

Accident Figures 2004 - Paragliding

Part 2

A report by Karl Slezak, DHV Safety Commissioner

Accidents during take-off Errors in preparation for take-off

Accidents during take-off			
unharmd	slightly injured	severly injured	fatal injured
0	4	20	0

4 (previous year also 4) severe accidents reported in 2004 were caused by knots in the lines, which pilots failed to see during their pre-flight and take-off checks or the control check. In 3 cases, a stall was caused at low altitude by corrective steering into the opposite direction, followed by a crash. One pilot was unable to stop the turn and crashed into the mountain. Considering the risks involved in a flight with knots in your lines, the effort to check your lines carefully before take-off is low. This applies especially at steep take-off sites, because the resulting short control phase often makes it impossible to feel/see knots in lines and interrupt take-off if necessary. Another piece of advice: If your wing is turning to one direction after take-off without you handling the steering lines, you should always try to correct the direction by shifting your weight first. If this is not enough, you can try to break really carefully. Do not try to resolve the knot in the take-off area. First gain distance from the terrain. If you have to get close to the stall point to keep the wing on track, there is a high risk of even small thermals or turbulences causing a stall. Unless the terrain below is completely unsuitable, a controlled use of the rescue parachute often presents the safest alternative to overcome this difficult situation with as little damage as possible. A small calculation: 7 pilots in 2003 and 2004 were severely injured due to uncontrolled reactions of the wing caused by knots in the lines. When using the rescue parachute, the risk of a severe injury only amounts to 10%.

Errors during take-off

In the actual (forward) take-off overshooting and deflation of the wing poses a problem which causes several severe accidents each year (2004: 4) It is particularly dangerous, because pilots tend to get airborne with a partially deflated canopy and are then thrown back into the mountain by a rapid rotary motion. The following two pilot errors lead to this accident situation: Too dynamic inflation of the wing and/or too little breaking of the wing towards the end of the inflation phase. The risk is particularly high at steep take-off sites in stronger winds. Pilots who are used to taking-off at flat sites or are mainly towed, are not used to the stop the dynamic rise of the wing when starting at a steep take-off site by breaking powerfully.

Such pilots should be advised to practice at a steep training hill, before e.g. going on a flying holiday in the alps. When practicing ground handling you can also acquire a sense for the necessary steering reactions very nicely.

A further fairly common cause for accidents during take-off is a release of tension and deflation of the wing, when a pilot runs through a dip or trough in the ground when accelerating (2004: 3).

Sitting down in the harness too early, followed by a dip with ground contact caused one accident with severe injuries. Unfortunately there is a widespread bad habit to sit down in the harness immediately after take-off instead of remaining upright and prepared to run until reaching a safe altitude to fly (2004: 2).

Four pilots were caught by strong gusts of wind during inflation and dragged across the terrain in an uncontrolled fashion. Two further pilots were caught by gusts of side-wind during the take-off run and thrown against an obstacle. They were all severely injured.

Mistakes during backwards take-off manoeuvres caused 6 accidents with 4 severe injuries. In 3 cases the pilots unintentionally turned the wrong way for take-off and were lifted off the ground with twisted lines and their back in flight direction. Due to the twisted steering lines, two of the affected pilots steered into the wrong directions and flew back into the mountain. One of them touched an obstacle in flight. One pilot forgot to lead the steering line along with the other lines when turning for a backwards take-off. The take-off was successful but the entangled steering line caused the wing to fly in a strong turn after take-off. Corrective steering led to a stall and caused the pilot to crash into the ground spinning.

Use of rescue parachutes

19 (previous year 17) uses of rescue parachutes were reported. Reasons for use: Uncontrolled extreme flight situations: 16 Collisions: 3.

Accidents after use of rescue parachutes			
unharmd	slightly injured	severly injured	fatal injured
12	3	4	0

In 13 cases, the rescue parachute opened completely and functioned correctly, in four cases the altitude at activation (20-30 metres) did not suffice for the parachute to open and function correctly.

