

The fascination of ULTRALIGHT SOARING

BY KLAUS BURKHARD



Ultralight gliders are not new, but they are something we haven't seen much of in New Zealand yet. German glider pilot and Ultralight enthusiast Klaus Burkhard shares details of these gliders and shares the thrills and joys of flying them. This article is adapted from one written for Ruppert Composite for distribution at the AERO-Friedrichshafen 2013.

In 1998 I read an interesting article about an Ultralight Glider, called the Banjo MH. The aircraft was of Czechoslovakian construction, very light weight, self-launching but also affordable with respect to my limited budget. It met my dreams of independence from the usual weekend gliding clubs and the need for towing, pilot and/or winch. It would provide



Ballistic Rescue System installed in aircraft.

cross-country flying, whenever I had time and the weather was good (mostly Monday to Friday).

I called the German dealer, Junkers Profly in Kulmbach, Bavaria and set a date to get a closer look at this low-weight butterfly and possibly do a test flight as well.

Outside the company's hangar, a slightly smaller but otherwise normal glider trailer was parked. I took a critical look at the fuselage, everything looked perfect. It was a nice clean compound construction. The whole aircraft seemed incredibly flimsy though. The fuse was paper thin. You could read the registration painted on the outside from the inside. The ribs were made of Styrofoam. When I pushed my thumb against the fuse it dented.

I was impressed with wings that only weighed 26 kg, but after seeing it struggle to take off in a slight crosswind I decided that only nutcases, gamblers and people with a suicide wish should ever entrust their life to a fragile aeroplane design like that. I was not one of them.

More than ten years passed before I had a second contact with lightweight gliders again and I became convinced that air sports do indeed need this type of aircraft. New traditional



BANJO

Designer	Václav & Ivan Brandejs
Manufacturer	ProFe (Czechoslovakia)
Wingspan	13.3 m
Length	6.3 m
Empty Weight	115 kg
MTOW	220 kg
Load factor	+4.4 / -2.2 g
Max Speed (Vne)	140 km/h
Max Speed Turbulence VB	110 km/h
Stall Speed	50 km/h
Min. Sink rate	0.68 m/s
Glide ratio L/D	28
Price approx.	19,500



GFW-3

Designer	Dr. Gerhard-F. Wagner
Manufacturer	Dr. Gerhard-F. Wagner
Wingspan	13.4 m
Length	5.47 m
Empty Weight	120 kg
MTOW	220 kg
Load factor	+5.6 / -3.5 g
Max Speed (Vne)	185 km/h
Max Speed Turbulence VB	142 km/h
Stall Speed	53 km/h
Min. Sink rate	0.55 m/s
Glide ratio L/D	35 at 81 km/h
Price approx.	n. a. (will be produced in series, most probably next year)

gliders are not only too big, too heavy and too over-regulated by EASA, but also expensive and mostly unaffordable for the majority of international glider pilots. Nowadays, glider designers follow one direction in new model designs: Faster, bigger, heavier = dearer.

Deregulated ultralight gliders covered by the National German LTF-L (Building and Construction Regulations for very light air sport vehicles less than 120kg empty weight) have some valuable advantages in comparison to the 'high-tech toys made in Germany,' for example:

- > lifetime valid license (like ordinary GPL)
- but
- > no medical required (self-assessment about personal fitness and health)
- > no expensive, aviation-certified parts mandated
- > no yearly inspection or maintenance by certified staff mandated (Maintenance/Repair/Overhaul is pilots/owners full responsibility)
- > no aeroplane registration mandated (but it can be applied for by pilots/owners)
- > no aeroplane logbook mandated

- > no EASA Maintenance Program mandated, which might be good for Business and Airline Aviation, but is just complete nonsense for a glider.

All these simplifications turn the cost curve downwards, getting back to affordability by everyone.

High performance ultralight aeroplanes like the GFW-3,



With a wingspan of 13.3 m, an empty weight of 112 kg, this new glider design had a glide ratio of 28, nearly doubling the glide ratio of the ULF-1. On second glance, a glide ratio of 28 was just about the same as of the Schleicher Ka-8, in service since 1957, but the Banjo was nearly half the weight of the geriatric Ka-8. This enables pilots to get in the air very early and in the weakest thermal conditions, when not even a Ka-8 could stay up in the air.

