-----  
Datum / Unterschrift (Brunn)

### Ergebnisse Festigkeit

---

**Last Soll [N]** 10000

**Last max. [N]** 10000

**Gebrochen?** Nein

### Zusatzangaben für Festigkeit GS

---

# Leinendaten

## Leinendaten

Gleitsegelmuster: **U-Turn U2**

Hersteller: U-Turn GmbH

Max. Startgewicht: 210 kg

### 1. Leinenspezifikation:

	Stammleine	Stammleine	Stammleine	1. Stockwerk	Stockwerk	Stockwerk
Leinenhersteller	TAE-GU	TAE-GU	TAE-GU	TAE-GU	TAE-GU	TAE-GU
Typenbezeichnung	Teijin Limited, Japan					
Nennfestigkeit unverarbeitet	469 daN	213 daN	180 daN	165 daN	114 daN	90 daN
Durchmesser	2.3mm	1.9mm	1.6mm	1.55mm	1.3mm	1.1mm
Material Kern	Technora	Technora	Technora	Technora	Technora	Technora
Material Mantel	Mantel Polyester					
Längenbezogene Masse der Leine	4,92 g/m	4,48 g/m	3,56 g/m	2,96 g/m	1,62 g/m	1,177 g/m
Längenbezogene Masse des Kerns						
DHV Leinenfestigkeit nach 5000 Knickungen	181,9 daN	112 daN	112 daN	99 daN	60 daN	47 daN

### 2. Festigkeitsnachweis:

#### 2.1 Nachweis der Festigkeit der Stammleinen:

Stammleinenzahl A-Ebene	Stammleinenzahl B-Ebene	Stammleinenzahl A+B-Ebene	Stammleinenzahl (A+B) x Leinenfest. <sup>1</sup> >8 x max. Startgew. und > 800 kg
8	10	18	<b>2549,2 kg</b>

Stammleinenzahl C-Ebene	Stammleinenzahl D-Ebene	Stammleinenzahl E-Ebene	Stammleinenzahl C+D+E-Ebene	Stammleinenzahl C+D+E x Leinenfestigkeit <sup>1</sup> >6 x max. Startge. und > 600 kg
8	8		16	<b>1775,8 kg</b>

<sup>1</sup> Leinenfestigkeit nach 5000 Knickungen aus DHV-Gleitsegel - Leinenbelastungsversuch.

# Line data

---

Seite 2 Festigkeitsberechnung und Leinendaten Gleitsegel U-Turn U2

## 2.2 Nachweis der Leinenfestigkeit oberhalb der Stammleinen

	Anzahl <sup>2</sup> der Leinen x Nennfestigkeit für jedes "Stockwerk" > Festigkeit der zugehörigen Stammleine			
	Stammleinen	1. Stockwerk	2. Stockwerk	3. Stockwerk
A-Leinen	1175,6 kg	1534 kg		
B-Leinen	1373,6 kg	1534 kg		
C-Leinen	1009,8 kg	1456 kg		
D-Leinen	766 kg	1206 kg		

## 3. Fertigungstoleranzen

Die oben unter Leinendaten aufgeführten Punkte sind bei der gesamten Produktion konstant zu halten. Ebenfalls konstant zu halten sind die Punkte:

- Leinenaufbau
- Zahl der Litzen Kern
- Zahl der Litzen Mantel
- Flecht- und Schlaglänge Kern
- Flecht- und Schlaglänge Mantel
- Schlichte und/oder Ausrüstung

Soweit bei anderen Parametern der Leine Streuungen auftreten, sind die Toleranzen diese Streuungen auf einem gesonderten Blatt anzugeben.

Sachsenkam, 10.01.2005  
Ort, Datum



\_\_\_\_\_  
Abgestempelt und Unterschrift Hersteller

vom DHV auszufüllen:

Überprüft am \_\_\_\_\_

von \_\_\_\_\_

Bemerkung:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

<sup>2</sup> Wert inkl. Stabiloleine (bei gleichem Leinenmaterial und Durchmesser), wenn die Stabiloleine dieser Leinenebene und diesem Stockwerk zuzuordnen ist.