In one case, a pilot was injured severely after landing with a rescue parachute. He tried to deform his paraglider at low altitude and caused the rescue parachute to enter into a pendular motion. 2 pilots were slightly injured when landing with a rescue parachute, the remaining 10 were uninjured. In the cases of incomplete opening, 2 pilots were severely injured, 2 pilots remained unharmd thanks to a tree-landing. The case of one pilot in Kössen, Austria,

Foto: Rainer Schelldorf



sounds rather quaint: According to his own accounts, a bird of prey attacked his wing. The bird got caught at the sides in the lines of the wing and caused it to enter a rapid spiral dive. The pilot reacted correctly and activated his rescue parachute. The bird escaped and flew away.

After a massive asymmetrical deflation followed by a spiral dive a pilot activated his rescue parachute at Wallberg, Germany. The rescue parachute failed to open completely and got entangled with the paraglider's lines. The pilot was severely injured at impact on the ground in full rotation. Unfortunately, this especially dangerous situation is not that rare. Most of the times it is caused by pilots being unable (or no longer able) to throw the rescue parachute in its container far away from the paraglider. The rescue parachute falls straight down and thus, close to the turning axle (when the wing is in a rotary motion) fails to be caught by centrifugal forces, which would usually

force the packet away. Instead, the rescue parachute, which is often still in its inner container, then moves upwards and gets caught in the rotating wing where can get entangled. In a collision resulting in entangled wings, only one of the rescue parachutes activated by the pilots opened effectively. Both pilots landed with only one rescue parachute. One of the two suffered from life-threatening injuries at impact and could only be saved by emergency surgery.

Collisions

5 (previous year 6) collisions (5 paraglider with paraglider) were reported. The most severe accident occurred at Babadag mountain in Turkey. A German and a Dutch Pilot collided close to the mountain. When crashing, the Dutch pilot suffered fatal injuries, the German survived. In the remaining 3 reported collisions (2 of them included the activation of rescue parachutes) the pilots were not injured.

Accidents after collisions			
unharmd	slightly injured	severly injured	fatal injured
2	0	2	0

Errors during preparation for landing and when landing.

The single most common cause for accidents during landing is a late turn from the cross landing approach to the final approach (often at an angle) and a resulting collision with the ground while turning. Landings with wind from behind also cause many injuries and occur fairly frequently. During the landing itself, typical beginners' mistakes lead to accidents, mainly these are too early, too late or no complete stall. An above-average number of beginners and inexperienced pilots are involved in landing accidents. It is often enough for one parameter to be unusual, for a pilot to be unsettled. e.g. stronger wind, wind from a different direction, upward or downward

moving air above the landing site. Overall, too low approaches to the landing site lead to considerably more accidents than too high approaches.

