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01. LETTER

2009/10/27

Federal Aviation Administration
J. Randolph Babbitt
Administrator
800 Independence Avenue
AFS 810 Room 832J
Washington DC 20591-0001

Dear Mr. Babbitt:

On 1984/10/25 the Federal Aviation Administration granted the United States Hang Gliding Association (now United States Hang Gliding and Paragliding Association) an Exemption - 4144 - which permitted the towing of unpowered by powered ultralight vehicles on condition of compliance with standards agreed to by the organization and defined within its Standard Operating Procedures and Aerotowing Guidelines.

The Standard Operating Procedures pertaining to aerotowing are based on dangerously flawed theory, hopelessly vague, lethally loopholed, and virtually never complied with in any case and the Aerotowing Guidelines appear not to even exist in any official and accessible form.

While aviation is inherently dangerous people should be suffering catastrophic injuries and dying because they violated standard procedures and training and used substandard equipment - not because they adhered to what they were taught and equipped their craft with "standard" equipment supplied to them by people with USHGA qualifications in whom they had extremely misplaced trust, as is the case in the vast majority of towing related crashes.

Hang glider towing is an extremely unstable affair, the safety margins are very thin, and the equipment and training to minimize the risks must be better than the equivalent in sailplane towing, but the case has always been quite the opposite. Flights are typically conducted in which the pilot has no reasonable expectation of being able to remain on tow or separate from it, as the situation may dictate, or maintain safe and effective control of the glider.

A glider pilot is typically towed with equipment with over a dozen built in and potentially lethal defects. The tug pilot almost always has one or two of his own. Training of the pilots on both ends of the line tends to be abysmal and adds several other options for turning survivable situations into fodder for the eleven o'clock news.

Even when critical safety issues are properly understood at the national level, advisories tend to be totally ignored and flatly contradicted at the local. Much of what is taught is at polar odds with reality.

For many years I have worked within hang gliding to improve technology and correct defects in its fiction based training and education. Early this year I was asked by the Chairman of the USHPA Towing Committee to assist with a revision of the Standard Operating Procedures pertaining to aerotowing to be acted upon at the spring Board of Directors meeting.

I provided very solid revisions of this and the Aerotowing Guidelines documents but could generate virtually no interest or discussion amongst members of the Towing Committee or anywhere else before, during, or after the meeting. In the seven months since I have become convinced that any effort to improve safety within the organization or culture will be as much of an enormous waste as many similar ones have been in the past. Any revision of the existing rules would, without a shadow of a doubt, be ignored as completely, openly, and permanently as all previous ones have been and are being.

Seat belts did not become standard and mandatory equipment because they were such obvious, cheap, and effective solutions to dramatically reducing death and injury rates in automobile accidents that Detroit voluntarily and immediately embraced the concept. It took a lot more.

Likewise, the standardized procedures and technology to vastly improve the safety and efficiency of hang glider aerotowing and towing in general have been known and available and called for by USHGA officials and everyday participants in the sport alike for decades to no effect whatsoever. The remedies are obvious, cheap, effective, and easily implemented and have been up and flying for many years on microscopic scales but will never be adopted on any significant level without outside intervention.

Hang gliding culture does things they way it's always done things because that's the way it's always done things - even when it's been conclusively demonstrated that it started out doing things wrong. Good enough for most circumstances most of the time has always been good enough for hang gliding. And the pilot can always be blamed when it isn't - especially if he's no longer around to present an alternate viewpoint. Strategies for improvement tend to be greeted with anything ranging from complete indifference to open hostility.

Sunday marked a quarter of a century of USHGA operating with virtual free rein under Exemption 4144 and it is high time for a review of the initial assumptions under which the exemption was issued and the general conduct of its implementation ever since. In order that participants in hang gliding aerotowing be afforded as safe an experience as possible and a measure of protection commensurate with their counterparts in conventional aviation I am requesting such a review.

This review should be conducted in the context of established universal standards for sailplane towing operations and with respect to the best aspects of relevant hang gliding towing practices and equipment and regulations of other national organizations. Deferring to the opinions of the "experts" who have been heavily involved in aerotowing for a decade or two would be like consulting long time driving school instructors, cabbies, and NASCAR drivers for recommendations on engineering standards for steering and braking systems and bridge construction. A critical mass of competence is needed for positive change and hang gliding culture doesn't have it.

I know of no modern era (early Eighties and on) towing accidents which positively could not have been prevented by properly trained pilots using good quality equipment. If proper, clearly and tightly defined, unambiguous standards for procedures and equipment are imposed and enforced, US aerotowing could become a model of safety and efficiency from which all forms of hang glider towing the world over could benefit. Otherwise it will remain the expression of the shoddiness, ignorance, stupidity, apathy, and conflict of interest that it has always been, regulations and guidelines will continue to be flouted, and more lives will be destroyed and lost for predictable and easily preventable reasons as a consequence.

Aviation is a discipline best done right or not at all.

I have prepared a file - 4144review.pdf - with documentation supporting this letter available on line at:

http://www.energykitesystems.net/Lift/hgh/TadEareckson/index.html

and divided into twelve sections.

01 - LETTER

The first is a copy of this letter.

02 - HANG GLIDER TOWING

The second covers a history and explanation of hang glider towing and aerotowing, the triumphs and failures, a discussion of the existing USHGA Standard Operating Procedures, the current hopeless state of affairs, and some recommendations for digging ourselves out of our hole.

03 - SOPS AND GUIDELINES REVISIONS

The third encompasses revisions to the aerotow related Standard Operating Procedures and Guidelines I am recommending.

04 - SOPS REVISION - ANNOTATED

The fourth is a copy of the recommended Standard Operating Procedures revision amended with incident and accident reports and comments illustrating why the provisions are highly advisable.

05 - THE ONE SIZE FITS ALL WEAK LINK

The fifth is a small collection of typical experiences with and comments about the only acceptable aerotowing weak link.

06 - TOWING INCIDENTS AND ANALYSIS

The sixth is a collection of reports of towing incident and accidents, most of which illustrate that the cost of business as usual is a lot higher than it needs to be.

07 - PHYSICS OPTIONAL

The seventh illustrates just how effective is the response to a national safety advisory.

08 - THE LAY OF THE LAND

The eighth gives the reader a bit of the feel for the chances of making a positive change within an unregulated pilot culture.

09 - ANALOGIES

The ninth relates glider tow components to analogous elements of conventional powered flight.

10 - LINKS

The tenth provides web links which illustrate some of the points made herein.

11 - SUMMARY

The eleventh is an eight sentence condensation of most of the rest of this material.

12 - WHO'S WHO

The twelfth identifies some of the individuals quoted in this documentation.

I realize that this encompasses a rather hefty volume of material but it was assembled and is being submitted at great cost (part of which has been an effective end to my 28 year flying career), a lot of people died illustrating the points I am trying to make, and it provides a lot of very solid evidence that my concerns are legitimate and widely shared. And if it prevents a single person from suffering so much as a broken wrist it will have justified the time someone else spent giving it a good skim.

(This document is likely to be revised in the future but all sections are and will be dated so that the reader may be alerted that changes have been made and I will retain a copy of the edition as it stood at the time of submission.)

I thank you very much for your attention.

Sincerely,
Tad Eareckson

TadErcksn
at
aoldotcom

2009/11/24
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02 - HANG GLIDER TOWING

Bicycles

If hang gliding culture made bicycles...

The bicycle would be beautifully engineered and would meet mandatory federal safety standards but would come from the manufacturer and dealer with no brake system or tires.

The brakes would be considered aftermarket add-ons and there would be no regulations whatsoever regarding their performance or reliability.

The rear brake assembly would be slapped together by some guy named Mike in his basement. It would be fabricated from parts designed for other applications and, consequently, would completely fail to function on frequent occasions for multiple reasons - despite its rather hefty price tag.

It would be adjusted such that the pads always dragged a little bit on the rims and thus was always converting about eight to ten percent of the peddling effort into heat.

The lever would be velcroed onto the top tube a few inches behind the head tube.

The front brake assembly would be made by anyone who felt like converting four bucks of materials and ten minutes of effort into a thirty dollar sale.

It would have a stubby little lever on it and would be pretty ineffectual at anything over fifteen miles an hour.

The stubby little lever would be strapped onto the top tube in front of the rear brake lever.

To provide a redundancy for the brake system the dealer would sell the new owner a pair of very thin tires and instruct him that if the speed of the bicycle ever became excessive or he couldn't get to the levers the tires would blow and the bicycle would slow down enough to avoid a collision.

So you buy your ten year old kid a new bike, a helmet, and a dozen spare tires and take him and fifteen traffic cones to an empty parking lot with a nearby hilly bike path to teach him everything you know to keep him safe in traffic.

He needs to practice reaching with his right hand for the rear brake lever while controlling the bicycle with his left.

He needs to know that a velcroed on lever can spin around the tube if he's not careful so he's got to be taught the trick of wrapping his hand around the tube while squeezing the lever with his thumb.

He's got to develop the accuracy and strength he needs to hit the little front brake lever and make it work up to its fifteen mile per hour limit.

And he needs to learn how to slide the bike a little to blow the tires in case they do hold when he gets going too fast and he can't get to the brake levers.

You get to the lot and let him ride a bit and get comfortable with the bike but after five minutes the front tire blows on a sharp stone while he's moving at a pretty good clip in a turn and he loses it and scrapes his knee.

"No worries. Happens all the time to the best of us."

"Dad, there's this kid at school who took first at the science fair last month. For his project he fixed up his bike by putting both his brake levers on the HANDLEBARS! And they're CLAMPED on! They don't wiggle out of the way when you go to use them. And they're both BIG levers! I tried them - they're really easy to use and and they're right there in his fingertips when he needs them. He can keep BOTH hands on the handlebars ALL THE TIME! He can steer AND brake AT THE SAME TIME! The pads don't drag on the rim so he can go REALLY FAST! And he's got thick knobby tires with lots of pressure and he can go ANYWHERE with them! And he NEVER gets flats! Couldn't we fix up my bike like his?"

"Remember that guy last summer who was flying downhill not two miles from here, couldn't slow down in time, ran the light, and left in a helicopter?"

"Yes."

"And he never came home from the hospital, did he?"

"No..."

"Well HE had thick knobby tires with lots of pressure."

"But..."

"Do you see anyone ELSE with brake levers on THEIR handlebars?"

"No, but..."

"Well don't you think that if it was a good idea EVERYBODY would be doing it?"

"Yeah... Probably."

"And you CAN ride a bike with NO hands! I've seen you do it."

"Yeah, I guess you're right."

"Alright then. Let's get back on that bike and blow some more tires. Try to get a foot down before your knee hits next time."

"Dad, you're the BEST! I love you!"

"I love you too Tommy. And I want to do everything I can to keep you safe. Now saddle up and let's practice some REACHES!"

The reason the Wright Flyer did as well as it did is because Wilbur and Orville were bicycle designers and engineers first and pilots second.

Mission Statements

Federal Aviation Administration

Our continuing mission is to provide the safest, most efficient aerospace system in the world.

United States Hang Gliding and Paragliding Association

The purpose of the United States Hang Gliding and Paragliding Association is to promote the growth of sport flying in foot-launchable soaring aircraft.

To this end the USHPA will:

Develop, standardize and administer programs that will foster and promote practices for safe flying and disseminate information on such practices and programs to its members.

But, with respect to the latter organization, known as the United States Hang Gliding Association until 2006/03, that "effort" has been a total failure in many critical respects with absolutely no hope of improvement in sight.

One of hang gliding's deadly little peculiarities is the ease with which a pilot can foot launch without being connected to his craft.

By at least the late Seventies a few of the independent thinkers in the sport understood that the key to preventing these accidents was to never launch under the assumption that they were connected - to treat the gun as if it were always loaded, as it were. At the last possible instant before committing to launch the glider was lifted enough to lightly load and feel the tug of the suspension.

The practitioners easily developed this routine into a virtually unforgettable motor skill and immediately removed themselves from the ranks of the annual fatality summaries.

By 1981/05 USHGA incorporated into its requirements for all pilot rating levels a criterion that all launches must be immediately preceded by a final check, that no delay was permissible. But its rating officials, by and large, did absolutely nothing to implement this most fundamental of all hang gliding safety rules. Pleas from the organization's Accident Review Committee Chairmen fell on deaf ears through the end of the century and by the 2007/05 published summary all traces of institutional memory of the "the gun is always loaded" concept had totally vanished.

Reinventing The Wheel

I recall USHGA Regional Director Les King relating, circa 1981, about a year after my entry into the sport, that in the early days the hang gliding community had approached the sailplane folk for guidance in developing our branch of soaring aviation. He said that our cheap, low performance wings were treated with disdain by the fiberglass establishment, the entreaties were rejected, and a lot of people died as a consequence. That dynamic was a large part of what precipitated hang gliding's effort to reinvent aviation and has been costing lives ever since.

Despite the fact that towing has been inextricably linked to hang gliding from its very inception, it is almost universally poorly understood and dangerously practiced.

In the Seventies hang gliders tended to be towed using three point bridles which connected to the control frame apex and corners. It was intuitive and very unstable. Gliders locked out easily and quickly and many people died.

On 1979/09/26 one Brian Pattenden addressed the Norfolk Hang Gliding Club in Suffolk, England and proposed a theory that a portion of the tow force be routed through the pilot. And around that period Dr. Donnell Hewett, a physics professor at Texas A&M University-Kingsville, had independently reached a similar conclusion and was experimenting in South Texas. Center of mass hang glider towing was out of the box.

In the 1981/04 issue of USHGA's Hang Gliding magazine was published the first of four articles Dr. Hewett had written on his "Skyting" (sky kiting) approach to towing. It came with the following editorial warning label plastered across it in bold black lettering:

Note: These techniques are purely experimental in nature and are not advocated by the USHGA or this publication.

Considering the volume of deadly towing fiction that would be propagated by the organization and publication in years to come, this US introduction to center of mass towing was an interesting choice of articles upon which to bestow such a disclaimer.

And apparently the disclaimer was considered insufficient because the organizational and cultural establishments saw to it, unforgivably, that the hang gliding public was protected from further exposure to these ideas and had Skyting Articles 2, 3, and 4 buried without a word of explanation to the membership.

But the logic and superiority of center of mass towing were so obvious that within a couple of years it had started breaking out on its own and the articles were continued, starting with the 1983/08 magazine, after only four more lockout deaths of US tow pilots over the 27 month suppression period.

Flats

But as much of a leap the Skyting approach represented and as much thought, care, and experimentation went into it, it had a few serious practical and theoretical holes.

It tended to use models in which everything was going reasonably well during the critical launch period - which it often is for several thousand flights in a row.

Launching an aircraft is dangerous. Foot launching an aircraft is very dangerous. Foot launching an aircraft on tow is very very dangerous.

Hang gliders are foot launchable and landable aircraft. This capability allows them to exploit environments necessary to both ends of the flight unavailable to conventional fixed wing aircraft.

Foot launching necessitates starting with the pilot's body vertical and hands on the downtubes, a configuration in which control is compromised. Upon attaining an adequate margin of airspeed the pilot rotates to prone and transfers his hands to the basetube such that control authority is maximized.

If the glider is flying level and close to trim a momentary removal of a hand from the control frame to change position or access a release actuator is usually a non issue. In compromised situations such an action can be immediately lethal.

There were no simple and easy ways to configure a reliable release system which could be safely actuated in all emergency situations for foot launched towing so the mythical concepts of actuators being "readily accessible" and "within easy reach" were rationalized into existence.

Levers mounted on basetubes were inaccessible before the pilot proned out, levers mounted on downtubes became inaccessible after the hands were transferred to the basetube, a lanyard anchored at a shoulder strap or wrist required a surrender of control no matter what and slackened and tightened as the pitch attitude decreased and increased, and shackle sleeves might as well have been on the moon when situations started going south.

The Magic Weak Link

In an attempt to compensate for the deadly inadequacies of the release actuator configurations a second myth was rationalized into existence - that of the weak link that could prevent tow line tension from exceeding "the limit for safe operation".

Where to begin...

There is very little correlation between tow line tension at any given moment and the safety of an operation. High tension is rarely a factor in tow accidents and low or zero tension is the cause of the vast majority of crashes.

Many people have died with their sub 0.8 G weak links very much intact to well beyond the point of survivability.

Many other people have died because their weak links (or tow lines) failed when line tension was the only thing they had going for them to pull out of lethal stall situations.

And it's virtually impossible to find an issue of an overstrength weak link causing a problem since the advent of glider certification.

But some people have LUCKED OUT because the weak link HAPPENED to fail at a fortuitous moment and gave the appearance of compensating for failure or inability to keep the glider under control and/or actuate the release in a timely manner.

The focus on the latter scenario category to the exclusion of the others has been a catastrophic and nearly universal failure within hang gliding culture. It has fostered a religion whose primary tenet is that it's always safer to be off tow than on when, in fact, the case is almost entirely the precise opposite. This religion gets a huge artificial boost in the statistics because the occasions in which gliders are pulled out of lethal situations to continue happily on their ways aren't represented in the accident columns.

Nobody has ever gotten killed during a tow launch attempt before coming back down. And losing the line during a tow launch attempt is an ironclad guarantee that one will come back down to the only place at which one can get killed.

Nevertheless, in hang gliding culture there is no such thing as an understrength weak link and there is no problem on tow that isn't best addressed by a pop or a squeezing of a lever by whichever end of the line gets to one first.

Deep Sixing The Foot Launch

In the mid Eighties Jerry Forburger and Mike Haley of Lubbock, Texas, who appreciated just how bad an idea foot launching in an environment that didn't require it really was,.configured a pickup truck with a payout reel and launch platform.

The pilot starts off prone with his hands were they belong on the basetube and thus in optimum position to control the glider and almost always has a nice strong straight in relative wind in which to quickly rocket up and away at a moment of his choosing. An opportunity was missed, however, to configure his release system such that no compromise in control was necessitated - and many more lives were shortened unnecessarily.

And, of course, there were no shortages of harebrained strategies to compensate for this glaringly obvious defect, most of which involved dumbing weak links down to or below the ragged edge of sustainable tow and stationing observers armed with axes and machetes at the upwind end of the tow line.

Aerotowing had started to arrive on the scene on a significant scale in the early Eighties with the introduction of the Cosmos trike tug but there were a lot of bugs yet to eliminate. The gliders of the day were not terribly happy with the lower part of the tug's speed range and the connection was made via a one point (pilot only) bridle and these issues equated to a lot of back pressure on the basetube being required to keep things together. The launches were foot and the release necessitated a reach.

For a very brief window in the early Nineties, hang glider aerotowing was at a safety zenith. The Bailey-Moyes Dragonfly tug - which had the power to do the job safely yet flew at a comfortable speed - had hit the air, the gliders had gotten faster and were dolly launched and connected with two point bridles such that they trimmed well, and the primary releases were cheap, reliable, and configured such that they were triggered with a slight inboard movement of one hand remaining in controlling position on the basetube.

Reverse Evolution

But before the engines had finished cooling following the Dragonfly promotion tour hang gliding culture had once again figured out how to make things more complicated, expensive, draggy, and dangerous.

The core release mechanism - a cheap panic snap - was replaced with a multiples more expensive Wichard 2673 spinnaker shackle, which had a tendency to snag and chew up the already flimsy weak links that engaged it, and the loop actuator on the basetube was replaced by a bicycle brake lever most easily mounted on the downtube where the pilot would have no guarantee of it even being physically accessible in an emergency situation.

Perhaps only two or three deaths can be attributed to this giant step backwards but those were two or three deaths that

probably didn't have to happen - and the word "only" tends to lose relevance to family members and others close to the situations.

More Botched Weak Link Theory

Since a tug pulls the glider skyward more efficiently than does a ground based power source it does so at a reduced line tension. Thus, according to the hopelessly botched hang gliding weak link hypothesis, an aerotow weak link should be proportionally lighter than one connecting a glider to a truck, boat, or winch - 0.8 to 1.0 versus 1.0 to 1.2 Gs.

In terms of day to day operations, this thinking is, of course, completely backwards.

Surface based towing is virtually all tension controlled such that it's impossible for line tension to fluctuate much above a level set on the ground, save for brief variations related to inertia and surges and serious situations involving equipment malfunctions.

Aerotowing, on the other hand, is speed controlled and thus line tension fluctuates enormously as gliders are pulled through thermal turbulence.

A weak link rated to a small percentage over normal line tension can be gotten away with most of the time in tension controlled systems but is categorically unacceptable and dangerous when used in a connection between two aircraft with nothing between them to dampen the fluctuations.

The Magic Loop

The founders of Dragonfly towing discovered some material known as 130 pound Cortland Greenspot Braided Dacron Trolling Line, tied it in a loop, assumed that the two strands of that loop put it at a rating of 260 pounds, and decided that this was the proper weak link every solo glider ever manufactured - be it a children's model tipping the scales at 165 pounds awaiting a glassy evening sled ride or a big competition bladewing loaded for a 400 mile task in the most violent thermal conditions available anywhere on the planet and squashing the dolly with well over twice the aforementioned mass.

It didn't matter that:

from Day 1 these weak links were going off like popcorn in silk smooth air on all manner of gliders occupied by anyone over the age of fourteen and all manner of flying opportunities were being squandered;

folk with load testers and/or understanding of line and knots were pointing out that these loops were - in fact - about half as strong as they had been pronounced to be AT BEST and that they were frequently degrading to a quarter under the stress of a normal acceleration and initial climb out;

people were frequently leaving the runway with bent and broken aluminum and occasionally on stretchers as consequences of pops with everything going otherwise normally enough;

other people were locking out and killing themselves just fine with the weak link they had been promised would keep them safe;

the fourteen and under year old girls who were towing at the highest G ratings were the ones having the fewest problems and the only ones not cursing their weak links every fifth flight; and

people were extremely hard pressed to cite instances of weak link failures doing anything besides harm.

No, these were the ONLY acceptable weak links and anyone daring to approach even half of the USHGA specified 2.0 G maximum for his larger glider was placing both himself and the tug pilot (whose own weak link would, of course, be negated by the glider's) within millimeters of Death's Door and would be immediately grounded.

And, of course, a doubled loop of the 130 pound test was pronounced to be 520 pounds - even though the test rig puts it around 200 to 260, depending upon the configuration - and deemed appropriate for all tandem flights. (Anything in excess of the single loop puts the tug pilot in extreme danger but ONLY if it's on a SOLO glider.)

And since the Dragonfly's manufacturer didn't trust the users to properly install weak links in the system a redundant weak link was built into the tow mast at about the maximum loading capable of being transmitted by of the doubled loop.

What sailplane culture has always understood that hang gliding culture never has and, on its historic and present course, never will, is that the ONLY purpose of a weak link is to protect the aircraft from being overloaded and stressed. It is not there to protect the pilot. It can ONLY keep the plane from being broken and ONLY if the plane doesn't hit the ground before the tension limit is reached.

Like a parachute it is not there to keep the pilot safe. It is best thought of as a straw at which to grasp which, depending upon the circumstances, may or may not do him any good after he has seriously screwed a pooch or two.

The Accident Always Trying To Happen

When the innovators of center of mass towing in East Anglia and South Texas successfully implemented their theories they did not make towed hang gliders safe and stable - they made them less dangerous and less unstable.

Sailplanes connect to the tow line at a single point on the fuselage such that the line of force is aligned through the center of mass and the control surfaces are not interfered with. They are able to get far out of position behind the tug and return with little difficulty.

Hang gliders connect to the tow line either directly to the pilot, who is most of the mass, or use a bridle to split the loading between the pilot and the glider, which is the rest of the mass. Hang gliders are controlled by the interrelation of pilot and glider. The pilot/glider combination IS the control system and the tow tension very much interferes with it.

The pilot can usually keep the glider tracking well enough easily enough but small corrections must be made almost constantly - especially in turbulent air (and turbulent air is usually his sole reason for towing in the first place) - the more out of position he gets that harder it is to come back - squared.

The FAA's Glider Flying Handbook defines the response to failures of releases at both sailplane and tug ends as landing with the aircraft connected. This could never be an acceptable procedure in a like hang gliding scenario as there can never be a safe expectation of a hang glider remaining stable on tow. (The proper procedure would be to continue the tow to a safe altitude and have the glider roll away to break the weak link.)

The hang glider pilot has very little yaw authority and his feet - unlike those of his counterpart - are completely useless to him. He might as well be (and sometimes is) paralyzed from the waist down.

Hands are all he has to deal with pitch and roll and it's a rare two second interval during which he can afford to use one of them for something else. And for most practical purposes in hang gliding two minus one does not equal one - two minus one equals zero. Half the number of hands does not yield half the control. Half the number of hands yields virtually no control - sometimes way less.

On fairly frequent occasions the glider can be hit hard and fast enough that it rolls to near or well beyond the limitations specified on its placard and no amount of experience, skill, or strength will either prevent the glider from doing so or bring it back after it does. The tow will terminate a short time later one way or another but the glider will fly again only if it can be brought under control before it hits the ground.

The good news is that these events almost always happen at an altitude at which the glider can recover no matter what the pilot does or doesn't do because the ground which is such a threat after the lockout also tends to suppress and dampen vertical air movement.

The bad news is "almost".

If a lockout occurs shortly after launch - usually as a consequence of a thermal breaking off or a dust devil crossing the runway - it may be advantageous to fight the roll and delay release if the glider is gaining altitude so as to buy time and air in which to recover after release. In such a situation a weak link failure could well prove catastrophic. If the glider's roll is increasing without an altitude gain it will be imperative to release at least as fast as human reactions will allow, as sometimes lockouts progress so quickly that the pilot's first indication that something is wrong is the horizon tilted at eighty degrees.

Configuring a glider with a release which requires the pilot to surrender his grip on the basetube and hunt for a remotely mounted actuator which may spin away to the side as allowed by the velcro straps "securing" it in position when and if contacted is an act of unconscionable negligence.

Configuring a glider with a release which requires the pilot to surrender his grip on the basetube for ANY reason is an act of unconscionable negligence because the technologies to make that potentially suicidal action totally unnecessary have predated center of mass towing.

Very interestingly, in the very magazine issue in which Dr. Hewett's Skyting approach to towing was introduced, also appeared the following:

Unfortunately, our local club members learned a very valuable lesson because of a serious accident to a fellow pilot. This pilot was being towed on a winch with a three-point bridle. The release mechanism is a motorcycle band-brake which is mounted on the control bar within fingertip reach. However, this pilot chose to mount his release on the downtube where it was somewhat difficult to get to. He had had many flights on the tow and had never had any difficulty getting to his release. One day while flying the tow he got into a lockout, and could not get to his release in time. His glider nosed into the ground from about 50' and he is still in critical condition in the local hospital. This accident has caused our club members to open their eyes and carefully examine the procedures used in flying the tow.

Gordon Rose
Ed Miller
Eastern North Carolina Hang Gliding Association

Perhaps a few local club members learned a very valuable lesson but the culture at large didn't.

Low locked out pilots with release actuators requiring a surrender of grip are often faced with a choice of going for the actuator, immediately losing control, and immediately dying or continuing to fight for control which physics dictates they will never be able to regain and prolonging their lives a couple of extra seconds. They almost always take the latter option. Nobody should ever have to make such a choice.

For decades hang glider pilots have been able, with both hands on the basetube and in continuous control of the glider, to regulate the carburetors of two stroke auxiliary power units, take pictures of themselves with cameras mounted on the wing, carry on conversations with friends a hundred miles away, and, to some extent, alter their airframe geometries and sail tensions. But they almost universally reject similar technology upon which their lives may depend. The reason can only be that the gratification for the trivial stuff is instant and constant whereas the lethally critical release situations tend to arise only about once or twice every ten thousand tows and always happen to somebody else.

We need to be able to stay on tow when tension is the only thing keeping us from stalling and cratering and release while being able to maintain whatever level of control we have remaining before the tension overpowers us and slams us in - but, in fact, we can do neither.

Towing hang gliders is a lot more difficult and dangerous than towing sailplanes and thus the equipment relating to the tow must be designed and built, proportionally, to MORE demanding specifications than those used in sailplaning but the junk we're using tends to be designed and built to no specifications whatsoever.

For sailplanes the FAA specifies an acceptable weak link range of 0.8 to 2.0 Gs. The relevant physics for hang gliders is the same and the USHPA specifies the same maximum but, bizarrely, NO MINIMUM. Because of our limitations we would do well to stay well clear of both extremes but especially the bottom end and our releases must be able to handle appropriate loads with an absolute minimum of time and effort and no compromise of control.

Aerotowing "Regulations"

On 1984/10/25 the FAA granted USHGA and Exemption - 4144 - permitting it to have hang gliders towed aloft by ultralight tugs if it followed specified conditions. These conditions were encoded within the Exemption itself and the USHGA Standard Operating Procedures and a document titled Aerotowing Guidelines referenced by the SOPs.

The United States Hang Gliding and Paragliding Association, Inc.
12. Standard Operating Procedure
02. Pilot Proficiency System
10. Hang Gliding Aerotow Ratings

A. Aero Tow Vehicle Pilot Rating (ATP)

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3. Must give a complete discussion of aero tow vehicle operations including all normal and emergency procedures, and signals between aero tow pilot and glider pilot, in accordance with the USHPA Aero towing Guidelines.

The alleged USHPA Aerotowing Guidelines do not seem to actually exist in any form that can be confirmed as official and can be accessed by an aerotow rated member. Documents which can be scavenged from the web which appear to have USHGA origins are inconsistent with and sometimes directly contradictory to the Standard Operating Procedures and contain deadly misinformation.

B. Aero Vehicle Requirements

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1. The tow vehicle (powered ultralight) must have a rated thrust of at least 250 lbs.

Yes, there is a recognition that towing a glider with insufficient power is dangerous. The tug must be able to get the glider up to a crisp airspeed and away from the ground quickly and safely and pull it out of stalls and other critical situations.

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2. The towed vehicle (un-powered ultralight) must meet or exceed the Hang Glider Manufacturers Association's Airworthiness Standards.

The HGMA certifies gliders to strength, stability, performance, and control standards. A pilot within a specified weight range with both hands properly positioned on and securely gripping the basetube is an integral part of the glider and its control system. The instant a pilot removes a hand from the basetube all stability, performance, and control predictions and expectations are history. The action is analogous to momentarily severing the linkages to the ailerons, elevator, and rudder on a conventional aircraft. The glider can and often does become a leaf in the wind.

A release which requires a pilot to interrupt his grip on the basetube and thus control of the glider decertifies the craft.

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3. The tow line connection to the towing vehicle must be arranged so as to not hinder the control system of the towing vehicle.

Interestingly, nothing is said about the TOWED vehicle. Good thing, because the connection to the glider - by definition - hinders its control system quite a bit. It not infrequently totally removes the glider's control system from the equation.

And a pilot towed one point is pulled a great deal forward of the position at which the glider is designed to be flown and thus sacrifices a great deal of his top end negative pitch control authority. And this compromise also, in effect, decertifies the glider.

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4. A pilot operational release must connect the tow line to the towing vehicle. This release must be operational with zero tow line force up to twice the rated breaking strength of the weak link.

The most widely used tugs do not use a release which connects the tow line to the towing vehicle. They use a release which connects the bottom end of a bridle to the towing vehicle. In order for the tow line to be dumped that end of the bridle must feed through a ring to which the front end of the tow line is connected. Should the bridle fail to clear the tow ring the tug pilot can only hope for the failure of a weak link somewhere between the top end of the tow mast and the front end of the tow line - assuming he has one.

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5. A weak link must be placed at both ends of the tow line...

But weak links are virtually NEVER placed at the ends of the tow line. They are placed at the ends of bridles. This is an acceptable practice as long as weak links are placed at BOTH ends of the bridles but this has never been the case with respect to the Dragonflies and until 2005 was virtually unheard of with respect to gliders and today remains an irregular implementation.

A person who installs a weak link on only one end of a bridle is making the bold assumption that the bridle will successfully clear the tow ring after release or weak link failure. The greater the tension present the lower the likelihood of a successful separation.

...The weak link at the glider end must have a breaking strength that will break before the towline tension exceeds twice the weight of the hang glider pilot and glider combination...

But, of course, NOTHING is specified regarding a LOWER weak link limit and thus the requirement for minimum tug power becomes a waste of paper and the glider pilot instantly becomes a victim of every clueless flight park operator, tug driver, and competition meet director who KNOWS how dangerous it is for any glider to use anything other than the single loop Greenspot and the death and destruction that that entails.

...The weak link at the tow plane end of the towline should break with a towline tension approximately 100lbs. greater than the glider end.

Yes, one definitely wants the front end weak link to hold longer than the back because a glider dragging 250 feet of spectra routed over its basetube with a carabiner on the other end is one quick snag away from being slammed into the field.

But the word "should" when employed in a regulation inevitably translates to "won't". (One wonders what happened to get this requirement watered down since the 1985/07 edition of this document when the wording was "must".) A 300 pound glider wishing to employ a 1.5 G / 450 pound weak link is effectively out of luck because the tug is using a 400 pound weak link which he believes is a 1040 pound weak link and the tow mast is designed fail at the lower loading in any case.

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6. A release must be placed at the hang glider end of the tow line within easy reach of the pilot...

Yeah, the good ol' "easy reach" fairy tale. Everything's always within an "easy reach" - until the situation arises when being able to reach something matters.

This requirement is analogous to a law which allows an automobile driver to hit the highway with his brake system configured to operate via a lever installed behind the passenger seat.

With this "easy reach" concept, hang gliding has managed to create a very interesting and ironic inverse relationship - the more critical the situation, the less is the likelihood that the equipment needed to deal with it will be functional.

...This release shall be operational...

So assuming you can get to it, what does operational mean? Oh, yeah, this is hang gliding. Anything anybody wants it to.

In practice hang gliding uses releases whose functionality varies in inverse proportion to the seriousness of the situation. The more critical things are with respect to time, loading, reliability, and accessibility, the less is the likelihood that of successful separation.

...with zero tow line force up to twice the rated breaking strength of the weak link.

And since there's no minimum weak link rating specified the field is wide open.

C. Aerotow Special Skill Endorsement (AT)

The aerotow skill is a demonstration of the pilot's ability to launch and tow successfully and safely behind a flying tow vehicle. In order to receive the endorsement, a pilot must demonstrate the following to an Aerotow Official:

With the equipment permitted by these Standard Operating Procedures and almost universally employed in the field this endorsement and the requirements which qualify one for it are jokes. If release actuation cannot be effected while maintaining control and the weak link is such that it blows at random the pilot has absolutely no ability to launch and tow successfully and safely and the glider shouldn't go up. Without proper equipment it is physically impossible to qualify for this sign-off.

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1. Demonstrates the assembly and preflight of the system, including inspection of the tow line, tow line connection, release pre-flight.

There's not much point to inspecting a two thousand pound tow line when using a weak link that pops at way less than a third of what it should, a sixteenth of what new Spectra should be doing. And lots of really dangerous releases work great when the glider is parked on a launch dolly with a buddy pulling thirty pounds on the tow line and the pilot can spare a hand and has all the time in the world.

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2. Demonstrates understanding of signals between tow vehicle pilot and glider pilot. Must demonstrate system set up and pre-flight, including a complete discussion of all those factors which are particular to the specific aero tow system used and those factors which are relevant to aero towing in general. Must demonstrate complete understanding of both normal and emergency procedures, including checklists for normal procedures and the indications of an impending emergency and convince the instructor of his ability to execute emergency procedures.

I always like to ask people what plan they have to react to a situation in which the weak link pops when the glider is at a hundred feet and rolled seventy degrees with a stalled low wing. I never get any real good answers to that one.

"A complete understanding of emergency procedures" is useless to the glider pilot unless his judgment is the factor

which determines whether or not he remains on tow and he can maintain continuous control of his craft.

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3. Gives a complete discussion of the dangers to the glider pilot and tow vehicle pilot of improper positioning in flight of the glider pilot and improper management by the glider pilot of tow line tension. Discusses methods for controlling and correcting towline tension.

Unless the weak link will hold to over a G the pilot can have no reasonable expectation of tow line tension to manage, control, or correct.

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4. Demonstrates successful, confident, controlled launches and flight under tow to release at altitude, with a smooth transition to flying, with proper directional and pitch control resulting in proper tracking of the aero tow vehicle in both straight and turning flight and appropriate maintenance of proper tow line tension and airspeed. Should demonstrate the ability to control the glider position relative to the aero tow vehicle. Such demonstrations should be made in typical soaring conditions. A minimum of 5 such successful demonstrations must be made.

No launch or flight involving a downtube mounted brake lever, a shoulder mounted Bailey release, a single loop of Greenspot, a front end weak link which "should" be stronger than the one at the rear, and/or a tug driver who thinks part of his job is to dump the glider for its own good if anything goes wrong can ever be considered "confident" by anyone other than a complete idiot. There can be no "appropriate maintenance of proper tow line tension and airspeed" if the tension randomly drops to zero even in smooth air, let alone "in typical soaring conditions". Such tows are frequently quite the opposite of "controlled" and "successful". It's probably by design that the requirement doesn't specify five CONSECUTIVE successful demonstrations.

FAA Exemption 4144

The following requirements must be understood and adhered to:

5. The pilot of the unpowered ultralight vehicle must possess and have in his possession a current pilot rating issued by the USHGA. This rating shall be at least a USHGA Intermediate (level 3) for a recreational pilot and a USHGA Novice (level 2) for a student pilot under the supervision of a USHGA certified instructor.

No level of pilot proficiency is of any use to a person in an aircraft unless that aircraft is controllable. And a hang glider is only controllable when the pilot has both hands on the control bar. As soon as a person takes a hand off the basetube he is no longer a pilot - he is loose ballast shifting at the whims of an uncontrolled aircraft.

The Field

If a single hang glider aerotow has ever been conducted in compliance with even the hopelessly misguided, vague, and inadequate current aerotowing regulations and requirements I am not aware of it.

It would be a statistical miracle to have pilots on both ends of the line with a safe and proper understanding of tow equipment, dynamics, and procedures. Education and training standards are abysmal.

In hang gliding it is rare to come across anyone who understands the difference between the terms pitch attitude and angle of attack and the implications with respect to towing.

Only a tiny percentage of tug and hang glider pilots know and understand what a weak link is, what it can and cannot do, how that strength relates to the glider model being flown, its actual strength, and the hazards of premature failure.

It is a certainty that two aerotow pilots have been killed due to insufficient tow line tension and a high probability that several others died because the tow line was lost or relinquished or tension was reduced at inappropriate moments.

The weak link configuration on the front end bridles is noncompliant and assures no guarantee of protection and that on the back end is frequently similarly wanting.

Many tows are deliberately conducted in which the glider's weak link strength far exceeds that of the tug's. A fair percentage are conducted with no weak link at the glider end whatsoever.

Tugs and gliders are configured and flown as if it were an absolute certainty that a bridle would clear a tow ring and most pilots have no idea what happens when a glider ends up being towed by its keel following a bridle wrap.

Minimum performance specifications for releases endorsed by the USHGA Tow Committee were published in 1993/02 but there has been virtually no attempt to certify anything that goes up. One particularly moronic design which locks up at about a third of the load to which it may be subjected is almost universally employed in aerotowing.

The spinnaker shackle which is the core mechanism of virtually all two point releases is built to retain a safe working load around thirty times that to which it is normally subjected at actuation time. But it does not function well as a release above about ten percent of its capacity and is designed to be used with a leechline lanyard routed to afford a two to one mechanical advantage to boost its performance.

As employed in hang gliding it is modified via welding and configured with a cable lanyard in such a manner that the intended mechanical advantage is halved and a common modification rotates the device perpendicular to its intended orientation and absolutely butchers its efficiency as a release. To compensate for the squandered performance potential at the top the mechanical advantage of the assembly is jerry-rigged back up with the amendment of a bicycle brake lever.

Cable adjustment with respect to release assemblies incorporating brake levers is critical. Too little play and the release will not close securely (a failing which has catalyzed one aerotow pilot fatality) and too much play and the lever will bottom out on the tube and the release will fail to open.

Cable assemblies themselves are problematic. The more bends are incorporated in their routing the more resistance one will encounter. There's a mandatory bend of about 130 degrees at the top end of the assembly and another 120 degree reroute is required to get from the downtube to the basetube.