This is contrary to 'common' glider development in Germany which seems focused on increasing VNE and improving glide ratio, obviously to beat present World Records and win World Championships. Ultralight glider development is divided in two rather contrary design and development directions, meeting different pilot demands. According to German Building Regulations (LTF-L), the restricting limitations are an empty weight of <120 kg and Vmin <55 km/h in landing configuration. Those limits are fixed and cannot be altered or ignored by design.

Now, the target of the first group of ultralight designers is to design an ultralight glider with the highest possible VNE and the best possible glide ratio. A good example of this category are gliders like the Banjo and the GFW-3.

The second group of ultralight designers has a rather different target in their mind, because 120 kg empty weight as well as 55 km/h Vmin, are far too high for them. Their targets are an empty weight of about 50-60 kg and a much lower Vmin, somewhere near 30 km/h. Both targets are combined with the best possible glide ratio and a high Vne as well. Their main intention is to design an aeroplane to be independent from clubs and allow pilots to launch early in the morning away from any airfield, just somewhere on the top of hills or up in the mountains, landing late behind their house.

When I searched the internet the first time for other types of ultralight gliders than the Banjo, GFW-3 and SparrowHawk, I discovered funny names like Carbon-Dragon, Swift-light and the Archaeopteryx. After a second glance at those ultralights, I



SWIFT-LIGHT

Designer	
Manufacturer	Aeriane
Wingspan	128 m
Empty Weight	8 kg
MTOW	158 kg
Load factor	+4.0 / -2.0 g
Max Speed (Vne)	120 km/h
Max Speed Turbulence VB	100 km/h
Stall Speed	32 km/h
Min. Sink rate	0.6 m/s
Glide-ratio L/D	27 at 65 km/h

designed and home-built by Dr. Gerhard-Friedrich Wagner from Kaiserslautern; the US-made SparrowHawk, designed and professionally produced in series by Craig Cole; and the Swiss made Archaeopteryx, a 65 kg foot-launchable and foot-landable Carbon/Kevlar glider (manufactured in an outstanding quality I have never seen before), are good examples of today's design, engineering, craftsmanship and new materials. These beautiful constructions are just the beginning of a new gliding era, which I personally believe, will change the world of gliding and soaring sports dramatically. As this happens, these aeroplane designs will initiate a new direction in glider development too. Producers in Czechoslovakia, Poland and other low-price countries, who design and build undoubtedly very good aeroplanes with high-quality, excellent performance and affordable prices will benefit.

Ursula Hänle designed and built the first ultralight glider ever, the Hippie H111 in 1974. The Hippie H111 was categorized as a hang glider, not an aeroplane, despite the fact that the H111 looked similar to a SG-38 and was 3 axis aerodynamically controlled. The spars of the Hippie wings were made of carbon and the open cockpit was (in her advanced design with 10 m wingspan) made of Epoxy Compound with a Styrofoam core inside. The form of the cockpit was designed to protect the pilot in case of a roll-over during landing.

With a wingspan of 10 m, an Empty Weight of 45 kg, a glide ratio of 12 at 45 km/h, a sink rate of 1.3 m/s at 40 km/h and a Vmax of 60 km/h, the performance of the Hippie H111 was far away from the performance of any common glider at that time. Hänle and her husband Eugen produced the well-known H101-Salto six years earlier.

Other designers built on the idea. ULF1 was very popular and twenty years on people are still buying the kits. The main focus of the designers was neither aesthetics nor performance, but an excellent climb ratio in very weak weather conditions; low speed flying abilities for the sake of pleasure soaring and safety. Last, but not least, they should be a low-budget production by do-it-yourself and home-build activities. Foot launch and foot landing, auto launch, winch launch, trike launch and bungee launch; a very wide variety of launching methods, including a horse launch – which actually happened, there are pictures on the internet!

Many high profile aircraft designers joined in the fun.

A small breakthrough came in 1997, when a tiny aeroplane manufacturer from Czechoslovakia (Pro FE) introduced a new ultralight glider – Banjo. It was the first ultralight glider design of its kind and offered for an unbeatable price of about 15.000 DM.