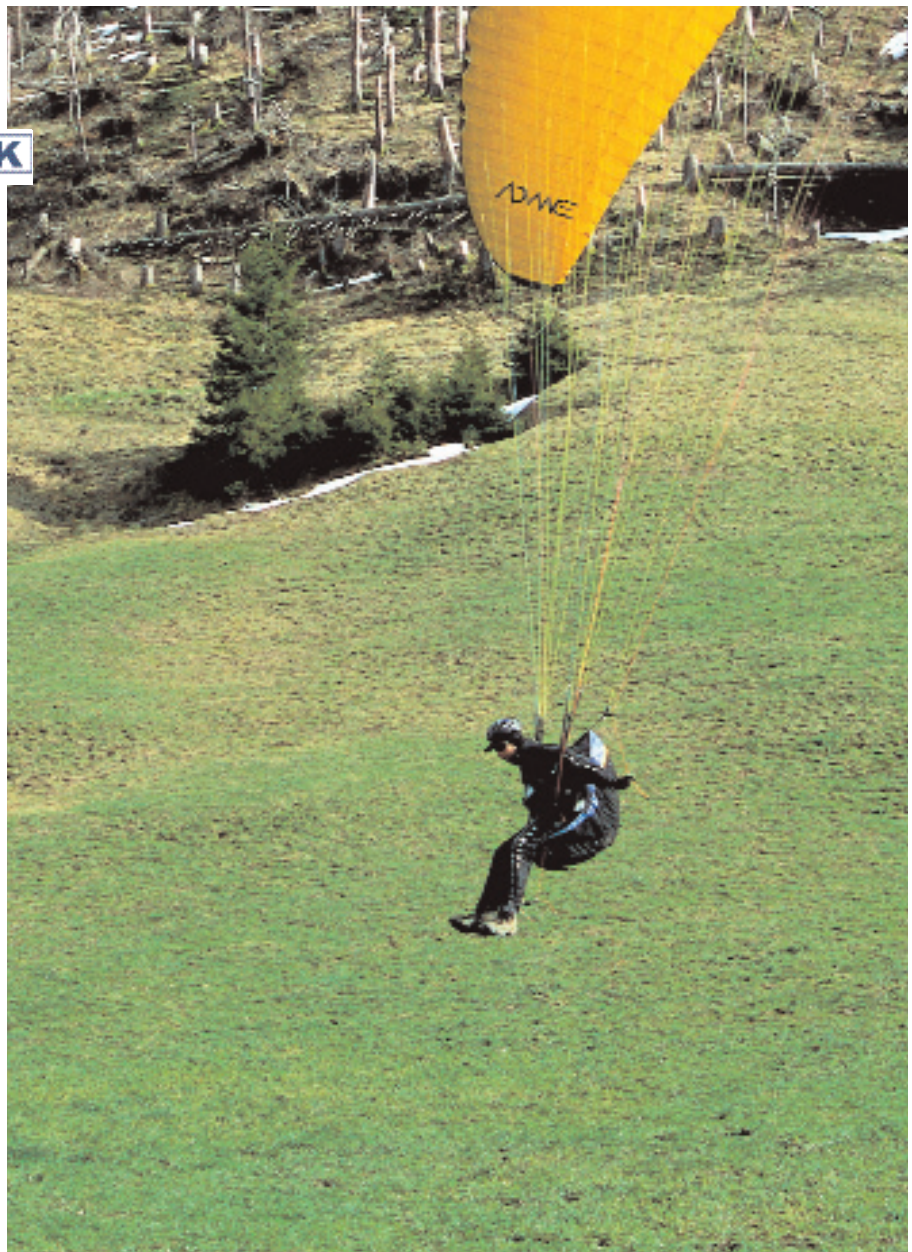
In addition to these causes, each year, there are a number of pilots who simply twist their ankles after landing, step into a hole or fall forward or to the side, etc. and injure mostly their legs.

5 accidents occurring during top landing, including 3 severe injuries, were reported. There are a whole range of causes for accidents when landing at the take-off site. A misinterpretation of the wind situation (e.g. landing site is too far in a lee, wing is positioned towards the wind too late), resulting in an asymmetric deflation, slight falls or landing with wind coming from behind pose the most frequent reasons for accidents. There are, however, other reasons for accidents: Stall caused by excessive breaking, fall or injury after landing (e.g. due to highly uneven terrain or because the canopy gets out of control after landing and drags the pilot along). Take-off sites are generally ill-suitable for landing (with the exception of tow-sites). Turbulence and the results of thermals are often difficult to assess. Additionally, the approach for landing is not without problems. In practice, an approach by drifting with the side wind (cross landing approach) and a relatively short final approach against the direction of the wind have proven successful. Advantage: Lower risk of getting into a lee area and better assessment of the altitude. Top landing followed by a new take-off is great fun, but should be restricted to truly obstacle-free, unproblematic terrain and easily assessable and not very gusty flight conditions.

Contact with obstacles

Tree landing and tree contact

Tree landings with paragliders are usually not very severe (2004: 14 uninjured, 2 slightly injured pilots). Most pilots consciously take the decision to fly into a try if the flight path does not leave any other options. It would be disproportionately more dangerous to try to land into a clearing or a narrow forest road. Pilots often underestimate the space required by their canopy. If this results in contact between the side of the wing and the trees, there is



only a very low probability for the emergency landing to end without injuries. (2004: 1 death, 4 severe injuries, 1 uninjured pilot) A rapid catapulting movement of wing and pilot occurs. At best, the pilot crashes into the branches, sometimes, however, pilots crash on the ground or into the stem of the tree.

Accidents after contact with obstacles

unharmd	slightly injured	severly injured	fatal injured
21	4	11	2

3 pilots ended up in the trees after circling in thermals (too) close to the mountain-side. Later they all described how the expected uplift failed to occur when turning towards the mountain-side and the “trees almost jumped towards them” in the subsequent downwind. One of the pilots later said “In future I will stay far enough away from the mountain, so that I can finish my circle even if I encounter a sudden down-

wind or a gust from behind”. We have nothing to add to that.