For obvious reasons, it is a bad idea to mount anything on the basetube which can snag a bridle, even if the basetube will accommodate BOTH lever and wheels.

So a pilot with one of the ubiquitous spinnaker shackle / cable release assemblies is always faced with a decision of compromising one aspect of his safety to enhance another. He may have to mount a lever where it may become physically inaccessible in an emergency situation to improve its performance, prevent it from neutralizing his control input, or allow him to use wheels. If he eschews the lever and routes the cable to the basetube he may not be able to transmit enough force to get the spinnaker shackle to function.

These primary releases, not surprisingly, DO frequently fail and pilots are advised to use their secondaries (presuming they'll have the time) in the event they have one or more of these problems.

Primary releases are frequently mounted on the keel to trim the glider safely and properly on tow. If a secondary release is actuated out of sequence and the bridle fails to clear the tow ring, a glider so configured can be expected to immediately tuck and break under negative loading. Yet pilots are almost universally instructed that the secondary releases - whose only function is to compensate for a primary bridle wrap - are backup releases to be used in the event that a shoddy primary release fails. Some pilots deliberately release from the bottom end as normal practice.

On top of all of the other problems inherent in slap-on cable releases they introduce enough junk into the airflow to rob something on the order of a full point off of the glider's performance. Pilots thus have a strong incentive to tow one point. This is a bad news / good news / bad news situation.

The bad news is that the pilot sacrifices a considerable degree of control authority and any compromise in control authority will eventually translate to fatalities.

The good news is that, in addition to the fact that a glider can be configured for one point towing very cheaply and cleanly, it is very easy to put a lanyard or trigger device in the pilot's teeth such that release can be accomplished with nothing more than an increase or relaxation of bite pressure.

The other bad news is that hang gliding culture is too stupid - outside of Eastern Europe anyway - to capitalize on the good news.

The Swamp

Over the short history of hang gliding astounding gains have been made with respect to the actual aircraft because that aspect of the sport is controlled by engineers who understand such disciplines as mathematics and physics and build and test to standards. Today's gliders are remarkable in terms of airworthiness, handling, and performance.

But while the USHPA claims that it will:

Develop, standardize and administer programs that will foster and promote practices for safe flying and disseminate information on such practices and programs to its members.

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and, from time to time actually makes a few gestures along those lines, it virtually never does anything of an effective job to implement or enforce anything.

As mentioned previously, virtually no students are taught to check their connection to the glider "just prior to launch" so virtually no pilots do and thus once every couple of years or so someone leaves the slope in a body bag.

It can't seem to understand that complicating landings and compromising control so that people can stab at landing on their feet at all costs is a bad idea so we have arms being broken and ripped out of their sockets at perpetually and depressingly high rates.

Advisories on the dangers of losing tow tension are circulated and totally ignored or flatly contradicted.

Standards for tow equipment are defined but the operators disregard them because the junk they make and sell doesn't come anywhere close to adhering to them and they've gotten very comfortable with and really good at making and selling junk and teaching supposed work-arounds. And, of course, if quality equipment were to find its way into significant circulation, negligence would be apparent and people would be liable for decades worth of defective product sales and the odd fatalities related to them.

And thus advances in safety technology are suppressed decade after decade because the market is flooded with shoddy equipment which works good enough most of the time and we can ignore the rare catastrophic exceptions.

Hang gliding always boasts of its success in "self regulation" of the sport but this two word expression is as much of an oxymoron in aviation as it is in banking or anything else. It inevitably degenerates into all "self" and no "regulation".

In order for aviation to work safely on a significant scale of numbers and time it needs several groups of people:

engineers who understand mathematics and physics to design, build, and test planes for airworthiness and performance;

regulators to ensure that safety standards for man and machine are set and adhered to;

instructors who understand principles of aviation who can train individuals to fly well and safely; and, last and least;

pilots who don't necessarily understand much but can equip their craft according to standards, memorize a few rules, and follow instructions and procedures.

Hang gliding has excellent engineers who adhere to the standards of the HGMA and the gliders themselves tend not to be problems.

It claims to be self regulating but everybody tends to do whatever he feels like because sanctions are virtually nonexistent.

The instructors tend to be skilled and accomplished pilots but there aren't many of them who begin to understand the science and math related to what they're trying to teach.

And the students and pilots believe that because the instructors have racked up a lot of hours and miles they know what they're talking about and are qualified to set policy and serve as engineers.

The fact that the Bailey release has been the universal standard for shoulder mounted aerotow releases for seventeen years is pretty solid evidence that hang gliding culture has got a very long way to go before it will ever come to any kind of grips with grade school science.

The fact that virtually all aerotow pilots are told and believe that the same weak link limits everyone to the same 1.0 Gs of tow tension suggests that there is something seriously wrong with the water.

Too much damage has been done for hang glider pilots to ever understand what a weak link is - it will always be viewed as a Plan B for a shoddy release no matter how many obituaries are read which indicate that it's not. If left to their own devices they will continue to use little bits of flimsy string to keep themselves "safe" without any understanding of how dangerous things can get if one pops at the wrong time. If a minimum strength is prescribed pilots will react the way they always have - by declaring it to be above the lower limit.

Then we have this problem...

Towing Aloft

1998/01

Pro Tip: Always thank the tug pilot for intentionally releasing you, even if you feel you could have ridden it out. He should be given a vote of confidence that he made a good decision in the interest of your safety.

William Olive

2005/02/11

I give 'em the rope if they drop a tip (seriously drop a tip), or take off stalled. You will NEVER be thanked for it, for often they will bend some tube.

2008/12/24

I've seen a few given the rope by alert tug pilots, early on when things were going wrong, but way before it got really ugly. Invariably the HG pilot thinks "What the hell, I would have got that back. Now I've got a bent upright."

The next one to come up to the tuggie and say "Thanks for saving my life." will be the 1st.

Jim Rooney

2007/08/01

Whatever's going on back there, I can fix it by giving you the rope.

It's more of this crappy argument that being on tow is somehow safer than being off tow.

We have a huge fleet of tug drivers who can't seem to grasp the concept that a low glider suddenly deprived of tow tension is going to experience an abrupt increase in angle of attack and start going down immediately.

I myself have been crashed by a remote winch operator when I was straight and level in smooth air and in need only of more tension. He gave me the opposite. "Thank you" was not on the list of things I felt like saying to him. It is not the place of an observer hundreds of feet away to make the glider pilot's decision about whether or not to continue the tow.

Giving him the rope if he seriously drops a tip or takes off stalled is the absolute worst thing the tuggie can do to the glider. Often he will bend some tube, occasionally he will be killed immediately from severe neck and head trauma.

There's a really good reason pilots aren't pulling their crashed gliders to the side of the runway and lining up to thank Bill for saving their lives.

And, of course, the corollary...

Jim Rooney

2007/07/22

I've heard it a million times before from comp pilots insisting on towing with even doubled up weaklinks (some want no weaklink). I tell them the same thing I'm telling you... suck it up.

2008/11/24

I've personally refused to tow a flight park owner over this very issue. I didn't want to clash, but I wasn't towing him. Yup, he wanted to tow with a doubled up weaklink. He eventually towed (behind me) with a single and sorry to disappoint any drama mongers, we're still friends. And lone gun crazy Rooney? Ten other tow pilots turned him down that day for the same reason.

Davis Straub

2008/04/23

From section 3.4 of the 1999 Hang Gliding Federation of Australia Towing Manual:

Recommended breaking load of a weak link is 1g. - i.e. the combined weight of pilot, harness and glider (dependent on pilot weight - usually approximately 90 to 100 kg for solo operations; or approximately 175 kg for tandem operations).

Here is the requirement from the 2007 Worlds local rules (which I wrote) for weaklinks:

Pilots must use weaklinks provided by the meet organizers and in a manner approved by the meet organizers. All weaklinks will be checked and use of inappropriate weaklinks will require the pilot to go to the end of the launch line to change the weaklink.

Weaklinks will consist of a single loop of Cortland 130 lb Greenspot braided Dacron Tolling line and should be placed at one end of a shoulder bridle.

At the 2008 Forbes Flatlands Greenspot for the first time was used as the standard weaklink material (thanks in large part to the efforts of Bobby Bailey). We applaud these efforts to improve the safety of aerotowing by using a better weaklink material.

We have national organizations, international competition meet organizers, and swarms of tug drivers operating way above their pay grades and overriding and implementing policy based on engineering, physics, and mathematics of which they have no understanding whatsoever.

The HGFA states that the "recommended breaking load of a weak link is 1g" but they don't say who recommended that figure or why.

The individuals who prevent gliders from going up with anything other than single loops of Greenspot don't actually know what its breaking strength is and can't seem to grasp the fact that there are different sized gliders with different load capacities.

Single loops of Greenspot are so anemic that they frequently fail before the glider even starts rolling on launch and typically pop at random once aloft.

And the dreaded double loop...

It doesn't get the smallest solo gliders up to much more than one and a quarter Gs. The larger ones may not make it up to a half.

The FAA and USHGA seem to feel that 2.0 is a perfectly acceptable upper limit.

So what might we expect to happen to a pilot who travels half way around the world for a competition under control of such people?

Davis Straub

2005/01/13

Tom Lanning had four launches, and two broken weaklinks and a broken base tube. He made it just outside the start circle.

Yeah, we heartily applaud these efforts to improve the safety of aerotowing by using a better weaklink material. On behalf of parts dealers, x-ray technicians, and funeral directors in both hemispheres, you can't be thanked enough.

Highly skilled pilots are told - and believe - that the reason they blew weak links on ten consecutive tows in normal conditions is because their flying skills are not what they should be.

The aerotowing of hang gliders is the only mutant dead end branch of aviation in the world in which it is considered normal and acceptable to lose power on climb out once out of every five or ten takeoff attempts.

The Fixes

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adi

2009/07/02

I have to chirp in on this.. I know I'm a noob and all that, but Tad seems to be talking sense to me. From what I can gather the US has some quite different (dated?) ways of doing things which it appears are not used here in the UK, and some of the reasons I've heard cited for not using these methods relate directly to accidents in the US.

For instance, the idea of tying your own weak link is absolute nuts to me, as is using a bit of string for the job! Over here it's aluminium only (sailplane style link) and if I turned up with a bit of tied string, I'd be shown the exit road.

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axo

2009/06/18

I would like to improve my weak link setup so I am better than now at avoiding a low altitude break during launch and I want to start releasing sooner when I get into a lockout position as now I know the weak link won't do s*** to save me.

I haven't seen any of those Tost or any other setups in a hang glider yet. I would be open to use a system like that if the park owners also approve it after learning the benefits and increased security.

Tost Flugzeuggeratebau makes releases and weak links which are industry standards in sailplaning. They make hang glider range weak link inserts with plus or minus ten percent tolerances which are used to great advantage in Europe. The only practical hope I see of getting weak links up to safe and reliable standards in the US is to make these weak links mandatory.

I have prepared a table:

http://www.energykitesystems.net/Lift/hgh/TadEareckson/index.html

or

http://groups.yahoo.com/group/towinghanggliders/

which lists over two hundred glider models so far and relates each to its appropriate Tost weak link. And we need at least the next size up for the front end. And we need to make sure the Dragonfly tow mast is up to the job and start using the weak link as the weak link and the tow mast as the tow mast.

And, of course, the corollary...

Doug Du Bois

2006/01/29

Tugs operate within a very narrow speed range, and unless the tug pilot is being careless he can rarely slow down significantly. And wanting the tug pilot to slow down to get you out of a bind "when in a lockout situation or are fast losing control of the glider"... that's simply not gonna happen. In that situation you only have a heartbeat or two to get off the rope, if that, and there's no time to make a radio call, much less get a reaction from the tug that can help.

You write: "When in a lockout situation or fast losing control of the glider, sometimes releasing is not an easy option." That worries me a great deal, as it goes against good sense and all the training I've encountered. It is essential that you are able to release immediately at will, especially in this kind of situation!

In my tug pilot training, I was taught that the tug pilot's job is to keep himself alive. And by extension, it is the glider pilot's job to keep himself alive as well. Expecting the tug pilot to help you out of a bind is dangerous thinking.

We need a lot more tug pilots who understand that, beyond supplying power and maneuvering as best they can to stay in front of and level with the glider, the safety of the glider is not their responsibility. Unless the the glider is endangering the tug, it is never the tug pilot's job to release the glider. Tug pilots who don't understand that concept need to be retrained if possible, grounded if not and glider pilots too poorly skilled and/or equipped to keep themselves safe on the back end of the tow line do not belong on the back end of the tow line.

A two point release system is too important to be designed, accepted, and velcroed onto a glider by a pilot. This assembly essentially is used to convert a glider into a powered aircraft and it needs to be designed and built in by the manufacturer and certified by the Hang Glider Manufacturers Association as the critical element of the aircraft's power and control system it is. As things stand the vast majority of them lack reliable and accessible kill switches and the results have often been ugly.

VG systems are complex and have demanding engineering requirements, are not critically important with respect to safety and control, and yet are not third party add-ons.

Two point release systems are relatively simple and have relatively mild engineering requirements, are critically important with respect to safety, and yet are invariably third party add-ons.

Something is seriously wrong with this picture.

In a VG system a string is routed from a mechanism forward of the control frame apex, down through a downtube, and out to the pilot's hand on the basetube.

In a proper two point release system a string is routed from a mechanism forward of the control frame apex, down through a downtube, and out to the pilot's hand on the basetube.

The technology and hardware to configure a proper two point release system has been around for decades. One needs do little more than mirror image a few constructions.

Proper systems can easily and cheaply be built into production gliders and retrofitted into existing gliders with anyone with enough skill to replace a VG side downtube and drill a couple of holes.

While some slap on, cable actuated assemblies are better than others and reasonably safe, all of them are problematic and the more mediocrity that floods the market the harder it will be to have the job done properly. Slap on systems need to be quickly phased out and banned.

One reason for banning slap on releases is that they provide tow pilots incentives for dangerous compromises such as taking wheels off and/or deciding to tow one point.

There are halfway rational reasons for making such compromises for making such decisions. Wheels degrade performance and can only be useful for a few seconds at the end of a flight. A properly designed one point release assembly is simple and cheap, eliminates the possibility of a bridle wrap, and can be stowed quickly and easily after the tow.

But a pilot aloft with no wheels is always in more danger than he would be otherwise and a pilot taking off one point is always in more danger than he is two because he has sacrificed a lot of control authority for that configuration. Neither the difficulty in routing cable nor the drag associated with it are acceptable reasons for those compromises.

Brake levers, cables, spinnaker shackles, and curved parachute pins need to be taken off of gliders and put back on the bicycles, sailboats, and skydiving rigs for which they were intended.

Secondary / one point release assemblies must also be configured such that they can be actuated without loss of control. This is most easily accomplished by using a trigger held in the pilot's teeth. This technology has been around for a long time and it's pure insanity not to take advantage of it. Such releases when used in two point configurations make primary bridle wraps non issues. When used in one point configurations they allow the pilot to quickly and easily deal with slack line situations with a quick surrender of the grip of one hand.

2009/12/18
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03 - SOPS AND GUIDELINES REVISIONS

The following are the revisions to the USHPA Standard Operating Procedures governing aerotowing I am recommending be adopted by the organization.

Proposed Revision - 2009/10/25

2.10. USHPA Hang Gliding Aerotow Ratings

The following requirements apply to the equipment and pilots employed in the towing of unpowered by powered ultralight vehicles, hang gliders by tugs respectively.

A. Vehicles

1. The tug must have a rated thrust of at least 250 lbs.

2. The glider must meet the Hang Glider Manufacturers Association's airworthiness standards.

3. The tow attachment mountings on both vehicles must be able to sustain without damage 700 pounds of tow tension.

B. Connections

1. The tow line and/or bridle connections must be configured so as to not unduly impede control of either vehicle. Where connections incorporate the use of one or more bridles these are considered to be extensions of the tow line.

2. Tow lines and their extensions must be constructed of braided low stretch materials.

3. All components other than weak links which transmit tension between the vehicles (attachment hardware, bridles, releases) must reliably withstand a minimum of 675 pounds of tow tension. The tow line and rings must have rated 1000 pound minimum safe working loads.

4. Tow rings at the ends of the tow line must be of designs which minimize the tendency of a bridle to wrap or snag, cause no undue wear or abrasion of bridles, and minimize the probability of snagging the glider.

5. Bridles

a. The length of a bridle spanning upper and lower attachment points (two point) must be of sufficient length to form an apex angle of 60 degrees or less and of a design which minimizes the tendency to wrap at the tow ring.

b. A bridle which is a component of an assembly spanning the shoulders of the glider pilot (one point) must be configured such that the distance between a releasable end and the apex does not exceed 12 centimeters.

c. A sailmaker's thimble must be installed in the lower eye of a two point (primary) bridle where it interfaces with a secondary (one point) bridle.

6. Weak Links

a. Weak links must be installed at both ends of the tow line proper and/or its extensions.

b. Any bridle long enough to present a hazard must have weak links installed above and below the tow ring.

c. Weak links at the glider end must be rated to maximize the tow line tension at between 1.0 and 2.0 times the glider's maximum recommended operating weight, with a factor of 1.4 being strongly recommended, and limit the tow line tension to a maximum of 675 pounds.

d. On bridles having upper and lower attachment points weak links installed below the tow rings must be a minimum of 20 percent stronger than those above.

e. Tug end weak links must be reliably stronger but no more than 25 percent above those of the aft ratings.

7. Releases

a. Any release design employed in the connections which engages a primary bridle end must:

i. have demonstrated to function infallibly, easily, and instantly under direct loading from 0 to 390 pounds without damage and with the required actuation effort recorded and not exceeding 25 pounds;

ii. be configured such that they are operational by the pilot in command without necessitating the moving of a hand or foot from a control (joystick, rudder pedal, basetube, downtube) except that in a slack line situation it is allowable to employ a one point / secondary release which requires one hand to be removed from the basetube for a maximum period of two seconds;

iii. have been demonstrated to reliably retain connections in all circumstances, releasing only upon pilot actuation; and

iv. have no components which present a potential for interference with the travel of a bridle or tow line or necessitate the removal of a glider's basetube wheels for installation.

b. Any release which is subjected to the undivided tow tension must meet all of the above relevant requirements with the range extended to 675 pounds.

c. When the glider incorporates a bridle with a releasable upper attachment point it is required that a secondary release be employed below the tow ring. This release must adhere to all the specifications of the primary release and be used only in the event that the bridle wraps at the tow ring following an upper point separation.

8. Whenever a configuration is employed in which the tow line is exposed to a possibility of significant twisting a swivel must be installed at its front end.

C. Aerotowing Operational Standards

1. Aerotowing operations shall be conducted in compliance with the requirements of FAA Exemption #4144 (see Addendum 2).

2. No pilot may intentionally release a tow line in a manner so as to endanger life or property.

3. The tug and glider pilots must have an agreed upon general course of action including airspeeds and emergency procedures.

4. The glider must stay well clear of the tug after release and during landing so as to avoid wake turbulence.

5. Free flying ultralight gliders should stay clear of the towing pattern.

D. Aero Tug Pilot Rating (ATP)

To attain the Aerotow Tug Pilot rating required to tow a glider a candidate must complete the following requirements.

1. Satisfy Aerotow Special Skill Requirements 1 through 6 (below).

2. Either:

a. posses an FAA private pilot license with single engine rating; or

b. log 100 hours of powered ultralight airtime, however for weight shift trike tugs half of the time may be qualified with hang gliding experience.

2. Log:

a. 10 hours in tug type; and

b. 5 flights each on an aerotowed hang glider, solo or tandem, and as a tug pilot towing an Advanced rated pilot highly experienced in aerotowing, with practice of turns in both directions, control of airspeed and throttle to correct for glider position, and simulated emergency procedures.

3. Successfully complete the Intermediate and Advanced pilot written examinations.

E. Aerotow Special Skill (AT)

The Aerotow Special Skill is an endorsement of one's ability to safely launch and tow behind a tug, is available to Novice and above rated pilots, may be demonstrated through foot or dolly launch procedures, and is required for pilots not under the supervision of an aerotow official. The applicant must:

1. carry a copy of FAA Exemption No. 4144;

2. be familiar with the signal standards illustrated in the FAA Glider Flying Handbook (FAA-H-8083-13 - www.faa.gov/library/manuals/aircraft/glider_handbook/) and the USHPA Aerotowing Guidelines;

3. demonstrate complete understanding of aerotow vehicle operations including checklists, the importance of proper positioning and tension management, indications of impending emergencies, and normal and emergency procedures;

4. fully understand the components of the tow system (connections, tow line, releases, weak links) and their potential effects on the vehicles, both in general and specific to the systems being employed, and demonstrate their assembly and preflight;

5. convince the aerotow official of ability to execute emergency procedures;

6. understand and adhere to the protocols described in this Section 10 and the USHPA Aerotowing Guidelines;

7. demonstrate an understanding of the correct use of airspeed to achieve maximum distance in various conditions and the likely presence of wind, lift, and sink over various types of terrain; and

8. demonstrate in typical soaring conditions a minimum of five confident, properly controlled launches with smooth transitions and under tow flights including turns.

F. Aerotow Instruction

1. All Instructors of aerotowing must possess a USHPA Instructor certification and be either an AT Administrator, AT Supervisor, or Advanced Instructor with the AT Special Skill.

2. The AT Special Skill may be issued by an AT Administrator, AT Supervisor, or Advanced Instructor or Observer with the AT Special Skill.

3. All instructors who utilize aerotowing for instruction shall keep a written log of all such flights, including dates, students' names, and locations.

2.20 Addendum 2 – Exemption #4144 (Towing)

Pursuant to the authority contained in Sections 313(a) and 601(c) of the Federal Aviation Act of 1958, delegated to me by the Administrator (14 CFR 11.53), the individuals authorized by the USHGA are granted an exemption for the FAR's to the extent necessary to allow unpowered ultralight vehicles to be towed aloft by powered ultralights.

The exemption is subject to the following limitations:

1. Each operation must comply with all sections of Part 103 except #103.1(b) of the FAR.

2. No charge, assessment or fee may be made for the operation of the towing ultralight except the actual expenses of the specific flight.

3. Both pilots on both ultralights must possess a current pilot rating issued by the USHGA.

4. For identification purposes, the USHGA shall issue an individual authorization to each person allowed to conduct operations under this exemption. Each authorization shall include an identification number and a copy of this exemption. The USHGA shall have a procedure to rescind this authority when needed.

5. Operations conducted under this exemption shall be in accordance with the safety and certification rules and guidelines, as amended, established by the USHGA, including those specified in paragraphs 1 through 12 in the petitioners supportive information.

6. Each individual who operates an ultralight vehicle under the authority of this exemption must be familiar with the provisions contained herein and must have in his or her personal possession a copy of the authorization issued by the USHGA and a copy of this exemption. These documents shall be presented for inspection upon request by the FAA.

Daniel C. Beaudette
Director of Flight Operations
Issued in Washington, D.C. on October 25, 1984

Proposed Revision - 2009/02/27 06:35

FAA Exemption No. 4144

Petitioner's Supportive Information
Paragraphs 1-12

The following requirements must be understood and adhered to.

1. Both vehicles (powered and unpowered ultralight) must meet the vehicle standards of Part 103.

2. Both vehicles must meet the requirements specified in the Hang Gliding Aerotow Ratings section of the USHPA's Standard Operation Procedures.

3. While towing, both vehicles may be used for recreational purposes only.

4. The pilot of the powered ultralight vehicle (tug) must have in his possession a current tow rating issued by the USHPA.

5. The pilot of the unpowered ultralight vehicle (glider) must have in his possession a current pilot rating issued by the USHPA. This rating shall be at least Intermediate (level 3) for a recreational pilot or Novice (level 2) for a student pilot under the supervision of a USHGA certified instructor.

6. The glider may be used for two place instructional purposes if the instructor possesses a current USHGA instructor rating and is operating under the conditions of the two place exemption.

7. Prior to a student's first flight in a towed glider the tug pilot and instructor must inform him that instruction under aerotow is conducted under an exemption granted to the USHPA by the FAA.

8. The instructor must maintained for 12 calendar months a written record of all operations conducted under this exemption including the date, location, and student's name and shall present this record for inspection upon reasonable request by the USHPA or FAA.

9. The instructor shall within 30 days notify the USHPA of any accident occurring while operating under this exemption. This information shall be made available upon reasonable request by the FAA.

10. The structural integrity of the tow hitch and line must be substantiated in accordance with the specifications of the Standard Operating Procedures and recorded in the tug's records by the owner.

11. The capability of the tug to satisfactorily tow and release a glider must be demonstrated to a USHGA observer in an assigned test area under actual operational conditions and be recorded in the tow vehicle records.

12. Both tug and glider pilots must obey operational procedures set forth in the Standard Operating Procedures.

Proposed Revision - 2009/10/25

USHPA Aerotowing Guidelines

This document serves as a supplement to and expansion of the USHPA Standard Operating Procedures pertaining to aerotowing.

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Equipment

Aerotowing equipment must meet standards which afford both pilots the means to launch, climb, and separate safely and reliably and with as much control as possible.

Tug

Power

The tug must have a minimum 50 horsepower engine.

Maximum Stall Speed

The stall speed during tow must not exceed 30 knots (35 mph).

Minimum Tow Speed

The tug must be able to tow the hang glider with a speed of at least 21 knots (24 mph).

Minimum Climb Rates

A climb rate during tow of 300 or, if used for foot launching to shorten the takeoff run, 500 fpm is required.

Gauges

The tug should have a visible translucent fuel tank, exhaust gas and cylinder head temperature gauges, and an airspeed indicator.

Seat Belt

Four-point seat belt restraint is strongly recommended.

Protection

A helmet and eye and ear protection should be worn.

Mirror

The mirror must be adequately sized and firmly attached (so multiples of the glider do not appear).

Weak Links

Weak links must be of sufficient strength to ensure that the glider is not left with the tow line in the event of failure.

Swivel

When a tow line is routed through a propeller shaft a possibility of a bearing seizure and resultant rapid and dangerous twisting of the tow line exists and a swivel must be installed near the tug end of the line to minimize the likelihood of releases and weak links being disabled.

Logs

Logs of hours and maintenance and repairs must be maintained and checked.

Ground Launch Vehicle (Dolly)

Stability

Pitch

By ensuring that the glider's basetube is supported at least three inches aft of the vertical plane defined by the ground contact points of the front wheels the dolly remains pitch stable enough to compensate for the normal drag of the wheels and the lifting of the keel from its support.

Roll

Roll stability is a function of the separation of the front wheels which must be a minimum of five feet.

Yaw

Yaw stability is determined by the distance between the line defined by the front wheels and the rear wheel. A minimum of six feet must separate the basetube support and the base of the rear support.

Wheels

Minimum Diameter

Wheels must have minimum ten inch diameter. The larger the wheels, the smoother the rollout and the less drag over uneven ground.

Front

The front wheels of dolly must caster to allow the dolly to follow the tug. Up to launch speed the wheels must not wobble as this action creates drag that can delay liftoff or result in a nose-over.

Rear

The rear wheel is fixed and must be aft enough to clear the harness.

Supports

Basetube

Basetube supports must be laterally adjustable and set as widely as possible to increase stability and decrease stress on the basetube while allowing safe clearance for the glider's wheels.

Rear

The rear support must be height and rake adjustable to set proper pitch attitude for gliders with different upright lengths and geometries.

Hold-Down

Hold-down lines or analogous structures are necessary to prevent premature and/or asymmetrical liftoff and must accommodate different gliders and wheel arrangements.

Tow Line

Length

Length must be between 100 and 250 feet.

Short

Short lines require fast reactions, are more conducive to lockouts, and increase the likelihood of subjecting the glider to prop wash on takeoff.

Long

Long lines may result in vertical position oscillations between the tug and glider in thermal conditions and eat into available runway length.

Material

Stretch

A low stretch line (e.g., Spectra) is required as surging is minimized and the efficiency of the tow is maximized. High stretch materials are dangerous as tow components may recoil into the propeller or the face of the glider pilot upon rear or front end release or weak link failure respectively.

Construction

Hollow braid material is recommended due to the ease with which splices are formed. The weave of the tow line and bridle extensions must be tight so as to minimize snag potential. Line of twisted construction is not acceptable as it is very likely to cause problems with the bridles and release systems at both ends.

Knots

The tow line must be kept free of deliberate and self tied knots as they weaken the line and can promote tangling.

Tow Ring

The tow ring must be selected with respect to its weight and the danger it poses to the glider in the event of a tow line failure or tug release. A carabiner is often employed due to the convenience with which it may be connected to a bridle already engaged by its release but this device must treated as a potential hazard in that it has the capability to connect to a nose wire after release and has been known to connect to a basetube during one point towing. Due to this latter phenomenon it is mandatory that a carabiner be connected to a one point bridle gate up.

Drag Device

A drag device may be employed on the end of the tow line to help keep it out of ground obstructions and reduce flailing. A parachute must not be used as it presents a danger of tangling the glider in the event of the tow line breaking or separating from the tug.

Bridles

Type

Closed

Both ends of a closed bridle remain attached to their mountings following release by means of a mechanism engaged between the bridle's apex and the tow line.

Opening

An opening bridle functions by having an end released to allow the free half of the bridle to pay through a tow ring. It has the advantage of nearly halving the tension to which the releases are subjected. It should be constructed with relatively large (3/16 inch) even or tapering diameter and stiffness and of low stretch material to reduce its likelihood of wrapping at a tow ring and must have releases at both ends to cope with that possibility. Any weak link incorporated in the top end must be configured to minimize the probability of a wrap (i.e., its bulk and loop size must be kept to a minimum).

Two Point

If the bridle is long enough to span the upper and lower attachment points of a glider towing in two point configuration it is - by definition - long enough to tie itself to the tow ring and therefore must be releasable from both ends.

One Point

A one point bridle assembly spans the releases mounted on the pilot's shoulders and can and must be short enough to preclude the possibility of wrapping.

Two Point

A two point (pilot and glider) bridle is connected to the pilot's one point (shoulder to shoulder) bridle at the bottom and usually anchored at the carabiner, control frame apex, or keel at the top. For reasons which should be obvious, under no conditions is it acceptable to configure the carabiner with its gate aft if, as is virtually always the case, the parachute bridle is anchored at that connector.

Control

It facilitates comfortable trim of the glider and allows the pilot to be properly positioned with respect to the control frame.

Length

It must be long enough such that the loading of the releases and/or mounting points does not rise much above half the tow tension. Ten feet is a good rule of thumb. Excessively long bridles present more of a problem with stowing after release.

Interface

A sailmaker's thimble must be installed in the bottom eye of the two point bridle to eliminate abrasion between it and the secondary (one point) bridle and facilitate the latter's clearance should the former wrap. In the absence of the thimble the two components constantly saw into each other during tow, their capacities become unknown quantities, and the glider becomes vulnerable to a potentially dangerous bottom end separation.

One Point

One point (pilot only) bridle assemblies span attachment points on the pilot's shoulders and may engage the tow ring or bridle apex mounted release or serve as a secondary bridle anchoring the bottom end of a two point bridle.

Control

Routing all of the tow tension directly to the pilot pulls him fore with respect to the rest of the glider and diverts nothing to aid in trim. Thus he will find himself positioned considerably fore of proper position with respect to the basetube and deprived of a substantial and potentially critical range of aft bar travel and top end speed range. As he is pulled fore when properly lined up so will he be pulled further to the leading side when yawed away from a proper track. Fast modern gliders with light pitch pressures can handle one point connections reasonably well but the pilot should be aware that the tow will be somewhat less comfortable and more difficult to keep under control.

Length

As its attachment points are so narrowly separated there is virtually no advantage in terms of load reduction in extending its length beyond 25 centimeters and thus introducing a potential for it to wrap after the release of an end (giving enough rope to hang oneself, so to speak). It is centered using a matched pair of shoulder mounted releases which themselves should extend about 35 centimeters fore from the shoulders.

Weak Links

Function

The sole function is to limit the tow force to prevent damage to the vehicle. Practically speaking, it is most important in ensuring that release mechanisms are not overloaded. It is not a device which does or can ensure that the glider remains within limits of safe control, compensate for inadequate release systems or pilot competencies, prevent a lockout and/or impact, be depended upon to keep the pilot(s) safe, or substitute for timely release actuation or decision making. Just as the reason a pilot was killed is never because his parachute didn't open, the reason a pilot was killed in a towing accident is never because his weak link was too strong.

Placement

Weak links are required at both ends of the tow line. Where bridles are considered extensions of the tow line weak links installed at both ends of the bridles satisfy this requirement.

Relative Strengths

Tow Line

For reasons of safety and convenience it is mandatory that the aft weak link(s) fail first so that the glider is not left with the tow line. A 250 foot tow line with the fore end tow ring trailing from a bridle routed over the basetube presents an absolutely lethal threat to a low flying glider.

Bridles

For the reason given below in the discussion of release actuation sequencing, when weak links are installed at the ends of two point bridles the lower must be at least 20 percent stronger than the upper. For example, when used in conjunction with a 1.4 G upper weak link one of a minimum of 1.68 Gs be employed below the tow ring. In the event that the bridle wraps the then directly loaded lower weak link will translate to slightly less than 1.0 Gs (0.97) and the glider will almost certainly separate even if the starting tension were no greater than normal.

Loading

The loading to which a weak link is subjected is dependent upon its placement.

Tow Line

A weak link installed on an end of the tow line proper will, obviously, be subjected to the full tension.

Bridles

A weak link installed on a bridle end however, is subjected to more than half of the full tension.

One Point

If the apex angle formed by the bridle is acute, as is the case with respect to a one point bridle, the increase over the halfway mark is negligible.

Two Point

Due to their widely separated attachment points, two point glider bridles should and generally do form apex angles of about 60 degrees and the bridle tension is significantly greater than half of what is transmitted by the tow line. This increase is calculated by multiplying half the tow line tension by the secant of half of the apex angle. For the purposes of the glider and as an example, a tow line tension of 400 pounds translates to 200 pounds multiplied by the factor of 1.15 and results in 230 pounds of bridle (weak link) tension. Working backwards, a 200 pound weak link will fail at a tow line tension of 348 pounds which is calculated by dividing the weak link strength by 1.15 and doubling the result.

$$w=t*1.15/2$$

and

$$t=w/1.15*2$$

where t and w are tow line and weak link tensions respectively.

Tug

Tug bridles normally remained attached at both ends, need and can not be stowed when an end is separated, and thus can be and generally are long enough to form an apex angle acute enough to make the increased loading issue fairly negligible.

Glider Rating Recommendations

1.4 Gs is recognized as the "sweet spot" for weak links. At much below that figure the probability of dangerous and expensive premature breaks increases. Above that releases and other equipment may be loaded and stressed unnecessarily. Small gliders tend to be able to handle G loading better than larger ones and, hence, could handle higher weak link ratings.

Releases

Load Range

A release must be effective at tension ranging from zero to one and a half times the point at which an appropriate weak link will fail.

Tow Deviation

A release must be effective with the tow pulling 60 degrees laterally and vertically.

Actuator

Glider Control

Any release system whose actuation requires that a hand be moved from the normal control position is as dangerous and unacceptable as would be a motorcycle braking system which would require relinquishment of a grip on the handlebars for the same obvious reason. However, because of the difficulty and tradeoffs involved in designing one point glider releases with slack line, hands free capability, the rare frequency of slack line events, the even rarer frequency of occurrences in which these events are dangerous, and the greatly reduced likelihood of a momentary sacrifice of grip resulting in a significant control compromise in the absence of line tension, it is acceptable for one hand to be briefly moved from control position to assist in effecting release in a slack line situation.

Security

It is not acceptable to configure an actuator such that it causes an automatic release as there are many circumstances in which being involuntary separation will be lethally dangerous. Separation within a safe loading range must only occur as consequence of pilot judgment and action.

Interference

A lever mounted on the basetube in such a manner that it can snag a bridle is dangerous and unacceptable.

Configuration

Two Point

Two point releases have been developed which are actuated by means of a control frame mounted loop around a hand and a button held between the fingers.

One Point

One point releases have been developed which are actuated by means of a mechanism, lanyard, or trigger line held between the teeth or loop mounted on the basetube.

Actuation Sequence

Releases at the bottom end of a two point bridle are SECONDARY releases designed to cope with a bridle wrap and should never be considered BACKUP releases which one might expect to use to compensate for an unreliable primary (upper) release. Viewing them as such and/or deliberately releasing from the bottom end first is a dangerous practice which has resulted in fatal instances of gliders tucking and failing under negative loading following bridle wraps. Should the glider pilot experience a primary release failure he should respond as follows.

Tug Release

If the situation is not time critical continue the climb to a safe altitude if necessary, signal the tug to release, and drop the tow line after actuating the secondary release.

Weak Link

If locking out at a safe altitude altitude take no action and allow the weak link to fail.

Secondary Release

If time, altitude, and circumstances permit no other options actuate a secondary release and hope that the bridle clears the tow ring or the weak link fails or the tug reacts quickly enough if it doesn't.

Personnel

Signals

In addition to the relevant FAA standardized glider towing signals, all personnel must be familiar with the following conventions.

Takeoff

Wag rudder, elevator, or trike wing.

Release

Wave left arm up and down.

Pilots

Tug

Turn Requirements

Practice engine outs to determine your most efficient 180 degree recovery. At altitude (2000 feet or above), climb at 600 fpm, throttle back to idle, descend, actuate the release, turn 180 degrees, and note altitude loss. Know what your minimum requirements are BEFORE you must perform one in an emergency.

Control

Practice for loss of control options, if applicable. Fly and, in smooth conditions, land with rudder only and ailerons only.

Glider Pilots

Only experienced tug pilots should tow inexperienced glider pilots. The latter and any pilot on a glider to which he is unaccustomed are more prone to oscillation at launch. While it is not the responsibility of a tug pilot to evaluate glider pilots, it is in the best interest of all to use discretion.

Glider

Pilots below Advanced skill level should learn by first towing tandem, then with a novice glider in calm conditions. Advanced pilots should learn on an intermediate glider in smooth conditions, then progress to more challenging gliders and conditions.

Assistant - Optional

Dolly Adjustment

Check glider pitch attitude.

Preflight Check

Assist the pilot with a preflight check.

Connection

Connect the glider to the tow line.

Release Check

Inspect the release and, if applicable, ensure the pilot can move through the full control range without triggering it.

Dolly

Ensure the dolly and its front wheels are properly aligned with the tow line.

Launch

Push the dolly on initial rollout if ground resistance or inertia warrant.

Procedures

Tug

General

Multiple Pilots

Preflight upon taking control of a tug rather than trust the quality of the preflight and landings of your predecessor.

Engine

Frequently monitor gauges the entire time the engine is running, particularly during warm up. An abrupt loss of power is usually an indication that this procedure was not followed.

Tow Line

Maintain contact with the release actuator at any time the tug is moving on the ground at significant speed or aloft - keep two fingers on the lever or the toe of your shoe over the pedal, as applicable.

Taxiing

Avoid subjecting gliders to prop wash.

Power

Do not reduce power when low, regardless of the situation of the glider.

Traffic

Divide your attention between the mirror and your heading. Do not become dangerously distracted by a problem at the other end of the line. Maintain a minimum 200 feet clearance from other aircraft.

Preflight

Fuel

Check for sufficient fuel reserve. Use caution when filling in operations involving 4 and 2 cycle engines.

Parachute

Remove the safety pin. Place your hand on the deployment handle to refamiliarize yourself with its location.

Warm-Up

Bring the engine to full operating temperature.

Bridle

If applicable, check to ensure the bridle has not wrapped around the horizontal stabilizer or tail wheel. This is most likely to occur while taxiing with a long bridle during execution of a tight 180 degree turn.

Mirror

Check mirror adjustment.

Slack

Take up slack carefully when signaled.

Weather

Be alert to deteriorating conditions.

Airfield

Evaluate the airfield in terms of size, slope, condition, presence of obstacles, and bailout options.

Emergency Options

Establish a flight plan with options for emergencies.

Traffic

Verify traffic is clear.

Takeoff

Signal

Signal by wagging the rudder, elevator, or trike wing.

Power

When signaled accelerate at appropriate power.