ARCHAEOPTERYX

Designer	Roger Ruppert
Manufacturer	Ruppert Composite
Wingspan	13.6 m
Length	5.7 m
Empty Weight	66 kg
MTOW	164 kg
Load factor	+4.0 / -2.0 g
Max Speed (Vne)	130 km/h
Max Speed Turbulence VB	85 km/h
Stall Speed	30 km/h
Min. Sink rate	0.5 m/s
Glide ratio	1:28
Glide ratio (70° Flaps)	1:5
Price approx.	75,000 €

decided for myself, that these were not the types of aeroplanes I would ever board. The first and very visible difference to what I was used to in 40 years of glider flying was the fact that you do not get into the cockpit like entering a common glider, but you have to slip into them or pull them over your body. Once you somehow manage to get yourself in the cockpit, you have to run downhill and hope that your wings will produce positive lift before you stumble over your own legs and end up with the nose in the middle of a fresh and juicy cow-pie. Definitely not for me, or for other pilots of my advanced age of 66.

But in July 2012, I had to adjust my attitude to these 'funny toys'. I invited three Swift-light and three Archaeopteryx pilots to the yearly DULSV meeting in Bad Sobernheim. Manfred Ruhmer from Austria, multiple world hang-glidering champion, came with his Electro-Swift, also Jaques Bott from France, the OLC-World Champion 2012 in PHG FAI Class-2 (rigid wings) with his Swift-light. Roger Ruppert, Swiss designer and builder of the high-tech Archaeopteryx brought his aircraft. My former attitude about those 'funny' gliders changed when I saw them flying on the first day. Long before the ordinary gliders were even unpacked, the ultralight pilots were already in the air. Until that day, I had only seen hawks and buzzards soar the unimposing Domberg ridge, a very small hill-plateau between Frankfurt and Kaiserslautern. But now, Swift and Archaeopteryx did just the same, together with some birds of prey.

In September, I arranged to have a test flight in the Archaeopteryx with Roger Ruppert in Switzerland. This first flight in an Archaeopteryx changed my attitude of ultralight soaring completely. It was very different compared to common gliders, with a side stick and especially low speed flying characteristics, between 30-140 km/h.

ARE THOSE 'LIGHTWEIGHTS' DANGEROUS?

No, not at all, as long as pilots adhere to the limitations (Vne and Structural Limits) published by the manufacturers. But this basic regulation applies for all kind of aircraft or air sport vehicles, from the giant A380 to a Duo-Discus and down to Swift-light and Archaeopteryx. As everybody should know and be aware off, exceeding the specified limitations can result in breaking the aeroplane apart – all aeroplanes, not only ultralights.

On the other hand, all ultralight vehicles certified according to German Regulations (LFT-UL and LFT-L) are equipped with a 'Ballistic Rescue System' (BRS), instead of a common pilot's parachute. In a worst-case scenario, there is no need to unbuckle the harness, open the canopy and try to bail out of the tight cockpit, wasting useful time before the release handle of the parachute can be pulled. Within a second the red handle in the cockpit is pulled and immediately the BRS is activated, igniting a small rocket device which pulls out a huge parachute fastened to the structure of the plane, bringing it safely down to earth, together with the pilot safely belted to his seat.

Low landing speeds mean any landing accident may destroy the aircraft but the pilot will be unhurt or only slightly injured.

These are good reasons for pushing the deregulated air sports scene forward.

Despite the low speeds, long distance flights of 500 km and more are possible. The longest flight so far was done by Marlies Eicher in Australia flying 485 km from Yando Airfield to Forbes in January 2012.



SPARROWHAWK

Designer	Greg Cole
Manufacturer	Winward Performance
Wingspan	11.0 m
Length	6.28 m
Empty Weight	70 kg
MTOW	188 kg
Load factor	+5.5 / -4.0 g
Max Speed (Vne)	228 km/h
Max Speed Turbulence VB	148 km/h
Stall Speed	63 km/h
Min. Sink rate	0.61 m/s
Glide ratio L/D	37 at 92.5 km/h
Price approx.	45,000 €

SparrowHawks hold nine world records in FAI class "DU" by Gary Osaba, Jim Payne and Robert Spielman.