Lift cables and power lines

The German tabloid newspaper BILD only rarely features articles on paragliding. There has to be a very special occasion for them to do so. One of these occasions was last year, when a female paragliding pilot became entangled with the cables of Tegelbergbahn and had to be rescued. In two further collisions with lift cables, one pilot was injured at his back, when the lines of his wing ripped during a rescue attempt by helpers and he fell to the ground. A pilot who flew into the cables of Schäflelseilbahn in the flying resort Ebenalp (Switzerland) which is littered with lift cables. He had to be saved in complicated and extremely expensive (EUR 9,000) rescue effort. A particular problem is caused by lift cables being particularly difficult to spot during flight. All pilots should approach these

tricky obstacles with particularly great respect and keep their distance.

4 (previous year also 4) collisions with power lines were reported. None of the pilots involved was injured by the power. Two pilots injured their backs when they fell to the ground after the collisions. A pilot in training failed to see a large power line in the Drautal valley during a practice flight. In spite of instructions via radio, he flew his wing straight into the line. He remained uninjured because his wing slipped off the line and continued to fly normally after a massive pendular motion. The relatively "harmless" consequences of accidents involving collisions with power lines over the past two year, however, must not delude us from seeing the potentially life-threatening risks involved in these situations. In the past there were also accidents resulting in severe and fatal electricity burns.

Several collisions with cars (5) luckily resulted in more damage to the cars than injuries. One pilot, whose wing was blown into a lamp post in an uncontrolled manner (lee conditions), suffered severe back injuries. One wing became entangled and the pilot was thrown to the ground in an extreme rotary motion.

Ground handling

unharmd	slightly injured	severly injured	fatal injured
0	1	5	0

Ground handling becomes an ever more popular method for practicing in flat areas. Playing with the canopy has undoubtedly great training benefits for flying itself. However, very gusty winds can become dangerous and this season lead to 4 (previous year 6) severely injured pilots. They were all caught by gusts and lifted several metres up before they hit the ground or an obstacle in an uncontrolled manner.

Gusty winds pose the greatest safety problem in ground handling. Pilots should respect it greatly and always wear a helmet, gloves and a harness with protectors. If a pilot tries to control his wing on the ground only by using the steering lines, it is virtually impossible to prevent a lift-off caused by gusts. In very strong winds or gusty conditions pilots should therefore always leave

their hands on the C- and D-risers.

In flight resorts, the animals on the fields have become used to the pilots. In other places, where they see their first ever paraglider, the situation is different. One paragliding pilot, practicing on the ground, scared some cows so much, that they ran, broke through several fences, disappeared and had to be searched for several hours before they could be caught again. In two other cases, horses broke loose on a neighbouring field. The two animals were injured and one of them, an expensive race horse, had to be treated by an animal psychiatrist afterwards!

Training

unharmd	slightly injured	severly injured	fatal injured
5	7	17	0

Just as in the previous year, there was no fatal accident during flight training (2002: 3). A very positive balance. In total 19 (previous year 29) accident occurred during flight training, most of these accident occurred during take-off or landing. Safety trainings reported 2 accidents.

Accidents during winch towing

Only 4 (previous year 9) accidents were reported during towed take-offs (from take-off to release of the tow line). 3 incidences of deep stall on the tow line (see "oversteering") were reported.

unharmd	slightly injured	severly injured	fatal injured
0	1	7	0

One pilot took-off with a knot in this lines and oversteered when correcting the direction of the canopy which was moving to one side, resulting in a stall. A tow-aid completely solves the problem of deep stall on the two line. The German Hanggliding Association DHV recommends its use in all cases. The decline in deep stall accidents seems to suggest that pilots follow this recommendation. Not a single year passes without at least one accident being reported from a fixed rope tow. This time, a youth attached a climbing rope to the tow-bar of a

car and attached it to his harness. The gusty wind lifted the canopy up and lead to a sideward motion of the canopy when reaching the peak of the upward movement (Lockout) so that the boy fell to the ground at high velocity. He was severely injured. Two years ago amateurish tows with fixed ropes claimed two lives.

Accidents involving tandem paragliders

unharmd	slightly injured	severly injured	fatal injured
Passenger: 1	Passenger: 0	Passenger: 1	Passenger: 0
Pilot: 2	Pilot: 0	Pilot: 0	Pilot: 0

After two accident-laden years (2002: 8 accidents, 2003: 11 accidents) only two accidents involving tandem flights were reported this year. Only one case (take-off with back winds!) resulted in severe injuries of the passenger. In the other accident, a tandem canopy collapsed in a leeward thermal. The rescue parachute, which had been activated just in time, and the tight bushes on the ground dampened the impact and prevented injuries to passenger and pilot.