Transition

Lift three wheels simultaneously to minimize prop wash.

Climb

Establish proper climb speed and control, if necessary, to compensate for glider position.

Speed

Do not allow the glider to get low. Increase power if any reserve remains and dive to level with or below the glider to bring it up to safe airspeed.

Turns

Turns should be avoided and shallow.

Landing Options

Keep a bailout field in range.

Premature Separation

If the glider separates leave it the remaining runway and continue climbing.

Tow

LZ

Stay within a 4:1 glide of the field. Drop the glider upwind.

Correction

Maneuver in front of the glider to help it maintain position.

Oscillation

At safe altitude reduce power to allow the glider to recover from oscillation.

Separation

Turn left after a normal release.

Landing

Engine

Plan your approach as if the engine were out.

Tow Line

Avoid approaches over people, aircraft, or any obstacles and turning low over trees such that the tow line becomes perpendicular to the tug as release may be compromised by a side load in the event of a snag.

Right Of Way

Yield to landing gliders.

Emergencies

At the first sign of a problem with the tug release or wave off the glider as your safety demands. Do not compromise your safety by looking back.

Engine

Out

Low

If landing straight ahead is the best option, stop as near the side of the field as possible to allow clearance for the glider.

High

If you are not certain you have sufficient altitude to safely turn 180 degrees, then land straight ahead or take your best option requiring the least amount of bank.

Compromised

Continue to climb, if necessary and able, to a level which will allow a safe landing.

Structure

Shut off the engine if at all possible prior to parachute deployment.

Glider

Preflight

Glider

Preflight the glider.

Dolly

Check tire pressure and otherwise preflight the dolly, load the glider, and ensure proper basetube cradles and pitch attitude adjustments.

Harness

Check parachute security, connect harness to glider, climb in harness, and ensure that leg loops, zippers, and buckles are engaged, closed, and fastened. Check parachute handle clearance as required.

Lines

Ensure that VG and pod lanyard lines are stowed so as to preclude the possibility of fouling with the dolly.

Release

Perform release checks and ensure that all are securely engaged.

Bridles

Ensure that bridles are routed properly clear of the dolly and through the control frame.

Instruments

Basetube mounted instruments present hazards to the glider pilot in terms of potential interference with free bridle movement and impact in the event of a crash. If electing to so mount them take care not to engage the dolly hold-down.

Emergency Procedures

Review emergency procedures plans.

Takeoff

Dolly

Check wheel and dolly alignment.

Hold-Down

Grasp the hold-down.

Slack

Dolly

When operating without an assistant, signal to take up slack and drag a foot to prevent the dolly from rolling.

Foot

Back up.

Signal

Check conditions and signal when ready.

Lift Off

When the glider begins to lift off the dolly, release the hold-down and climb to and remain at 10 to 15 feet until the tug starts to climb.

Tow

Airspeed

Being low and slow behind the tug is extremely dangerous below a stall recovery altitude which may translate to hundreds of feet. Should the glider find himself in such a situation he must increase his airspeed to the point at which he will remain safely above stall in the event that tension is lost irrespective of the tug's response or lack thereof and release if the tug fails to take appropriate remedial action.

LZ

It is the glider's responsibility to stay within range of the runway or other safe landing area.

Release

Maintain bank angle if the tug signals release in a turn, otherwise turn right.

Emergencies

Stalls

Level

If the glider is slow and low relative to the surface and the tug and pushes out to climb to tug level his future is immediately taken out of his hands. His life is now dependent upon the tug pilot responding correctly, the tug's reliability and capacity to maintain or increase power, the security of as many as four releases, and the integrity of the tow line and all weak links under the resultant increased tension. When the glider finds itself in such circumstances the only safe option is to remain on tow, pull in to build up a safe margin of airspeed, and release when safe to do so. The tug should respond by dropping to below glider level and maintaining or applying full power.

Tip

Power must be maintained if the glider is low, rolled, and unresponsive.

Yawing

A glider can be yawed at a surprisingly large angle away from the tug and still in good shape as long as it remains level. The glider pilot should stay level and ready to release but allow the tow line to yaw the glider back into alignment.

Oscillation

If the glider is low and experiencing a worsening oscillation problem release must be effected only as the glider is coming back from the extremity of a cycle.

Lockout

A lockout will - by definition - eventually result in the separation of the two vehicles. While in some circumstances it may be imperative for the glider to release immediately to stand any chance of survival it is quite possible for the glider to be locked out but climbing and advantaged by delaying release.

Snagged Dolly

Launch dollies can taken aloft with the glider as consequences of a misrouted tow bridle, failure to secure harness or VG lines, and securing a hold-down line to the basetube along with an instrument. The tow should be continued to allow time and altitude for corrective action.

Tug

While in all situations the tug can do much better without the glider, when low it is virtually always much safer for a glider to remain on tow. For the vehicle at the back end premature loss of tension is analogous to engine failure and there have been many crashes resulting in glider damage and minor injures and a few resulting in major injuries and fatalities because of gliders being released prematurely or inappropriately and line tensions being insufficient to pull gliders out of stalls. It is the tug pilot's responsibility to release only when he is endangered by the glider and such circumstances are extremely rare. The glider pilot is always in a better position to assess his situation and respond appropriately. When in any doubt - maintain power, optimize relative positions, and continue the tow.

AT Accidents

Severity

Minor

Minor accidents - those usually resulting in no more than bent or broken downtubes - are quite common and almost always a consequence of using weak links a half or third of the strength they should be. Additional downsides of using weak links which fail for no reason include major delays of launch lines, subjection of pilots to unnecessary repetitions of the two most dangerous phases of flights (launches and landings) and providing them with more opportunities to botch preflight procedures, and leaving glider pilots vulnerable in situations in which their lives may depend upon tow tension.

Major

Serious accidents are rare and almost always a consequence of a combination of loss of control at low altitude and the decision - usually made months or years before - to accept noncompliant equipment incapable of dealing with such a situation.

Tension

Fatal accidents can easily occur in scenarios in which the tension required to put the glider beyond the point of any possibility of recovery never exceeds the rating of a dangerously understrength weak link and pilots have died for want of tension. There is very little correlation between tow line tension and the severity of outcomes.

Contributing Factors

Launch Method

Foot

Foot launching is almost always magnitudes more dangerous than dolly launching and one should have a good reason for opting for that mode.

Dolly

Dolly launching is a virtual ironclad guarantee against launching unhooked and/or being dragged. The glider is held level, the angle of attack is limited to an appropriate range, and the commitment to becoming airborne may be delayed until a very healthy reserve of airspeed is accumulated. The pilot is at all times prone and engineering of appropriate release actuators is a simpler matter than in the analogous situation.

Air

Unlike the situation at the slopes, the decision to launch in marginal air is always a consensus of at least two people - at least one of whom is likely to be very experienced in making such assessments. Upper wind limits tend to be lower and dolly launches can handle a lot of latitude with respect to less than optimal directions, switching, and light tailwinds. The rare situations which are problematic usually involve unpredicted and violent thermal activity (monster thermals, invisible dust devils).

Pilot Performance

Glider

Glider pilots can put themselves in jeopardy by lacking the skill to control their launch and/or failing to recognize and appropriately respond to a dangerous situation or failing to properly configure and preflight the equipment.

Tug

Glider pilots can through no fault of their own can and have suffered serious consequences as a result of tug pilot actions taken and not.

Tension Loss

Premature loss of tension as a result of action taken by either pilot, a release malfunction, inadequate connection components, or understrength weak link failure can result a in serious accident. A glider in a borderline stalled condition will no longer be in a borderline stalled condition upon losing the tow.

Equipment

Through acceptance of inadequate equipment, low locked out gliders have been put in positions in which they are unable to access a release actuator without losing control. One is then left with the choice of letting go of the basetube to release and die immediately or continuing to resist and extend one's life a few more seconds while hoping that a tug release or weak link failure does the job in time. The record of success on those scores isn't very good.

Reporting

Reporting on high profile serious and fatal AT accidents has typically been abysmal with easily recorded elements critical to our understanding and ability to take remedial action regarded as irrelevant and completely omitted. Information which may be vital to the analysis is categorized as follows.

Air

wind direction, strength, gusts, temperature, relative humidity, barometric pressure, thermal activity

Tug

model, engine, propeller, functionality

Glider

model, size, hook-up weight (pilot, harness, glider (passenger)

Bridle

configuration (two or one point), attachment points, length

Release(s)

type, placement, operational load capacity, actuation device and location (port or starboard if applicable, evidence of attempted or successful use or failure, bridle wrap

Weak Links

types, strengths, ratings - glider AND tug, placements, status (intact or failed)

Tow

elapsed time, altitudes, relative positions, roll rates, directions, and degrees, oscillations, timing of release or weak link failure

Pilots

qualifications, experience, tandem positions

Incidents

MANY incidents which undoubtedly would be fatal shortly after takeoff are of no consequence because they occur well out of striking range of the surface. The bulk of these potentially lethal losses of control occur at altitude for three reasons: there tends to be a lot more vertical movement of air, the tow spends a much higher percentage of its time, and the pilots need be and are less attentive up high. Nevertheless, any such incident, regardless of its outcome, which was contributed to by anything other than rough air and pilot reaction time should be regarded as a potential fatality and reported to USHPA in order that problem equipment and/or procedural problems can be identified and remedied.

Tad Eareckson
TadErcksn
at
aoldotcom

2009/10/25
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04 - SOPS REVISION - ANNOTATED

The following are the revisions to the USHPA Standard Operating Procedures governing aerotowing I am recommending annotated with statements supporting the various elements and/or incidents illustrating why they are advisable.

Proposed Revisions - 2009/09/26

2.10. USHPA Hang Gliding Aerotow Ratings

Rohan Holtkamp

2005/02/14

Our hang gliding community, like other facets of aviation (and life) must learn and adapt if deaths are to be avoided in the future. I feel saddened and frustrated when facts and physics prove change is needed, then the solutions that are offered are rejected.

Luen Miller

1997/06

Stacking The Odds

Our family had a close friend who piloted B-29's in WW II and afterward, then worked for NASA. He was well acquainted with the space program and the risk involved in flying, and ways to minimize it. I once asked him if he thought going into space was really that dangerous. This was back in the mid 1960's when the Gemini program was in full swing, long before Challenger, even before Apollo I. He said, "Well, they have backup systems for the backup systems for the backup systems, and when they stop doing that, people are going to die."

George Worthington

1979/08

I would urge every hang glider pilot in the United States to read "The Key to Self Regulation" in the June issue of Hang Gliding.

Please, let's keep the FAA out. Please, let's try to continue to be responsible and free.

1982/09/10

Scott Rutledge

But as George was 360ing, the inboard wing broke. It broke right in the air. And it looked like there was a puff of dust that came off it.

Rick Masters

We attempted CPR. Joey gave mouth-to-mouth while I worked his chest. Soon our clothes were soaked with George's blood. I think we both knew he was dead, we just couldn't accept it. It was George Worthington, after all. George was our teacher. George showed us how to do this stuff safely. George was immortal . . . wasn't he? George couldn't die. Not here. Not today. This was George's contest. This was the future of ultralights. Could ultralights have a future without George?

Adam McVay

2003/05

I read Peter Reagan's incident report for February concerning seven paragliding fatalities last year. How could this happen? Under close inspection I've found most accidents involve not one mistake but many, be it from intention or inattention. Some pilots dislike regulation, but more rules and enforcement is the only way I see to make things safer (you know, like 'real' pilots). Until we get a handle on preventable accidents, the public is never going to accept foot-launched flight, and they would be right.

Gregg Ludwig

2006/01/26

With aviation accident investigations it is always so easy to just blame the pilot in command.

Safe operations require safe pilots/safe operating procedures/safe equipment...don't rely on pilot skill alone to prevent accidents.

Luen Miller

1996/10

We have two more fatalities because of a glider that couldn't be released from tow. Again, the fatalities occurred in a

training situation in which a student should reasonably not be expected to do everything perfectly.

I am strongly recommending formal review and analysis of releases and weak link designs for all methods of towing by the Towing Committee, and that recommendations on adoption or improvements be generated.

I believe that from preflight through release we should have more standardized procedures in towing.

Dennis Pagen

1997/01

I don't agree with the accident analysis in the October, 1996 issue that indicated that it was the failure of the pilots to release. I think the root cause was a series of problems as outlined above, and more specifically, our failure to educate pilots on all levels of towing. This includes towing administrators as well as pilots.

Bill Bryden

1998/12

Our best defense against problems relies upon the use of good equipment, sound general procedures, and sound emergency procedures that must be reviewed and practiced periodically for pilots to remain familiar with them. With these, towing can be performed safely. History does support this notion.

Tracy Tillman

2005/02/08

The sailplane guys have been doing this for a long time, and there are many hang glider pilots and quite a few tug pilots who don't understand what the sailplane guys have learned over the years. It certainly would help if hang glider towing methods and training were standardized to the degree that they are in the sailplane world.

Chuck Burgoon

1992/09

I'm continually amazed by the "reinvention of the wheel" and "forgotten knowledge" in this sport.

I do R&D for a living, and think that it is tragic that so much time, money, and resources have been expended to acquire empirical information that goes unused, undocumented or unaccounted for. It's agonizing to watch people struggle through the same learning curve, being unable or unwilling to tap into the wealth of existing knowledge.

Current USHGA emphasis, along with efforts to compile and homogenize towing technology in general, will hopefully accelerate the evolution of this launch alternative, rather than prolong it.

Steve Kinsley

2006/11/22

Sailplanes are a piece of cake to tow. Much easier than a hang glider.

Joe Gregor

2007/05

Weight-shift aircraft are inherently compromised when it comes to control authority.

Martin Henry

2008/12/23

If we get badly bent on tow, its not likely we are coming back. Having been at the controls of a sailplane that was getting way out there... thinking I had hopelessly screwed the pooch... only to have my instructor kick me in the ass and fix it for me, I know first hand the differences between the towing a sailplane and a hang glider.

Gregg Ludwig

2008/10/07

Tad-

I find your latest post quite interesting. I must say it has taken me sometime to get used to or accept your writing style but you make some valid points. When you refer to "ushpa" you are actually referring to me, Chair of the ushpa Tow Committee. Our next Tow Committee meeting will be at Chattanooga, TN 23-25 October. Can you attend?

2009/02/11

Tad-

Would you be interested in a position on the ushpa Tow Committee? You can participate via e-mail if you can't make it to a BOD meeting. ..or just help me with a single project...

I need to rewrite the aerotow SOP...to include ATP and Sport pilot stuff....weaklinks...or just send me a proposal on weaklink sop ideas...

Gregg
Tow Committee Chair

2009/03/04

Gerry Grossnegger

re: AT SOPs - proposed revisions

Tad,

Can you send me a complete copy of the latest version?

I assume you don't mind if I use all or some of it in the Towing Procedures Manual (of the Hang Gliding / Paragliding Association of Canada), with credit of course?

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adi

2009/07/02

I have to chirp in on this.. I know I'm a noob and all that, but Tad seems to be talking sense to me. From what i can gather the US has some quite different (dated?) ways of doing things which it appears are not used here in the UK, and some of the reasons I've heard cited for not using these methods relate directly to accidents in the US.

For instance, the idea of tying your own weak link is absolute nuts to me, as is using a bit of string for the job! Over here its aluminium only (sailplane style link) and if I turned up with a bit of tied string, I'd be shown the exit road.

I dunno... Maybe I'm missing something, but if someone (who appears to be knowledgeable in his field) is suggesting some aspects of towing methods are unsafe (to which as an outsider I agree with him), then why are there criticisms and not constructive arguments or additional input to rectify these issues?

Just an opinion...

The following requirements apply to the equipment and pilots employed in the towing of unpowered by powered ultralight vehicles, hang gliders by tugs respectively.

A. Vehicles

1. The tug must have a rated thrust of at least 250 lbs.

Helen McKerral

2009/06/29

The three times I narrowly avoided injury when car towing was purely through luck, not skill (stopping was not an option - I could only screech, MORE TENSION MORE TENSION MORE TENSION and hope the vehicle had enough oomph to get me up).

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2. The glider must meet the Hang Glider Manufacturers Association's airworthiness standards.

Chicago Sun-Times

2005/10/06

An airplane towed the hang glider into the air, with plans to reach 3,000 feet before the cable was released and their tandem hang glide began, an attorney said.

But 200 feet into that ascent, the cable snapped, and the hang glider plummeted to the ground, smashing to pieces and instantly killing Thompson and Birkett.

On Wednesday, Thompson's family filed a negligence lawsuit against the company, demanding unspecified damages but also hoping to find out how the crash happened.

"They're 200 feet in the air, and while normally they would glide to the ground, this hang glider nose-dived to the ground," attorney Matthew Rundio said. "We need to find out why that happened."

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3. The tow attachment mountings on both vehicles must be able to sustain without damage 700 pounds of tow tension.

Martin Henry

2005/09/09

What is known, the (double fatal) event occurred at or near the departure from the tug. The departure from tow was reported (by the tug operator) to be a violent separation. The tug (Moyes) suffered a failed vertical pylon on the upper portion of the tug end V bridle, just prior to the tug end weak link failure.

B. Connections

1. The tow line and/or bridle connections must be configured so as to not unduly impede control of either vehicle. Where connections incorporate the use of one or more bridles these are considered to be extensions of the tow line.

2. Tow lines and their extensions must be constructed of braided low stretch materials.

Davis Straub

2006/01/24

Another issue with the poly rope is that it twists. It twists up your bridle. Not good. It would twist up my car towing bridles when I used the exact same blue poly rope that Tove uses and that Bill uses. Not a good thing.

2006/01/25

I feel that the springy poly line was a major contributor to both of my 'close call' wrap-ups. One was while experimenting with a new dolly (it rolled too well) and 3000' of poly line. The other was while aerotowing on a wooly quartering tailwind day with the cart darting way off course, then jerking back toward the center once the line tightened up.

Hang Gliding Federation of Australia
HGFA Towing Procedures Manual

2005/09

Bridles should be constructed from pre-stretched rope. This is necessary to avoid injury to the pilot in the event of a weak link break or release under tension. A bridle that can stretch under tow will spring back toward the pilot if the load is suddenly released.

Gregg Ludwig

2006/01/22

I just can not understand why operators continue to use poly towlines (for aerotow ops) when spectra towlines are clearly superior. Poly is less expensive...but when considering the cost of a tow plane and HG and the advantages of spectra, a few dollars of savings is foolish.

2006/01/23

Towline elasticity produces a rubberband effect that results in everchanging towline forces that can also produce significant airspeed changes as well. Since spectra does not offer elasticity (or very little) this rubberband effect does not occur resulting in a safer tow. Trikes normally tow with longer lines of 200-250 ft so the advantages and spectra are even greater at these lengths.

Steveseibel

2006/01/23

Obviously one of the dangers of an elastic towline is that when it breaks, it can spring back and hit the pilot with much force--I've heard of a (nylon?) towline actually breaking its way through the canopy and into the cockpit of a sailplane after it broke under a heavy load.

Bruce Mahoney

1987/01

I had heard of similar accidents involving rope snap back injuries so I designed my tow system to prevent them: the bridle rope is made of at least 1/8" dacron rope (dacron is low in stretch)...

Marc Fink

2005/06

Soon after liftoff out of our field, the towline itself failed at the tow ring. The ring remained attached to the bridle and came whizzing back at me and my passenger like a speeding bullet.

Bill Bryden

2000/01

During an instructional tandem flight a pilot was being aerotowed aloft. During the launch, the towline broke. The ring attached to the towline (a bridle attached to the pilot and glider threads through this ring) snapped back, striking the student pilot in the forehead. This produced a laceration requiring stitches.

Unfortunately, the above incident is far from the first occurrence of this type. A friend of mine has a scar over one eye from a nearly identical incident. I had a ring snap back during a tow about 10 years ago that knocked the lens out of my glasses. I was uninjured, but landing with 20/20 vision in one eye and 20/400 in the other was interesting.

Michael Robertson, author of the Robertson Charts of Reliability and instructor extraordinaire, was simply observing during a boat tow, the weak link broke, and a ring struck him in the eye permanently blinding him in that eye.

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3. All components other than weak links which transmit tension between the vehicles (attachment hardware, bridles, releases) must reliably withstand a minimum of 675 pounds of tow tension. The tow line and rings must have rated 1000 pound minimum safe working loads.

Joe Gregor

2006/01

A highly experienced tandem pilot and student crashed while launching via aerotow. Initial witness reports indicate that the glider entered a lockout and was disconnected from the tug in a non-flying attitude at approximately 250' AGL due to a failure of the towline. The accident glider dove steeply to the ground, impacting before showing any sign of recovery to controlled flight. The instructor and student died on impact.

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4. Tow rings at the ends of the tow line must be of designs which minimize the tendency of a bridle to wrap or snag, cause no undue wear or abrasion of bridles, and minimize the probability of snagging the glider.

Chris Fogg

Fatal Accident Report
Bernie Zwahlen

2005/09/11

Inspection of the tow line release showed that the snap link on the pilot end of the tow line had snared the ski rope, piercing the braid and consequently locking the bridle and tow line together.

Combat2

2006/01/20

I was talking with Dave sharp last weekend and he said he had an incident where the carabiner locked itself on his basetube immediately after aerotow cart launching. He said that if he wasn't flying a rigid he would have peeled up and over crashing in, in a similar manner as Robin Strid.

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5. Bridles

a. The length of a bridle spanning upper and lower attachment points (two point) must be of sufficient length to form an apex angle of 60 degrees or less and of a design which minimizes the tendency to wrap at the tow ring.

b. A bridle which is a component of an assembly spanning the shoulders of the glider pilot (one point) must be configured such that the distance between a releasable end and the apex does not exceed 12 centimeters.

Jim Rooney

2009/11/02

(On the frequency of two foot long one point bridle wraps...)

Oh it happens. I have, all the guys I work with have. (Our average is 1 in 1,000 tows)

Oh yeah... an other fun fact for ya... ya know when it's far more likely to happen? During a lockout. When we're doing lockout training, the odds go from 1 in 1,000 to over 50/50.

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c. A sailmaker's thimble must be installed in the lower eye of a two point (primary) bridle where it interfaces with a secondary (one point) bridle.

6. Weak Links

a. Weak links must be installed at both ends of the tow line proper and/or its extensions.

Tad Eareckson

1997/02

To further address the danger of a primary release failure, a secondary weak link, of strength somewhere between significantly stronger than and double that of the primary, should be installed at the other end of the primary bridle. Note that a double strength link will fail at a somewhat higher tow tension than is allowed by the primary, as the primary bridle has ceased being a bridle and is now an extension of the towline (as explained in Dennis Pagen's and Bill Bryden's November article), but you'll still be in a reasonable ballpark. Also note that this secondary link may make the effects of the snagging of a trailed primary bridle (the potential for which is illustrated on the December issue's cover) a lot easier to live with.

Towing Aloft

1998/01

I witnessed a tug pilot descend low over trees. His towline hit the trees and caught. His weak link broke but the bridle whipped around the towline and held it fast. The pilot was saved by the fact that the towline broke!

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b. Any bridle long enough to present a hazard must have weak links installed above and below the tow ring.

c. Weak links at the glider end must be rated to maximize the tow line tension at between 1.0 and 2.0 times the glider's maximum recommended operating weight, with a factor of 1.4 being strongly recommended, and limit the tow line tension to a maximum of 675 pounds.

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michaelb51

2005/09/15

The resultant abrupt stall happens when the tug's energy is instantly subtracted from the system. And it is functionally equivalent to sudden power loss when flying a powered aircraft at or near full throttle, below Vx speed. Having survived such an event in a powered aircraft many years ago (the aircraft was totaled,) I will side with Matt. Regardless of its relevance to this incident, it's really really important to dispel this idea that you "cannot stall while towing."

For years I've told my story to friends, students and strangers alike, with the warning that when the power disappears, "You cannot count to one. It might as well be a balloon drop. If the ground is near, never never never venture on the backside of the pitch curve."

2009/07/04

A glider under tow is a powered aircraft. String powered. When climbing under power, the angle of attack is relevant to the climb path, not the horizon. And if the tow force is subtracted instantly, the angle of attack is instantly translated, whether or not there is pilot input. A classic Departure Stall can easily, almost instantly result. Pitch and power are not independent forces.

If you are in the middle of a climbing correction when the "power" fails, failure to immediately lower the angle of attack can yield an immediate deep stall.

Mike Lake

2009/04/21

A failed weak link during the highly critical initial climb out could be very bad for you.

Given the choice between a weak link that might be too weak and one that might be too strong I'll take the too strong one every time.

Victor A. Toce

1992/12

Towing with a "weak" weak link can cause many premature weak link failures, and even though platform towing techniques can handle weak link failures at any altitude and in most conditions, they are still dangerous.

Doug Gordon
Donnell Hewett

1988/03

For towing as well as for free-flight, low altitude stalls are responsible for the vast majority of accidents resulting in serious glider damage, bodily injury, and/or death. Never forget that stalling on takeoff or when landing is statistically the most dangerous maneuver you can perform on a hang glider.

Jerry Forburger

1990/10

Now consider the effect on the glider should the towline force be suddenly eliminated due to a weak link failure or release from the towline. Without the forward force of the towline the glider will be at a stalled angle of attack and try to recover by lowering the angle of attack, gaining airspeed and creating lift. This works great if you have sufficient recovery altitude.

Helen McKerral

2009/06/29

Of the 2000+ flights I've had, less than 10% are footlaunch ground tow, but they account for 50% of the 6 times I've genuinely thought I was going to die or be seriously injured in this sport, and was literally inches away from doing so. Of the three towing instances, two were not my fault, one was. All three involved hurtling at extremely high groundspeeds very low to the ground with insufficient airspeed to climb, where "STOP STOP STOP" would have seen me plough in headfirst.

Larry Keegan

1992/05

Staying on the tow line can save your life. If you get disconnected from the line, then I would say there is little that can help you. In such a situation a low-rated weak link could possibly break under a strong inertial moment resulting in a severe stall.

Dennis Pagen

2005/01

Analyzing my incident made me realize that had I released earlier I probably would have hit the ground at high speed at a steep angle. The result may have been similar to that of the pilot in Germany. The normal procedure for a tow pilot, when the hang glider gets too high, is to release in order to avoid the forces from the glider pulling the tug nose-down into a dangerous dive. This dangerous dive is what happened when Chris Bulger (U.S. team pilot) was towing John Pendry (former world champion) years ago. The release failed to operate in this case, and Chris was fatally injured. However Neal kept me on line until I had enough ground clearance, and I believe he saved me from injury by doing so. I gave him a heart-felt thank you.

Danny Brotto

2008/11/04

An instance where the weak link could have broken and I'm glad it didn't...

I had the Axis on the cart with the AOA a bit high, launching to the west, with a moderate 90 degree cross from the left. I came out of the cart rolled and yawed to the right with the upwind wing flying and the downwind wing stalled. It was rather dramatic. If I had released or if the weak link had broken, the downwind wing would have further stalled and I would have cartwheeled into terra firma in an unpleasant fashion. I held on tight gaining airspeed until the downwind wing began flying, got in behind the tug, and continued the flight.

Sunny later told be he was about to give me the rope and I thanked him to no end that he didn't.

Joe Gregor

2005/07

The weak link broke with the glider in an extreme left bank and the glider continued to roll left to enter a near-vertical dive. The glider struck the ground left wing first with a near-90-degree pitch attitude.

Dave Broyles

1992/07

...I saw a UP Dragonfly IIB tumble and break both leading edges after a weak link break-induced whip stall. I also saw a LEAF Talon perform an Immelmann because of a weak link break.

1990/11

The weak link breaking strength should be between 100% and 150% of the combined weight of the glider and pilot (the gross load) being towed, but each pilot should be totally responsible for his own weak link.

I talked to a lot of pilots at Hobbs, and the consensus was that in the course of Eric Aasletten's accident, had a weak link break occurred instead of the manual or auto release that apparently did occur, the outcome would have been the same. Under the circumstances the one thing that would have given Eric a fighting chance to survive was to have remained on the towline.

Donnell Hewett

2008/11/05

I am sure you can imagine more than one situation where getting off line is the worst possible alternative you can take. In such cases, the towline becomes a "lifeline" rather than a "death-line". It pulls you out of danger rather than plunging you deeper into danger.

FAA Glider Flying Handbook

2003

TAKEOFF EMERGENCY PROCEDURES

The most common emergency situations on takeoff develop when a towrope breaks, there is an inadvertent towrope release, or towplane loses power. There are five planning situations regarding in-motion towrope breaks, uncommanded release, or power loss of the towplane. While the best course of action depends on many variables, such as runway length, airport environment, and wind, all tow failures have one thing in common: the need to maintain control of the glider. Two possibilities are stalling the glider, or dragging a wingtip on the ground during a low altitude turn and cartwheeling the glider.

Bill Daniels

2006/09/18

I would like to add, however, that at least my reading of accident reports suggest that a fatal glider accident is more likely when the towline fails prematurely. For that reason, I like to stay near the stronger end of the FAR 80% - 200% range.

Actually, reading the Pilot's Operating Handbook for several German gliders, I note the weak link for aerotow is specified as an exact figure. For example, the weak link for both aero tow and winch for my Nimbus 2C is specified as 600 KG (1323 Lbs) or a blue Tost weak link. The tolerance is + or -10%. The US Airworthiness Certificate specifies that the Nimbus 2C is to be flown as specified in the POH. Considering the possible flying weights, this ranges between 95% - 160% which is a narrower range than specified in the FAR's.

Makes me wonder if we should be using Tost weak links instead of old bits of rope.

Marco Vento

2007/05/22

Tad,

We have been using the Tost weak links in association with either Koch double release (for dolly launch and for foot launch) or Moyes release (for dolly launch or launch on wheels). The great point is the reliability and precision of these weak links. The weak side is the mass, but the pilot side, when the link breaks, is lighter - the protection box keeps attached to the cable when the link breaks.

We are quite happy with it, although they are expensive, no false breaks occur anymore. The links are available in a wide range of calibrated break loads as well.

Please send us photos and info on your weak links - we are very much interested in it.

Donnell Hewett

2009/03/26

Let me lend my support to Tad Eareckson's proposal to improve the SOPs of aerotowing by setting a weak link standard of a minimum of 1 g, a maximum of 2 g's, and an optimum of 1.5 g's. Although this proposal violates Skyting Criterion 7 (which specifies a maximum of 1-g), it is necessary to help compensate for the way that aerotowing violates Criterion 2 (constant tension). Since aerotowing uses air speed to try to regulate towline tension on a short towline, the probability of breaking a 1-g weak link is relatively high for aerotowing compared to most other forms of towing. And because a premature, unexpected, or unwanted weak link break can often be more dangerous than staying on line, non-essential weak link breaks should be minimized as much as possible. And, finally, since aerotowing should never be performed solo by an inexperienced pilot, any pilot qualified to aerotow should be able to handle the proposed weak link standard without difficulty. Therefore, the proposal is consistent with the intent of Skyting Criterion 7 which states, "Breaking point should be appropriate for the weight and experience of the pilot."

Tad should be commended for his tireless effort to improve the safety of aerotowing.

Lionel D. Hewett, Interim Chair
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d. On bridles having upper and lower attachment points weak links installed below the tow rings must be a minimum of 20 percent stronger than those above.

Rohan Holtkamp

2008/04/21

Once again history has shown us that this thread-through system can hook up and the hang glider remains being towed by the keel only, with the bridle well out of reach of even a hook knife. I know of just one pilot to survive this type of hook-up, took him some 12 months to walk again though.

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e. Tug end weak links must be reliably stronger but no more than 25 percent above those of the aft ratings.

Wallaby Ranch

2009

DO NOT LAND WITH THE TOW ROPE STILL DANGLING, if you can possibly avoid it!

Bill Bryden

2000/02

If the towline or bridle connect to the pilot or glider above the control bar, this will be wrapped down and around the control bar or frame, and any residual line tension will pull in the bar, pitching the nose down. Fifteen to twenty pounds can "stuff" the bar and dive the glider into the ground...

Joe Gregor
Brian Vant-Hull

2005/11

On the final tow the pilot was unable to release and ended up heading 90 degrees to the intended flight path while dragging the towrope, which eventually caught on something and initiated a nose-over. Injuries included a broken wrist.

Bud Brown

1993/02

When the pilot (Ron Smith) flew to the end of the line, the bridle line that passed over the top of the control bar basetube caused a large "dive" control input. At this time the pilot was at low altitude with no options left.

(Doug Hildreth: Pilot survived to the local hospital, but died prior to transfer to a larger institution.)

Davis Straub

2005/09/11

The tow rope stayed connected to the "pilot" after he "released" and after it was released from the tow vehicle (as was normal at the end of the tow). The rope tangled into foliage/trees by the runway and that led to the accident and fatality.

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7. Releases

Jerry Noland

1981/10

By the way, on my last attempt, the safety release at my end failed, and I was just short of stuffing it in at a blurring speed, when the tug cut me loose (thanks, Jay). The required high speed pull-out deformed the battens in the Comet.

Tommy Crump

1986/10

There are some things that you must rely on hundreds of thousands of times without failure. A release mechanism that is properly designed can do that.

Bill Bryden

1993/02

There are many variations on the towing theme, but common to virtually all of them is the use of a release mechanism to separate the tow line from the glider and/or pilot. Review Donnell Hewett's Skying newsletters from 10 years ago and you can follow attempts to devise good releases and tow bridle systems. Talk to old-time tow pilots and listen to the stories of release problems and tales of close calls. Learn of the accidents and injuries related to release failures and one can't help but wonder.

One wonders why tow line releases have been reinvented so many times. Why have so many people been "test pilots" for new designs? Why was so much of this equipment evaluated for the first time with test flights? What can be done to prevent future injuries or fatalities? When a pilot recently suffered a fatal accident as a direct result of a release failure, it was clear that these questions and problems needed to be addressed now. But the question is how?

These questions are similar to those that were asked 15 and 20 years ago about glider design. What evolved from those questions was the Hang Glider Manufacturers Association's performance standards and testing methods to assess a glider's structural integrity, pitch stability and other qualities. Likewise, performance standards for tow line releases may provide some similar benefit. At the very least, it is hoped that a Failure Mode and Effects Analysis and some structural testing will provide better evaluation of a new design before someone attempts to fly with it.

David Kincheloe

1993/05

There is a lot of poor tow equipment being used. Some of it is outdated and only being used because "it's what we've always used," or "it's what Mr. X told me to use." There is some equipment that is very simple and effective, but chances are that most tow pilots will never see it because there isn't much money to be made selling such simple items. Let's spread some good ideas around so we can all fly safely.

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a. Any release design employed in the connections which engages a bridle end must:

i. have demonstrated to function infallibly, easily, and instantly under direct loading from 0 to 390 pounds without damage and with the required actuation effort recorded and not exceeding 25 pounds;

Jim Gaar

2007/04/04

I had my first lockout last January in a U2 145. I released as soon as I started to roll hard to the right but that was STILL not fast enough as by the time I hit the release I was 90 degrees to the tug going nowhere fast.

John Fritsche

2008/12/12

I haven't towed in several years. Do people still use those (IMO, stupid) releases that involve bicycle brakes?

Rohan Holtkamp

2005/02/14

Recommendation One:

Do not use a 'Wichard' or 'spinnaker' release directly connected to a string or rope. This type of metal release has a metal knob on the opening arm that a rope will catch on, even when the release is activated and open.

Sergey Ka

2006/05/23

I have aerotowed recently, my first three times. Wasn't allowed to use my mouth release (got the proper type which opens when you open your mouth) because the club uses Wallaby ranch style V-bridle. I've been really worried about releasing in a critical situation.

Also it didn't help my confidence that the particular top release was very hesitant to open - it took about three seconds of squeezing the bicycle brake type lever to open the release.

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axo

2009/06/20

I always check my spinnaker shackle hook and the cable. Mine is still pretty much new and has worked perfectly.

But I have seen others fail twice and one of them was during one of my training tandems. I just kept hitting the brake lever for a few seconds in WTF mode, and the instructor used the barrel release.

Ralph Sickinger

2000/08/26

Under sled conditions, I decided to borrow Brian Vant-Hull's glider instead of setting up my own, since we both fly the same type of glider. Brian's release is a different style, but I tested it twice during preflight to make sure I was familiar with it. After towing to altitude, Sunny waved me off; I pulled on the release (hard), but nothing happened! After the second failed attempt to release, I thought about releasing from the secondary, but before I could move my hand the tug stalled and started to fall; Sunny had no choice but to gun the engine in attempt to regain flying speed, but this resulted in a sudden and severe pull on the harness and glider; I was only able to pull on the release again, while simultaneously praying for the weak link to break. The release finally opened, and I was free of the tug.

Brian Vant-Hull

2000/08/28

I purchased my release (the one Ralph used) at Lookout Mountain over a year ago, but never had any problems until the Ridgely Fly-in, where the same thing happened. I pulled three or four times on the release, then finally went to the secondary, by which time I was high above the tug and Sunny (is there a connection here?) was frantically waving me off.

I've found it to fail this way once more since then, then on Ralph's flight, for about 1 time in 10.

Steve Kinsley

2000/08/28

I agree that it is pretty disconcerting. The first time it happened to me I was, like you, just "duuuuh". Many seconds elapsed before I found the secondary. It could be critical if a problem happens low so it is worth fixing.

Greg DeWolf

2000/08/29

I had an incident where the same (spinnaker) release (although with the connection being a brake lever and cable) did not release on the tandem glider at Lookout. This release had the hole drilled in the Wichard spinnaker shackle, just as Chad is describing as being the best configuration. The spinnaker release is not meant to function this way (that's why it doesn't come with a hole there) because the more force that is put on the line (happens at the time you need most to release), the more force that will be required to release it.

Now, I understand that the spinnaker release doesn't always function in the unmodified setup either (attached to the glider by the originally provided attachment point)...

Add to all of this the fact that Wallaby has found that after much use these spinnaker releases can jam because the pivot gets sloppy from wear, then maybe we find they are not the best releases we could be using in a mission critical situation.

My experience tells me that you are guaranteed to have a release problem in at least one in a hundred tows...

Lauren Tjaden

2008/03/23

When Jim got me locked out to the right, I couldn't keep the pitch of the glider with one hand for more than a second (the pressure was a zillion pounds, more or less), but the F'ing release slid around when I tried to hit it. The barrel release wouldn't work because we had too much pressure on it.

Janni Papakrivos

2008/06/30

Being able to tow and release without ever having to take your hands off the base tube is wonderful and much safer. With a bunch of tows to boot I can say that it happened once that I tried to release but missed the brake lever, instead I just pushed it around the down tube and had a much harder time reaching and actuating it. I have no trouble picturing how this could cost me valuable time and altitude in an emergency situation.

Rick M

2009/04/04

After another pilot got a morning sled ride I hooked in again for a second flight before breakfast. Since the first tow went so well I decided to remove the fin for this one. Yikes. I PIO'ed the crap out of the glider - right from the very beginning. I was over controlling like crazy. I actually went for the release just above tree level and missed. I hit the top of the release and knocked it sideways a little.

Davis Straub

2005/01/11

Rohan Holtkamp did an analysis of the fatal accident, in particular the bridle and weaklink, which never broke. The weaklink was caught on the release mechanism, a standard spinnaker release found on bridle systems used at Lookout Mountain, Moyes, Wallaby Ranch, and Quest Air. The release clamp has an arm that is thicker at the release point and this held onto the weaklink which consisted of multiple loops of thick line.

Bill Bryden

2004/04/01

Some aerotow releases, including a few models from prominent schools, have had problems releasing under high tensions. You must VERIFY through tests that a release will work for the tensions that could possibly be encountered. You better figure at least 300 pounds to be modestly confident.

Maybe 8-10 years ago I got several comments from people saying a popular aerotow release (with a bicycle type brake lever) would fail to release at higher tensions. I called and talked to the producer sharing the people's experiences and concerns. I inquired to what tension their releases were tested but he refused to say, just aggressively stated they never had any problems with their releases, they were fine, goodbye, click. Another person tested one and found it started getting really hard to actuate in the range of only 80-100 pounds as I vaguely recall. I noticed they did modify their design but I don't know if they ever really did any engineering tests on it. You should test the release yourself or have someone you trust do it. There is only one aerotow release manufacturer whose product I'd have reasonable confidence in without verifying it myself, the Wallaby release is not it.