REPUBLIK ÖSTERREICH



ÖSTERREICHISCHER AERO-CLUB FAA

Blattgasse 6, A-1030 Wien, Tel. ++43-1-7187297, Fax ++43-1-7187297-17  
Referat Technik Hänge- und Paragleiten:  
D-83703 Gmund, Miesbacherstr.2, Tel ++49-8022-9675-40, Fax: ++49-8022-9675-99

## MUSTERANERKENNUNGSSCHEIN

CERTIFICATE OF TYPE ACCEPTANCE

für Paragleiter

Nr. MAK GS-01-1333-05

Das nachstehend bezeichnete Luftfahrzeug wird als Muster anerkannt auf Antrag von:  
The product described below has been accepted on application of:

*U-Turn GmbH, Esslingerstr. 23, 78054 Villingen-Schwenningen, Deutschland*

Dieser Musteranerkennungsschein ist auf Grund der die Anerkennung ausländischer Musterprüfungen betreffenden Bestimmungen der Zivilluftfahrzeug- und Luftfahrtgeräteverordnung in der am Tage der Ausstellung geltenden Fassung ausgestellt.

This certificate of Type Acceptance is issued in accordance with the appropriate Austrian regulation as in force today.

**Luftfahrzeug:** *Paragleiter*  
Product:

**Hersteller:** *U-Turn GmbH, 78054 Villingen-Schwenningen, Deutschland*  
Manufacturer:

**Musterbezeichnung:** *U-Turn Tandem U2*

Type designation:

**Musterzulassungsbehörde und Musterzulassungsschein:** *DHV*  
Type Certification Authority and number of Type Certificate: *Nr. DHV GS-01-1333-05*

**Anerkannte Bauvorschriften:** *Lufttüchtigkeitsforderungen für HG und GS*  
Accepted Certification Standard:

**Zusätzliche Auflagen:**  
Additional requirements:

*Diese Musteranerkennung ist an die Einhaltung der Auflagen der o.g. Musterzulassungsstelle gebunden*

Diese Musteranerkennung kann durch den ÖAeC übertragen, ausgesetzt oder widerrufen werden.  
This certificate shall remain in effect until surrendered, suspended or revoked by ÖAeC.

**Datum der Ausstellung:** *09.03.2005*  
Date of issue:

**Unterschrift:**  
Signature: *[Handwritten Signature]*  
Österreichischer Aero-Club FAA  
Blattgasse 6, A-1030 Wien, Tel. ++43-1-7187297, Fax ++43-1-7187297-17  
Referat Technik Hänge- und Paragleiten:  
D-83703 Gmund, Miesbacherstr.2, Tel ++49-8022-9675-40, Fax: ++49-8022-9675-99

Deutscher Hängegleiterverband e. V. im DAeC  
DHV/OeAeC-Technikreferat

LBA-anerkannte Prüfstelle für Hängegleiter und Gleitsegel



# MUSTERPRÜFBESCHEINIGUNG

*Gleitsegel*

Musterprüfnummer **DHV GS-01-1333-05**

Bezeichnung des Gerätemusters

***U-Turn Tandem U2***

Das nachstehend bezeichnete Luftsportgerät ist als Muster geprüft im Auftrag von:

***U-Turn GmbH, Esslingerstr. 23, 78054 Villingen-Schwenningen, Deutschland***

Diese Musterprüfbescheinigung ist erteilt auf Grund der die Musterprüfung betreffenden Bestimmungen des Luftverkehrsgesetzes, der Luftverkehrs-Zulassungs-Ordnung, der Verordnung zur Prüfung von Luftfahrtgerät und der Lufttüchtigkeitsforderungen in der heute geltenden Fassung sowie zu den Bedingungen der Vereinbarung über Musterprüfung und des Schreibens vom 09.03.2005.

Die Musterprüfung gilt gemäß zugehörigem Geräte-Kennblatt Nr.: **DHV GS-01-1333-05**

09.03.2005

Datum der Ausstellung

Unterschrift