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Accident statistic 2004

Hangliding

Accident numbers

In 2004 28 accidents of German Pilots in Germany and abroad have been reported to the DHV, including 2 fatal accidents.

The following spread sheet shows the hang gliding accidents in an annual comparison.

Year	Accidents total	Fatal accidents
1997	50	5
1998	43	6
1999	33	3
2000	42	5
2001	34	4
2002	32	4
2003	38	2 (+ 1 Passagier) 1 Pilot vermisst
2004	28	2

The total number of accidents, as well as the fatal accidents, in the last season show the lowest numbers for years.

Flight phases when accidents occurred

Landing and landing approaches are the most accident prone situations in hangliding.

More than half of the hang gliding accidents happened here, whereas 30% occurred on take-off and departure and only 20% in midair.

Causes for accidents

Mistakes in landing and approach	2000	2001	2002	2003	2004
Mistakes take off departure	34%	27%	43%	26% (10)	8 (29%)
Collision with obstacle in flight	16%	22%	12%	24% (9)	5 (18 %)
Midair collision	14%	17%	20%	14% (5)	5 (18%)
Kollision Luftfahrzeug	5%	4%	0%	3% (1)	0 (0 %)
Dangerous flying conditions	not levied	7%	11%	5% (2)	3 (11%)
Medical condition	not levied	4%	3%	0 % (0)	0 (0%)
Technical equipment	9%	4%	6%	10% (4)	0 (0%)
Lockout winch towing	5%	7%	0%	5% (2)	1 (3%)
Technical towing equipment	5%	2%	0%	3% (1)	2 (7%)
Tumbling	7%	2%	5%	7% (3)	3 (11%)
Not hooked in	0%	4%	0%	3% (1)	1 (3 %)
Others5%	0%	0%	0 %	0 (0%)	



Mistakes in landing and landing approaches

For more than half of these accidents (2004:7) the cause was striking of obstacles during the landing approach. Misjudgement of distance to the obstacle, mostly when turning from downwind into baseleg, is as common, as hitting sudden lift or sink, which leads to dangerous approach to the obstacle. Almost always

such accidents ended with serious injuries. In 2004 hitting trees during the landing approach and the subsequent fall to the ground, all from heights between 5 and 10 meter, lead to 4 severely injured pilots, one pilot with life threatening injuries and one fatality. The pilot who was killed had crossed a village without sufficient height and was forced to land in a little fielding in the middle of the village. With a 25 kph tailwind he approached his landing field, but when hitting strong turbulence his course was slightly deviated and he hit a trunk of a fir tree with high speed. In the impact he suffered a broken neck.

Two times pilots had severe accidents because they were too low when they turned from base leg into final, touching the ground with the inner wing.

In landings itself, pushing out to late and the subsequent touchdown with high speed lead to 3 severe accidents. All 3 pilots swung through the A-frame and broke an upper arm.

Another pilot had to land in a high crop field. During the flair the high grain caused



a sudden stop, in the impact the pilot suffered severe head and chest injuries.

Mistake pre flight check, take-off and departure

“Not hooked in” the nightmare of all hanglider pilots also hit last season again, but with an outcome that astonished all experts. At the Tegelberg an American student pilot dehooked himself after the instructor had done a hangcheck, because of an interruption in the take-off sequence. When it was his turn again nobody realised the fatal mistake. After take-off the student was consequently hanging on the base bar just with his hands. He ignored his instructors radiocall to throw the reserve. Instead, the muscly Yank, former member of a spe-

cial forces unit, managed to pull himself up so far, that he could get his upper arms above the basebar and jamming it under armpits. Like this he flew down the 900 meters of altitude in front of numerous stunned witnesses, he even managed to do the approached against the wind. In one meter height he let go of the basebar and “landed” unharmed except some abrasions under his armpits.

Main mistakes on take-off are, as in the past years, taking off at an angle of attack which was too high and take-offs with not enough airspeed. In most cases dropping a wing with following impact on the ground are the consequences of taking at an angle of attack which was too high.