Hang Gliding Federation of Australia
Towing Procedures Manual

2005/09

The pilot effort required shall not be less than 20 Newtons or greater than 100 Newtons (4.5 - 22.5 pounds).

The release control shall be so located that it can be operated by the pilot without having to release any of the primary controls.

Gregg B. McNamee

1996/12

PRIMARY RELEASE CRITERIA

3) The pressure required to actuate the release must not be more than three to five pounds throughout the entire towline tension range (from zero tension to the maximum strength of the weak link).

Greg DeWolf

2000/09/01

...(however, I have heard of some complaints of the Baileys being difficult to work under high loads).

Martin Henry

2008/04/28

Several years back I took the time to load test a version made local, they were hit and miss when you started get over 200 pounds of force. More to do with the pin type and condition of the inside of the barrel. When you did get a direct load onto the release the barrel did not provide the best grip to allow you to overcome the friction created by the forces.

Brian Vant-Hull

2008/06/30

Tad's barrel release tested

I, Brian Vant-Hull (hereafter referred to variously as "I" or "me") in the company of James Rooney (hereafter variously referred to as "Jim" or "Rooney" (collectively referred to as "we")) do attest that on Saturday, June 28, I have laid hands upon and inspected, under controlled and numerically repeatable conditions, the barrel release (hereafter referred to as "Tad's Release") constructed by Thaddeus Eareckson (hereafter referred to as "Tad") and have compared it under identical conditions to the 'Bailey' barrel release.

We found that under a load of 194 pounds the Bailey release required a very strong tug (I couldn't do it at first) while Tad's release could be actuated with the friction of two fingers at twice that load. Rooney could actuate the Bailey release immediately, but admitted they practiced this during tandem training, so he knew to wrap his fingers over the top and pull vigorously. I do not believe that if the forces became this strong I could operate the Bailey release with the alacrity required under lockout conditions, but could actuate the Tad release. I won't speak for Jim, but

Under weight of these observations, I do attest that TAD's RELEASE is SUPERIOR to the BAILEY RELEASE and that the BAILEY RELEASE is SERIOUSLY FLAWED UNDER HIGH LOADS.

In witness thereof, I attach my signature and moreover have purchased Tad's release.

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ii. be configured such that they are operational by the pilot in command without necessitating the moving of a hand or foot from a control (joystick, rudder pedal, basetube, downtube) except that in a slack line situation it is allowable to employ a one point / secondary release which requires one hand to be removed from the basetube for a maximum period of two seconds;

Wills Wing

glider owner/service manuals

...there are a few important principles to observe. The first is that you should not make any change in hand position unless you are flying at or very near trim speed. At speeds faster than trim, you will be holding the bar in in pitch against substantial force, and if you let go to move your hand the glider will pitch up and roll towards your remaining hand. The second is that while moving either hand, you have no control over the glider.

Phil Brown

2006/06/19

I began towing using the Koch style 2 stage release. I had some ideas to make it simpler and safer. Nothing reinforced my ideas more than when I had a near lock out scenario early in my towing experience. I was flying too slow and started sliding to the left. I pulled in and went full to the right. Slowly the glider straightened out and it all turned out okay. I would have released, but I needed both hands to "fly the glider."

Shiny

2006/05/23

I haven't aerotowed yet, every time I think seriously about it I read about another incident/accident and it scares the hell out of me although I realize that I am probably missing out on one of the most enjoyable aspects of our sport. My fear is mainly due to the fact that I think if I got into a irretrievable situation close to the ground my brain would not act quickly enough to unlock my hands and release! The incidents I have seen (albeit on video) appear to happen so quickly and by definition must therefore take the pilot by surprise.

Paul Tjaden

2005/10/08

At around two hundred feet I felt like I was losing the battle and released. The glider did a HUGE wingover but recovered with enough altitude to do a safe approach and landing. After that... I decided to stay on the ground for the rest of the day. Besides, I needed a change of underwear.

...

BTW, In both instances I was using an off the shoulders, pro tow type bridle with a bailey release. I've always felt that it was quick and easy to use this type of bridle and release. It was right under my nose and took only a split second to pull it. There was never any delay or anxiety caused by taking my hand off the base tube to reach for it. I quickly had both my hands back on the bar and don't feel it contributed to any loss of control. I would NOT, however,

have felt comfortable trying to reach way off to my corner bracket to find a bike release.

2008/07/22

The lockout Lauren mentioned was precipitated by my attempt to pull on more VG while on tow. I have done this before but this time the line wouldn't cleat properly and while I was fighting it, I got clobbered and rolled hard right in a split second. There was a very large noise and jerk as the relatively heavy weak link at the tug broke giving me the rope. I recovered quickly from the wing over and flew back to the field to drop the line... I have never had a lockout situation happen so quickly and dramatically and had no chance to release as I have always thought I could do.

Dallas Willis

2009/04/13

Wingspan34,

Could you go into more detail about your push button truck tow release and the lanyard version you experimented with? I'm truck towing an awful lot lately and have yet to find a release that doesn't scare the heck out me.

Wes

2006/01/30

I've only gotten badly out of shape twice, mainly because I'm sooo hyped I concentrate like a bugger! But when I did pin off, I found the urge to hang on to the base bar and try and fly my way out of trouble, rather than let go and scrabble for the release almost overwhelming.

It has made me realize that I would have been a lot happier if I'd been holding under my hand a kind of dead-man's switch. D'you know what I mean? Rather than having to let go and find my chest release, which is what I've used here in the UK (which I can't even see 'cause of my full face helmet) or strike the brake lever which was mounted on the upright (Wallaby) ... I could just let go of the brake lever and maintain control of the base bar with two hands.

Doug Hildreth

1991/06

Good launch, but at about 50 feet the glider nosed up, stalled, and the pilot released by letting go of the basetube with right hand. Glider did a wingover to the left and crashed into a field next to the tow road.

This scenario has been reported numerous times. Obviously, the primary problem is the lack of pilot skill and experience in avoiding low-level, post-launch, nose-high stalls. The emphasis by countless reporters that the pilot lets go of the glider with his right hand to activate the release seems to indicate that we need a better hands-on way to release.

I know, I know, "If they would just do it right. Our current system is really okay." I'm just telling you what's going on in the real world. They are not doing it right and it's up to us to fix the problem.

Helen McKerral

2009/06/29

A pilot's (modified) release failed at the top of tow, he locked out and spun/looped/wingedover more than 1000 ft within seconds to below ground level (we were fortunately towing parallel to a river gorge; he had fortunately wanged his way over the gorge; the link finally broke at cliff height and he had 150' to turn and land without a scratch below the cliff).

Watching that event highlighted the very short time frame between being slightly out of control, where you would still be thinking you could salvage the situation, to being completely out of control and flapped about around the glider like a rag doll, the G-forces preventing you from snatching at anything accurately. It is a horrendously short window of opportunity - maybe four seconds if that.

Steve Kinsley

1996/05/09

Personal opinion. While I don't know the circumstances of Frank's death and I am not an awesome tow type dude, I think tow releases, all of them, stink on ice. Reason: You need two hands to drive a hang glider. You 'specially need two hands if it starts to turn on tow. If you let go to release, the glider can almost instantly assume a radical attitude. We need a release that is held in the mouth. A clothespin. Open your mouth and you're off.

Sergey Marin

2005/02/16

It's good to be able to open release without taking your hands off the base bar. Most of HG pilots in former USSR use release locks operated by mouth peg. You are attached to the cable while you hold the peg by your teeth like Mosquito throttle. Anything goes wrong - you scream or swear and immediately you're free.

I have done a few winch flights with such release ~10 years ago, and people still use them for winch and aero towing.

I have no idea why pilots in other countries do not use it. Can't imagine learning to tow with anything else.

Dave Massie

2009/12/05

Tad is right in that any release that involves you taking your hands off the bar is faulty design.

Karolis Dautartas

2009/12/09

For HG aerotowing we use releases which get actuated by mouth - this is probably the quickest release system ever designed: by the time you get scared and say "AAAAGH", you are already flying on your own. This system already saved me once from a very serious crash.

Craig Stanley

2009/04/12

I've been working on making flying a bit safer. Because it takes 2 hands to fly a hang glider, it is important to be able to release from the tow plane while keeping your hands on the control bar. I have experienced, and seen plenty of videos of pilots getting out of control on tow, and unwilling to take their hands off the controls. When you get in a bad situation, pilots tend to try to control the glider instead of letting go of the tow rope. In the second it takes to grab for a release, a glider near a lockout position can really get in bad shape. The pilot in this video failed to release from the tow plane when he started to lose control (PIO) which shot him at the ground after locking out.

http://www.youtube.com/watch?v=F_n5B3-MIC4

After some pointers from Steve Kinsley and Tad Eareckson, I created the release shown here. The idea is quite simple, and can be made with $3 worth of material from the hardware store and an hour of spare time (more if you're like me and can't find your drill so you turn the bits by hand).

2009/06/02

Sorry to stir this up again, but I wanted to give a quick update on the mouth release. I added another loop into the release and I have to say, I love this thing.

Tension at the mouth is low and comfortable. Locking it off with the sliding barrel at altitude is quite simple. Releasing couldn't be easier.

Yesterday I was hit with a quarter side/tailwind off the cart. I got really high and to the left of the tug. I was pulling in and turning back to the right to get in line with the tug, but the tug was unable to climb fast enough and I could not dive fast enough. By just opening my mouth, I was free of the tug. I did not have to take my hands off the bar and let the glider get in a worse AoA or turn.

I'm sure my release is not the best one out there (I think the mouth-throttle version is good as well), but I strongly believe having a mouth release adds a lot of safety to towing from the chest.

British Hang Gliding and Paragliding Association Technical Manual

2003/04

On tow the Pilot in Command must have his hand actually on the release at all times. 'Near' the release is not close enough! When you have two hands completely full of locked-out glider, taking one off to go looking for the release guarantees that your situation is going to get worse before it gets better.

Gregg B. McNamee

1996/12

PRIMARY RELEASE CRITERIA

1) To actuate the primary release the pilot does not have to give up any control of the glider. (Common sense tells us that the last thing we want to do in an emergency situation is give up control of the glider in order to terminate the tow.)

If your system requires you to take your hand off the control bar to actuate the release it is not suitable.

Bill Bryden

2000/02

Our sport suffered a tragic fatality the evening of December 11. Debbie Young, age 43, an enthusiastic new novice-level pilot died from injuries suffered in a hang gliding crash.

An instructor mentoring Deb during her early solo tows radioed release instructions and the tow was aborted, but it was observed that her hands appeared to not leave the control bar to effect release.

The rapidity of the lockout was absolutely stunning to those observing the event. The glider went from being banked approximately 25 degrees and angled roughly 45 degrees to the towline, to being rolled over and pointed down in less than two to three seconds after the rollover.

Dennis Pagen informed me several years ago about an aerotow lockout that he experienced. One moment he was correcting a bit of alignment with the tug and the next moment he was nearly upside down. He was stunned at the rapidity. I have heard similar stories from two other aerotow pilots.

I simply don't think the sport or the industry fully understood or comprehended the rapidity with which these lockouts

can occur, and hence these corresponding needs. I didn't.

It is now clear to me that tow equipment must be capable of terminating a tow, including severing or releasing the line almost instantly. Taking a few seconds as required with many systems, and previously considered adequate by much conventional wisdom, is now clearly too long.

Luen Miller

1996/12

As one pilot stated in a summary of what went RIGHT in one of the above incidents, "I should have released as soon as I felt uncomfortable on the dolly. Release early and release often.

"What saved me? I imagined over and over and over at what point I would release, and I imagined releasing.

"Second, I used a loop release that attaches to the control bar. You put two fingers through it before launch and you never have to let go of the control bar. I might have been able to reach the bicycle release, I seriously doubt I would have had a chance to pull the three-ring release."

Peter Birren

2008/10/27

Imagine if you will, just coming off the cart and center punching a thermal which takes you instantly straight up while the tug is still on the ground. Know what happens? VERY high towline forces and an over-the-top lockout. You'll have both hands on the basetube pulling it well past your knees but the glider doesn't come down and still the weaklink doesn't break (.8G). So you pull whatever release you have but the one hand still on the basetube isn't enough to hold the nose down and you pop up and over into an unplanned semi-loop. Been there, done that... at maybe 200 feet agl.

Bill Reynolds

2007/04/03

I was aerotowing in a Sport 2 the other day. Everything was going fine until my left wing got popped up by a thermal, banking me to the right. At the same time, it looked like the tug just banked left, so I knew I had a problem.

I shifted all my weight hard left to correct, but it wasn't having much effect. I thought "release!", but I didn't want to let go of the control bar with my right hand to hit the release because I was holding my weight to the high side with all my strength, and if I let go I would have fallen to the low side and may have lost all my grip on the control bar.

Luckily, the weak link broke, and all worked out well.

2007/04/04

At the attitude and hang position I was in, I don't think my instincts would have let me let go of the control bar to hit the tow release, no matter how much I wanted to do it. I know that if I did, my body would have fallen hard right, jarring my left hand off the bar also, sending me swinging wildly around.

Carlos Weill

2008/11/30

On June of 2008 during a fast tow, I noticed I was getting out of alignment, but I was able to come back to it. The second time it happen I saw the tug line 45 deg off to the left and was not able to align the glider again I tried to release but my body was off centered and could not reach the release. I kept trying and was close to 90 deg. All these happen very quickly, as anyone that has experienced a lock out would tell you. I heard a snap, and then just like the sound of a WWII plane just shut down hurdling to the ground, only the ball of fire was missing. The tug weak link broke off at 1000ft, in less than a second the glider was at 500ft. At that point I realized I had the rope, so I drop it in the parking lot.

Dallas Willis

2008/12/23

...Also, during the first 500 feet of the tow (the most dangerous part), I'd submit that you should keep your hands right where they are on the control frame doing as you said "flying the aircraft".

Tad, I'm not sold yet but you are addressing my biggest fear of towing (and I have over a thousand aerotows in my logbook). I've been locked out a couple times low and have frozen and not felt like the right move was to let go of the control bar and release so I've been looking for a system where I don't have to do that for years. I've also either gotten the rope or wanted to let go with a lot of slack in the line and not been able to actuate the release since the standard ones rely on tension (makes the link-knife system attractive). So two questions for you:

1) Is there any kind of system that will allow me to continue to aerotow just from the shoulders and not have to let go of the bar? Even reaching up in front of my face to let go scares the snot out of me sometimes.

2) Have you or anyone else given thought to a similar system for ground based towing? I own both the Steve Wendt system and a couple others (I've modified Steve's by attaching a foam ball to the middle of the release string which gives me a bit bigger target to hit) but they all require both tension on the rope and a removal of the hand from the control bar to actuate. I've not thought about it enough to come up with a solution but perhaps someone out there has.

Rick M

2009/04/13

This has nothing to do with stability and feeling happy. I understand that I might do 99 tows using any given release and never have a problem. It's that 100th tow I'm worried about that might kill me because it exposes a fatal flaw in the release such as having to take my hand off of the basetube. Sure I might have successfully taken my hand off a dozen times to release while low but that doesn't mean it's safe. Getting away with something a few times DOES NOT mean that the "something" is in any way safe.

I'm focusing on the negatives in an effort to be as safe as possible. Why should any of us blindly accept these limitations? Just because you have gotten away with it so far is no reason to ignore the possible safety risks.

People do die or get seriously hurt aerotowing. Why don't we learn why and try to improve the situation? If many of the bad towing accidents could have been prevented or reduced with a better release then it is worth pursuing improvements.

JohnG

2009/04/13

Rick,

Not being constructive? There is one person who has put more thought and time into releases than anyone. That person is Tad. He explains the pros and cons to every release out there. I gave you the link to more release information than the average person could ever digest, and I didn't get a thank you. Just you bitching that we aren't being constructive. What more could you want? He has created something that is a solution, but no one is using it... apparently you aren't interested either. So what gives??? What do you want us to tell you? Your concerns echo Tad's concerns, so why not use his system? Every other system out there has known flaws.

Davis Straub

2006/01/19

I spoke most extensively with Chris Smith. He said that he watched the whole flight.

He stated that the pilot was getting out of whack, both yaw and roll, behind the Dragonfly. Then the Dragonfly and pilot entered a strong smooth thermal and they were both going up fast. When the Dragonfly got out of the thermal he went down fast and the hang glider pilot pulled in to follow him, getting out of whack again. He significantly reduced the distance between himself and the Dragonfly.

Then the radical actions continued and the glider went upside down and the wings folded. From 500 feet the glider tucked and spun. The pilot got the parachute out, but it did not open in time to stop the impact.

The rope looped around the side wire and formed a knot.

It is not clear when the rope looped around the wire. From Chris Smith's description, the rope would have been bowed substantially after the tug came out of the thermal. The weaklinks on both ends of the rope were broken and the pilot landed with the rope tied to the wire.

We have noticed that there is considerable movement and differences in altitude between the tugs and the hang glider pilots on the tow rope. Often the tug has been way above me or below me with bow in the rope when it is below me. This seems quite a bit more extreme than I have experienced aerotowing previously.

One of the things that interests me about this accident is that it highlights one of the potential problems of the windtech type tow release. These releases are really difficult (if not imposssible) to release with one hand if there is no tension on the tow rope. You need the bridle to be under tension for the release string to remove the pin. It strikes me that if you have enough slack in the rope to wrap around your wing wire there is probably insufficient tension to release even if you wanted to.

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iii. have been demonstrated to reliably retain connections in all circumstances, releasing only upon pilot actuation; and

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Hang Gliding Federation of Australia
Towing Procedures Manual

2005/09

All releases fitted to gliders must release at any angle and at any load that may be applied during tow. All releases must be infallible and must only release upon pilot activation...

Gregg B. McNamee

1996/12

PRIMARY RELEASE CRITERIA

2) The primary release must disconnect the towline from the glider at the pilot's discretion and not before. (The inability to release or premature release can have serious consequences for an unsuspecting pilot.)

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axo

2009/06/20

I always check my spinnaker shackle hook and the cable. Mine is still pretty much new and has worked perfectly.

But I have seen others fail twice and one of them was during one of my training tandems. I just kept hitting the brake

lever for a few seconds in WTF mode, and the instructor used the barrel release. The other one I saw failing was another tandem. The release just opened when they took off, around 50 feet up.

Doug Hildreth

1990/09

Immediately after launch, the glider pitched up sharply with nose very high. Apparently the angle caused an "auto release" of the tow line from the pilot, who completed a hammerhead stall and dove into the ground. Severe head injury with unsuccessful CPR.

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iv. have no components which present a potential for interference with the travel of a bridle or tow line or necessitate the removal of a glider's basetube wheels for installation.

Marc Fink

2005/02/09

I once got locked out on a Laminar ST while under aerotow--we went through a thermal coming off the field and the tug got rolled left and I got rolled right. The line was locked at the basetube corner bracket corner and the glider was rolled past 90--there was nothing to do to correct (hence lock-out) and I distinctly recall feeling what I felt were significant tow pressures. The weaklink finally gave way with a 'Ker-pow!' as I reached for the release, but the situation had already got to the point where I was stalled past 90 and was subsequently diving at the ground. I was very lucky in that I had just enough altitude to pull out and level off.

Luen Miller

1996/04

One pilot found his center-mounted vario caught on the tow bridle, preventing proper turn response until he freed it.

James Freeman

2005

Placing instruments on your base tube when ground towing is inviting a lockout. The reason is simply that the bridle no longer needs to contact the upright or front wires to exert leverage in the opposite direction to that which is desired - your instrument mount will do just fine as a fulcrum. In effect you have wound back the clock by twenty years and are now effectively towing off your base tube. Similarly the rubber grip material on some base tubes has also been proven to cause problems. We discovered this at our school when a course of students experienced unexpectedly frequent lockouts, always right at the top of the tow. Examination of the base tubes of the brand new floater gliders in use showed that the manufacturers recent addition of rubber grip material to the base tube was causing the top bridle line to grip the base tube at the top of tow. Scuff marks were evident on the rubber. After taking these rubber grips off the top of tow lockout problem completely disappeared.

Thomas Johns

2003/09

During aerotow instruction, pilot released from cart early. Glider settled back until the base tube contacted the ground, slid momentarily, then dug in and nosed over hard. Minor injuries. Wheels had been left off base tube in order to attach tow release.

Bill Bryden

2000/07

A pilot landed without wheels, whacked, broke his neck, and was paralyzed from the waist down.

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b. Any release which is subjected to the undivided tow tension must meet all of the above relevant requirements with the range extended to 675 pounds.

c. When the glider incorporates a bridle with a releasable upper attachment point it is required that a secondary release be employed below the tow ring. This release must adhere to all the specifications of the primary release and be used only in the event that the bridle wraps at the tow ring following an upper point separation.

Chad Elchin

20000/08/28

...a tow pilot should be planning on having to go to his secondary each time he tows. It is not often that you will need it, but you need to be ready. Even if the release works properly, the bridle can wrap around the tow ring and snag.

DaveB

2009/11/03

On my very first aerotow lesson, the bridle from an Lookout Mountain style upper release promptly wrapped itself around the towline carabiner prompting an even quicker secondary shoulder release by my instructor.

In fact, in three weekends of crack of dawn lessons and then ground crewing for the day for the rest of the pilots, the incidence of an upper bridle line tangling in the carabiner seemed almost 1 in 25 to 30.

Donnell Hewett

1996/11

Although it rarely happens, the free end of a threaded bridle has been known to whip around itself while unthreading, tie itself into a knot, and fail to release. The resulting sudden change in towline tension has caused more than one pilot to lose control of his glider, pitching the glider up into a stall or down into a tuck. I can't remember whether or not such a tuck ever resulted in a tumble, but I do know that if a threaded bridle ever jams at low altitude, the result could be fatal.

Harold Austin

1988/05

His bridle separated from his harness but remained attached to the keel. This resulted in a structural failure of the glider, a parachute deployment, two broken ankles...

Mike Lake

2009/07/04

If the bottom leg failed/released in flight for any reason then you would be towing from the keel only. This is a disaster (seen it happen) and likely to be fatal.

Just the one life lost because of this bottom leg failure as far as I know.

Rohan Holtkamp

2008/04/21

Once again history has shown us that this thread-through system can hook up and the hang glider remains being towed by the keel only, with the bridle well out of reach of even a hook knife. I know of just one pilot to survive this type of hook-up, took him some 12 months to walk again though.

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8. Whenever a configuration is employed in which the tow line is exposed to a possibility of significant twisting a swivel must be installed at its front end.

Davis Straub

2008/04/24

Chris Smith had an interesting thing happen to him here at the Santa Cruz Flats Race. On the first day he was towing behind a trike. Somehow the tow rope at the trike end got caught (just how is unclear), couldn't be released and was twisting up. It started vibrating at Chris's end. He wasn't aware of what the problem was and he decided just to hang on.

But the rope was now twisting and shorting itself and twisting itself up at Chris' end without him realizing it. Chris looked down as the rope kept vibrating and saw that his pro tow was twisting up also and twisting the barrel releases together. He immediately released one of his barrel releases and then the other, but that didn't release him from the tow rope, but it did scare him.

Then the weaklink broke and released him (just how is unclear).

(The tow line was routed through the propeller and the sleeve bearing froze.)

2009/12/12
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05 - THE ONE SIZE FITS ALL WEAK LINK

Whereas sailplanes have mandatory minimum weak link strengths based upon "the maximum certificated operating weight of the glider", hang glider pilots and flight park operators have absolutely no concept that there can be such a thing as an understrength weak nor any idea that the strength of the weak link should correlate with the mass of the glider.

They're also too stupid to adjust to new information once an old assumption has been debunked. So when it has been demonstrated that a weak link which was presumed to limit the tow line tension to 520 pounds actually is frequently failing at a quarter of that, no compensation will be made or even tolerated.

So while sailplanes tend to blow weak links at a rate in the ballpark of one per thousand tows and understand that the failures are dangerous, hang gliders consider themselves lucky to get five tows to altitude in a row and believe half G weak links are keeping them safe no matter how many flying days are ruined or how much aluminum is crumpled. Rather than adapt the weak link to the glider and power, conditions, and flying required to get it aloft, futile and unbelievably stupid and dangerous attempts to adapt the power and flying to the weak link is the standard operating procedure.

Typical experiences and reactions...

NEVER TRUST A WEAK LINK!

Expect two things from your weak link:

(1) It will break unexpectedly at the most inopportune time, with no warning adn no indicaiton of a flight problem.

(2) It will hold strong and fast whenever you move into a lockout.

Then I switched to the Falcon and the birds were singing in tune again. Until the brand new weak link vaporized at about 1000 feet for no apparent reason.

At 840 feet I noticed the tug was high and rising so I pushed out a bit to catch up. Broke the weaklink and stalled since I was so nose-high.

First try was a notably short flight, with a weak link break moments after lifting from the launch cart. The wind had shifted, so I had a down-wind landing, rolling in. I succeeded in dragging a knee instead of a toe on one side, so I earned a nice strawberry scrape.

I got five launches with three full flights on the US. Two weak link breaks. Both were non-issues.

Got to Ridgely after 12, late as usual and was one of the last to launch. Broke a weak link. From now on I use a new weak link every time since they're giving us dental floss now.

Kristen attached me to the plane and I rose briefly in the air. Pop! My weak link broke. (...The bad part is that sometimes the links just break, for no particular reason.)

Just a quick story with good educational value for other tow pilots. Yesterday I was the second of 3 off cart weak link breaks behind a 914 tug. Turbo was kicking in too quick says Bo.

I bent one this year when I had a weak link break right off the cart...

I had a weak link break at maybe 50 feet. I thought I was going to have to land in the soybeans -- the very tall soybeans -- when I looked at my angle. But, my glider stalled quite dramatically almost instantly (hard not to stall when you have a break), and dove towards the ground (a bit disconcerting from so low).

...I hit enough turbulence to break my weak link. #%*&!

Steve had a weak link break on his first launch just after leaving the cart and rode it in on the asphalt.

A second later, we are horrified to see her weak link has broken. We know she has been well prepared, but we want her first flight to be perfect.

...but at 400 feet my pussy-##s weak link broke.

I had a late start due to a weak link break.

Being a "large and tall" pilot (6' and 225 lbs) on a big glider, I don't get pushed around as much by thermals...but then again, I'm pushing the weak link that much closer to its breaking point (since everyone tends to use the same test-strength line for the link).

I've only had one weak link break while aerotowing and it happened while I was still very low and over the runway. I was happy that I automatically pulled in as soon as I heard the snap and got slow.

One of the more interesting and poignant ones is the smooth air break. Towing up in smooth air, in position and you have a good weaklink... just towing along straight and level, nice and smooth... when the weaklink breaks. There's no apparent reason. No rough air, no rough glider inputs... it just breaks.

Broke the weak link at 100' this time. The tow was a little rowdy, but not that bad. Don't know what caused the break.

This time the link broke at 900'. Damn.

Broke the weak link at 1000'. And it was a fairly mellow tow.

I was in line early but had a green tow pilot. My weak link broke after an extremely fast 350 feet.

Anyway, on my first tow, Tex entered a thermal at just over 1100 AGL, and I failed to track properly behind him. I got turned away from him (not badly) and as I was about to get back into position the weak link broke at 1200 AGL.

I could feel a huge gust hit right as I came off the cart. Uh oh. I was right behind the tug at maybe 100 feet when my link broke. (Kev said yesterday the weak link might have also broken because of the very powerful tug, which throttled back yesterday.)

My weak link broke for no obvious reason at ~2,000' as Zach was pulling me in a wide turn to get back into a thermal he had found earlier.

I also understand the reason why some comp pilots would choose to fly w/o a weak link. I have been in situations where I am thinking "please don't break, please". The glider's coming back, things are under control and "pop". #$%^$.

I have had one weak link break during launch and I feel "lucky" everything went well and just landed a bit hard on the wheels.

But I also saw a world class pilot having exactly the same problem and breaking the link at the same altitude. But he broke the downtubes on his Litespeed and looked to be in pain in one of his wrists. He was fine though.

I saw more weak links break at low altitude and it is always a few seconds of anguish and uncertainty about what's gonna happen to the pilot.

Due to the rough conditions weak links were breaking just about every other tow and the two tugs worked hard to eventually get everyone off the ground successfully.

Tom Lanning had four launches, and two broken weaklinks and a broken base tube.

Don't ever pull a solo at full throttle... they will not be able to climb with you. You can tow them at 28mph and you'll still leave them in the dust... they just won't be able to climb with you... weaklinks will go left and right.

And every now and then someone gets killed.

2009/11/30
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06 - TOWING INCIDENTS AND ANALYSIS

Following is a collection of hang glider towing incidents.

Most occurred during aerotowing operations in the United States, all are relevant to the manner in which aerotowing operations are conducted in the United States.

Eight of the involved individuals got off without injury or crash damage.

Two were uninjured but had substantial repair bills.

One each for cut lip, broken wrist, and concussion.

Two were severely injured but put back together.

Three were horribly injured and permanently incapacitated.

Sixteen people died.

These incidents illustrate the how little safety margin exists as a result of the inherent instability of the hang glider towing system and how vital it is that the pilots receive unambiguous training and use the best equipment available so as to maintain as much control as possible at all times - especially when the situation starts going south.

It can also be seen that physics cares a great deal about equipment and little to nothing about one's reaction time, proficiency rating, years of experience, competition standings, or aerobatics capabilities. New Hang 2 or national champion, hang glider towing is an equal opportunity killer. The point of no return is the point of no return, is the same for everyone, and one can easily get to it in a heartbeat or two.

In nearly all of the aerotow incidents one can document the violations of equipment standards that are universal practice but never really matter until the situation is such that they really matter. The release actuators are all within easy reach until the pilot's lives are dependent upon them. At those times they become completely inaccessible.

There is no such thing as a premature release or understrength weak link until one's future existence becomes dependent upon remaining on tow. Then after the ensuing and predictable whip stall the fatality is blamed on some other peripheral factor and business continues as usual.

The HGMA certified glider is always controllable and stable enough for acceptably safe flight under tow until that controllability and stability are critical for survival. Then the pilot takes a hand off the basetube to get to a release and the glider starts doing whatever the hell it feels like. And what it feels like doing on its own never seems to be in its own best interest.

Cheap, easy, and obvious fixes for these problems have been available for decades but without some form of regulation will never be adopted.

01

2007/10/18

Bill Floyd

Doug Koch

2007/10/24

A long-time pilot from Southern California and recently Las Vegas named Bill Floyd was seriously injured in a hang gliding accident last week. He launched unhooked while towing at a dry lake bed in Vegas.

Bill fell about 20-30 feet from his glider and hit the dirt so hard that he broke both feet at the ankles and drove his shin bones out the bottom of his feet. He also broke his hips and nose, along with other more minor injuries. He is

currently in ICU for a few more days and then on to a regular hospital room for a while then to rehabilitation.

Stewart LaBrasca

2009/08/27

How many of you have ever helped airlift a fellow pilot off the hill after launching unhooked? Because this is a (tongue in cheek) self regulated sport, there is no SOP for hooking in prior to launch. Therefore it is obviously up to the PIC to make sure he is hooked in. As a commercial pilot for an airline I am glad that there are mandatory flows and checklists required.

George Whitehill

1981/05

Over the years I have observed the problem of pilots taking off not having hooked into their gliders. I've also read about and seen the tragic results.

Just doing a hang check is not enough.

The point I'm trying to make is that every pilot should make a SECOND check to be very certain of this integral part of every flight. In many flying situations a hang check is performed and then is followed by a time interval prior to actual launch. In this time interval the pilot may unconsciously unhook to adjust or check something and then forget to hook in again. This has happened many times!

If, just before committing to a launch, a second check is done EVERY TIME and this is made a HABIT, this tragic mistake could be eliminated. Habit is the key word here. This practice MUST be subconscious on the part of the pilot. As we know, there are many things on the pilot's mind before launch. Especially in a competition or if conditions are radical the flyer may be thinking about so many other things that something as simple as remembering to hook in is forgotten. Relying on memory won't work as well as a deeply ingrained subconscious habit.

In the new USHGA rating system, for each flight of each task "the pilot must demonstrate a method of establishing that he/she is hooked in, just prior to launch." The purpose here is obvious.

By taking responsibility for our own safety we are truly SELF regulating our sport. Isn't this the way it should be?

Rob McKenzie

2009/08/26

I do a hang check before nearly every flight. I probably miss the hang check about 1 in 1000 flights.

I like variety. Sometimes AUSSIE and sometimes not. It helps to bring the thought process alive. Routine leads to boredom which leads to reactive thinking which IMO is a poor facsimile of true thinking.

+++

Analysis - TE:

01. This very common little oversight of failing to secure oneself to one's glider cost this pilot the lower parts of both legs.

02. The use of a launch dolly, like the one normally used at this site, mitigates a lot of problems in tow launches and virtually eliminates any possibility of this one occurring. There should be very good reasons for conducting flight operations with anything less than the best safety equipment available, especially when dollar cost on the most expensive of it are all within or just barely outside of triple digits and a great many are double digit affairs.

03. As one can see from Regional Director George Whitehill's announcement in the USHGA's Hang gliding magazine well over a quarter century prior to Bill's accident, quite contrary to Stewart's observation there is, in fact, an extremely effective and virtually effortless standard operating procedure for ensuring the pilot is hooked in to the glider just prior to launch. Strangely enough it is found in USHGA's Standard Operating Procedures - which nobody ever bothers to read or follow.

04. However, because this is, in fact, a (tongue in cheek) "self regulated" sport, this most fundamental and critical of all of hang gilding's procedures was NEVER implemented on any significant scale and the few instructors who have even heard of it tend to treat it with open defiance and contempt.

05. Whereas USHGA's stated intent was to make the hook-in check within seconds of launch so much of an established routine that it became a subconscious component of the launch procedure and could not be forgotten, Rob likes to liven the scene up a bit with the trusty ol' hang check which he, a highly experienced and accomplished professional pilot and instructor, manages to remember all but one time in a thousand. Instead of training to make the procedure reflexive, Rob wants to keep it something the pilot has to stop and think about when he's standing on the edge of the cliff - pretty much the precise opposite of the stated intent of the "regulations".

06. So doing the math, assuming that all of a flock of a hundred of his students have their acts together as well as he does, if everyone does ten flights someone's gonna miss the check. Most of the time that oversight won't get him hurt or killed but a fair percentage of the time it will.

07. So how does USHGA enforce discipline on the Instructors it certifies to teach and rate pilots according to its standards but who instead defy those standards? By meting out the dreaded annual Instructor of the Year Award. Rob got his in 2000.

08. Offhand I can think of two Instructors of the Year who had pilots on whom they had signed off leave launch without their gliders not long after the honor. One sent his tandem glider and passenger into the power lines and himself into a coma, the other was killed instantly below the base of the escarpment.

09. Until there are sane and proven mandatory standards of equipment and procedures implemented and enforced in hang gliding operations the sport will remain the threat to the public that it has always been.

10. Yeah, George, we should be taking responsibility to make this a safe self regulated sport but it's pretty obvious

we NEVER will.

02

1985/07/17

Chris Bulger

Rob Kells

1985/09

On July 17 you and I lost one of the most gifted pilots who has ever been in the sport of hang gliding. Chris Bulger started flying at age thirteen, and had racked up thousands of hours in hang gliders, hundreds in trikes and many in airplanes. The guy was a pilot's pilot: one of the world's best, and as the saying goes, he could have flown a picnic table.

The following is a brief summary of what happened during the tow flight that cost Chris his life. It is presented here with the hope that all who aero tow will not repeat the mistakes that were made; we know that Chris would want it that way.

I was not at the airport that day so what follows are my conclusions after talking with many of the people who were there and personally inspecting the equipment that was being used, after the accident.

It was late in the afternoon, and the conditions were smooth. A number of successful tows had been made that day without mishap. Kenny Brown, Mitch McAleer, and Jeff Huey each had clean tows to approximately 2500'. While Chris was towing John Pendry they climbed to between 1,000 and 1,500 feet.

Chris made a fairly sharp right turn which caused John to lock out to the left. John was fighting to get back behind the tow vehicle. At one point he started to recover from the lock out and then felt a "bump" (hard pull on the line). The trike tumbled, the single strands of 505 leech line that went from John's shoulder straps to the three-ring broke one at a time, and presumably the shackle pulled out of the trike release at the same time the second strand of 505 gave way.

The trike tumbled a second time, and broke a leading edge, and then on the third tumble Chris was thrown out and fell approximately 500' to his death. Exactly what happened will never be known but studying the physical evidence suggests several observations:

THE WEAK LINK:

It was one continuous strand of 205 leech line looped through the ring on the three-ring circus release (glider pilot end) and the tow rope, and fastened together with a fisherman's knot. This material is rated at 125 lbs. per strand by the manufacturer. The strength of the weak link would figure to be 4 X 125 = 500 lbs. minus the loss in strength due to friction and the knot. I have done several load tests with this material and duplicate hardware and found that the "weak link" was good for at least 400 lbs. Chris was telling me at breakfast that morning that Thevenot, when towing at the factory, doesn't use a weak link. In any case the weak link that was being used did not break. It is recommended that you never use a weak link good for more than 150 to 200 lbs. I have been using for years a single loop of 205 with three overhand knots and two bowlines to tie the ends together. Its breaking strength is between 210 and 215 lbs. It has always broken when necessary, but sometimes a little more time was required than I was comfortable with.

If you're towing, USE A WEAK LINK and test its breaking strength on numerous samples. Be sure it is breaking consistently at UNDER 200 lbs.

THE TRIKE RELEASE:

The trike was manufactured in Australia by Ricky Duncan. The trike release had been tested by the manufacturer for a straight pull of 300 lbs. They had always used 150-lb. weak links and had never had a release failure. Due to the increased load with this weak link it appears that the release on the trike did not malfunction. It was a steel pin on the end of a cable that went through two bolts with a shackle fitting in between. The cable was routed to a foot peddle at the nose of the trike. The trike inspection revealed that the pin was bent above the bottom bolt making release from the trike end impossible, and the cable was broken away from the foot pedal, indicating that Chris was trying hard to pin John but was unable to. So a release that was tested to 300 lbs. proved inadequate for a 350-lb. plus load at an angle up and to the side. It is of course also possible that the release was damaged on the ground by an impulse load caused by the rope snagging on something.

THE GLIDER

The glider was a Moyes GTR 180 which had been modified to increase wing area and airframe strength for the purpose of using with a trike. This particular glider had undergone continuing modifications as late as the day of the accident. There is no evidence that the glider was a contributing factor in the incident, but at the same time there is no data on file which establishes its level of airworthiness.

PILOT RELEASE:

It is my understanding that John did not have a lot of aero tow experience. He was locked out and putting everything he had into recovering. It's tough to let go when you're locked out and it has usually been the case that the better the pilot the more attempt is made to recover rather than release well before a lock out becomes severe, especially when on high tow.

THE PILOT RESTRAINT SYSTEM:

The pilot restraint in the trike was a single lap belt of two-inch webbing with a pinch type buckle, so when open you can actually take the buckle right off. I think the buckle would be OK if it were clamped down fully but it seems too easy to misuse this system. I believe in four-point harnesses in all ultralights. It is all too easy to deploy a chute or tumble and then be thrown out of a lap belt. The appearance of the trike suggests that Chris may have survived had he stayed in the trike.

NO PARACHUTE:

Chris had no parachute. They had one in the trailer, but they were too anxious to get towing to take the time to put it on. In view of the fact that Chris came out of the trike it would not have helped him unless it was the type that attached a pilot harness to the chute and the trike.

NO HELMET:

Chris wasn't wearing a helmet. It may not have mattered in this case, but it could have. A pilot cannot do much to help himself if he is knocked out in the air.

Hang glider towing has been around since the earliest days of foot launched hang gliding itself. It has long been felt by many that towing has the potential to open up hang gliding to a much wider potential market of pilots. The major stumbling block through the years has been safety; towing has always been more dangerous, both inherently and statistically, than foot launched flying. Recent advances involving improved winches, the center-of-mass bridle system and the use of relatively weak "weak links" have offered new promise of increased safety in towing. The development of aero towing has made towing feasible from smaller fields, once more promising to extend the range of potential flying sites.

However, Chris Bulger's accident should serve to remind us that the dangers involved in towing are still very significant. There are few pilots in the world, if any, more skilled than John Pendry. Chris Bulger was both a highly skilled hang glider pilot and a very experienced trike pilot. They were towing in mellow, ideal conditions. They made a few seemingly innocuous mistakes, and it cost Chris his life.

NEVER underestimate the danger in towing, and never shortcut or ignore any safety procedures. Let's not let Chris Bulger's tragic death be for nothing.

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Analysis - TE:

01. This accident occurred immediately following publication of the original USHGA Aerotow Guidelines.

02. The action which triggered the cascade of failures was a voluntary and inappropriately abrupt turn executed in smooth air by the tug pilot to which the competition pilot behind him was not able to adequately respond.

03. The glider was not, as Rob states, locked out. He was out of position but in the process of returning to proper and stable position as the weight shift tug was losing control.

04. Rob's assessment of the weak link was based on botched theory. An ideal weak link for that glider would have been in the neighborhood of 430 pounds and, under current USHGA regulations, permissible up to around 600. Weak links in the range the reporter recommends are dangerously understrength for virtually all gliders flying.

05. It appears that there was no weak link between the tug and the tow line, as was and is required.

06. As the sole purpose of the weak link is to prevent the aircraft from being overstressed and both tug and glider were intact at the time of separation, the weak link was not a factor in this accident, one way are the other.

07. The glider pilot's tow bridle and tug's release were flimsily constructed and failed with the tow tension not far beyond 300 pounds. They should have remained intact and functional at any conceivable angle to at least twice what they did. (It is extremely unlikely that damage to the tug's release was a consequence of the tow line snagging on anything prior to impact.)

08. The glider pilot's release required a reach which would have instantly cost him any control he might have been able to regain and more. He would have been completely unable to effect the separation the tug pilot was desperately trying to achieve without at least temporarily making the situation worse.

09. The tug's pilot restraint system was, obviously and as stated, inadequate but at the time of its failure the pilot's survival was very far from a sure thing in any case - with or without a parachute and helmet.

10. While the tug's safety was dependent upon timely separation the glider pilot was apparently not aware of that fact at his remote vantage point.

11. This accident dramatically illustrates that, even in totally benign atmospheric conditions, the best pilot skills on the planet can in no way begin to compensate for shoddy equipment.

12. A lot of these reports end with a plea from the author that we learn from the tragedy so as not to repeat it. But we never do. Eleven years and eight days after Chris was killed Bill Bennett and Mike Del Signore slammed in and came reasonably close to taking the tug pilot out with them. Smooth air, mistakes made regarding relative position, junk equipment including nonfunctional release on the front end. And of course the standard invocation that we learn from the mistakes and make our sport safer. Then right back to business as usual.

03

1990/07/05

Eric Aasletten
24
Intermediate
2-3 years

UP Axis
Platform tow
Hobbs, New Mexico
Fatal / Head

Doug Hildreth

1990/09

Reasonably proficient intermediate with over a year of platform tow experience was launching during tow meet. Home-made ATOL copy with winch on the front of the truck. Immediately after launch, the glider pitched up sharply with nose very high. Apparently the angle caused an "auto release" of the tow line from the pilot, who completed a hammerhead stall and dove into the ground. Observer felt that a dust devil, invisible on the runway, contributed or caused the relatively radical nose-up attitude. Also of concern was the presumed auto release which, if it had not occurred, might have prevented the accident. Severe head injury with unsuccessful CPR.

Comment: Pilot error in terms of pushing out too much too early or in terms of a purposeful release could not be determined. The reporter was certain he saw a dust devil begin on the edge of the runway in a location that would support an invisible dust devil on the runway crossing the path of the truck and glider.

Recommendation of the reporter: If towing is done in gusty, turbulent or thermal conditions, a row of wind flags should be on each side of the runway at 50-75 foot intervals to warn of invisible turbulence. 1) Pilots should attach their release line in such a way that there will not be an auto release. 2) Weak links should be strong enough so that breaks right after launch will not occur. 3) Pilots should be trained not to release in a pitch-up situation until the glider is stabilized. 4) Test each tow rig regularly to assure that line tension just after launch is below 150-200 pounds.

Hang Gliding Federation of Australia
Towing Procedures Manual

2005/09

All releases must be infallible and must only release upon pilot activation...

Cragin Shelton

2009/11/11

...on down to Blue Sky at Manquin.

Good tows off the truck; I reached 1150 and 1250 on first two runs. Release popped early on the third at 600.

Peter Birren

2009/08/09

PITCH & LOCKOUT LIMITER

The lockout starts with a bit of roll away from the tow direction. This rolling ultimately makes the glider want to behave like a tail-less kite and turn 'round the line. A short way into the turn there is a high degree of pitch-up attitude relative to the towline, so having a release at the point of too much pitch could automatically release the pilot and hopefully provide the pilot with sufficient recovery time.

How it works:

With the release at the apex release site, a second release line will be attached to the glider's nose. As the glider pitches up relative to the towline, the release gets farther from the nose and tightens the line.

2009/08/09

If you want a truly foolproof release, it's got to be one that eliminates the pilot from the equation with a release that operates automatically.

Bill Walsh

2008/01/25

Just after getting my rating I had a wild tow. The glider had gotten out of alignment with the tow rig, I overcompensated and oscillated quite a bit. Luckily I was able to get back in line.

After landing some of the pilots came over and showed me how to "short tie" the release line. They shortened the release line and tied it to my shoulder pad (or to the aero tow loops). Then if the glider pitches up too much on tow, or you get too out of alignment the bridle releases automatically. It works!!! The very next day I was once again on tow and got into a REAL lockout. I was 75' off the ground and going almost straight into the ground when the release engaged. I was free of the line, the glider stalled with the release of all that weight from the tow tension, and I was able to land perfectly after diving and flaring. Now I fly "short tied" always and we demand that all pilots are "short tied".

Mike Bomstad

2009/06/18

Static winch towing a Moyes Matrix Race

I have a Rotor harness and tow from the leg loops with a home made bridle. It works well and I have no issues with it.

The 3rd line (green) attaches higher on the harness, this is in the event of a lock out. The angle will become to steep and pull the pin on its own.

+++

Analysis - TE:

01. The pilot had the release lanyard loop on his wrist such that it would be tensioned as the glider's pitch attitude increased and slackened as it decreased. It should have been no great surprise that this accident waiting to happen eventually happened.

02. Another popular and somewhat less shoddy arrangement which reduces the magnitude of this problem has the lanyard anchored at one of the pilot's shoulder straps.

03. A configuration which eliminates this problem which, not surprisingly, is used by no one save for yours truly, is to anchor twin lanyards on the both of the harnesses tow loops. (A pair of barrel releases on the tow loops is an even better way to address the problem.

04. Despite all of the cautions against routing the lanyard to a wrist that emerged in the wake of this fatality, the configuration today is just as popular as it was almost two decades ago - and auto-releases are just as common.

05. No release which requires removal of a hand from the basetube is safe or acceptable.

06. One would have hoped that the hang gliding community would have learned from this fatality that configuring a release system such that it could ACCIDENTALLY release as a result of the glider pitching up was a really bad idea. But instead DELIBERATELY configuring the system to do so is viewed as such a great idea that it's made mandatory.

04

1996/07/25

18:00-19:00

instructor, passenger:
Bill Bennett
40
175 pounds
port side
20+ years, Master rating, Examiner, Observer, Instructor, Tandem Instructor, Tow Administrator, Aerotow Supervisor, Tow Administrator, all special skills
killed instantly
head, face, neck, back

student, pilot in command:
Mike Del Signore
44
225 pounds
starboard side
spaghetti harness
17 years, Advanced, Advanced Instructor, all special skills (including foot/tow launch and aerotow) except Tandem
second tandem tow, first in command
airlifted, did not survive trip to hospital
face, neck, back

tug pilot:
Dave Farkas
unrated

Pacific Airwave Double Vision
tow line: 100 feet

Cleveland Sport Parachuting Center, Gates Field, Garrettsville, Ohio

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Luen Miller

1996/10

Towing behind a Saber trike, the two pilots began a tandem flight that was to be part of a Tandem 1 sign-off. The student was acting as pilot in command, with the instructor as passenger. Conditions were reportedly calm, warm, very humid, and post-frontal.

After a normal roll-out that was slightly extended by the trike pilot to allow the tandem glider to achieve more airspeed before liftoff, the flight began normally. The trike pilot observed the glider behind him to be slightly low and slightly off line. He reported the climb to be "a little slow, but normal for the weight."

Witnesses on the ground saw the glider yaw slightly to the left some time soon after it came off the dolly, remain slightly off line, then begin to roll harder to that side. At this point the tug pilot attempted to release, couldn't, and tried slowing to let the glider catch up, then speeding up to try to break the weak link. At some point the glider either seems to have entered a hard, arcing locked-out turn into the ground. There is a possibility that the glider stalled in a steep turn as the line or weak link broke. The maximum altitude estimated for the steep turn ranges from 50 to 150 feet.

The glider hit the ground hard at a steep angle, left wing first. One pilot was apparently killed on impact, the other died a short time later.

Dave Farkas

1996/05/02

Due to the extra weight on the glider, I kept the trike on the ground a little longer than usual to make sure the glider could gain enough flying speed. The launch from the trike side seemed normal. Climb out was a little slow, but felt normal for the weight. I was checking the glider in the mirror as we climbed out and it appeared a little low, but not way off. Mike seemed pushed out, but not all the way. The glider never dipped below my view in the mirror and seemed to stay about in the same place and stable as we climbed out. I can't remember for certain, but I may have eased the bar out slightly to try to get a little better rate of climb and get away from the ground a little quicker.

I estimate at about 100 - 150 feet, I noticed the glider tracking left. I felt confident with Mike and Bill on the glider that if they got off track or in a problem situation, they would correct it or release, as had happened a couple of other times during the week on other tandem flights with other students, though at higher altitude.

As I checked on the glider, it continued to track more to the left and wasn't coming back to center. I estimate the airspeed at this time to be between 30-35 mph. Due to our low altitude, I didn't want to wait too long to take action, as it seemed pressure was building and the weak link hadn't broken. The next two steps may not have happened in this order, as this part is still a little confusing in my mind. I believe I pulled the release handle, but nothing happened. I tried to maneuver the trike a little to line up better with the glider to get them back in line, but that didn't work.

The trike was now being pulled to the left toward a tree line and I felt we were now in real trouble. I either pulled the release handle again or it was still opened from before, but the line still did not release. I didn't want to try this, but I thought if I reduced power a little, I might be able to lighten the pressure for Mike and Bill and maybe they could get the glider back under control, so I came back on the power some. I waited a short period and then powered up to try and force a weak link break or make the tow line release. At this time the trike was again being pulled what seemed very close to the tree line. I kept up power to try to pull us away when either the weak link on the trike broke or the tow line released. I was able to pull the trike away from the trees and circled back to check on the glider which I then saw on the ground. I quickly landed the trike and proceeded to the accident site.

Dennis Pagen

1997/01

However, perhaps more critical was the fact that during the flight that proved fatal, several factors were combined. First, Mike, while a very experienced ground-based tow pilot, was new to aerotowing. Second, Mike was not an experienced tandem pilot. Third, the tug pilot was inexperienced. Fourth, the weak link was way too strong. Fifth, the arrangement of the tandem pilots was not ideal, and sixth, the release at the tug end may have malfunctioned.

A significant matter is the fact that Mike was by far the largest pilot Bill was flying with. Not only did this create a very high wing loading on the glider, but Bill was unable to reach the control bar according to some witnesses. Even if he could in normal flight, I believe he could not in the reported situation in which Mike was pushing full-out to climb behind the tug.

Witnesses reported Bill saying that the tow was too slow on their first flight together. Unfortunately, a witness who was standing with the tug pilot between flights indicates this message was never given to the tug pilot. It seems clear from Bill's comment and what happened subsequently that a slow tow combined with heavy loading is what initiated the fatal sequence.

Once the pilots were airborne they remained low on the tug and most likely passed through at least a portion of the tug's wake. This wake is very turbulent and requires constant, hard roll control with a nearly full push-out to climb above. This is not a desirable position to be in, especially close to the ground. The tug pilot can help in this situation by diving to increase the glider's speed. In this case, the inexperienced tug pilot didn't know the proper procedure and cut power to "let the glider catch up." Later he apparently dove to break the weak link, but by this time a lockout was in progress and speeding up makes it worse.

If a tug is going to slow to begin with, there is no way to climb above the wake and the only recourse is to release. I believe he tug's wake turbulence rolled or stalled the hang glider and a lockout rapidly ensued. I am sure Mike did not have the experience to make a quick and timely release decision, and anyway he had his hands full trying to control the glider. Bill was certainly monitoring what was taking place, but without being on the control bar he had no idea what forces and feedback were occurring. I expect the lockout progressed so fast that he had no chance to react once it got serious.

The bridle system used was like that shown in the photograph on page 20 of the September 1996 issue of this magazine. There was only a bottom release. The weak link was at the top and was tested after the accident to break at over 300 pounds (it was constructed from 205 Dacron line). Because of this doubling effect of the bridle, this would requires a towline force of over 600 pounds to break. This is way too high. There is no known reason for the failure of the tug release since it was tested before and after the accident with a realistic tow force. However, correcting both of these matters - overstrength weak link and release failure - would not have necessarily prevented this accident, for even if the glider was freed from the towline it may have been too low to recover from the lockout attitude.

In conclusion, let me point out that like most accidents, in this case a cascade of events occurred that got out of hand. I don't agree with the accident analysis in the October, 1996 issue that indicated that it was the failure of the pilots to release. I think the root cause was a series of problems as outlined above, and more specifically, our failure to educate pilots on all levels of towing. This includes towing administrators as well as pilots. To remedy this situation we recommend the following. (These are merely my suggestions and I'm sure many more items will be addressed in the USHGA Towing Committee.)

1) A pilot should be an experienced tow pilot before he or she is allowed to be pilot-in-command for the first 300 feet AGL in a tandem situation.

2) A training situation should not include an inexperienced pilot at both ends of the towline (tug or winch operator at one end and glider pilot at other end).

3) Tandem aerotowing should take place at five mph faster than solo towing for the first 300 feet.

4) Weak links should be tested for maximum load with the actual bridle setup to be used.

5) Pilots should be taught early emergency release procedures and should practice such as part of their training.

It should be made very clear to all pilots that tandem gliders are less responsive than solo gliders in general, and are thus more susceptible to wake turbulence-induced problems and lockouts. There has been some suggestion on the Internet that tests of the wake turbulence behind an aero-tug be conducted to check its magnitude and potential danger. This is probably unnecessary, for many pilots, including myself, have been in this wake turbulence. It is not overly upsetting to a responsive glider with an experienced pilot, but I, for one, would not like to be in the wake in a tandem glider near the ground. Tug pilots may have a tendency to resist diving down to help the hang glider in such a situation close to the ground because of obstructions and field limits. Thus, the safest procedure is for the glider pilot to release if he gets caught low in the first 100 feet of aerotow climb out. In the 12 different towing operations I have aerotowed with, I have never heard of or seen anyone practice low releases. Such practice, if carried out with safe limits, will go a long way toward training pilots to come off the line in a timely manner in case of trouble.

Felipe Amunategui

1996/08/02

Examination of the tow line after the crash revealed that the weak link in the tandem end was intact, and that the tug end had no weak link and no steel ring (used to secure the line to two string release on tug). This suggests that the line did not release when the tug pilot intended it to.

1996/12

Also, I am certain that Mike would want want us to learn how to avoid a similar tragedy. We owe it to Mike and Bill to further refine aerotowing in general and tandem towing in particular. Mike left us a legacy in the form of a community

of hang glider pilots where there had been none, a community that helped its members ease the pain of his departure. We owe it to him to keep it alive.

Greg DeWolf

2000/08/29

One of the most important factors making aerotowing as safe as it is nowadays (and much safer than it was in the past) is the release system we employ. Being able to pin-off within a second or two of recognizing a situation going sour is key. The lack of that ability was a major contributing factor in Bill's accident several years ago, IMHO.

Jim Rooney

2007/08/01

Whatever's going on back there, I can fix it by giving you the rope.

It's more of this crappy argument that being on tow is somehow safer than being off tow.

+++

Analysis - TE:

01. Much has been made of the issue of the glider's alleged overstrength weak link, however... The reporters somehow seem the miss the fact that the back end weak link's strength is completely irrelevant if it exceeds the rating of the front end weak link.

02. Felipe's report shows that the tug end weak link failed before the glider's and thus indicates noncompliance with USHGA guidelines. (It appears that the tug pilot actuated his release after the failure of his weak link and lost the ring which engages the release.)

03. The glider's only weak link was at the top end of the primary bridle - in direct violation of the aerotowing regulations. Had it failed and the bridle wrapped at the tow ring the glider would no longer have been weak link protected and its only release - which was likely marginal to begin with - would have been have been subjected to at least twice the anticipated load.

04. Dennis estimates that - even had the tug's weak link been heavier than the glider's - the tow tension would have been limited to around 600 pounds. This would translate to about 1.2 Gs which is a very appropriate figure for any glider.

05. The mechanical advantage afforded by the tug's release was entirely inadequate for the job - in violation of the guidelines - and the safety of the tug was thus actually jeopardized and the safety of the glider could have been. This deficiency could have easily turned this incident into a triple play.

06. The stellar inadequacy of the tug's release, however, played no part in the fatalities. By the time it was brought into play and failed the glider was far beyond the point of no return.

07. The actuation of the glider's release required a surrender of the grip on the basetube and thus a potential critical loss of control.

08. Releases are required to be operable under zero tension and the glider's was extremely poorly suited to this task. Slack line release would have required the use of both hands. The release used was similar to the one which was believed to be and very likely was a factor in the James Simpson fatality. No mention was made regarding the anchoring of the lanyard.

09. The glider was deliberately releasing the bottom end of the bridle and had no means of releasing from the top in the event of a bridle wrap at the tow ring. Even under normal circumstances in benign conditions at altitude a release with that complication could easily have proved immediately fatal.

10. Such a release cannot be considered "operational" and is thus in violation of the aerotowing regulations.

11. A glider low behind the tug is a de facto request for the tug to drop and, if possible, increase power, but this was not understood by the tug pilot who, instead, at least continued his climb and may well have attempted to increase it. The missed communication should not have mattered. Getting "away from the ground a little quicker" is never a great idea unless everyone has a comfortable reserve of airspeed.

12. Additionally, the tug should have moved to the left to accommodate the glider as much as circumstances permitted.

13. Summary:

A glider loaded towards the upper end of its capacity was launching in high density altitude conditions behind a tug which was hard pressed to deliver the power for a comfortable safety margin. One can almost predict the outcome based on those facts alone.

The glider was flying with inadequate speed and should have immediately gotten the nose down and released but instead nosed up in an attempt to stay level with the tug.

The control compromise necessitated by release actuation could have been (but probably weren't) a disincentive to timely termination of the the tow.

At this point the lives of the glider pilots became dependent upon the actions of the tug pilot who failed to understand what was going on behind him and did the opposite of what was required.

The glider pilots were mushing and in desperate need of power but soon realized that they were never going to get it and were living on borrowed time. They were partially stalled and would crash as soon as they lost the tow line either through a release or weak link failure at either end.

And meanwhile at the front end end the tug pilot is trying to reduce tension, get his shoddy release to function, and induce a weak link failure because in hang gliding tow culture there is no problem that can't be solved by reducing or dumping line tension.

The front end weak link eventually failed and two people died when it did. And still in hang gliding tow culture there

is no problem that can't be solved by reducing or dumping line tension. An advisory was circulated by USHGA long after this accident when it was better understood but remains almost universally ignored.

This accident is emblematic of a great deal of what's wrong with hang glider towing culture - people on opposite ends of the tow line working towards completely opposite objectives. The training and weak link implementation is all geared towards dumping the glider at low tension no matter what the circumstances while the people with the most to lose and actually experience how the glider is being affected would give the farm to stay on with all the tension they can get.

05

1998/01

Towing Aloft - Page 349

I witnessed a tug pilot descend low over trees. His towline hit the trees and caught. His weak link broke but the bridle whipped around the towline and held it fast. The pilot was saved by the fact that the towline broke!

+++

Analysis - TE:

One can only wonder in amazement why the authors of this extensive and popular text on hang glider towing seem to have such enormous difficulty comprehending the thirteen words in the following sentence from the USHGA aerotowing regulations:

A weak link must be placed at both ends of the tow line.

Survival in aviation isn't supposed to be governed by luck. It's supposed to stem from adherence to common sense rules, procedures, and equipment standards.

I note that, a year before this book was unleashed upon the public, a letter to the editor of mine was published in Hang Gliding magazine advising that, as an alternate safe configuration, weak links be installed on both ends of bridles.

But that's not the way the experts do things so it was another eight years before the practice gained any acceptance - after the idea finally dawned on the operators of a flight park - and some level of implementation started rolling. For some unknown reason however, it's deemed useful only for the glider end of the line. Everybody's quite content to continue running the tugs in luck mode. And why not? They got away with it once. No reason to believe that their luck won't continue to hold (unless, of course, next time the tug is trailing a NEW two thousand pound Spectra tow line).

06

1998/05/15

Richard Graham

Bill Bryden

1998/12

Unfortunately, we suffered a fatal towing accident earlier this year but only recently received some details about it. Richard Graham, and advanced pilot with 24 years of experience, was fatally injured in a towing accident on May 15, 1998 near Grover, Colorado.

Rich was platform-launch towing in strong (25-30 mph) winds crossing 35-40 degrees to the tow road. Thermal activity was also reported as moderately strong. The launch sequence commenced with the "go to cruise" command, and the glider cleared the tow vehicle. Approximately 300-400 feet of line unspooled, and according to the data memory in the vario the glider reached about 80-90 feet AGL. The pilot then radioed to the vehicle driver to stop, and a few seconds later the VOX on his radio transmitted the words, "Oh no." The glider impacted in a steep nose-down attitude and then inverted.

It is suspected that no attempt was made by Rich to release since the towline was still attached after impact, and the release and winch were determined to be functioning properly before and after the accident.

After this accident and other similar towing accidents and incidents, a common reaction by many pilots is to question why the weak link did not break. Too often the discussion evolves into questioning the breaking strength of the weak link and suggesting that weak links with lower breaking thresholds be used.

I was recently told about a platform-launch towing incident a close friend experienced of which I was not aware. He launched and was quickly turned away from the towline. This progressed to a lockout, crashing the glider into soft ground which spared the pilot serious injury. When asked why he hadn't released, the pilot commented, "I thought the weak link would break!" For those unaware, a weak link is very simply a device, typically a loop of string, added to the tow system that is intended to break in the event that towline tensions exceed a safe or desired threshold, thus freeing the glider from the towline.

I've heard pilots comment that they believed the weak link would break, safeguarding them from the evils of lockouts, high angles of attack and banking turns away from the tow. This belief is predicated on the notion that these maneuvers cause increases in tow force and thus break the weak link, freeing the pilot of the towline.

They might break, but more regularly will not. The reason should be obvious, but for some reason often is not for many pilots.

+++

Analysis - TE:

Where oh where could hang glider pilots have possibly gotten the idea that the weak had something to do with keeping the pilot and glider from slamming into the ground on tow? Perhaps they read the following fiction published in Towing Aloft (by Dennis Pagen and Bill Bryden) four months earlier:

Fortunately we have good defenses against lockouts. These defenses include limiting the tow forces by using weak links...

A weak link is the focal point of a safe towing system.

A weak link is a very simple device--typically a loop of line--that is intended to break in the event towline tensions exceed a safe or desired threshold.

As discussed above, aerotowing is a constant speed form of towing and the tow forces can vary dramatically in response to thermals, sink, pilot actions, etc. A weak link is required that will not break needlessly in response to moderate thermals, or pilot inputs, yet will break at a low enough point to avoid disaster or excessive pilot panic.

A weak link is a fuse that protects the equipment--your body!--on an overloaded circuit.

Always use a weak link when towing--weak links save lives.

Of course, your weak link should break before the lockout becomes too severe, but that assumes a properly applied weak link.
---

or these little gems from Wallaby:

A weak link connects the V-pull to the release, providing a safe limit on the tow force. If you fail to maintain the correct tow position (centered, with the wheels of the tug on the horizon), the weak link will break before you can get into too much trouble.

In an excessive out-of position situation, the weak link will snap before the control authority of the glider would be lost.
---

and Quest:

The strength of the weak link is crucial to a safe tow. It should be weak enough so that it will break before the pressure of the towline reaches a level that compromises the handling of the glider...

Compare/contrast to this statement from former USHGA Towing Committee Chairman Steve Kroop - who actually had a clue as to what he was talking about:

2005/02/09

A weak link is there to protect the equipment - not the pilot. Anyone who believes otherwise is setting himself up for disaster.

And that is a very large part of the pathetic history of hang glider towing. The approach has always been that it's acceptable to use releases that you can't get to when you need them because your flimsy weak link can always keep you within the limit for safe operation. Hang gliding culture set itself up for disaster on Day 1, reaps the consequences on a steady basis, and will continue to do so unless radical changes are made.

And it doesn't matter how properly a release is functioning before or after an accident if you can't get to it when you need to.

Mike Lake
2009/07/04

I admire the undoubted skill and bravery of pilots who are able to deliberately break a weak link to get them out of trouble.

That this technique can be relied upon horrifies me.

---
axo

2009/06/18

Tad... Thanks for the links to the Dynamic Flight reads on lockouts and weaklinks. I must confess I was one of those expecting the weak link to break in case of an ugly lookout before reading that. The info on that site is very clear and makes a lot of sense.

And still we're teaching people that the function of the weak link is to keep the glider safe and under control.

07

1998/10/25

17:45

instructor:
Jamie Alexander
student:

Frank Spears, Jr.

Bill Bryden

1999/01

The accident occurred near Groveland, Florida. Conditions were mellow with a light two-to five-mph wind.

The glider was equipped with tricycle landing gear consisting of castering wheels mounted to the control bar, and aft, a tailwheel assembly supporting the keel. This widely used system allows the glider to launch and land rolling on the gear, eliminating the need for a launch cart. The harness was the over/under style tandem harness that is used in a number of tandem operations around the country. The 175-pound instructor was in the top harness and the 198-pound student was in the lower.

This was the student's 10th instructional flight and his training was progressing normally. On this flight the student was flying the glider, hands on the basetube with the instructor at the "ready" position on the downtubes. After launching the glider popped up a bit high behind the tug, but the position was soon corrected. This suggests that the student was controlling the glider with the instructor initiating the correction either verbally or physically.

Shortly thereafter, the glider began oscillating in roll and yaw, again suggesting the student was piloting and over-controlling the glider. At a point just before things went bad, the tug climbed and the glider got low behind the tug. At about 75 feet AGL, one of the oscillations progressed into a left turn that quickly accelerated into a bank of approximately 80 or 90 degrees, at which time the rope was released from the glider. The glider then slipped/dove into the ground impacting on the left leading edge, then nose, finally rolling over on the right leading edge and kingpost. The occupants impacted the ground with major injury to the head, neck, back and internal organs of both. Frank died at the site and Jamie the nest morning at the hospital.

INVESTIGATOR COMMENTS

While there may have been a wind gradient at about 75 feet, it is not believed that the conditions were a main contributing factor. In the investigator's opinion, the student was probably allowed to fly the glider too much at the critical time near the ground. With the student having more body mass and possibly being stronger, and being in the lower harness position which affords more control and leverage, it is possible that the student's control efforts overpowered the instructor's. Earlier in the day the student had flown with an instructor who outweighed him and likely would have remembered the amount of control effort required then, which would be excessive with the much lighter instructor.

+++

Analysis - TE:

With everything else that was going wrong the tug climbed above the glider, thus putting it at a higher pitch attitude which would have and did translate to a more severe stall if and when the aircraft were separated.

08

1999/02/27

Rob Richardson

Bill Bryden

1999/06

Rob Richardson, a dedicated instructor, died in an aerotowing accident at his flight park in Arizona. He was conducting an instructional tandem aerotow flight and was in the process of launching from a ground launch vehicle when the accident occurred.

Rob had started to launch once but a premature tow line release terminated this effort after only a few meters into the launch roll-out. It is suspected the cart was rolled backwards a bit and the tow line was reattached to begin the launch process again. During the tug's roll-out for the second launch attempt, the tug pilot observed the glider clear the runway dust and then begin a left bank with no immediate correction. At that point he notice the launch cart was hanging below the glider and immediately released his end of the 240 ft. tow line. The tug never left the ground and tug pilot watched the glider continue a hard bank to the left achieving an altitude of approximately 25 feet. Impact was on the left wing and then the nose of the glider. Rob was killed immediately from severe neck and head trauma. Rob's body likely cushioned much of the student's impact. She was basically uninjured but suffered short term memory loss (not uncommon in hard crashes) and did not recall the events of the accident.

Of particular note is that the launch cart was not observed dangling from the glider. Rather it was seen positioned below the glider exactly as when the glider is resting upon the cart when on the ground. The cart construction was a rather typical triangle type arrangement. Approximately midway between the rear wheel and two front wheels, a cross member was connected between the two main frame rails running fore and aft. This cross member was parallel to the glider's control bar and located at about the pilot's waist when the pilot is positioned ready to launch. The tug pilot noted after the incident that the tow line was routed under this frame member on the cart and then connected to the release.

It is speculated, that after the aborted first launch, the bridle fell below this frame member and when it was picked up to reattached the tow line, it was pulled up but inadvertently was looped under the cross member. This would be consistent with the tug pilot's observations of the tow line after the crash and would explain how the cart could be held beneath the glider with the glider still positioned in the control bar and keel cradle points while airborn.

Towing Aloft
1998/01

Pro Tip: Always thank the tug pilot for intentionally releasing you, even if you feel you could have ridden it out. He should be given a vote of confidence that he made a good decision in the interest of your safety.

William Olive

2005/02/11

I give 'em the rope if they drop a tip (seriously drop a tip), or take off stalled. You will NEVER be thanked for it, for often they will bend some tube.

2008/12/24

I've seen a few given the rope by alert tug pilots, early on when things were going wrong, but way before it got really ugly. Invariably the HG pilot thinks "What the hell, I would have got that back. Now I've got a bent upright."

The next one to come up to the tuggie and say "Thanks for saving my life." will be the 1st.

Jim Rooney

2007/08/01

Whatever's going on back there, I can fix it by giving you the rope.

It's more of this crappy argument that being on tow is somehow safer than being off tow.

+++

Analysis - TE:

Apparently the release configuration wasn't deemed of sufficient importance to include in the report but virtually all tandem gliders used in aerotowing in the US are fitted with a release of the following description.

A modified Wichard 2673 spinnaker shackle serves as the core mechanism and is harnessed to the keel at a point fore enough to trim out the pitch control pressure. It is actuated by a bicycle brake lever velcroed to the control frame which transmits force to the spinnaker shackle latch via cable strapped to a downtube. And the brake lever is almost always mounted on the downtube.

This description is consistent with the recollections of John and Dale Stokes who took tandem flights with Rob a short time (weeks, months) before the accident.

The spinnaker shackle was not designed for the job it is asked to do in hang gliding towing and is dangerously problematic in that environment. Furthermore, it is not designed to be used in conjunction with a cable lanyard and the combination is predictably more problematic.

In this incident (and in many others) the cable afforded too much resistance to allow the latch to seat reliably. This sort of failing can be fatal in and of itself but here it was merely the trigger for the interruption of normal procedure which catalyzed the fatality.

It is highly likely that Rob was immediately aware that something was seriously amiss the instant the dolly started rolling. Had his release actuator been in hand - as is required under the regulations of the British Hang Gliding and Paragliding Association - it would have been a simple matter for him to immediately abort the tow. The release actuator was practically accessible in the first seconds but his instinct as a pilot would have been to control the glider. And after the glider had attained enough airspeed to start becoming buoyant his best option was behind him.

The glider and launch dolly were soon observed airborne, turning, and climbing by Corey Burk, the tug pilot who reacted - according to hang gliding aerotow protocol - by almost immediately actuating his release.

It must be noted that Rob was alive and climbing before tension was dumped and dead immediately afterwards.

It must also be noted that the bank was not described as "hard" until AFTER the glider had been released.

It is highly unlikely that an observer 240 feet distant from a glider has a better assessment of the glider's situation than does the pilot flying it.

If the proper response at that moment WAS to dump tension it should have been the glider pilot's decision to make. Since the glider pilot had not dumped tension at that point one must almost certainly conclude that either dumping tension was an inappropriate response or the glider pilot lacked adequate equipment to effect the separation.

Neither alternative is acceptable in light of the consequences.

Granted, an argument can be made that the consequences could have been even worse had release been further delayed but gliders on tow have been able to respond and fly safely out of worse situations if given time, there is a good record of outcome for gliders with dollies bound to them if kept on tow, and it is seldom a good idea for the pilot of one aircraft to be second guessed and deprived of options by the pilot of another at a remote vantage point. As was stated in an early article on center of mass towing in the 1983/05 edition of Hang Gliding magazine, "Experience shows that an observer is usually wrong."

Hang gliding has got a very big problem with tug pilots who think it's their job to fly two planes at once.

For further discussion of this accident see the LINKS section.

09

1999/12/11

Debbie Young

Bill Bryden

2000/02

Our sport suffered a tragic fatality the evening of December 11. Debbie Young, age 43, an enthusiastic new novice-level

pilot died from injuries suffered in a hang gliding crash.

Deb successfully launched a beginner glider from ground-launch cart being towed with a static-line tow system. At approximately 125 feet (estimates by observers ranged from less than 100 up to 150 feet), her glider started turning relative to the towline. Observers did not note corrective action by the pilot. The glider turned enough that the tow bridle strongly contacted the flying wires and/or the pilot strongly contacted the control frame of the glider. The resulting lateral force on the control frame pulled the glider into an aggressive lockout. The glider rolled over extremely quickly and dove into the ground in a manner of only several seconds.

An instructor mentoring Deb during her early solo tows radioed release instructions and the tow was aborted, but it was observed that her hands appeared to not leave the control bar to effect release. Towline tension was controlled at 120-130 pounds and the towline release's integrated weak link did not break. (Nor should it have broken. Reference this column in the December, 1998 issue for a detailed discussion as to why it should not have been expected to break.)

The rapidity of the lockout was absolutely stunning to those observing the event. The glider went from being banked approximately 25 degrees and angled roughly 45 degrees to the towline, to being rolled over and pointed down in less than two to three seconds after the rollover. This may sound like an unreasonably brief time, but remember that 10 mph equals 15 feet per second, and a hang glider diving straight down at only 30 mph would travel 90 feet in two seconds.

When a towline strongly contacts the front flying wires or the pilot's body is pulled into strong contact with the control frame or rear flying wires, a lateral, sideways pulling force is applied to the control frame. This force very strongly causes the glider to bank and turn further away from the towline and will easily be much stronger than any weight shift the pilot may effect. This is a lockout, and releasing and terminating or reducing the tow force are the only means of escape at this point.

This tragic accident vividly demonstrated how rapidly a lockout can occur, and teaches the lesson that pilots must NOT be hesitant to release when their glider gets turned too much. Unfortunately, I can not effectively communicate how quickly and aggressively this may occur. Dennis Pagen informed me several years ago about an aerotow lockout that he experienced. One moment he was correcting a bit of alignment with the tug and the next moment he was nearly upside down. He was stunned at the rapidity. I have heard similar stories from two other aerotow pilots.

Understanding how incredibly fast this can occur, we should question and reexamine the procedures and equipment utilized to abort a tow. Many payout winches employ a pressure-dump valve to quickly drop pressure, but some have to be cranked down and most utilize a hook knife to sever a towline. Many, if not most, tension-controlled, static-line tow systems require the vehicle to aggressively brake and then the driver to cut the line or back up as required. Many stationary, pay-in winch systems can drop tension somewhat quickly and others are rather pokey at dumping tension. In addition, some do not employ a quick mechanical system to sever the line, relying upon an operator with a hook knife or ax to accomplish this emergency task.

If a lockout occurs and the glider rolls over, when the tow tensions are reduced with the glider in this position it may pull out flying opposite the original tow direction. If the towline or bridle connect to the pilot or glider above the control bar, this will be wrapped down and around the control bar or frame, and any residual line tension will pull in the bar, pitching the nose down. Fifteen to twenty pounds can "stuff" the bar and dive the glider into the ground, hence the extreme importance of dropping the line tension to zero or severing the line at the tow rig and the pilot releasing.

From the time Deb's tow was noted as going bad, there was only about two or three seconds to completely terminate the tow and provide the glider with ZERO line tension, giving it a couple of seconds to pull out of the dive. Problems encountered at lower altitudes would permit even less time for pilot and tow crew reaction. The implications of this establish some equipment requirements that some tow rigs likely don't accommodate. I'm not leveling criticisms. I simply don't think the sport or the industry fully understood or comprehended the rapidity with which these lockouts can occur, and hence these corresponding needs. I didn't.

Payout winches absolutely must employ a tension-dump valve. A guillotine or other automatic line cutter to sever the line is also required. A quickly rotating or free-spooling winch drum can spin off extra line resulting in a jumble and snarl. You likely don't have time to snatch a hook knife, then grab and cut a line in two seconds or less. With static-line tow systems the line tension monitor at the vehicle must have a quick-release that the driver can actuate in a fraction of a second, cleanly releasing from the vehicle. Stationary pay-in winches (including scooter systems) must be able to stop and dump tension almost instantly. Inertia and hydraulics may preclude this, and as with a payout winch a line snarl can occur, thus likely making line cutters that can be activated very quickly mandatory.

A secondary observation from this accident is the occurrence of pilots freezing during a moment of panic. During tandem training, Deb had been taught how to correct glider and towline alignment during a tow and had been instructed when it was necessary to release. Her instructor had simulated lockout scenarios, covertly banking the glider while she was flying, and testing how she reacted and released. She performed this superbly. During her second solo tow she got a bit angled to the towline and demonstrated that she knew when and how to release. Before each of her solo tows she was quizzed about what to do if the tow bridle touched the flying wires and was required to demonstrate the release action. Still, it would seem that fear or panic overwhelmed her during this incident and she froze.

This phenomenon has jammed fear into the hearts of most instructors at some point during their careers. Unfortunately, there is no way to really test a pilot for this tendency during training. Situations can be created to incite a degree of panic in a student and some might freeze. But for those who don't, they know it is a training scenario, and in the back of their minds know the instructor is controlling things, protecting their safety. Remove this safety net, during a real emergency -- and who knows what a pilot might do -- even experienced pilots have been seen to freeze in an emergency.

Knowing that all pilots, but especially new pilots, are potential candidates for brain lock, and considering the rapidity with which a lockout can occur, the tow system and ground crew must be capable and prepared to save a pilot as soon as possible should the tow go bad. The equipment must be able to accommodate this and the crew must be trained to perform this.

A third lesson from this event was highlighted during discussions with pilots several days later. After the crash, an instructor sprinted to Deb's aid, arriving just moments later. He sliced through the hang straps and began CPR in scarcely more than a minute. Two other observers present assisted until a firefighter arrived, and his instructor continued compressions for paramedics until she was transported to the trauma center. Another pilot summoned the ambulance with a cell phone, providing location and directions. It was commented by a few pilots that they were glad these particular people were present, because they would not have known what to do, or didn't have a cellular phone, or didn't recall the road name, etc.

Pilots with first-aid training must be present each flying day, and there must be enough of them so that there are always a few around when everyone else is flying. This means that most folks in a club need to have first-aid and CPR training. This is a good time of year to contact the Red Cross and schedule the training. CPR efforts sustained Deb till she arrived at the hospital where the trauma team battled for nearly an hour attempting to save her. Tragically, she died, but the CPR gave her a chance she never would have had otherwise.

A telephone, cell phone or radio capable of reliably reaching emergency services through a phone patch must be present

whenever folks at a flying site, and EVERYONE must know where to find it and how to use it. Everyone must either know by heart or be able to promptly access the address and specific directions to the accident site. Everyone must know where the club's first-aid kit is located. Your club does have one doesn't it? This kit shouldn't be just a boo-boo kit, but have supplies for significant life-threatening injuries.