Striking obstacles during flight

A fatal accident occurred on the Tegelberg in August. With low, overlying cloud base and strong NW-wind a pilot went cross country direction east. Southeast of the Tegelberg he directly flew into a rockwall for unknown reason. Whether he went into the clouds and lost orientation, or if he was thrown into the rocks by lee turbulence could not be determined, there were no eyewitnesses.

Two pilots deliberately landed in trees when they ran out of other options, both pilots got away with it unharmed.

Midair collisions

No midair collisions have been reported in 2004.



Foto: Oliver Barthelmes

wn into the bottom surface, breaking the glider. After deploying his reserve chute he was unfortunate enough to get blown over a little village, “impacting” on a rooftop, where he broke one leg.

Towing accidents

Winchtow

One accident while winch towing was reported. When releasing the upper towline at wrong angle of attack the glider went into a lockout. The pilot could not correct anymore, although the winch driver reduced the force on the towline immediately. Still attached to the towline, the pilot, according to him, deliberately decided not to counteract the bank angle anymore and went for a treelanding. It worked out and he was taken out of the 25 meter beech tree by the fire brigade suffering only light injuries.

Aerotowing

While training for aerotowing two accidents took place. Both times this was related to the bridle end piece which was used. This endpiece was below/behind the pilots when they were coming to land. In one case the bridle got caught on the ground, causing the glider to a sudden stop. The glider went nose over and the pilot suffered a severe vertebra injury.

The other pilot tripped on the bridle with his first step when landing, the glider went nose over as well, the pilot suffered a broken upper arm.

Medical conditions

In 2004 no accidents have been reported related to a medical condition. (blackout, unconsciousness, heart attack, stroke).

Accidents during training

Five accidents (previous year 6) occurred during training, or during introduction to new tak-off methods.

Three accidents, one on take-off, one during ground handling and one while landing have been reported from beginners training (training hill). In one case borderline wind conditions, and the first flight on a new glider, were too much for the female Student. She did not respond to the instructor’s radiocalls anymore and landed out of control in a sharp turn.

Two accidents happened when pilots were introduced to aerotowing.

Other accidents

A horrific accident occurred on an airstrip in Baden Württemberg. There was mixed operation, Gliders, powered aircraft and hanglider (aerotowing) where flying. A powered aircraft loaded with 4 people slightly came off the grass runway when taking off, going through the take-off area from the hanggliders. The hanggliders towrope was lying here, ready to be hooked up to the trike and hanglider after the take-off from the powered aircraft. The towrope got caught by the undercarriage of the powered aircraft. A glider pilot, who had just landed warned the Pilot in command via radio. He apparently thought he’d picked up the rope from the glider winch, and initiated a sharp turn when climbing out in approximately 30 meters altitude. Due to low airspeed and high angle of attack the aircraft stalled and crashed. Three of the four occupants died.. The official accident report revealed, that the ultralight hanglider pilots were not responsible for the accident.

Injuries

Amongst the fatal injuries there are mainly head and cervical vertebra injuries killing the pilots. This was same in the two fatal accidents of last year. Most common severe injuries in hangliding are fracture of upper arm (2004:6) and fractured vertebra (2004:6) and head injuries (2004:5).

Degree of injuries in annual comparison

Year	unharmed	slightly injured	severely injured	fatal injured
2000	8 = 19%	9 = 21%	20 = 48%	5 = 12%
2001	4 = 12%	6 = 17%	20 = 59%	4 = 12%
2002	6 = 19%	4 = 12,5%	18 = 56%	4 = 12,5%
2003	9 = 24%	4 = 11%	21 = 57%	3 = 8%
2004	5 = 18%	6 = 21%	15 = 54%	2 = 7%

Tumblings

Three tumblings of German pilots have been reported. Fortunately all three accidents went out lightly, since all pilots managed to deploy their reserve chutes.

Two of the tumblings occurred after the gliders had been pitched up strongly (tailslide) and then rotated forward into the tumbling. In one case the glider rotated forward directly into the tumbling after the pilot experienced a “big Hammer” from above and following weightlessness. “Fresh winds and springthermals obviously ask for more respect”, that’s the conclusion of a pilot from his tumbling at Porta Westfalica. Apparently a windshear caused the tumbling. After numerous tumblings, he lost contact with the basebar, the pilot got thro-