This month's incident column was personally particularly troubling to write. I knew Deb. I was there. I saw her crash. Her husband saw the crash and we cried together at the hospital. During the thousands of tows I've made and probably tens of thousands I have witnessed, I had never seen a true, hardcore lockout, nothing close to this. I am still stunned by how fast it occurred. I did not fully comprehend Dennis's lockout when he described it to me. I do now. These must be treated with a great deal of respect. It is now clear to me that tow equipment must be capable of terminating a tow, including severing or releasing the line almost instantly. Taking a few seconds as required with many systems, and previously considered adequate by much conventional wisdom, is now clearly too long. Pilots can freeze in a panic, and tow observers and proper equipment must be capable of assisting them out of a disaster as much as possible. Your flying community members must be prepared to quickly react to an accident and have the proper communications and first-aid equipment at the ready.

I hate writing about fatal accidents and I usually agonize over these articles for hours and days, trying to identify the relevant lessons and to say things with proper sensitivity but enough objectivity toward lessons to be learned. Please spare me that and work aggressively to not lose a fellow pilot this new year.

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Analysis - TE:

01. Incredibly, given the length and detail of this epic accident report and all the references to control and need for speed in releasing in this situation and many others like it, is there anywhere the slightest indication of the release configuration with which the pilot was equipped.

02. The report does make it quite clear however, that actuation required removal of a hand from the basetube (big surprise).

03. Frequently, as is the case here, one hears reports that "Observers did not note corrective action by the pilot." Statements like this should not be taken to mean that pilots aren't taking every ounce of corrective action they can muster. I suspect that, more often than not, all they're really observing is a glider that isn't responding to corrective action. Hang gliders - on and off tow - often take a very long time to respond to corrective action - time circumstances may or may not permit.

04. Of course it was observed that her hands appeared to not leave the control bar. She was trying to control the glider. And it's a control bar. No one in similar circumstances is going to be able to take a hand off the control bar.

05. I do not buy all these accounts of new pilots "freezing" at the critical moments. Highly experienced competition and professional pilots die in circumstances nearly identical to this set on frequent enough occasions. When it's a new pilot - he froze. When it's a sky god - there was nothing he could have done. We can't afford to be sending ANYBODY up with junk equipment and ask him to compensate by doing the impossible. Dennis Pagen survived a lockout because he was LUCKY enough to have had enough air. Debbie didn't because she wasn't.

06. Given that it is known in this case that the pilot was fatally slammed with no more than 130 pounds of tow tension, one wonders how people can claim decade after decade that one can be kept safe by a 200 pound weak link.

07. Bill and hang gliding culture put a lot of misplaced focus on trying to prevent these sorts of accidents by relying on an observer at the upwind end of the tow line to dump tension or sever it. This strategy is almost completely delusional.

08. Pilots can die as easily if tension is dumped inappropriately as they can by being trapped on the line. As we see once again, these situations can go to hell before anybody has time to blink and a remote observer is a lousy bet for assessing the situation, making the right call, and executing the best response. The pilot is always in the best position to know what's going on and what to do about it. But he has to be equipped well enough to be able to do something about it.

09. Tug pilots have mirrors, are never more than 250 feet away from the glider, have a pretty good feel for what's going on with the air and the glider and a pretty lousy record of helping the glider by doing anything other than maintaining tension and maneuvering to maintain or regain proper relative position.

10. CPR and hook knives are equally useful in hang glider towing. By the time they come into play it's way too late. This was probably the most successful application of the technique in the history of hang gliding and all it did was keep a heart beating for an extra hour.

11. If we wanted to get the best bang for the buck we'd have skipped the first responder training and spent the time fabricating a battery powered release operated by a switch at the end of some wires running up our sleeves.

10

2004/06/26

14:00 - approximately

Mike Haas
Advanced
53

Litesport 147
W 5 mph, thermally

Hang Glide Chicago
Cushing Field
Sheridan, Illinois

Joe Gregor

2004/09

Highly experienced mountain pilot aerotowing a newly-purchased glider experienced a lockout at low altitude. Witness reports indicate that the glider began oscillating immediately after leaving the launch dolly. The weak link broke after the glider entered a lockout attitude. Once free, the glider was reportedly too low (50-65' AGL, estimated) to recover from the unusual attitude and impacted the ground in a steep dive. The pilot suffered fatal injuries due to blunt trauma. There is no evidence that the pilot made an attempt to release from tow prior to the weak link break, the gate was found closed on the Wallaby-style tow release. Reports indicate that this was possibly only the second time the incident pilot had flown this new glider (a replacement for a smaller Xtralite 137), and that the previous flight had taken place at a foot-launch site. The pilot's last reported aerotow flight at this site took place in October of 2003.

Angelo Mantas

2005/08/30

Scenario - Mike's accident happened during midday thermal conditions. He was flying a Moyes 147 Litesport, aerotowing it off of a launch dolly. Several witnesses saw the accident, but I give Dave Whedon's account the most weight, because a) He saw the entire event, from start to finish, and b) He was watching several tows intently to see what conditions were like, since he hadn't towed in a while.

The tug was given the "go" signal. Dave said that almost as soon as Mike launched off the cart, he appeared to be having difficulty with both pitch and roll control. Then, at around 50' - 60', the glider pitched up radically and started arcing to the left. Somewhere around this time the weak link broke, or the pilot released. The glider continued rotating left and dove into the ground, first hitting the left wing tip, then nose. The glider's pitch was near vertical on impact, confirmed by the fact that the control bar, except for a bend in one downtube, was basically intact, whereas the keel and one leading edge snapped just behind the nose plate junction. This all happened fairly quickly. Based on witness and tug pilot accounts, the glider was never over 100'.

Despite help reaching him almost instantly, attempts to revive him proved futile. Mike suffered a broken spinal cord and was probably killed instantly.

Causes - In examining the circumstances surrounding the accident, it seems to me that several factors, which by themselves might not cause major problems, combined to lead to Mike's losing control of the glider.

1) New, high performance glider.
2) Larger size glider than what he was used to.
3) A fast flying tug (Kolb)
4) Flying through a thermal just after launching.
5) A rearward keel attachment point on the "V" bridle.

Mike had only one previous flight on his new Litesport, in laminar coastal ridge soaring conditions. Although he flew over two hours, he probably never flew the glider at the speeds encountered when aerotowing. Mike had many aerotows on a Moyes Xtralite, but according to Matt Taber, the Litesport doesn't track as well at high speed. The Litesport was also bigger than his Xtralite, which would make it less responsive and harder to control.

The tug used was a Kolb ultralight. Although this tug had an increased wing span than normal Kolbs, it still tows at a higher speed than a Dragonfly. I can tell you from my own experience that it is harder to tow behind a faster tug.

Soon after launching, the glider and tug flew through a strong thermal. This is confirmed by witnesses watching the tug, and the tug pilot's reporting a strong spike in climb rate.

Here is where some controversy might come in: on examining the wreckage, Arlan (tug pilot) saw where the upper "V" bridle was attached, and immediately felt that that was a possible cause of the accident. It was attached at the hang point, and in his opinion, was too far back for a stable tow. Since then, there has been debate on whether or not that was a safe attachment point. That positioning on the keel was recommended to him by the seller, and apparently many other pilots have towed a Litesport from the same position. Shortly after the accident, some pilots in Wisconsin did an aerotow of a Litesport from slightly behind the hang point, and reported it towed fine.

I agree with Arlan that the upper bridle attachment point contributed to the accident. The test done in Wisconsin was done early in the morning in stable conditions, and the pilot weighed 50 more pounds than Mike. Just because others have managed to tow with this upper bridle position, doesn't mean it's safe, especially for pilots on the light end of the weight range.

To sum up, Mike was flying a glider that was bigger than what he was used to, with less stability at the higher speeds needed to stay behind the Kolb. Even with Mike's hang gliding experience, these factors would tax his abilities. These difficulties would be magnified by the de-stabilizing effect of the rearward keel bridle attachment and the faster speed of the Kolb tug. Already struggling (as witnesses state), when Mike hit the thermal, a difficult situation became impossible. Mike lost control, and either locked out or stalled, leading to his dive into the ground.

How can we prevent this from happening in the future?

A proper keel attachment would have made the glider fly faster without a lot of bar pressure. It also would have made the glider more stable in yaw, because the tow force would be farther in front of the CG. My own experience has been that since moving my keel attachment further forward, tows are much more stable.

Using a tail fin - Tail fins definitely help stabilize gliders on aerotow, especially high performance gliders that may be less stable in yaw. A too rearward keel bridle attachment can be overcome with a fin. Many aerotow parks use tail fins on their demo gliders. The downside to fins is that they can make thermaling difficult on many gliders, but they can still be a valuable tool to make your glider safer while you figure out where your keel bridle attachment should be.

First tows of new gliders in smooth conditions. It is much easier to aerotow a new glider when the air is smooth. Learn how the glider tows in calm air, make any equipment adjustments necessary, then later tow in midday, thermal air.

Practice flying your glider fast before aerotowing it. If you foot launch or static tow your glider, you can literally fly for years without ever flying at the speeds involved with aerotowing. Even platform/payout winch towing doesn't involve those speeds. Practice pulling in the bar and keep it there. Easy? Now try to make a small heading correction and keep it. Good chance you'll be PIOing all over. This kind of practice definitely pays off.

Wind streamers along runway. It's agreed that Mike hit a strong thermal shortly after launching. Placing streamers on both sides of the runway, at regular intervals, would help detect if a thermal is coming through the takeoff area. If all the streamers are pointing the same way, it's safe to launch. If some of the streamers start moving other directions or reversing, it's obvious some kind of turbulence is coming through. This is not a new idea, it's not expensive (wood stakes and surveyor's tape) yet I've never seen anyone do this. Maybe it's time we start.

Mike was a Hang IV pilot with over twenty years experience. He was not a "hot dog" and was very safety conscious. No

one who knew Mike could believe that this happened to him. Although I feel I have a better understanding now of what happened, I can't help feeling that if this could happen to him, none of us are safe.

Peter Birren

2005/02/08

This scenario is IMO what happened with Mike Haas at Cushing Field last year. His weaklink broke at a low altitude and he rolled off the stall.

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Analysis - TE:

01. As usual, no reporters felt that the mounting location - downtube or basetube - of the brake lever release actuator was worthy of mention. Given the predominant custom in the sport and the outcome of this flight, the probability is that it was mounted on the downtube.

02. Also, as is the popular accident report custom, no mention is made of the weak link strength, but it's a pretty safe bet that he was using the ubiquitous single loop of 130 pound Cortland Greenspot installed on the top end of his two point bridle.

03. A weak link which limits this model glider at its maximum recommended operating weight to tow line tension of 434 pounds would translate to 1.4 Gs.

04. The weak link which he was undoubtedly using holds about 243 pounds of tow line tension maximum and frequently fails at around half of that figure. At best this weak link was about half as strong as it should have been. But, of course, had it been anything the least bit stronger it would have been identified as THE cause of the accident, having failed to keep him within "the limit for safe operation."

05. While the glider was not trimmed as well as it could have been with a bridle upper attachment point more forward on the keel, it was in much better shape than it would have been had the pilot been towing one point (off of his shoulders only) as is a very common practice with gliders of this ilk.

06. Contrary to Joe's statement, there is no indication that this glider was locked out. Mike was turning but probably climbing and definitely healthy until the weak link failed. And there was absolutely nothing he could have done to save his life after the weak link failed.

07. It must be noted that neither the tug pilot (Arlan Birkett, the flight park owner/operator, who himself would die at the back end of the tow line after it failed less than seven months later), nor the glider pilot released.

08. The tug's release is required by USHGA's Guidelines to be operable without compromising its control and almost certainly was, so it is likely that it was not actuated because Arlan deemed it appropriate to continue the tow.

09. There is no like requirement for the glider's release and it was likely configured such that it could not be accessed without a dangerous loss of control, so it is unclear whether or not it was Mike's decision to remain on tow.

10. This situation may or may not have been salvageable had Mike been able to remain on tow - I suspect the former and the outcome certainly wouldn't have been any worse. But in any case his fate was sealed the instant he lost tension and the separation was not the result of pilot judgment.

11

2004

Dennis Pagen

2005/01

SUMMER 2004 ACCIDENT REPORTS

Recently two unrelated hang gliding accidents occurred in Europe, which may have some lessons for us. I had flown with and knew both pilots. My descriptions and analysis are based on eyewitness reports in the first case and the fact that I witnessed and talked at great length to the pilot as well as examined the wreckage in the second case.

FATAL TOWING ACCIDENT

The first accident occurred in Germany at an aerotowing competition. The pilot launched with his Litespeed and climbed to about 40 feet when he encountered a thermal that lifted him well above the tug. After a few moments, the glider was seen to move to the side and rapidly turn nose down to fly into the ground, still on tow, in a classic lockout maneuver. The impact was fatal.

Analysis

This pilot was a good up-and-coming competition pilot. He had been in my cross-country course three years ago, and this was his second year of competition. What happened to him is not too unusual or mysterious. He encountered so much lift that although he was pulling in the base bar as far as he could, he did not have enough pitch-down control to get the nose down and return to proper position behind the tug. This situation is known as an over-the-top lockout.

I am personally familiar with such a problem, because it happened to me at a meet in Texas. Soon after lift-off the trike tug and I were hit by the mother of all thermals. Since I was much lighter, I rocketed up well above the tug, while the very experienced tug pilot, Neal Harris, said he was also lifted more than he had ever been in his heavy trike. I pulled in all the way, but could see that I wasn't going to come down unless something changed. I hung on and resisted the tendency to roll to the side with as strong a roll input as I could, given that the bar was at my knees. I didn't want to release, because I was so close to the ground and I knew that the glider would be in a compromised attitude. In addition, there were hangars and trees on the left, which is the way the glider was tending. By the time we gained about 60 feet I could no longer hold the glider centered--I was probably at a 20-degree bank--so I quickly released before the lockout to the side progressed. The glider instantly whipped to the side in a wingover maneuver. I cleared the buildings, but came very close to the ground at the bottom of the wingover. I leveled out and landed.

Analyzing my incident made me realize that had I released earlier I probably would have hit the ground at high speed at a steep angle. The result may have been similar to that of the pilot in Germany. The normal procedure for a tow pilot, when the hang glider gets too high, is to release in order to avoid the forces from the glider pulling the tug nose-down into a dangerous dive. This dangerous dive is what happened when Chris Bulger (U.S. team pilot) was towing John Pendry (former world champion) years ago. The release failed to operate in this case, and Chris was fatally injured. However Neal kept me on line until I had enough ground clearance, and I believe he saved me from injury by doing so. I gave him a heart-felt thank you.

The pilot in the accident under discussion was an aerodynamic engineer. He had altered his glider by lengthening the front cables and shortening the rear cables to move his base tube back. The amount was reportedly 10 centimeters, or about 4 inches. This is well within the acceptable range, according to Gerolf Heinrichs, the Litespeed designer. Why the pilot altered his bar position in this manner is anyone's guess, but my guess is that it was because he felt the bar was too far out on the glider with the VG off. This Litespeed was the pilot's first topless glider and I expect he wasn't informed that most of the new topless gliders experience a great movement of the base tube as the VG is pulled through its range. The result is that the bar is so far out and the pitch pressure so strong that with the VG off, that the standard procedure is to take off and land with at least 1/4 VG. If the pilot didn't know this he would have been tempted to move the bar.

Factors that attributed to the accident in various degrees were the pilot's experience, the conditions and the alteration of the base tube. To begin, he wasn't greatly experienced in aerotowing, although he had learned and spent much of his flying with surface tow. It is difficult to assess the effect of the turbulence, but suffice it to say that it was strong enough to project him upward, well above the tug. Finally, the alteration of the basetube position could have been a contributing factor because he he certainly would have had more pitch authority if he hadn't done that. It is impossible to tell, but perhaps the thermal that lifted him would not have done so as severely if he had had a bit more pitch travel.

What We Can Learn

To begin, alteration of our gliders should not be done without full agreement and guidance from the factory or their trained representatives. Even with such approval, be aware that the factory might not know how you will be using your equipment. Changing the pitch range of a glider is a fairly serious matter and should only be done with full understanding of all the effects.

Secondly, over-the-top lockouts are not frequent, but common enough in big-air towing that tow pilots should all have a plan to deal with them. Think about this: When we are lifted well above the tug, the tow system forces becomes similar to surface towing, with the limit of tow force only being the weak link. The susceptibility to a lockout is increased in this situation.

My experience leads me to believe that a strong thermal hitting when low can push you vertically upwards or sideways before you have time to react. If this happens when I am low, I fight it as hard as I can until I have clearance to release safely. If I am high above the tug, I stay on line with the bar pulled in as far as possible and keep myself centered if at all possible. I fully expect the tug pilot to release from his end if necessary for safety, but in the case of a malfunction, I would release before endangering the tug.

We are taught to release at the first sign of trouble, and I fully support that general policy, but in some cases, the trouble happens so fast and is so powerful that a release low would have severe consequences. In my case, I was instantly high above the tug with a strong turn tendency and a release at that point would have been ugly. The main point for us to understand is that we must gain our experience in gradually increasing challenges so we can respond correctly when faced with different emergencies. It should be made clear again that a weak link will not prevent lockouts and a hook knife is useless in such a situation, for the second you reach for it you are in a compromised attitude.

Thirdly, experienced pilots should be aware that towing only from the shoulders reduces the effective pull-in available to prevent an over-the-top lockout. Like many pilots, I prefer the freedom of towing from the shoulders, but I am aware that I must react quicker to pitch excursion. Sometimes reactions aren't quick enough and emergency procedures must be followed. It seems to me that we shouldn't be overly eager to encourage lower airtime pilots to adopt this more advanced method of aerotowing.

Certainly my experience indicates that tug and glider pilots must operate in combination to maximize the survivability and minimize the dangers to both individuals. Only communication will establish the best procedures.

Joe Gregor
2005/01

The mechanism by which a lockout occurs is not clearly understood by this investigator. What is clear, however, is that the practice of towing a delta-wing aircraft using a powered ultralight creates a dynamically unstable system. The pilot being towed must respond with a continuous series of control inputs in order to maintain a stable attitude while on tow. Experienced aerotow pilots make these numerous small inputs without thought. Move out of position far enough, however, and the required control forces can rapidly exceed the pilot's ability to correct. At this point, the situation WILL worsen as time moves on. If you, as the pilot, feel that you are able to release from a bad situation while still maintaining aircraft control, you should do so. If you feel that a controlled release is unlikely--due to the control forces being experienced, and the release system being used--you should strive to maintain stability while gaining sufficient altitude to recover from any post-release unusual attitude that may be experienced.

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Analysis - TE:

01. Dennis makes much of the German pilot's modification to his glider which deprived him of four inches of aft control range on the basetube.

02. It is a near certainty that both the German pilot and Dennis were towing one point.

03. The pitch travel authority loss due to the glider modification is completely dwarfed by the loss one experiences by electing to tow from one's shoulders. Three or four times the loss is put out of reach and the glider is effectively decertified.

04. Dennis cautions against encouraging "lower airtime pilots to adopt this more advanced method of aerotowing."

05. In situations like this neither the glider, air mass, or runway could care less what one's experience level is or how much training one has had. All that matters is how far back one can stuff the bar. And a world champion can't stuff the bar back any faster, farther, and/or better than a Hang 2 on his first solo. What's dangerous for one is equally dangerous for the other.

06. Because hang gliders fly at much slower speeds that do sailplanes they do not get as far out of position as quickly as do the latter and thus are virtually never threats to the tugs.

07. Yes, pilots at BOTH ends of the tow line are taught to release at the first sign of trouble. They shouldn't be. This approach has gotten a huge number of people unnecessarily crashed, injured, and killed. It is hardly ever appropriate to deprive oneself or another of the option of recovering and/or climbing out of a situation by dumping tension. Unfortunately, even if a glider pilot manages to rise above the defects of his training he is often at the mercy of a trigger happy tug pilot.

08. In keeping with the approach that there is no problem that can't be solved with by a flimsy enough weak link, hang gliding aerotowing is conducted with one size fits all weak links which fail at random for no reason whatsoever. It's interesting that Dennis didn't reflect on what would have happened to him if his had popped while he was going up like a rocket with the bar stuffed. As it was he barely gained enough air to pull out of the ensuing dive.

09. Both pilots were undoubtedly using shoulder mounted curved pin barrel releases with inadequate performance and the requirement for the pilot to let go of the basetube.

10. One wonders if those compromises were factors in the fatal accident. I rather doubt that the German pilot remained on tow all the way to impact by choice.

11. One also wonders if Dennis's glider would have instantly whipped to the side in a wingover maneuver if he had used a release which allowed him to actuate while keeping both hands on the basetube.

12. Hook knives, contrary to popular perception, are useless in ALL towing situations. Carrying a hook knife as a backup for a release is like keeping a deflated beach ball in your glove compartment in case you neglected to buckle your seat belt and your air bag doesn't go off.

13. As Dennis states, these situations frequently develop beyond any speed to which any pilot will be able to react. Therefore no pilot can afford to ever go up with second or third rate equipment - like the junk he was using.

14. As Joe states the aerotowing of hang gliders is an extremely unstable proposition and maximum control is required at all times. Sadly, in the same paragraph, he implies that it's acceptable and possible to compromise on release equipment and compensate by carefully climbing to a safe altitude. It's not. But his own equipment is third rate and perhaps the denial gives him some level of comfort.

15.

-

Dennis Pagen and Bill Bryden
Towing Aloft

1998/01

Pro Tip: Always thank the tug pilot for intentionally releasing you, even if you feel you could have ridden it out. He should be given a vote of confidence that he made a good decision in the interest of your safety.

Dennis Pagen

2005/01

Analyzing my incident made me realize that had I released earlier I probably would have hit the ground at high speed at a steep angle. The result may have been similar to that of the pilot in Germany. However Neal kept me on line until I had enough ground clearance, and I believe he saved me from injury by doing so. I gave him a heart-felt thank you.

-

Pick one, Dennis.

12

Peter Birren

Peter Birren

2008/10/27

Imagine if you will, just coming off the cart and center punching a thermal which takes you instantly straight up while the tug is still on the ground. Know what happens? VERY high towline forces and an over-the-top lockout. You'll have both hands on the basetube pulling it well past your knees but the glider doesn't come down and still the weaklink doesn't break (.8G). So you pull whatever release you have but the one hand still on the basetube isn't enough to hold the nose down and you pop up and over into an unplanned semi-loop. Been there, done that... at maybe 200 feet agl.

Gregg B. McNamee

1996/12

PRIMARY RELEASE CRITERIA

1) To actuate the primary release the pilot does not have to give up any control of the glider. (Common sense tells us that the last thing we want to do in an emergency situation is give up control of the glider in order to terminate the tow.)

If your system requires you to take your hand off the control bar to actuate the release it is not suitable.

Hang Gliding Federation of Australia
Towing Procedures Manual

2005/09

All releases must be infallible and must only release upon pilot activation...

Peter Birren

2009/08/09

PITCH & LOCKOUT LIMITER

The lockout starts with a bit of roll away from the tow direction. This rolling ultimately makes the glider want to behave like a tail-less kite and turn 'round the line. A short way into the turn there is a high degree of pitch-up attitude relative to the towline, so having a release at the point of too much pitch could automatically release the pilot and hopefully provide the pilot with sufficient recovery time.

How it works:

With the release at the apex release site, a second release line will be attached to the glider's nose. As the glider pitches up relative to the towline, the release gets farther from the nose and tightens the line.

2009/08/09

If you want a truly foolproof release, it's got to be one that eliminates the pilot from the equation with a release that operates automatically.

+++

Analysis - TE:

01. Taking a hand off of the basetube when the situation of a hang glider on tow is going to hell is a really bad idea.

02. Fitting a hang glider with a release system that requires one to take a hand of the basetube to actuate it is a really stupid idea. As Gregg stated a very long time ago it is not acceptable and defies common sense.

03. USHGA regulations require that an aerotowed glider meet or exceed HGMA strength, stability, and controllability standards.

04. No hang glider with only one hand on the basetube meets or exceeds HGMA stability or controllability standards.

05. No person with only one hand on the basetube is a pilot.

06. One wonders what Peter thinks would have happened had his 0.8 G weak link failed when he was going up like a rocket with the bar stuffed.

07. One wonders what Peter thinks would have happened had he been configured with his pitch limiter / whip stall guarantor when he was going up like a rocket with the bar stuffed.

08. One wonders why, after all that has been written on weak links and lockouts by people who know what they're talking about over and over for decades, Peter is still expecting a light weak link to do the job he can't because of his dangerous release configuration.

09. Peter's pitch limiter release configuration WILL work. It WILL operate automatically and take the pilot out of the equation. It's also extremely likely to take him out of the gene pool.

10. But despite the fact that out of a career of a "(whopping) 60 aerotows" Peter's almost gotten himself killed on this occasion and gotten himself half killed on another, he DOES have a USHPA National Aeronautics Association Safety Award - so it's probably OK to ignore these other discordant voices and troubling fatality reports and slap on one of his pitch limiters and a 0.8 G weak link to compensate for the release actuator you won't be able to get to.

13

Martin Henry

Martin Henry

2005/02/10

While starting a tow (from a cart) I made the error of letting go of the cart rope just a little early (ok, actually - very early).

...the cart slipped out from below me. I wasn't even close to being airborne. Next thing I knew I was making contact with the terra-firma and suffered a severe case of terminus abruptis. To add just a little extra insult to my predicament, the (heavy) rolling cart ran up onto me and my wreckage. Atomic Whack! (Broken keel, leading edge, dent in my helmet.)

Ok, so what worked? The weak link did, so the dragging was kept to a minimum.

+++

Analysis - TE:

01. Martin doesn't launch with a release actuator in hand so there was no possibility of him aborting the tow at a time of his choosing.

02. Note that the weak link failed, the glider stopped, and the pilot got his helmet dented and himself and what was left of his glider run over by the dolly.

14

2004/08/02

Davis Straub

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http://ozreport.com/pub/fingerlakesaccident.shtml

Summary - TE:

Davis attempts to launch a demo Wills Wing Sport 2 behind a Dragonfly using a Wallaby two point release configured at the trim point on the keel and the release actuator on the starboard downtube and a Bailey secondary release mounted on his right shoulder and positioned straight below his face.

The dolly has front wheels which are unstable and oscillate causing it to drag and slow and the glider is pulled off, pitched down, and power whacked.

The weak link pops, the glider stops, Davis doesn't - until a short time later when he finishes swinging into aluminum tubing and stainless steel wires. Thirteen stitches are used to close the lip damage.

+++

Analysis - TE:

Davis Straub

2004/09/12

It would have been nice to release from the tow rope just a bit before this so that I wouldn't be being pulled down."
---

01. It sure would have but there's not much you can do when your hands are on the basetube and one of your actuators is on the downtube and the other is within a few inches of your hand.

Gregg B. McNamee

1996/12

Common sense tells us that the last thing we want to do in an emergency situation is give up control of the glider in order to terminate the tow.

If your system requires you to take your hand off the control bar to actuate the release it is not suitable.

British Hang Gliding and Paragliding Association Technical Manual

2003/04

On tow the Pilot in Command must have his hand actually on the release at all times. 'Near' the release is not close enough! When you have two hands completely full of locked-out glider, taking one off to go looking for the release guarantees that your situation is going to get worse before it gets better.

Davis Straub

2006/01/24

Bill Moyes argues that you should not have to move your hand from the base bar to release. That is because your natural inclination is to continue to hold onto the base bar in tough conditions and to try to fly the glider when you should be releasing.

I'm willing to put the barrel release within a few inches of my hand.
---

02. Short memory. Maybe a few more repetitions will drive the point home.

03. Note that the weak link failed, the glider stopped, and the pilot got hurt.

15

Peter Birren

Peter Birren

2008/10/27

I know about this type of accident (Davis's) because it happened to me, breaking 4 ribs and my larynx... and I was aerotowing using a dolly. The sh*t happened so fast there was no room for thought much less action. But I wasn't dragged because the weaklink did its job and broke immediately on impact.

2008/10/26

...I see the weaklink as most necessary to prevent the glider/pilot from being dragged after an initial launch accident.

+++

Analysis - TE:

01. If the sh*t is happening so fast there's no room for thought much less action you don't want to have your release system configured such that the actions are more time consuming, numerous, and problematic. Peter's never been able to grasp that concept.

02. Note that the weak link failed, the glider stopped, and the pilot got half killed.

16

Justin Needham

Justin Needham

2005/02/09

I had a scary incident back in the early 90's where a doubled up weaklink (unbeknown to me) caused a bad accident.

A Swift pilot who had been towing on the same site had been doubling weaklinks to prevent early breakage, but not advising the flex wing pilots of his actions. We had all been clipping into the same line. My launch on this occasion was in medium length grass where the tug had slow acceleration. The tug pilot was inexperienced. The winds were pretty much zero. On my "all out", I guess a gentle thermal tailwind hit me from behind as I began to run. This was enough to prevent me from getting airborne. I ran a very long way till I could no longer keep up with the groundspeed. The glider wasn't taking my weight, and I was then forced to push out to try and avoid hitting the ground. Unfortunately even in deep ground effect mush, there was still not enough lift. The control frame hit down, followed immediately by the nose of the glider and then everything went crazy.

At this point, a normal weaklink would have broken instantly and I'd have been left embarrassed but (probably) healthy in a heap down the runway. On this occasion, the doubled link wouldn't break. I was accelerated along the ground, with a flattened control frame, with my face in the dirt and absolutely no ability to release since my arms were being flailed about. All I clearly recall, is shouting "stop stop stop" since I could do nothing else. I was in severe danger of breaking my neck, since my head was being caught up in all this as I did 20MPH+ across the ground.

The tug pilot was inexperienced, and for those few seconds was concentrating on getting airborne, not on looking at me. (Mistake number 2) After ploughing a furrow for ~ 75 meters, while my glider disintegrated about me, the tug pilot got the message and finally stopped.

Why didn't I use a trolley you ask? Well there was no trolley on site, and perhaps I was relying on my normal perfectly adequate nil wind launch technique a little too much. (Potential mistake number 3). It didn't seem an undue risk under the circumstances at the time, - we all take calculated risks every time we fly. Unfortunately this risk had no safety valve.

+++

Analysis - TE:

01. Every since the invention of the launch dolly, foot launched towing has been a really bad idea. Trying to do aviation on the cheap can get real expensive.

02. Launching with a release that doesn't blow when your hand comes off the control frame or when you relax your bite on a string between your teeth is a really bad idea. We have dead man switches but people don't use them.

03. Flying a glider without wheels is a really bad idea.

04. The tug pilot's job is to keep himself safe - the glider is an afterthought.

05. The glider pilot's job is to keep himself safe - no matter what the tug is doing.

06. Justin's speculation that a "normal" weaklink would have broken instantly is speculation. A "normal" weak link can allow 260 pounds of tow tension and provides no assurance of being dumped.

07. Justin's speculation that had the weak link failed he'd have been left embarrassed but (probably) healthy in a heap down the runway is in no way supported by the experiences of Martin Henry, Davis Straub, and Peter Birren. Martin's helmet, Davis's lip, and Peter's ribs and larynx were all in good shape until AFTER the weak link failed and the glider came to an abrupt stop.

08. Justin hasn't given much thought to what will happen if, just coming off the cart he center punches a thermal which takes him instantly straight up while the tug is still on the ground and the weak link he's trying to use to compensate for the junk release he's using suddenly fails under the load.

09. Note that the weak link held, the glider didn't stop, and the pilot wasn't hurt.

17

2005/01/09

Robin Strid

Davis Straub

2005/01/10

On Sunday, Robin Strid, a Norwegian pilot, chose to foot launch in light cross wind conditions in spite of the pleadings from the ground crew on line number two to use a cart. With the wind from the right and being light I wouldn't have

chosen to foot launch if I liked the carts well enough to trust them not to caster.

As he took off his left wing was dragging. Bobby Bailey, the best tow pilot in the business, moved to the right into get further into the wind, and Rob got his left wing up and flying as he lined up behind Bobby.

Then Robin shifted off to the left again getting his right, upwind wing, high again. He was seen reaching for his release. I understand that Bobby also released him.

He kept doing a wing over to the left and dove straight into the ground from about 50 feet. He was killed immediately.

Like Robin, yesterday I got out of control behind a trike and dove quickly to recover. Unlike Robin I was at 400 feet and had plenty of time to recover.

There does seem to be an issue with the carts. I've been pushing hard on the ones I've used to get them rolling on the rough ground. The wheels do seem to caster, and I got the distinct feeling today that about twenty feet into it, the wheels went totally sideways. I pushed really hard and the cart kept going until I pulled it into the air.

Rohan Holtkamp did an analysis of the accident, in particular the bridle and weaklink, which never broke. The weaklink was caught on the release mechanism, a standard spinnaker release found on bridle systems used at Lookout Mountain, Moyes, Wallaby Ranch, and Quest Air. The release clamp has an arm that is thicker at the release point and this held onto the weaklink which consisted of multiple loops of thick line.

This type of release mechanism has been banned (at least for a short while) from the Worlds at Hay. When the weaklink didn't break and after the release didn't work even though it was open, the 5 mm bridle line holding the release broke and going to the pilot's shoulders, and then the 1.5 mil cable that opens the release broke. Bobby released the tow line approximately when the pilot's wing tip hit the ground, which is when Rohan felt the the cable on the release mechanism broke.

Most pilots here are towing off their shoulders. Those pilots who are also towing off the keel are now required to have a release at the keel if they have a bridle release at their shoulders requiring the bridle line to slip through the (ring) that connects to the rope connecting to the tug . If you don't have a release at the keel, then you will not be allowed to tow with this system.

Rohan Holtkamp

2005/02/07

Robin's own release failed to release, plus he refused our weaklink, even to the point of yelling and physical threat. After viewing video evidence of the entire flight, even an 80 kg weaklink would have made little difference. His actual weaklink did test to be stronger than 180 kg, but that was not the primary cause of his accident. Release failure was, same as Mike Nooy's accident. A full lockout can be propagated with less than forty kg of tension. Read "Taming the beast" on our website and/or come have a look at the video if you doubt this in any way.

2005/02/14

Recommendation One:

Do not use a 'Wichard' or 'spinnaker' release directly connected to a string or rope. This type of metal release has a metal knob on the opening arm that a rope will catch on, even when the release is activated and open.

William Olive

2005/02/08

Would a weak link have saved Robin? Again, I concur with Rohan's assessment. I have viewed the video of the event many times, and it is clear that the ONLY thing that would have saved him is if he had been able to release (or been released by the tug). Which brings us back to a previous post in which you quoted Rohan's thought on infallible release systems.

As a final note, Matt posted an article on our club web forum, I include an excerpt here:

Hay Worlds from a tug driver's perspective

It took a fatality on the third day to raise some safety concerns about both the quality of the towing and the safety of the equipment.

Greg DeWolf

2000/08/29

I understand that the spinnaker release doesn't always function in the unmodified setup either (attached to the glider by the originally provided attachment point), but that is because it was not designed to be used with the thin line we use for weak links.

Add to all of this the fact that Wallaby has found that after much use these spinnaker releases can jam because the pivot gets sloppy from wear, then maybe we find they are not the best releases we could be using in a mission critical situation.

Bill Bryden

2005/02/20

This is not the first time release issues with these shackle style releases have occurred. There have been some that were very difficult to actuate when under higher loads. The release in the (photo) shown here avoids some of the issues the spinnaker shackle presents. This was sold in the USA by Lookout Mountain Flight Park for aerotowing but I don't know if they still manufacture this release presently.

Sadly, the whole issue with poor releases is not new. Other fatalities have occurred as well. In response to those, performance test procedures were published in Hang Gliding magazine over a decade ago and are listed in the appendix of

the textbook Towing Aloft as well. While those standards may certainly need modification for some applications, and I don't suggest they are near perfect, they were presented to prompt people to adequately consider the design rigor and testing that is needed during development and manufacture of these devices. There is little excuse for many of the release failures that seem to still occur.

+++

Analysis - TE:

01. This accident occurred in Hay, New South Wales at that year's World meet. However, in terms of hang gliding culture, aircraft, and peripheral equipment, the US and Australia are the same country.

02. Normally, it's never a good idea to foot launch when a dolly launch option is available. At most flight parks it's a virtually nonexistent practice. However, given the stability problems that they were exhibiting the meet, Robin's eschewing of a cart was not unreasonable.

03. Robin, a former Norwegian national champion, was flying an Airborne C2, but I have not been able to determine the size. The maximum recommended operating weights of the 13 and 14 are 271 and 343 pounds respectively.

04. Much has been made of Robin's allegedly overstrength weak link which limited tow line tension to about 400 pounds. This would have put him at under 1.5 Gs on the smaller glider and under 1.2 on the larger.

05. Both of these figures are well under the USHGA maximum of 2.0 Gs. The smaller glider would have been at a virtually ideal rating, the larger one would have been flying on the lower end of a good range.

06. Incredibly and as usual, many of the reporters and participants in discussions about this accident seem unable to grasp the concept that weak links on BOTH ends of the tow line need to be heavy for excessive strength to be an issue. The tugs at this meet should all have been equipped with weak links a bit in excess of that of the heaviest (solo) competition gliders in attendance.

07. In any case, the Dragonfly itself has breakaway in the tow mast which fails before the tow line tension climbs much above 400 pounds.

08. Bobby is the designer of the Dragonfly and performed flawlessly in this incident. The tug pilot must always always be very careful about overriding a pilot's decision to remain on tow unless he himself is being endangered - which is extremely rarely in hang glider towing.

09. Robin was using a Wichard 2673 spinnaker shackle based release engaging the weak link at the end of the tow line. There was no bridle and thus the spinnaker shackle was feeling all of the tow tension (versus a bit over half of it as these releases are normally configured) and there were no secondary releases or any other means of disengaging in the event of a problem. And these releases were known to be extremely problematic over a dozen years before this "accident".

10. The fatal flaw in this incident could have been predicted by any six-year-old who gave it a moment's thought.

11. The release was actuated by a bicycle brake lever velcroed to his downtube. This is an extremely dangerous configuration but was not a factor in this accident.

12. Apparently competitors were flying with two point bridles and deliberately releasing from the bottom end with no Plan B to handle a bridle wrap at the tow ring. This is an excellent and proven method for committing suicide. The requirement imposed after the accident to have a secondary release at the keel is nearly as good.

13. Despite Rohan's diagnosis of the cause of the fatality, the hang gliding communities in Australia, Norway, and the US nevertheless attribute this accident to the use of an overstrength weak link, made rules to prohibit anything greater than would allow a 280 pound tow line maximum, and promptly returned Robin's release configuration to service.

14. The rather obvious flaw in this universal release mechanism is illustrated in two photos referenced in the LINKS section.

15. With respect to the tug driver's comment... One wonders why the safety of the equipment issue hadn't been addressed at least a dozen years prior to the competition, let alone three days into it. It still hasn't been addressed - that release in that configuration still goes up.

16. The spinnaker shackle which caused this fatality was since late 1991 the industry standard for aerotow release mechanisms and remains so today (nice try, Rohan).

18

2005/05/29

Holly Korzilius

Steve Wendt

Summary: I observed the accident from a few hundred yards away, but could clearly see launch and the aero tow was coming towards my area so that I had a full view of the flight. I was at the wreckage in a few seconds and afterwards gathered the information that helps understand the results of some unfortunate poor decisions of the injured pilot.

The pilot launched at 12:15 while conditions were just starting to become thermally, with just a slight crosswind of maybe 20 degrees with winds of 8 to 12 mph NNW. The pilot had flown here via AT more than 50 times.

Holly immediately had control problems right off the dolly and completed 3 oscilations before it took her 90 degrees from the tow vehicle upon when the tub pilot hit the release and Holly continued turning away from the tow in a fairly violent exchange of force. Holly pulled in to have control speed and then began rounding out, but there was not enough altitude and she hit the ground before she could do so. She was barely 100 feet when she was locked out in a left hand turn. At that time, she was banked up over 60 degrees.

The basebar hit the ground first, nose wires failed from the impact, and at the same time she was hitting face first. She had a full face helmet, which helped reduce her facial injuries but could not totally prevent them. The gliders wings were level with the ground when it make contact with the ground.

First aid was available quickly and EMT response was appropriate.

Now, why did Holly not have control? Holly has two gliders, a Moyes Sonic, and the Moyes Litesport that she was flying during the accident. She has flown here in much stronger conditions before. and has always flown safely, on both of her gliders, but usually chooses her Sonic if air is questionable, or if she hasn't flown in a while.

Holly for some reason chose to fly her Litesport, she has always towed it with proper releases and weak links and usually seeked advice from me when unsure of something.

This time she couldn't find her v-bridle top line with her weak link installed for her primary keel release. She chose to tow anyway, and just go from the shoulders, which to my knowledge she had never done before, nor had she been trained to understand potential problems. This could have been done with a short clinic and if we thought it a possibility, been done under supervised conditions in the evening air. Our dollys have check lists for many things, on is that you have a proper weak link installed. She had no weak link as it was normally on the upper line that she couldn't find, and we can only assume that she didn't even consider the fact that she now didn't have a a weak link.

These mistakes caused her to have too much bar pressure, farther bar position, she was cross controlling, and had no weak link. She hadn't flown that glider in a while and changed these towing aspects that I believe all combined to make a violent combination. The pilot also stayed on tow too long. She should have released after the first, or even the second oscilation when she realized that things were not correct. Failing to do so put the glider in a locked out situation that she could no longer control.

Scott Wilkinson

2005/05/29

From what Steve told me, she experienced oscillations shortly after takeoff which quickly became severe. At an altitude somewhere between 50 and 100 feet (We don't know for sure) there was a lockout situation with the glider at a near 90-degree angle. When a line broke (I don't know which one), Holly's glider recoiled backwards, almost fully inverted, then partially recovered in a dive toward the ground.

Steve saw Holly pulling in for speed. He speculated had she been 10-20' higher, she might have made it...and 10-20' lower, she could have died. Whatever the case, she hit the ground hard at something less than a vertical angle. Her Charley Insider full-face helmet was broken through in two places (the chin and next to her eye), and Steve believes the breaks absorbed some of the impact and probably saved her life.

2005/06/08

Holly is doing as well as can be expected after 15 hours of surgery. The doctors came to see us around 10:45pm last night. They said everything went fine. Once into surgery, they found many more fractures than were evident on the CT scan. Holly's face wasn't just cracked in a few places, it was shattered into many pieces over large areas. Piecing everything together and securing it in place was meticulous, time-consuming work.

Now Holly is quite literally the "Terminator," with a largely titanium face.

And to pilots reading these messages, please bear in mind the physical and emotional devastation that accompanies an accident like this. I have far greater empathy now for others who have been through it. I am nobody to lecture and don't mean to. I'm still reeling from the lasting consequences of a few effortlessly simple flying-related decisions and events that could happen to any of us. Enjoy the wonder of free-soaring flight, and remain vigilant and careful. Complacency can be deadly.

2005/08/31

Tad's point of view is irrelevant to me---there's no intelligent reason to ignore his work if it is superior to what we're all currently using. (The sport would never improve if everyone thought "if it ain't broke, don't fix it.)

Holly Korzilius

2006/09

I have no recollection of the accident itself. My hang gliding instructor saw my 'flight' from a distance. The only thing I remember was making the decision to tow off the shoulders, preparing to get towed aloft by the ultralight, and acknowledging that the wind was crossing slightly from my left and to prepare for my left wing to get lifted (which would put me in an unintentional right-hand turn immediately after I released from the tow dolly).

I set up my Litesport that morning. I felt that conditions were good for flying early that day. There were scattered clouds, warm temps, and winds blowing between 5 and 10 mph from the SE. Shortly before noon, I decided I wanted to aerotow. While getting ready to fly, I discovered that I had lost of the lines that make up the aerotow release. The missing line was the primary release line that connects to the keel (as opposed to the secondary release line that runs shoulder-to-shoulder).

I discussed 'towing off the shoulders' with a couple of other pilots, as this was something I thought I could do with the remaining portions of my aerotow release. I did not discuss my intent to tow off the shoulders with either of the hang gliding instructors present prior to launching. Based on the anecdotal comments/observations I got from a couple of other pilots who had experience towing off the shoulders, I decided that I was ready to try this method of towing.

I left the primary release (bicycle brake) attached to my right downtube and never thought through how I would release with the secondary barrel release. It's possible that, when things started to go wrong on tow, I attempted to release by whacking the bicycle brake. It's possible that I panicked when the release 'didn't work'.

Based on the other pilots' reports, my glider ended up perpendicular to the tug's flight path and the Spectra tow line snapped. I ended up doing a low-altitude loop. I was able to correct the attitude of the glider and, if I'd had about 15 more feet of altitude, may well have been able to pull off a safe(r) landing. Unfortunately, the tangent of my flight trajectory was about 10 feet below ground level. I impacted headfirst. My Litesport's flying wires snapped and the glider collapsed on top of me.

Joe Gregor

2006/09

It seems reasonable to assume the launching from the shoulders alone (the so-called "pro-tow") would represent a

substantial modification of the entire aerotow system. As pilots of what the FAA would consider a (highly) experimental aircraft, we are all a little bit test pilot, even in our routine day-to-day operations.

Pilots who contemplate attempting a new maneuver, flying with a new type of wing or harness, or trying out a new type of flight-critical system (such as a new-style tow release) are encouraged to seek out qualified instruction if they wish to preserve their safety margin while doing so.

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Analysis - TE:

01. This accident has largely been written off as being purely a consequence of Holly towing one point rather than two.

02. Towing two point is far from a guarantee against oscillation by any pilot on any glider.

03. Any pilot who flies with a two point bridle which releases from the top end must be qualified and equipped to deal with one point configuration because it is far from guaranteed that the bridle will clear the tow ring.

04. A two point bridle wrap would have removed her weak link from the equation just has effectively as did her decision to tow one point. The USHGA regulations state that "A weak link must be placed at both ends of the tow line." They do not state that a weak link at one end of a bridle is an acceptable alternative.

05. Had she had weak links at the top end of her primary bridle and both ends of her secondary bridle she would have been as properly weak link protected regardless of malfunctions or decisions as she would have been with a weak link installed in compliance with the regulations. But this would involve and expenditure of about a nickel's worth of extra material so it's not a particularly popular practice in hang gliding culture.

06. As much has been made about the absence of a weak link at the back end, it should have made no difference. A weak link is required at the front end of the tow line and it's supposed to be no more than moderately stronger than the glider's. It is unclear from any of the reports that this was the case.

07. Weak links were not a factor in this incident. The function of weak links is only to protect the plane from being overstressed in the air and neither was.

08. The statement that "she has always towed it with proper releases and weak links" is total fiction.

09. Her primary release actuator was always configured on her downtube in a lethally inaccessible location.

10. The weak link on the top end of her usual but missing two point bridle was undoubtedly the "one size fits all" Greenspot. A 1.4 G weak link for that glider - a Moyes Litesport 4 - is 434 pounds. The Greenspot would have put it at under 0.8 and, as previously discussed, wasn't configured such that it could be counted on to do it any good at all.

11. Her secondary release, which in this instance was her primary/only release, was a single curved pin barrel release. It was stupidly designed, has zilch in the way of mechanical advantage, does not comply with any reasonable interpretation of the uselessly vague USHGA Standard Operation Procedures, and has been documented to have locked up in flight under a lot less load than that to which Holly may have been subjected. As she has no memory of the flight it cannot known whether an attempt to release was made. If she had taken a stab at releasing she would have had to overcome well over three times as much resistance as she would have with a properly designed comparable release.

12. The statement that "she was cross controlling" doesn't have much of a ring to it.

13. "Cross controlling" is a sadly misnamed description of a person yawing his body such that his head moves in one direction, his feet move in the opposite, and his center of gravity remains unchanged. The effect on the glider is not that it responds in a manner opposite to that which was intended. The effect on the glider is nothing whatsoever.

14. Holly was oscillating. Those oscillations are rather easy to get into on tow - one point or two - and they're pretty much always Pilot Induced Oscillations. In other words, too MUCH pilot input, not too little.

15. If it was obvious to Steve that "she should have released AFTER the first, or even the second oscillation when she realized that things were not correct" one must wonder why she wasn't released from the front end at those opportunities - the tug pilot was a lot closer to Holly than Steve was.

16. Granted, that's not really the tug pilot's job - but, then again, neither is pulling the pin when the glider is at a hundred feet at the extremity of a third oscillation heading perpendicularly to the desired path and standing on its ear beyond the placarded roll limitation. One needn't have a crystal ball nor be a rocket scientist to predict near future events in that situation.

17. If this glider was indeed locked out and not going to come back from the third oscillation, its fate was pretty much sealed. However, in the text Towing Aloft (1998/01, Pagen/Bryden) on Page 333 it is stated that lockouts general occur after the fourth or fifth cycle. If the situation had another cycle or two left in it - and people had left releases alone and the weak links and tow line had held - the glider could have been released without consequence as it was coming back from one.

18. There are conflicting accounts as to whether Holly was separated by an actuation of the tug's release or a failure of the tow line.

19. If the tow line failed the flight was conducted in violation of the USHGA Standard Operating Procedures which require the tow line to be at least twice the strength of the weak link. Such a failure would have deprived her of any hope of coming back from the oscillation cycle.

20. Holly and her glider were both in excellent shape during the oscillations and toast immediately after they lost tow tension.

21. On 2004/09/20, a bit over eight months prior to the accident, I made a trip to the flight park at Manquin, Virginia to showcase a two point aerotow release system which could be actuated with a twist of one hand on the basetube and incorporated weak links at both ends of both bridles and a secondary system with excellent mechanical advantage that could easily handle over 750 pounds of tow tension. Steve couldn't have been interested much less.

22. Several months prior to the accident Steve Kinsley demonstrated at Manquin a one point release he developed which would actuate when the pilot relaxed his bite on a string. There was no interest in taking advantage of that technology either.

23. Ten days prior to the accident I was involved in correspondence with Scott - Holly's then significant other, now husband - concerning improving release technology.

24. That a low oscillating or locking out glider pilot will be able to take a hand off of a basetube to actuate a

release is an obscenely absurd expectation.

25. Implementation of these technologies has has been virtually nonexistent in the years since this accident as well.

19

2005/07/07

16:00

John Woiwode

Ken Cavanaugh

2005/09/18

Introduction

The following is a depiction of information surrounding a hang gliding accident that occurred on 7/7/05 30 miles NE Rock Springs, WY. Ken Cavanaugh (KC) is the owner of the tow rig. KC provided the platform launch unit on a trailer and the vehicle that towed the launch trailer. KC provided the bridle and release combination that the pilot was using at the time of the accident. He also provided the tow procedure that included use of a checklist. Toni Cavanaugh was the tow driver. John Woiwode (JW) was the pilot.

The method of presentation used here is to describe the equipment used and the accident scenario as perceived by the two people that were there. A summary is presented that includes potential factors that may have contributed to causing the accident

Equipment

The heart of the system was a trailer mounted payout winch using a Tow Launch Systems MK III drum incorporating automobile friction brakes that are hydraulically controlled and adjustable from inside the vehicle.

A Flennor part # BR1827-1 "Ball Reverser" level-wind unit had been modified and adapted to serve as the level-wind.

The line used was 3000 feet of braided material with a flattened cross section measuring about 1/8 by 3/16 inch. The material composition is believed to be "Spectra".

An audio beeper was wired to the payout drum and terminated at the driver's console where each drum revolution was detected and reported with an LED and audio "beep".

The weak link was of standard design (see page 60 of the reference) and tested to fail at 250 - 300 pounds (or 100 - 120 % of total flying system weight).

A parafoil was installed on the end of the line to enhance rope retrieval and prevent the line from touching the ground.

The hydraulics were set to 38 psig which measured about 70 pounds horizontal force on a scale when tested.

Ken provided the bridle and release (unknown manufacturer) that were identical to his own and purchased in the mid 1990's from a local ATOL and Wills Wing dealer. The release used the standard 3-loop arrangement.

The bridle attachment method was the "single point" method described for surface towing on pages 36 through 38 of the reference. The bridle leads are routed through tabs sewn on the harness and connected at the carabiner. JW's harness did not have the standard tab sewn aft of each armpit to contain the bridle leads. Tabs were rigged in the field by tying rope between his shoulder tangs and his hip supports. This arrangement could have allowed a maximum of about 12 inches of movement of each bridle lead during the tow.

A wind gauge was attached to the front of the vehicle and a horn was rigged to the trailer so that the driver could notify the pilot of the correct time to launch.

JW's glider was an Aeros Combat 14 Meter with minor modification to enhance turning (slightly shortened flying wires).

Vehicle attached to trailer was 1997 Chevrolet Suburban 4WD with 4 speed automatic transmission and 5.7 liter (350 c.i.) V-8 "Vortec" gas motor.

We were new owners of the tow system but the previous owners had about 600 tows on the unit. The history included no serious mishaps but I don't have a record on close calls.

Driver and Observer

The entire crew consisted of the three people mentioned above. Two were pilots so until the first pilot went cross-country, there was an observer. At the time of the accident, Ken had proceeded downwind and there was no observer.

The driver was relatively inexperienced. This was her fourth time as driver with two previous tows serving in a solo capacity (no observer). She also had served as observer three times and had numerous dry runs.

Although on page 18 of the reference, it is acknowledged that some operators perform payout winch towing without an observer, it suggests that the driver be a well-trained observer that has a special mirror to track the tow and dump pressure when necessary. Our rig had no such mirror nor were any of us experienced enough to know when to dump the pressure. Our only agreed emergency procedure was that if the "abort" was sounded; the driver was to come to a slow, controlled stop.

Pilot Experience

The pilots had contrasting tow experience. KC had maybe 15 or 20 tows, mostly in mid-day thermal conditions, all but one off of a payout winch platform. JW had hundreds of static-line tows and numerous aero tows. He had approximately 30 previous launches from payout winch platforms. This was his first day using the Aeros Combat glider for platform towing. His two earlier tow launches of the day with that glider were without incident and largely unremarkable.

Launch Technique

The launch technique was as described under "Technique II" on pages 170 to 171 in the reference. The method basically

involves vehicle acceleration to 40 mph with launch occurring at about the 30 mph point. The driver (or observer) signals the correct time to launch by tripping the horn switch. The wind gauge is marked with a black line at the 30 mph point. After achieving 40 mph, the driver allows the vehicle to decelerate to about 30 mph and then adjusts speed according to the drum rpms and pilots input. In our case, the transmission was placed in 4WD high range second gear.

Weather Information

It was a high-pressure day with temperatures in the 90F -99 F range. The surface elevation was about 7,000 ft. MSL. The upper air was predicted to be from 260 degrees (west) that day and was true at altitude. The tow road faced 260 degrees but the surface wind turned out to be light and quite often crossing from the south. We had two or three huge cumulus clouds drifting slowly overhead with cloudbase at about 20,000 feet. We noticed quite a few dust devils during the course of the day. The accident occurred about 4:00 PM. We were on Wyoming's Red Desert 30 miles NE of Rock Springs

Accident Scenario - Driver's Perspective

Everything was normal until it was discovered that the line was on the ground about a minute into the tow. The acceleration, horn honk and drum rpms as indicated by the audio beeps were identical to the previous successful tows. There was no radio communication from JW of there being a problem.

Accident Scenario - Pilot's Perspective: JW

I remember the launch and the sequential events quite clearly. Further corroboration of my memory of the events was supplied by the hard facts on the ground: i.e. when KC carefully scrutinized the scene of the accident afterwards, he noted that the tow bridle was released and found near the site of impact. I remember releasing before impact. And the glider was found facing the opposite direction of the tow: I recall the glider seemingly going upside down in its violent lock out, which could have readily faced it the other direction.

The wind was light from 260, down the road. Toni radioed that the wind looked pretty good. I watched for another 10 seconds and told her let's wait, there seemed to be a little L&V from the south. After a few more minutes of watching I told her the wind was lining up ok and consistent enough, and "go to cruise". When the horn sounded, I pulled the release with my left hand. The glider came off the trailer clean and I climbed straight up at an acceptable rate.

At about 30', I drifted lightly to the right with a soft south push. It was a gentle deviation, so I applied a correction that stopped the right drift and eventually brought me back in line with the trailer. I was still climbing ok as the line paid out. It was at this time, lined up square with the road and climbing slowly, that I felt a distinct pull on the glider from the tow line, and a rapid acceleration. My fleeting thought at that moment was that I was ok for a bit because the glider was straight and in line with the tow vehicle. I noted that I was catching up to the vehicle/trailer.

The next fractions of seconds happened in a blur, but I agree that I must have locked out to the left. The increase in speed exacerbated the speed of the lock out and its disastrous consequences. I recall pulling my release, but it was far too late. I had the distinct feeling that my glider was going upside down, which in retrospect must have been some sort of vertical spiral just before impact. Somehow, in a reaction I do not recall, I got my feet under me just before impact, which saved my life.

Toni immediately stopped the truck and was at my side offering assistance. I was conscious and suggested she try her cell for 911. In this vast desert with very spotty cell connection, astoundingly she had a signal and was able to get through. A ground ambulance from Rock Springs and a Medivac helicopter from Casper arrived at about the same time, about two hours later. Because of the severity of the injuries, I was Medivaced to Rock Springs; later that night I was flown on a fixed wing Air Ambulance flight to the Salt Lake City Trauma Center. KC and Toni followed as best they could to Salt Lake. I want to thank them for all their assistance then and since.

Post Accident Information

The glider was positioned right side up facing east (opposite from direction of tow). The glider was about 141 feet south of the road centerline. The downtubes were broken as were the keel, crossbar and right leading edge. The sail was intact except for one small rip on the under surface.

Summary by KC

Hang gliding is a dangerous sport. Towing adds an extra element of danger especially when performed in the big air out west in thermally conditions with high performance gliders. The two pilots participating recognized the hazards and accepted the risks.

The accident was the result of a low altitude lockout. The specific cause and methods that could have prevented the accident are not known.

Analysis by KC

I am going to add some of my own speculation as to what happened, but the facts are presented above. The following is speculation.

JW reported that he felt some binding or that the rig seemed to "pull hard" and he accelerated until he was clearly catching up to the trailer. I attribute this to either one of two things. The level-wind guide may have been offset with respect to where the line was feeding from the spool. I notice this phenomenon with my level-wind fishing reels at times. Also, the line may have been wound improperly. Sometimes lines fall between underlying lines and get partially bound. The driver reported winding in the line with the electric retrieval system and parafoil fully inflated as normal when recovering from the previous tow that was inadvertently terminated early. However, it seems possible that the low altitude early release during the previous tow created some sort of problem spot in the reel at that point.

I measured the vehicle acceleration/deceleration response from 30 to mph to 40 mph and back again. I did this to determine what stage the launch rig was in (procedure-wise) during the lockout. It was only about 9 seconds total time for the vehicle to return to normal pay-out velocity from the time of launch.

If I assume an average rate of climb for JW at about 200 FPM, and assume initiation of the lockout between 70 and 141 feet, the accident began between 23 seconds and 42 seconds after launch. It therefore seems reasonable to assume that the vehicle speed was constant and it was doing about 30 mph airspeed. For JW to drift some distance behind the rig and then catch up to it, he would have had to be going faster than 30 mph. This could be perhaps 40 mph or more. It would not be unreasonable to assume that gravity and the lock out increased his speed as he descended, so I will assume 45 mph average speed during the event.

Once the deviation from the centerline became complete, all of the velocity was converted to horizontal along the arc toward impact. If I assume an average airspeed of 45 mph after initiation of the lockout, and assume the arc traveled is 1/4 of the circumference of a circle whose radius is 141 feet, I calculate that a maximum of 3.4 seconds elapsed between the initiation and impact. It was probably less time since the accident initiation altitude would have been

less than 141 feet and the average speed more than 45 mph. But any way you slice it, he didn't have much time to react.

Because JW's harness allowed the bridle to travel more aft as his angle relative to the trailer became steeper, the phenomenon discussed on page 37 of the reference would have become progressively more pronounced.

The fact that the weak link didn't break doesn't seem too surprising, now that I review the manual more closely. On page 54 of the reference, it indicates that tension controlled devices do not stress a weak link sufficiently. Unless the payout winch binds or jams, it delivers about the same tension regardless of what is happening on the other end. That is why they recommend a well-trained observer to intervene if a lockout is detected on a payout winch system.

It was certainly not our desire to be without a well-trained observer, but they were in short supply that day and we accepted the risk of not having an observer. I would not be surprised if our critics point at the lack of observer as the largest contributor to the accident. That may be true but neither JW nor I believe that an observer could have recognized the problem and executed an action that would have prevented the mishap in time. Such an intervention would have required a very special person with one hand on the pressure release and two eyes on the pilot. It would have taken immediate action within a second of the problem initiation. This same person would be required to recognize non-problems and not react with minor perturbations; otherwise the pilot is suddenly dealing with no pressure (and potential resultant stall) and a dangling line that can become snagged and create an accident of a different kind.

Reference

Towing Aloft by Dennis Pagen & Bill Bryden published January 1998.

+++

Analysis - TE:

01. A 466 pound weak link would have been appropriate for that glider.

02. A 300 pound weak link would have put that glider at 0.9 Gs.

03. There is no reason to believe that an observer could have reacted to the situation any faster than John did. My bet would be considerably more slowly and less effectively.

04. As usual, with the situation deteriorating at lightning speed, time is lost be taking a hand off of the basetube to effect the release.

05. It is likely that this accident was precipitated by a jam of the line coming off the reel.

06. The relatively light weak link did nothing to mitigate the outcome.

07. John was a highly accomplished cross country and competition pilot but his skills and experience did little to mitigate the outcome.

08. The outcome included multiple limb amputation.

20

2005/09/03

18:30

Arlan Birkett
47
H-4, advanced tandem instructor, AT administrator

Jeremiah Thompson

North Wing T2
over/under harnesses

Hang Glide Chicago
Cushing Field
Sheridan, Illinois

Paul Tjaden

2005/09/05

One witness said the glider fluttered and spun to the ground from 200 feet up like a wounded bird...

Vanman25

2005/10/10

I watched the glider come almost straight down from about 250 feet. I saw that Jeremiah was doing the take off right from the start and I watched him get pretty low on the tow as the tug crossed the road at the end of the runway. I looked down for a few seconds and when I looked back up, they were released, and going into what looked like a whip stall. After the wing dropped they were in an almost straight down nose dive and they couldn't pull out. The weak link broke from the tow plane, I'm guessing from the increasing pressure from being that low on the tug. My personal opinion is that the glider was just being pulled through the air in a stalled position and they were trying to push out to get back into position behind the tow plane which slowed them down even more, the weak link broke, they didn't have enough airspeed to fly safely yet, and then a whip stall.

2005/10/13

The weak link broke from the tow plane side. The tow line was found underneath the wreck, and attached to the glider by the weaklink. The glider basically fell on the tow line.

Chicago Sun-Times

2005/10/06

An airplane towed the hang glider into the air, with plans to reach 3,000 feet before the cable was released and their tandem hang glide began, an attorney said.

But 200 feet into that ascent, the cable snapped, and the hang glider plummeted to the ground, smashing to pieces and instantly killing Thompson and Birkett.

On Wednesday, Thompson's family filed a negligence lawsuit against the company, demanding unspecified damages but also hoping to find out how the crash happened.

"They're 200 feet in the air, and while normally they would glide to the ground, this hang glider nose-dived to the ground," attorney Matthew Rundio said. "We need to find out why that happened."

+++

Analysis - TE:

01. Gliders need to either stay level with or above tugs or pull in and release if they can't.

02. Tugs need to compensate for low gliders by diving and using full power.

03. Front end weak links are supposed to hold a hundred pounds beyond the rating of back end weak links.

04. Weak links need to keep gliders safely above 1.0 Gs, preferably around 1.4.

05. In 2008/06 I talked extensively with Rich Cizauskas, an instructor familiar with that operation who had interviewed witnesses. Witnesses reported that the sail was fluttering during the dive. This is an indication that the reflex bridle lines were slack and thus the glider would have been unable to recover from the dive.

06. Sails are made of Dacron and shrink over time. Reflex bridle lines are made of stainless steel cable and don't.

07. Regardless of whether the severity of the fatal plunge was the consequence of a stability problem or a whip stall, it must be understood that bad things often happen when things between the tug and the glider break and breakage of things between the tug and glider needs to be minimized.

21

2006/01/19

James Simpson

Davis Straub

2006/01/19

I spoke most extensively with Chris Smith. He said that he watched the whole flight.

He stated that the pilot was getting out of whack, both yaw and roll, behind the Dragonfly. Then the Dragonfly and pilot entered a strong smooth thermal and they were both going up fast. When the Dragonfly got out of the thermal he went down fast and the hang glider pilot pulled in to follow him, getting out of whack again. He significantly reduced the distance between himself and the Dragonfly.

Then the radical actions continued and the glider went upside down and the wings folded. From 500 feet the glider tucked and spun. The pilot got the parachute out, but it did not open in time to stop the impact.

The rope looped around the side wire and formed a knot.

It is not clear when the rope looped around the wire. From Chris Smith's description, the rope would have been bowed substantially after the tug came out of the thermal. The weaklinks on both ends of the rope were broken and the pilot landed with the rope tied to the wire.

We have noticed that there is considerable movement and differences in altitude between the tugs and the hang glider pilots on the tow rope. Often the tug has been way above me or below me with bow in the rope when it is below me. This seems quite a bit more extreme than I have experienced aerotowing previously.

One of the things that interests me about this accident is that it highlights one of the potential problems of the windtech type tow release. These releases are really difficult (if not imposssible) to release with one hand if there is no tension on the tow rope. You need the bridle to be under tension for the release string to remove the pin. It strikes me that if you have enough slack in the rope to wrap around your wing wire there is probably insufficient tension to release even if you wanted to.

Bill Moyes argues that you should not have to move your hand from the base bar to release. That is because your natural inclination is to continue to hold onto the base bar in tough conditions and to try to fly the glider when you should be releasing.

+++

Analysis - TE:

But why bother taking to heart anything this "Bill Moyes" person has to say? Who the hell is he anyway? (First person to pilot an aerotowed hang glider - 1970.) If there were anything seriously wrong with the way we're doing things, we wouldn't be doing them that way.

22

2006/02/05

John Dullahan

John Dullahan

2006/02/06

Went down to Quest late Friday to fly in small weekend comp organized by Paul and Lauren, and was greeted by heavy rain and spectacular lightning. John Simon also made the trek and there were lots of local and visiting pilots there as well.

Sat was blown-out, with 13-15 mph winds, so made do with dinner and socializing.

Sunday the winds were around 12 MPH, with a further reduction forecasted between 1 and 3 pm. Pilots lined up after Bo Hagwood took off in a single surface glider but sank out near the first turnpoint.

With winds of 10-12 mph I waited for a few minutes for a lull before giving the take-off signal. Lift-off from the cart was nice and level, but at about 10 feet the right wing was suddenly and violently lifted (Paul said a strong thermal came through just as I left the cart and pilots had to hold down their gliders). Almost immediately the glider went into a lockout and the weak link broke just as I hit the release. The high right wing put me into a left turn, so I committed to making a complete 360 back into the wind as the best option. At the 180 point I was about 20 feet over the ground and flying very fast downwind, so to avoid a downwind stall I pulled in slightly then pushed out to gain a little altitude before completing the 360. I almost got it around but couldn't quite pull it off, so the left corner of the control frame dug into the ground taking out the right downtube and fractured a small bone in my wrist (the ulnar styloid). I got a small soft cast which allows use of the hand for driving etc.

After that the winds and thermal activity on the ground picked-up, pilots waited, but the wind strength continued to increase, and the day was eventually called.

By Monday morning the winds had died down and the everybody was getting ready to fly as I left for an early afternoon flight.

The two people with me at the cart release didn't notice the thermal activity at the gliders, which were downwind and behind us.

Besides the windsock, which was about 250 yards away and 2 o'clock from my position (right front) there was a streamer about 100 yards away and 11 o'clock (left front). The windsock was about 30 degrees below the horizontal and indicating the wind was from the west, the direction of takeoff, and the streamer indicated similar conditions closer to launch.

The incident demonstrated the few options available when towing in winds of 10-12 mph and a wing is suddenly and violently lifted close to the ground - a lockout often ensues very quickly and the glider is pulled into a turn before either the pilot can release or the weak link breaks, and a dangerous situation ensues (flying downwind close to the ground).

With a similar wing lift at a mountain site I think the pilot has more options, such as pulling-in if airspeed is low, or immediately and aggressively high-siding (without having to remove one hand from the base tube to release).

The experience gives me a very healthy respect for any thermal activity during towing, especially when combined with winds over about 8 mph.

Every year people are injured or killed by incidents like this. Glider comes off the cart crooked (or gets crooked shortly after) and proceeds to a lockout situation very quickly before the pilot has time to release. These are generally advanced pilots towing from the shoulders in rowdy conditions.

Steve Kinsley

2006/02/09

While nothing like this has ever happened to me, reading about these incidents (particularly one in Australia where someone was killed) made me uncomfortable with my barrel release system. Accordingly, I devised a release where you hold a string that activates the release in your mouth. Open your mouth and you are off. Instantly. It works. What's more, as the pressure from an incipient lockout builds, you have to actively decide to stay on by biting down harder. "Duh" mode results in a release.

Once you are up a hundred feet or so and out of danger, you slide a keeper over the string and it becomes a barrel release. I think it is great. Tad Eareckson has made it even smaller. While I really do not like to proselytize on behalf of this system, it seems a no brainer to me. I think if everybody used this or something like it, there would be fewer incidents. So you should. And tow parks should make them and sell them.

I have made a few. Tad has some. If you want to try one let me know and I will send you one.

Craig Stanley

2009/06/02

Sorry to stir this up again, but I wanted to give a quick update on the mouth release. I added another loop into the release and I have to say, I love this thing.

Tension at the mouth is low and comfortable. Locking it off with the sliding barrel at altitude is quite simple. Releasing couldn't be easier.

Yesterday I was hit with a quarter side/tailwind off the cart. I got really high and to the left of the tug. I was pulling in and turning back to the right to get in line with the tug, but the tug was unable to climb fast enough and I could not dive fast enough. By just opening my mouth, I was free of the tug. I did not have to take my hands off the bar and let the glider get in a worse AoA or turn.

I'm sure my release is not the best one out there (I think the mouth-throttle version is good as well), but I strongly believe having a mouth release adds a lot of safety to towing from the chest.

+++

Analysis - TE:

01. John was towing two point with a bicycle brake lever mounted on the downtube of his Icaro 2000 Laminar.

02. The weak link would have limited him to about 243 pounds of tow line tension max and would have been off the bottom end of the safe range for that glider.

03. I don't buy that the weak link just happened to fail as he actuated the release. I've had this "coincidence" occur myself during a lockout at altitude and I believe that at high loading the weak link is being shredded by the spinnaker shackle gate as it's disengaging. It would be a big mistake to assume that the weak link would have done John's job for him just as well and quickly.

04. Given what he had to work with, it appears that John did everything right in this situation but still ended up with a broken wrist. As usual, things were going south very quickly and, as he notes, the requirement that he take a hand off the basetube didn't help him any in the time and control departments.

23

2006/05/06

Nuno Fontes

Advanced
California
scooter tow

Nuno Fontes

2006/05/27

We were towing on the lee side of some 1000 foot mountains. I had flown without problems an hour before.

The first of three mistakes was not having perceived a pronounced direction and speed gradient, not readily apparent due to the absence of clouds.

The second mistake was taking off with a stalled glider and not correcting it in the first few seconds. I got to about a hundred feet and the glider was completely veered to the left due to the strong crosswinds from the right.

The second mistake was not releasing immediately.

What made me hesitate and not release was having the right wing way up and being stalled and very low. I had the feeling I was going to be catapulted backwards if I released and had a clear notion I was going to hit dirt in a tailwind. Another problem was that we didn't leave any room behind and next to the launch point. We were surrounded by rocky hills, fences, and where I was heading we had a pit that was unlandable way down below.

The best option seemed to be to resist the lock out and slowly bring the glider down, even if it was crooked, but another problem arose when the observer had the tow line cut when I was down to about fifty feet.

I had no chance. The glider that had been hanging on like a kite dead leafed to the ground. The left leading edge hit first, destroying it along with the nose plates. My body's impact point was the left shoulder and the left side of my head and neck.

I remained unconscious for about 20 minutes with a bloody face from what poured from my nose. The chopper arrived about an hour after the crash. I was already semi-conscious but in a lot of pain and having trouble breathing. I was hauled to Stanford (about half an hour flight time).

The toll: fracture and crushing of the upper humerus, several broken ribs, a lung pierced and collapsed by one of them, and broken C1 vertebra right by the artery. They considered surgery, but the no-surgery risk was lower - they feared a chip would rupture the artery.

+++

Analysis - TE:

01. The first mistake actually was towing in an unsafe environment with insufficient bailout options.

02. While it may have been a mistake to launch in those micrometeorological conditions, most tow launches are done in thermal conditions and thermal conditions can unpredictably subject the pilot to a lot more serious control problems than those Nuno experienced.

03. I'm not convinced that failing to correct problems in the first few seconds was, in fact, an error. Problems aren't always correctable in the first few seconds and this was an Advanced rated pilot.

04. While any tow accident can be prevented by an early enough release, even with a proper release system it is simply outside the range of human response capability to react quickly enough to many of these scenarios.

05. This was almost certainly a foot launched flight and proper release systems for foot launched towing are virtually nonexistent.

06. This glider was not locked out.

07. The "best" option to which Nuno refers was probably his ONLY option - and it would have probably gotten him back down smoothly enough for an immediate relaunch.

08. BUT... Once again, hang gliding comes through with its Golden Rule. Whatever's going on at the end of the string - hit the release, blow the weak link, dump the tension, cut the line.

Garry and Denise Whitman

1983/05

Experience shows that an observer is usually wrong.

24

2008/03/23

Lauren Tjaden

When Jim got me locked out to the right, I couldn't keep the pitch of the glider with one hand for more than a second (the pressure was a zillion pounds, more or less), but the F'ing release slid around when I tried to hit it. The barrel release wouldn't work because we had too much pressure on it.

Anyhow, the tandem can indeed perform big wingovers, as I demonstrated when I finally got separated from the tug.

Greg DeWolf

2000/09/01

...(however, I have heard of some complaints of the Baileys being difficult to work under high loads).

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Analysis - TE:

01. The tandem glider's two point release actuator is the usual bicycle brake lever velcroed onto a downtube where it can't be accessed without loss of control of the glider.

02. Even after getting to the lever at the cost of control of the glider the sacrifice is in vain. A velcro strap didn't keep a flight critical control mechanism safely engaged? Who could have seen that coming? (Anybody who's ever asked around at any flight park - this malfunction occurs all the time.)

03. So Plan B - go to the Bailey release.

04. The good news is that it's so stupidly "designed" that it won't work. If it had worked and the bridle had wrapped at the tow ring two people could have died. (See further discussion in the LINKS section.)

05. The bad news is that if the primary release wasn't a piece of junk and had worked but a bridle wrap had occurred the Bailey release would have had twice as much load on it, would have been twice as hard to operate, and would be twice as useless.

06. USHGA requires releases to be operable at twice the weak link strength. The Bailey failed at half. But that's OK because it's "standard" equipment. ("Standard" doesn't mean it meets any kind of standards. "Standard" means it's what everybody sells and uses.)

07. How fortunate it was that this was a training exercise conducted at altitude with all the time and air in the world - instead of the real deal just off the runway where every foot and fraction of a second is critical.

25

Danny Brotto

Danny Brotto

2008/11/04

An instance where the weak link could have broken and I'm glad it didn't...

I had the Axis on the cart with the AOA a bit high, launching to the west, with a moderate 90 degree cross from the left. I came out of the cart rolled and yawed to the right with the upwind wing flying and the downwind wing stalled. It was rather dramatic. If I had released or if the weak link had broken, the downwind wing would have further stalled and I would have cartwheeled into terra firma in an unpleasant fashion. I held on tight gaining airspeed until the downwind wing began flying, got in behind the tug, and continued the flight.

Sunny later told be he was about to give me the rope and I thanked him to no end that he didn't.

Towing Aloft
1998/01

Pro Tip: Always thank the tug pilot for intentionally releasing you, even if you feel you could have ridden it out. He should be given a vote of confidence that he made a good decision in the interest of your safety.

William Olive

2005/02/11

I give 'em the rope if they drop a tip (seriously drop a tip), or take off stalled. You will NEVER be thanked for it, for often they will bend some tube.

2008/12/24

I've seen a few given the rope by alert tug pilots, early on when things were going wrong, but way before it got really ugly. Invariably the HG pilot thinks "What the hell, I would have got that back. Now I've got a bent upright."

The next one to come up to the tuggie and say "Thanks for saving my life." will be the 1st.

Jim Rooney

2007/08/01

Whatever's going on back there, I can fix it by giving you the rope.

It's more of this crappy argument that being on tow is somehow safer than being off tow.

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Analysis - TE:

01. It is good that Sunny didn't pull the pin on Danny, it's unfortunate that he was even considering cutting Danny's lifeline.

02. It is also unfortunate that Highland Aerosports has never understood what a weak link is or that there could possibly be any downsides to premature failures. They, like most aerotow operations, hand out the same weak link to a 350 pound glider as they do to a one not much better than half that and prevent gliders from staying in a good safety range by discouraging use of adequate weak links and overriding the pilot's decision with a substandard weak link on the tug end.

26

Carlos Weill

Carlos Weill

2008/11/30

Incident 1

On June of 2008 during a fast tow, I noticed I was getting out of alignment, but I was able to come back to it. The second time it happen I saw the tug line 45 deg off to the left and was not able to align the glider again I tried to release but my body was off centered and could not reach the release. I kept trying and was close to 90 deg. All these happen very quickly, as anyone that has experienced a lock out would tell you. I heard a snap, and then just like the sound of a WWII plane just shut down hurdling to the ground, only the ball of fire was missing. The tug weak link broke off at 1000ft, in less than a second the glider was at 500ft. At that point I realized I had the rope, so I drop it in the parking lot.

Mistake #1 Did not stay behind the tug
Mistake #2 Did not release earlier
Mistake #3 Did not use the secondary

Incident 2

As a background, after release I wrap the bridle on my hand to stow it away. The bridle is the 3-point brake release in the hangloop carabiner. More than 18months ago 2007, under during a turn when tow forces were too strong, my weak link broke. But bridle was still attached to the tug because the bridle was coiled and had wrapped itself around the carabiner. However I had left the weak link intended for pro-tow on the harness and it broke. This happened in no more than 2 seconds.

Since then I when I set-up I make sure the bridle has no twists and still keep the pro-tow weak link.

I welcome any face-to-face questions or comments on these incidents. Anyone who wants recommendations for their towing or training, you have a great pool of knowledge in the tow parks especially from the ones that do it regularly and have the experience in the tug and behind the tug.

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Analysis - TE:

01. One would like to think that in real aviation deadly junk like that which failed in Incident 1 would never have been allowed in the air to begin with.

02. One would also like to think that even in hang gliding deadly junk like that in Incident 1 which had just been demonstrated to be totally useless in even a less than ideal situation would be immediately and permanently grounded before a similar situation developed at 400 feet.

03. The glider's weak link is supposed to fail before the tug's but, since weak link breaks don't ever matter, what could be the point to properly preflighting that aspect of the tug's safety system?

04. "Mistake #1 Did not stay behind the tug" - Yeah, that's always an easy fix - until reality rears its ugly head.

05. "Mistake #2 Did not release earlier" - Another problem one need never again experience - as long as one's crystal ball or pocket time machine are in good working order.

06. "Mistake #3 Did not use the secondary" - It's called a SECONDARY for a reason. If one uses the SECONDARY as the PRIMARY and the bridle wraps - just as Carlos describes in Incident 2 - one will tuck his glider and likely kill oneself. Granted, the primary weak link MAY fail - but it probably won't because there's not much mass behind it at that location on the glider.

07. In Incident 2... The weak link is not supposed to fail because the tow force is too strong in a turn. It's supposed to hold until the structures of the planes are starting to feel some stress. The weak link failed because it was only about half as strong as it should be.

08. It's a very sad comment on the state of affairs that after two dozen years of flying under Exemption 4144 a pilot can be rated for aerotowing without being taught that he either needs a weak link on the end of the tow line or weak

links both above AND below the tow ring.

09. Carlos's loyalty to and respect for the tow operators that sold him all that junk that could have gotten him killed, configured the tug so that he ended up with the rope, failed to ensure that he was properly weak link protected, and failed to teach him how deadly hitting releases out of sequence is is really touching.

27

2008/11/29

Lauren Tjaden

2008/11/29

I know personally of another incident that occurred this year in a tandem (not at Quest, not with me). A pilot with limited tandem experience took up a tandem passenger behind a tug pilot with limited midday experience. The hang gliding pilot had difficulty controlling the glider's pitch due to bad flying on the tug pilot's part. He should have released earlier, but didn't. By the time the glider released the tandem had been stressed pretty hard. The tandem pilot safely landed the tandem. Afterwards, while examining the glider to ensure that it had not been overstressed, it fell apart on the ground. Very lucky it was not a double fatality.

The pilot will report this in a timely fashion but it is not my place to reveal details. The weak link did not break.

Being stuck to the plane is not always good.

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Analysis - TE:

01. This glider was not stuck to the plane. This glider was very deliberately held on tow.

02. A 1.4 G weak link for a tandem glider is in the ballpark of 750 to 800 pounds. It is very unlikely that the weak links actually installed allowed tension greater than half that and it is unlikely that the tension transmitted ever exceeded much over 300 pounds.

03. Aerotowed gliders must meet or exceed the Hang Glider Manufacturers Association's Airworthiness standards. HGMA certified gliders can take six Gs positive. This glider probably never saw more than a third of that on tow. It was a death trap before it left the ground.

04. On 2009/03/10 a North Wing T2 tandem glider - quite likely the same model - failed during mild aerobatics in Queenstown, New Zealand and, after its parachute bridle also failed, there WAS a double fatality.

05. A report on a failure such as described that comes out any time after the day it happened is not a timely one.

28

2009/08/31

Roy G. Messing

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Analysis - TE:

As, at the time of writing, the hang gliding community has yet to be graced with anything resembling a report, I have had to piece together information based on scraps gleaned from the web.

The pilot was 67 years old (born the day the United States declared war on Japan), a resident of Stickney, South Dakota, a Marine Corps veteran (1959-1963), a crop duster pilot, retired, and learning to fly hang gliders at Whitewater, Wisconsin.

He first soloed on 2009/08/18.

He flew a new Wills Wing Falcon 3 195 with Finsterwalder pneumatic wheels installed on the basetube, a cocoon harness with a chest mounted parachute, and a full face helmet.

He towed two point with his upper attachment point on the keel trimmed in accordance with Wills Wing's recommendation for that glider. His actuator was a loop at the basetube through which his hand was inserted.

He undoubtedly was using the ubiquitous single loop of 130 pound Greenspot installed at the top end of his primary bridle as his primary weak link. This would limit his tow line tension to 243 pounds max. An appropriate (1.4 G) weak link for that glider would have been 459 pounds.

He had a secondary weak link - undoubtedly identical to his primary - engaging a curved pin barrel (Bailey) release coming off of his left shoulder.

His secondary bridle was unnecessarily and dangerously long.

The tug was a Bailey-Moyes Dragonfly and he was dolly launching.

His last launch rolled on 2009/08/31 at 09:00. Conditions were 55 degrees, clear, with little or no wind.

While some of his equipment was junk everything relevant with respect to the accident was just about ideal. The tug is as close to perfect for towing hang gliders as one can ask, dolly launching is brain dead easy, the glider is light and easy handling and was ideally trimmed for towing, his primary release actuator was basetube mounted, the wheels were the best available for hang gliders, and the helmet provided good protection for his head and face and the parachute good padding for his chest. And the air was dead and dense.

It was reported that he "released after entering into a mild lock-out but did not regain control in time", crashed and wrecked the glider, and died four days later.

(I'm a bit suspicious of the account of a "mild lock-out". My feeling is that experiencing a mild lockout is like being a little bit pregnant.)

One wonders what went wrong. This is the first time I've ever heard of anyone engaging in center of mass towing with a basetube mounted release actuator being so much as scratched.

The release actuator may have been mounted more inboard - and would have thus required more hand movement - than ideal, as that may have been necessary in order to route the cable over the starboard wheel.

There is also evidence that he was fed the usual fiction about the weak link being there to prevent the glider from getting into a dangerous situation so it's also a possibility that his response was influenced by this.

And hang glider pilots are programmed to respond to any problem on tow by releasing immediately when, in fact, this is very rarely an appropriate response. The fact that he lived as long as he did suggests that he would have probably come through OK with the benefit of a little more time and air with which to work. And a couple more seconds on tow might have bought him that.

Pending further information on this rather bizarre accident there seems little to be learned from it.

It is, however further ammunition against the deadly hang gliding myth that the weak link has some useful roll as protection for the pilot.

And it also serves as graphic illustration that, as quick and easy as it is for the person at the other end to dump the line in aerotowing, the effectiveness of anyone doing so to keep the glider pilot in good shape is so poor that it should be regarded as virtually useless for any form of towing. The focus of the front end person should be to provide and regulate tension and he needs to leave the flying and the release decision and execution to the the glider.

2010/01/04

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07 - PHYSICS OPTIONAL

USHGA

2006/03/15

Safety Notice regarding the conduct of HG Aerotow Tandem operations

HG Tandem Aerotow Operations

It was noticed over a number of years there have been a number of fatalities to participants in hang glider aerotow instruction. The president of the USHPA, therefore, formed an Ad Hoc Joint Committee of the chairs of Safety and Training, Tandem and Towing to investigate this, appointing the Chair of Safety and Training to preside. Tandem instructors, Matt Taber and David Glover were invited to participate.

This committee reviewed a number of possible causes for aerotow tandem fatalities. One particular possible cause stood out as predominate. This was the common belief that when a glider gets low on tow the pilot can safely push out and let the glider climb up to the level of the tow plane safely because the glider will not stall under tow.

This issue is so important that this committee and the towing committee have recommended that the following message be sent to all aerotow pilots and all Aero-Tug pilots with a particular emphasis to aerotow tandem pilots.

Experiences in hang glider tandem flight using aero-tow launch along with analysis of accidents and incidents that have occurred during such flight strongly suggest, for safety reasons, the following cautions be observed.

If the pilot of the tandem glider finds that he/she is too low behind the tug and slow enough that the glider will not climb without pushing out pass trim, then the pilot should pull in and release rather than trying to push out and climb to the tug altitude. Though pushing out to climb to the tug altitude has been a common practice usually accomplished without incident, there is a deep underlying danger in doing this. Should the tandem glider become unattached from the tug during this maneuver, the nose high attitude of the tandem glider attained while doing this will cause a very abrupt stall which will result in a much greater altitude loss than one would expect (possibly more than 750 ft.) The most extreme cases may result in structural failure of the glider.

Towing tandems requires extra awareness on the part of the tug pilots, particularly in the early part of the tow to help the tandem pilot avoid the development of critical situations. Prior to the start of the tow, proper tow speeds based on the gross weight of the tandem glider should be determined. Greater total weight will require correspondingly higher tow speeds. It is CRITICAL to understand that the towed hang glider is at risk when the tow is slow and the glider is low. When towing a tandem glider, the tug pilot should fly the appropriate airspeed to keep the tandem glider in the proper position and if there is any doubt the tug pilot should fly slightly faster and avoid flying slightly slow.. The tug pilot should avoid pulling up abruptly and leaving the tandem glider low. If the glider is low on tow, the tug pilot should attempt to speed up and to descend to the altitude of the towed glider, releasing the tow rope only as a last resort.

These points are crucial to the safety of aerotow tandem flight. However, this letter is addressed to all aerotow rated pilots and tug pilots, not just to tandem pilots. This is because in consulting with pilots about this issue, we found that this problem is exhibited under the same circumstances with solo gliders as well. Because of the lighter wing loading of the solo gliders, the reaction of a solo glider is not as severe, but can still be violent.

To insure that all AT rated tandem pilots are notified, we are asking that the AT-rated tandem pilots sign on to the USHPA web site (www.ushga.org) and fill out a form that states that they have read and understand the safety notice. If you are an AT-rated tandem pilot and do not have computer access (ie. no email address) you will be sent the form to fill out and sign, and a USHPA addressed, stamped envelope. Understand that we are not asking if you agree with the safety notice, but that you have read it and understand what it says. You will need to do this in order to have your tandem rating renewed.

Flying with a tandem passenger is a special privilege which the FAA allows us to grant to qualified pilots. These pilots are supposed to be highly skilled. We expect tandem flights to be safer than solo flights, not more dangerous. Safety records do not currently seem to support this expectation. We expect tandem flights under the rules of the USHPA to be conducted in such a way that this expectation is realized.

David G. Broyles, Chairman of Safety and Training Committee
Steve Kroop, Chairman of Tow Committee
Paul Voight, Chairman of Tandem Committee

TE:

01. It's interesting that the Ad Hoc Joint Committee wasn't particularly concerned with the fatal accidents which have occurred as a result of solo gliders abruptly losing tow tension.

02. A tug pilot should not be "releasing the tow rope only as a last resort." A tug pilot should release the tow rope ONLY to maintain his own safety and leave the glider pilot in charge of the decisions regarding his safety. As soon as the tug pilot hits the release in these circumstances the glider is dead.

03. The last time I compared square footage to operating weights there was no difference between wing loading of tandem and solo gliders.

04. In fact a solo glider loaded to its maximum capacity can have over twice the wing loading of a tandem glider loaded at the minimum of its range.

05. If the Committee "found that this problem is exhibited under the same circumstances with solo gliders as well" one wonders what the point was of portraying it primarily as a tandem issue.

06. It's NOT a tandem issue. A great deal of the reason it's perceived to be a tandem issue is because the 2005/09/03 full luff dive which killed Arlan Birkett and Jeremiah Thompson was misdiagnosed as a stall.

07. It's great that one doesn't have to AGREE with the fundamental physics which dictate that a slow glider with a high pitch attitude will drop like a brick when it loses tow tension. This is hang gliding in which everyone is free to believe anything he wants and fly himself and his passengers accordingly. I myself, however, happen to believe it 'cause I went to one of the funerals which prompted this advisory.

Wallaby Ranch
"The First Fulltime Aerotow Hang Gliding Flight Park in the World!"

2009/10/15

The pilot fails to anticipate the tug's quick climb-out after launch, gets low, and then doesn't push out far enough to climb up. Remember: it is almost impossible to stall under aerotow. The induced thrust vector makes the glider trim at a higher attitude. It is OK to push way out; you will climb, not stall.

Yeah, as long as you have total confidence in the reliability of the engine, security of as many as four releases, strengths of the weak links at both ends, and predictability of the air in front of you you can push out all you want. There haven't been that many people who have died when something didn't work out as planned.

Felipe Amunategui

1996/12

I knew Mike well, and I am certain that he would have never wanted to discourage others from flying safely, yet I know he would have respected each one's decision and ways of dealing with the pain. Also, I am certain that Mike would want want us to learn how to avoid a similar tragedy. We owe it to Mike and Bill to further refine aerotowing in general and tandem towing in particular.

Jim Rooney

2007/08/01

Whatever's going on back there, I can fix it by giving you the rope.

It's more of this crappy argument that being on tow is somehow safer than being off tow.

Yeah Felipe, we did owe it to Mike and Bill to learn how to make towing safer. But we're pretty much stuck in the same thick clueless fog right back where we were in the mid Eighties.

2009/11/11
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08 - THE LAY OF THE LAND

Gil Dodgen

1983/05

A NOTE ON TOWING

The early days of hang gliding were marred by numerous towing accidents. During this period this aspect of our sport established a hopelessly bad reputation. And, indeed, last year, as you may have noted in Doug Hildreth's recent accident review, there was a towing fatality by a totally inexperienced Texas pilot.

Some time ago I received a series of four articles on a new towing system from Texas experimenter and inventor Donnell Hewett. I ran the first in the series of four articles. Editors learn from experience and if I could roll back the calendar I would run all four at once in condensed form. In fact, what happened was that the first article - which made seemingly outrageous claims without outlining the actual technique or hardware - inflamed the then towing establishment. It seems that today's innovators become tomorrow's conservatives so I was bombarded with calls, some from the USHGA Board, telling me that this Mr. Hewett was totally inexperienced, that he didn't know what he was talking about, and that I was contributing to the possible injury and death of unknown multitudes of innocent hang glider pilots.

I am not a tow pilot, and although Donnell's system made sense to me I was forced to discontinue the series. The essence of his system was a double bridle that connected to the glider and TO THE PILOT. This system would thus pull the pilot back on line in the event that the glider was inadvertently turned off course from behind the vehicle. This would produce a self-correcting system avoiding the infamous "lockout" THE factor which seemed to make towing so dangerous.

Well, it appears that Mr. Hewett's system not only works but, as I've been told by pilots who have made literally thousands of land tows with it, it works beyond all the most optimistic expectations. One pilot told me, "It is virtually impossible to lock out even if one tries."

The possibilities are obviously incredible if a safe, standardized towing technique can be established. The sport of hang gliding at this point is essentially limited by the availability of flying sites. With land tow the entire country is opened up, and as we have seen by Willi Muller and Bruce Case's world class cross country flights over flat land, the potential is unlimited. In fact, there are certain safety advantages to flying over flat land. The turbulence created by jagged terrain is avoided and the dreaded downwind turn into the hill is eliminated.

In upcoming issues we will try to supply as much information as possible on this new aspect of the sport. Those with experience are invited to contact us about possible articles.

However, any new technique or equipment always produces unforeseen problems. Towing must be approached with the most thoughtful and conservative attitude. As Garry Whitman pointed out to me recently, the only problem he has had has been with experienced pilots who won't listen to his instructions. And please remember, the equipment and methods described in this publication are based on the experience of the authors only and are not endorsed or recommended by the USHGA or Hang Gliding magazine.

With the kind permission of Donnell Hewett we will publish the remaining three installments of his Skyting series in upcoming issues.

1990/11

I remember when Donnell Hewett was ostracized from the then "established" towing community because of his unconventional ideas.

Mike Lake

2009/04/19

Brian Pattenden, an early member of the SCFHGC, and a university student had studied tethered flight and proposed the concept pilot towing (to about 60 pilots) on the 26th of September 1979 at the Fleece public house in Suffolk. The concept was implemented a couple of years later with a single point chest tow system (possibly the very first) and a two leg (pilot and glider) bridle system. This was all up and working to the point of XC flying perhaps a couple of years before anyone (or at least the developers) had heard of Donnell.

Both systems were later described in Donnell's Skyting News and the single point system also featured in an article by Donnell in a HG mag called Whole Air.

I do, of course, recognise Donnell's fantastic work but I would guess there were several parallel developments around the late '70s early '80s including the little known Brooks Bridle (Bill Brooks of Longbow fame) this towed directly from about 2/3 of the way down the hang straps.

Once we had moved to body towing and the lockout risk had been reduced a bit, other dangers became more prominent. Number one (on my list anyway) was a pitch up followed by a premature release or weak link break shortly after take off. I still think this is the case.

(In those days I would rather fly with NO weak link, relying on automatic line tensioning systems, than have one break outside of a real emergency). Unfortunately this emphasis was too late to save the life of another flying buddy.

We were also deemed nut jobs and indeed ignored completely by most of the UK's HG community, including the association at the time.

Chuck Burgoon

1992/09

I'm continually amazed by the "reinvention of the wheel" and "forgotten knowledge" in this sport.

I do R&D for a living, and think that it is tragic that so much time, money, and resources have been expended to acquire empirical information that goes unused, undocumented or unaccounted for. It's agonizing to watch people struggle through the same learning curve, being unable or unwilling to tap into the wealth of existing knowledge.

Current USHGA emphasis, along with efforts to compile and homogenize towing technology in general, will hopefully accelerate the evolution of this launch alternative, rather than prolong it.

Dutcher Sterling

2009/05/13

Tad,

I can see your frustration as we now have a "professional" not for profit corporation called the USHPA, which, IMHO, is no longer geared to be responsive to the needs of the pilot, but to those of the corporation.

It used to be a case of ineptitude and nepotism amongst the BOD, but now they are professionals...

Your best hope at this point is to send a copy of what you want changed, where in the SOPs, the changes themselves, and your arguments to the USHPA president, executive director, towing committee chair, safety and training committee chair, organization and bylaws committee chair; with a cover letter asking that these changes be made to the necessary documents. I would try to work through Tracy Tillman and Dave Broyles.

Then I would plan to take this to the next BOD meeting. If you can not go and champion this yourself, then find another to do so. Should this fail to get action of any sort, especially on the weak link standard and test standards then...

Send your work to the FAA by certified mail and a copy to the USHPA, also certified, with a cover explaining your action and stating that if any injury or death occurs because the USHPA and its directors failed to take action that they are negligent in their duties to the pilot community.

Now I must tell you that the "New" "Better" "Professional" USHPA has gone to great length to insulate themselves from any responsibility/liability IMHO. So needless to say, as you seem to have found out, you will have little chance to get anything done, but there is always hope if you make enough noise.

I commend your efforts, but do fear the involvement of the FAA. I used to go to BOD meetings and was able to effect some change before health and financial issues grounded me...

Wingspan34

2009/06/12

Aerotowing adds incredible complications to the sport of hang gliding.

I began with foot launching. Very simple. In the mid 80's I started towing first behind a Cosmos trike, then a few years later using the ATOL truck tow system. I liked truck towing better but it has its limitations. But BOTH truck towing and aerotowing add so many complicating factors into the equation (as compared to foot launching) that the utmost care needs to be taken during such flight activities.

I see (mainly hear about, from reports made here) all sorts of inconsistencies between the various tow methods and at the various tow facilities. That worries me. In the 70's and early 80's people were doing towing with any method and little to no thought as to how it should/could be done safely. People got hurt and died. Slowly, things got better. But I have NO DOUBT they could or should get even better. If things aren't getting better because the status quo seems good enough (i.e. USHPA isn't motivated to require improvements/higher standards) then that is NOT good (enough).

Tad is VERY passionate about improving the picture regarding hang gliding tow safety. A person's view has to be pretty small (perhaps even ignorant) to not appreciate his goals and efforts.

Consider just one life snuffed out due to "just good enough" (but under close scrutiny, poorly designed) tow equipment. Imagine that lost life was your good friend's - or your own. Consider how "just good enough" can negatively effect many people - forever. Then think how "the best we can do" is much more likely to prevent that lost life. What would you choose for yourself or your friend, "just good enough" or "the best we can do"? Besides ignorance or suicidal tendencies I can't imagine anyone choosing anything but "the best we can do" option.

Tad is your conscience, telling those of you who tow, TO WAKE UP! Stop accepting "just good enough", jerry rigged, mediocrity in your tow equipment.

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hgflyer

2009/06/12 17:44:04

Let me frame this the way I see it.

Most know that we all do what we do and support our sport out of passion and fun. Like I mentioned to NME, all things are fun and even exciting at first - like wanting to improve our sport helping our local school, club, or organization (USHPA). Then there can be a point of frustration in wanting to help (volunteer).

I think Tad has reached that point (frustration). And all can sense it in his tone and approach. I know I personally have spouted my share of emotions on SG's site.

I feel all politics start on a local level. This is the main reason I have decided to start my own school. Trying to change a shop owner's mind about bad practices, teaching methods, organization, equipment, selfishness, etc... is impossible for anyone to do.

So that leaves any existing club, to manage and support new pilots. HG clubs, I have found, have little say about how a school operates. Local clubs usually don't regulate or recommend improvements to schools or shop owners who also sit on a club's committee.

So that leaves the USHPA to set guidelines and improvements for schools, instructors, observers, passionate volunteers.

I think they are too overloaded (spread to thin) to see where changes are needed. I can do what Tad has done and volunteer all of my SOP's to the USHPA. Let's just say, I have done that in the past. If changes can't be accomplished on a local level (shop owners), what makes anyone think that the top organization (USHPA) will change?

Let's be real here. The USHPA is an insurance broker, which sends its members a magazine once a month. As far as any real change or improvements with the SOP's...

GOOD LUCK WITH THAT!

Wingspan34

2009/06/10

And Tad, as for people giving you negative ratings on your first couple posts, I think that is wrong. There was no good reason for those negative ratings. I opposed them with my own. I think you are making a positive and serious effort to improve the safety of hang glider towing.

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ian9toes

2009/06/11

Thank you for going out of your way to educate us. I've never done any towing so it's all Dutch to me, but when I do I'll be revisiting this thread.

I'm sorry you copped some flack when you were actually posting hang gliding stuff on a hang gliding website, especially when the threads "Hang Gliders' Gardens" and "we luv cats" are sitting on 12 and 20 pages.

2009/06/14

You won't be able to pass on all your wealth of knowledge if you get kicked off, so maybe a little diplomacy could be in order. Sounds to me like you know a hell of a lot more about this stuff than anyone on here, it'd be shame if we missed out on all your wisdom.

Larry West

2009/09/02

Sorry to see ya go, but I can imagine everyone has a limit to what they are willing to put up with. You put up with a lot and I've learned much from your writing. Thank you.

Jason Rogers

2008/10/14

Thanks for this discussion. I spent most of my flying time at a rounded hill take off, where this really isn't that much of an issue. I don't think I was placing the right sort of importance on being hooked in... So now that I'm flying less "forgiving" sites, you may well have saved my life.

2009/11/10

Well I think he's probably right that there is a problem. I don't know if what he proposes is the right solution, but it's better than mine.

I looked at the stats, I looked at the caliber of pilots who were dying in tow accidents (far better than mine). I concluded towing is simply far too dangerous and gave it up.

I've never seen a fatal, but what I have seen scares the hell out of me, far more than any foot launched issues. He proposes stronger weaklinks. I've been out towing with what were probably 2 G weaklinks. I've seen someone break one and do a full stall, tailslide and recover. His basebar skimmed through the two inch grass on the runway on the recover. I've watched another group with their own gear. I don't know what weaklinks they were using. Saw someone lock out at 1000 ft up, stabilize in a vertical dive doing at least 100 knots (maybe much more, he lost 5-600 ft in 2-3 seconds) and break his link about 2-300 ft up. He only just managed to pull out of the dive about 50 ft from the ground, tail wind with over 120 knots of ground speed. I never thought I'd hear a glider make a sound like that.

I loved towing. Really really loved it. To stand in a flat field, yell GO GO GO and then suddenly but roaring into the sky was an amazing experience. I just felt that every time I did it I was rolling the dice...

Freedomspyder

2009/02/14

Tad,

I've found your posts on both hook-in checks and releases very interesting and well thought out.

Best of luck dealing with the Oz Report forum cult and its leader.

Kevin Carter

2005/09/26

Clearly there is room for improvement with what we are currently using.

We all dream of coming off the cart with perfect speed every time but in our real world of average people, that doesn't

always happen.

Stay safe and keep working on making it better for us all.

Dan Tomlinson

2005/05/30

Tad's post is difficult to read but I've seen his work. His release mechanism is elegant in its simplicity and effectiveness.

Hugh McElrath

2005/03/05

Thanks, Tad. I was too green to fully appreciate your system when you showed it to me a couple of years ago. Now I'm more interested. Do I have to fabricate this myself from parts or are you in business?

Janni Papakrivos

2008/06/30

Tad showed me the release system he installed in Hugh's glider. I was amazed at the quality and complexity of the system. Being able to tow and release without ever having to take your hands off the base tube is wonderful and much safer.

Patrick Halfhill

2009/06/21

You and I met at the ECC a few years ago. We spent 45 minutes or more together going over your system. I saw it first hand. I was quite impressed with the quality of engineering and the time you spent on it.

Windlord

2009/05/03

Very nice engineering, Tad. I can see a lot of thought went into the systems and there is always room to "build a better mousetrap".

Every system we use in this sport can be improved on. Look where we progressed from since I first flew in '71.

Brian Vant-Hull

2007/07/21

I'll be lazy and ask if any of your references give a physical reason for the 0.8 to 2 g range they quote as safe. If not, constructing a reasonable physical argument could be a major contribution. You clearly have the physics down well enough (as good as anyone else in the world) to do so.

Donnell Hewett

2008/11/05

Let me begin by saying that I personally appreciate Tad Eareckson's efforts to improve the SOP of aerotowing as well as his suggestion to update the Skyting Criteria. It is through efforts like his that progress is made toward safer towing.

I thank him for keeping this issue before the hang gliding community.

TE:

The reasons that center of mass towing became established in hang gliding were not the reasons it should have been.

Center of mass towing should have taken off the INSTANT it was suggested - on either side of the Atlantic - that some or all of the tow tension be transmitted through the pilot. Light bulbs should have started glowing brightly all over the world. The logic was obvious.

But that's not the way it happened.

Mike's crowd was written off as nut jobs and ignored and Donnell had his microphone cut immediately.

It's been a very long time since hang gliding was, to a measurable degree, governed by science, reason, logic based exchanges of ideas, and experimentation. Hang gliding is now controlled by a testosterone poisoned oligarchy of air jocks which couldn't pass a junior high school level science class with a gun to its head. I believe - with the possible exception of folk in Eastern Europe - that worldwide the number of people who thoroughly understand the dynamics, mechanics, and physics of hang glider towing can be counted on the fingers of a hand or two.

And the older hang gliding culture gets the more senile it becomes. The people who were the innovators of this branch of aviation are thinning from the scene and the population becomes increasingly bloated with sport participants who've had everything handed to them on silver platters and can't fathom the concept that there may be better ways of doing

things than the way mistakenly believe they've always been done.

The reason that center of mass towing become established was because of the phenomenon of instant and reliable gratification. Once a pilot tried it the difference was felt and appreciated immediately and consistently with every flight. If the only advantage were that we were no longer killing someone once out of every fifty flights one wonders if it would have ever caught on.

Innovations in equipment and procedures that lack the instant gratification component will never be voluntarily incorporated in a sport controlled by pilots. If there's a fix that will keep someone from getting killed one out of every five thousand flights there will be a stampede of pilots rushing to ignore it.

The likelihood is that any that the average individual pilot will never derive any benefit from it in a critical situation the course of his flying career. He's very unlikely to get up to that number of flights. And in order for the fix to be a factor three things will have to line up wrong at the same time - and what are the odds of that happening.

But in a local club of a hundred participants it doesn't take very long at all to rack up five thousand flight and find the magic combination.

A pilot is not going to modify his procedures or equipment because there's a one in five thousand chance that failing to do so will get him killed. A pilot will only modify his procedures or equipment if there's a one in one or two chance that failing to do so will get him grounded and fined.

A hot shot competition pilot who has to take a hand off of the basetube to release during a lockout or whose 0.7 G weak link fails when the glider is mushing makes a properly equipped Hang Two with a .10 blood alcohol level look like Chuck freakin' Yeager. When the shit hits the fan the driver needs to be able to control power and have BOTH hands on the steering wheel - not running out of gas or having the throttle stuck wide open and text messaging about plans for the weekend.

Hang gliding has got a big problem with virtual drunks on the ends of strings and a quarter century of enforcement free aerotowing is pretty good evidence that self regulation doesn't work any better in the air than it would on the highways.

2009/12/17
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09 - ANALOGIES

Towed hang gliders are powered aircraft and powered aviation is something that hang glider pilots do not understand - even if they do thoroughly when they're flying conventional powered toys. Analogies may help. All of the following are applicable to low altitude situations.

The basetube is your control yoke. If you're flying trim in smooth air you can take both hands off of it for several seconds and not much will happen. But if you're holding control pressure and/or flying in rough air you can and should expect an instantaneous and dangerous loss of control if even one hand comes off. Your recovery will be dependent on the amount of air you have below you.

The tow line is your engine and is almost always your friend. With the thrust aligned properly everything's pretty straightforward - literally. But its alignment can change dramatically, it's pulling on your control system, the more out of alignment it gets the higher it revs, and it can turn into your worst enemy real fast. It can roll you completely out of control and power you straight into the ground unless you kill it before it kills you.

The release is your kill switch and is almost always your enemy. Flip it and you're going down - you will have no means of restarting your engine. If, at a wrong enough time, it's inadvertently flipped because it's poorly installed or it shorts out because it's poorly designed or maintained you WILL die. It must, however, be mounted such that you can flip it instantly and effortlessly while keeping both hands on the yoke at all times 'cause it's all you have to ground the magnetos when the throttle is stuck and you're heading in the worst possible direction.

The weak link is very much like a parachute - the kind under which both pilot and plane come down - configured to automatically deploy when an accelerometer reaches a preset positive G rating low enough to keep the plane from being damaged. Both also irrevocably kill your engine as they kick in.

Like a parachute in an aerobatic plane, it's something you ALWAYS wanna have on line but NEVER wanna have come into play. If it does come into play it's almost always 'cause you've really screwed a pooch and if you survive because of it it'll be because you were lucky and probably high. Both deprive you of the ability to climb and guarantee that you'll soon be encountering the hard stuff at an undetermined speed.

If either kicks in when things are still manageable it can kill you. And even either kicks in when the situation is otherwise beyond salvation it may have only the effect of killing you in a somewhat different manner.

Because the weak link automatically kills the engine as an unavoidable, unintended, and undesirable side effect of its true function of a load limiter, it's often mistaken by the less astute person as a form of kill switch which justifies the use of an unreliable and/or inaccessible actual kill switch. These people invariable dial down the accelerometer setting to the extent that the load limiter goes off at random and normal situations are often turned into crashes and recoverable situations are often turned into fatalities. But once in a few thousand pops the load limiter will, in fact, happen to function as compensation for an unreliable and/or inaccessible kill switch so the less astute people (read pretty much all of them) will dial down their accelerometers to the ragged edge of sustainable tow and congratulate themselves on what safe and conscientious pilots they are (and ground anyone who begs to differ).

2009/11/11
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10 - LINKS

My 2nd mountain launch, LMFP, ASW8055
http://www.youtube.com/watch?v=PjcCyMsOAOQ

Un-Hooked Aerotow Hang Glider
http://www.youtube.com/watch?v=u51qpPLz5U0

USHPA is SUPPOSED to teach pilots to verify connection to the glider IMMEDIATELY prior to EVERY launch. It doesn't. What happens to the pilot on the edge of the cliff WHEN he makes the same mistake the one on the asphalt did?

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hello dolly
http://video.google.com/videoplay?docid=-4095721502206080003#

Rob Richardson went aloft with a snagged dolly, was released from the front end immediately, and crashed and died immediately.

This pilot - who had wrapped his vario mounting strap around the dolly hold down line in addition to the basetube - was allowed to stay on tow and deal with the problem and, although the dolly ended up a little worse for the wear, both pilots and planes came out smelling like roses.

On the downside, Rob's bridle was routed under the dolly cross tubing such that his control effort would have been hampered, but not neutralized. On the upside the dolly was held fast to the glider perfectly centered and balanced.

The pilot in the video, while otherwise being in normal configuration, couldn't have had the dolly dangling much farther off center if he had tried.

The video record of the beginning of the latter flight is virtually IDENTICAL to the description of Rob's flight. The glider lifts off, rolls and tracks to the left with no correction for several seconds with the tug still on the ground.

But the tow is continued and shortly after the tug rotates and lifts off the glider pilot starts getting things together. He gets the roll corrected and gets back into position and climbs to a safe altitude where he's free to safely wallow around a bit while he attempts to deal with the problem.

Had he been dumped - or had his weak link failed - at the six second mark he would have immediately lost, of course, any hope of flying out of the situation and a lot of airspeed and would quite likely have experienced a very dangerous ground loop.

It should be noted that the tug in this case was a trike which was at no point jeopardized by what was going on behind it, despite the inferiority of its control authority as compared to the Dragonfly which was towing Rob.

I strongly believe that had the tow and full power been maintained that the severity of Rob's incident could have been reduced from the fatal accident it was to an amusing anecdote. But I would not expect the average member of today's fleet of tug pilots to react any differently than this one did over a decade ago.

MG crashes his brains out
http://www.youtube.com/watch?v=F_n5B3-MIC4

That's how close MG came to killing himself with BOTH hands on the control bar. How much better does the situation get if he has to let go with one of them? In similar circumstances how inclined would ANY pilot be to take let go of the basetube to actuate a release?

(It appears that separation occurred as a result of weak link failure.)

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http://www.flickr.com/photos/aerotowrelease/
Cache set

Spinnaker Shackle - Locked - 1
Spinnaker Shackle Gate - Locked - 1

These two photos illustrate how a highly skilled pilot was killed by using a piece of hardware in an application for which it is neither designed nor particularly well suited. And nothing changed after Robin's unnecessary and predictable death.

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http://www.flickr.com/photos/aerotowrelease/
temp set

This series of photos illustrates why the Bailey release which is a component of just about every solo and tandem aerotow release system in the world won't work under load.

Tandem Aerotow
http://www.flickr.com/photos/aerotowrelease/4037808062/sizes/o/

This glider is being towed in violation of close to a dozen regulations of the USHPA Standard Operating Procedures governing aerotowing operations.

There is supposed to be a weak link at the front end of the tow line. There isn't.

The glider is being towed by a Dragonfly tug. There is a weak link at the top end of the Dragonfly's bridle.

If that weak link fails it is possible that the bridle will wrap at the tow ring. There will then be no predictable limit to what the tug's release will be subjected below the breaking strength of the Spectra tow line which is probably

around two thousand pounds.

Assuming the tug pilot and Dragonfly are still alive and in a position to recover it is very unlikely that the release will function under the loading to which it could be subjected.

There is supposed to be a weak link at the back end of the tow line. There isn't. Granted, there could be a weak link concealed inside the funnel over the tow ring but - there isn't.

It can be seen in this photo that there is no weak link at either end of either bridle.

In fact there is no weak link of any description within 250 feet of this glider and there is no reliable weak link anywhere in the tow system.

The weak link at the front end is supposed to be reliably stronger than the weak link at the back end. The thought behind this approach is, most critically, to prevent a situation in which a trailing tow line routed over the basetube snags something on the ground and causes the glider to instantly and violently pitch down and kill itself.

Since there IS NO weak link whatsoever anywhere near the back end of the line the glider WILL end up with the line in the event of a front end failure or release and will have absolutely no way to separate once the releases become overloaded.

The primary weak release core mechanism is the same Wichard 2673 spinnaker shackle which got Robin Strid killed and has marginal performance even configured as it's supposed to be. And in this application it has been modified such that it's rotated about 45 degrees from the designed orientation, the gate is heavily loaded and the latch is under a great deal of tension.

Greg DeWolf

2000/08/29

I had an incident where the same (spinnaker) release (although with the connection being a brake lever and cable) did not release on the tandem glider at Lookout. This release had the hole drilled in the Wichard spinnaker shackle, just as Chad is describing as being the best configuration. The spinnaker release is not meant to function this way (that's why it doesn't come with a hole there) because the more force that is put on the line (happens at the time you need most to release), the more force that will be required to release it.

An appropriate weak link for that glider - if it had one, which it doesn't - would allow a tension of over four hundred pounds to that mechanism. There's no way it could be expected to function under that kind of load - let alone twice that as required in the Standard Operating Procedures.

The secondary release is a curved pin barrel (Bailey) which - when used as a secondary - will lock up when the tow tension exceeds 310 pounds which, for that glider, translates to about 0.6 Gs.

There is no release actuator on the basetube where the relevant (right) hand of the Pilot In Command is placed to control the glider.

This would be a direct violation of the regulations of the British Hang Gliding and Paragliding Association had this flight been conducted over UK turf.

The release actuator is a bicycle brake lever strapped to the starboard downtube. Under the regulations of the USHPA it is within easy reach and compliant just as long as the glider is flying trim. In any other situation it is not within easy reach (because there's no such thing as an easy reach when the glider is not flying trim) and thus in violation of the USHPA regulations.

Likewise with the secondary release.

This glider is dedicated to aerotowing exclusively. One would think that the primary release system would be built in - instead of velcroed on.

The primary bridle has to be long and can wrap at the tow ring.

The secondary bridle doesn't have to be long enough to allow the possibility of it wrapping at the bottom end of the primary bridle - but it is.

Although the odds of having a secondary bridle wrap following a primary bridle wrap are pretty microscopic, in that scenario the glider would have no means of separating - no matter how minimal the tension. For virtually no cost in terms of dollars, weight, and drag another release could be installed at the port end of the secondary bridle to add redundancy and eliminate another potential failure scenario.

The secondary bridle is run through an eye splice at the bottom end of the primary bridle. This is a fabric to fabric connection, these two critical components are constantly sawing each other apart while under tow, and the chances of the secondary bridle feeding out through the eye splice when it needs to are a lot lower than they need to be.

There is no way that kind of shoddiness would be tolerated on a sailboat. The splice in an analogous rigging application on a sailboat would be fitted with a sailmaker's thimble.

This glider is trimmed - as it should be - with the primary release coming off the keel a couple of feet forward of the hang point.

Hang glider pilots are - as a rule - taught that the secondary release is a backup release to be actuated in the not unlikely event that the shoddy primary release fails. On a glider configured and trimmed as is this one, if the secondary is used as a backup and the primary bridle fails to clear the tow ring all of the tow tension will be pulling on the trim point on the keel. The glider WILL pitch down instantly and violently, it WILL tuck, it WILL fail under negative loading, and there will be absolutely nothing anyone on the glider end will be able to do anything about it. And this sequence unfolds so quickly it's very unlikely that the tug pilot will be able to react in time. And still today some glider pilots are deliberately releasing from the bottom end.

The cost of properly weak link protecting both tug and glider would be a small fraction of the price of a can of Coke.

This glider could be configured with a virtually bulletproof release system for about the same - possibly even less than - the cost of the junk it's using now.

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http://www.flickr.com/photos/aerotowrelease/
Aerotow Release System set

I myself have spent years developing, bench and flight testing, and refining tow equipment technology and refining concepts of other inventors, published the documentation, and offered it for free to any individual or manufacturer who wishes to incorporate it. It solves problems that have been killing people for as long as gliders have been towing but it will never gain a significant foothold in a market flooded and continuously recharged with dangerous junk.

Norfolk Hang Gliding Club
http://nhgc.wikidot.com/mike-lake

Mike Lake gives a fascinating history of a very small group of very unsung heroes who got hang glider towing very right very early.

Texas A&M-Kingsville Physics Professor Receives National Award
http://www.tamuk.edu/news/2007/march/hewitt/

The university newsletter gives a sketch on Donnell Hewett's contribution to hang glider towing.

Dynamic Flight Hang Gliding School
Trawalla, Victoria
http://www.dynamicflight.com.au/

Possibly the only hang gliding school in the world run by people who really understand towing. Were it the norm rather than the exception no review of Exemption 4144 would be necessary.

2009/10/28
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11 - SUMMARY

1. We must stop pretending that hang gliders can be controlled in emergency situations with one hand and that expressions such as "readily accessible" and "within easy reach" have the slightest connection with reality.

2. Two point releases are critical components of a towed glider's release system, must be of a quality and reliability comparable to or better than the other elements of the glider's construction, and must be built in and certified by the manufacturer.

3. One point / secondary releases must be of quality and performance capability comparable to that of two point releases.

4. We must stop regarding weak links as emergency or backup releases, understand that virtually all weak link breaks - and all other unintended terminations of tows - are dangerous and indications of potentially lethal failures to control the flight, and start getting weak link strengths comfortably and reliably above 1.0 Gs.

5. The tugs must be capable of sustaining tow tensions comfortably and reliably above 1.0 Gs and be required to use weak links which hold to well beyond those of the gliders.

6. Training of pilots on both ends of the line must be greatly improved and standardized and we must stop propagating such fantasies as weak links which can keep tugs and gliders safe and under control and release actuations which can remedy any problem the glider is having.

7. Tug pilots must be made to understand that their job is to pull the glider up and away from the ground as safely as possible, not to second guess and override the glider pilot's decision to remain on tow.

8. Pilots who refuse to comply with procedure and equipment standards need to be grounded before they kill themselves or someone else or send the message that aviation rules don't matter.

2009/10/24

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2009/12/13

2010/01/04