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PAUL A SCHWEIZER

> MARTIN SIMONS



Sailplanes by Schweizer A History

Paul A. Schweizer and Martin Simons

Paul A. Schweizer and his brothers, Ernie and Bill, started to build and fly gliders in 1930 and formed the Schweizer Aircraft Corp. in 1939 to produce sailplanes. Since then the company has produced over 2170 aeroplanes of 22 different types and has become the main source of gliders and sailplanes in the USA. It is now the oldest family-owned aircraft company to have been in continuous operation in the USA.

This book tells the story of Schweizer sailplanes and includes a chapter on each of the 22 glider types and variations that were built and flown by the company. It describes how each type was developed, its purpose and gives the details of its construction, special features and how it flew. Outstanding flights made by each type are also included. Specification sheets give precise dimensional details and three-view drawings will assist all interested model builders. Many rare and unique photographs have been borrowed from the company archives to illustrate this book.



SAILPLANES BY SCHWEIZER

A HISTORY

Martin Simons May 2005

PAUL A. SCHWEIZER

with

MARTINS

Airlife England

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Unless otherwise noted, all the photographs come from the Schweizer archives or from the National Soaring Museum, plus a few from M. Simons' personal collection. It has not been possible to trace all the individual photographers, and apologies are offered to anyone who has not been given due credit.

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Introduction

The three Schweizer brothers, Ernest, then aged 18, Paul (16) and William (12), completed and flew their first glider at Peekskill, New York, in June 1930. After they had designed, built and flown four further gliders, and following their graduation in aircraft engineering, Ernie and Paul in partnership founded the Schweizer Metal Aircraft Company in 1937. Bill joined the company after his own studies in science were completed in 1941, by which time Ernie and Paul had moved to Elmira, NY, and the Schweizer Aircraft Corporation had been incorporated. In 1996 this was the only American aircraft design and production company with a continuous record of operations under the same family ownership and management.

The text of this book, written by Paul Schweizer and edited and expanded by Martin Simons, who also made the drawings, brings together the combined recollections and knowledge of the three brothers to tell the story of the gliders and sailplanes Schweizers designed and built over a period of sixty-five years. Data, accurate three-view drawings and photographs supplement and illustrate the text.

This book may be seen as a companion volume to Bill Schweizer's Soaring With the Schweizers (Rivilo Books, 1991), which explains how the Schweizer Aircraft Corporation developed over the years and how the gliders and sailplanes provided the foundation from which all the company's activities evolved. The general history of the gliding and soaring movement in the U.S.A. is covered in Paul Schweizer's book Wings Like Eagles (Smithsonian Institution Press, 1988). Martin Simons is the author of The World's Vintage Sailplanes 1908–1945 (Kookaburra, 1986) and Slingsby Sailplanes (Airlife, 1996). An explanation of the Schweizer aircraft numbering system is given in Appendix 1.

The Schweizer Family

We three Schweizer boys, and our sisters Helen and Emily, were the children of Paul Schweizer and Emma Bader. Paul Senior immigrated to the U.S.A. in 1906 from the town of Reigoldsville in Switzerland. Emma arrived in the U.S.A. in 1908, and before marriage was a governess at a family estate called Bonnie Brook near Tuxedo Park, New York. Father, or Papa as we called him, was a chef. His first job in the U.S.A. was at the Hampton Hotel in Albany, but he moved to different positions in New York City and Philadelphia as he worked his way up in the restaurant business. In 1915 he and a Swiss friend, Herman Schneider, established a

Swiss restaurant and pastry shop in Carnegie Hall, the world-famous concert hall at the corner of 7th Avenue and 56th Street, New York City. Business was good, so we children had the benefit of growing up under favourable circumstances. We moved to Elmhurst, Long Island. Papa bought a Hudson Super Six car, but did not take to driving after his first attempt. Joe Heimers, a young fellow from College Point, was hired as a chauffeur and handyman. We soon moved up to a 1916 Packard Twin Six touring car and a Cadillac town car. At weekends the family would go touring in the Packard with the top down.



The Schweizer home, 'Bonnie Brook', with, on the left, the barn where the early gliders were built.

Our first exposure to aviation came when we saw barnstormers operating from various hayfields around Long Island. On one memorable ride past Mitchell Field on the Vanderbilt Highway, also called Motor Parkway, a pilot in a Curtiss Jenny saw us driving along. As there was no other traffic, he decided to give us a buzz. I can still see his wheels just above the open car as he roared by, his helmeted and goggled head looking over the side of the cockpit, and a fiendish grin on his face.

In 1919 the British R34 had just made the first airship crossing of the Atlantic from England. It made a short flight to New York City from its temporary moorings at Roosevelt Field, and passed right over our house at only a few hundred feet. We could see the crew and passengers looking out of the gondola and waving to us. Its large size made a lasting impression on us. We

were becoming increasingly air-minded.

Papa wanted to get out of the city and into the country, to a place where he hoped eventually to have his own restaurant. We moved in 1924 to a large house with a barn on a ten-acre lot on East Main Street in Peekskill, a small village about forty-five miles up the Hudson from New York City on the New York Central Railroad, within commuting distance. Papa continued to run the restaurant at Carnegie Hall, leaving home early each day and not returning until after dark. To the family's great distress, our mother, aged only 40, died of cancer the next year. After this the children and house were looked after by Joe and his wife, Pauline. A brook ran through our land, and Papa named our place 'Bonnie Brook' in memory of mother's first home in the U.S.A.

Todd Field, which was used by barnstormers, was

A rear view of 'Bonnie Brook'.



only a mile away. Whenever we heard an aeroplane we would run outside to see if we could identify the type, and speculate as to whether it was going to land. One morning, while we were still in bed, we heard an aircraft overhead. Suddenly its engine stopped. We rushed to the window to see where it would glide, and, as expected, it headed towards Todd. We quickly dressed and ran to the field. The aeroplane was a cute little Commandair biplane, and the feature that attracted us most was its spot-burnished cowling. We learned from others who had also been drawn there that the pilot had telephoned Roosevelt Field for a new magneto. We spent the morning hanging around and asking the pilot endless questions while he waited. The magneto was delivered by car after a few hours, and was quickly installed by our hero, who took off and continued on his way to Buffalo.

In 1926 the family took a trip to Philadelphia to attend the Sesquicentennial Exposition. The most exciting exhibit to us was the huge Curtiss NC-4 biplane flying boat which in 1919 had been the first aeroplane to fly the Atlantic, which it had done in stages. The NC-4 was mounted on a large launching dolly and parked on the ramp at the edge of the river. Its top wing was almost 50 ft from the ground, and it was a really impressive giant.

Barnstormers such as the famous Gates Flying Circus came to Todd Field, selling joyrides in Jenny biplanes. We had not yet been able to persuade Papa to pay for a ride for each of us, so we could only watch. A few years later Capt. Arnold arrived with his 'bananawinged' Standard sesquiplane, with four passenger seats in the open front cockpit and the pilot in his own cockpit behind. This time we had financial support, and we three boys and our sister Emily, and our fox terrier, went up for our first flight. We were thrilled.

At about that time an incident occurred that switched our interest temporarily to boats. The editor of the magazine *Motor Boating* suffered a puncture outside our home, and Joe repaired it for him but refused payment. A few days later he received a copy of *Motor Boating* and was advised that he now had a year's free subscription. Joe was not interested, so he passed the magazines to us. We started to make model boats, visited boat shows in the Grand Central Palace in New York, and built a rowing boat, although our pond proved too small for it. We dreamed of sailing the

sleek class yachts that we had seen at the shows.

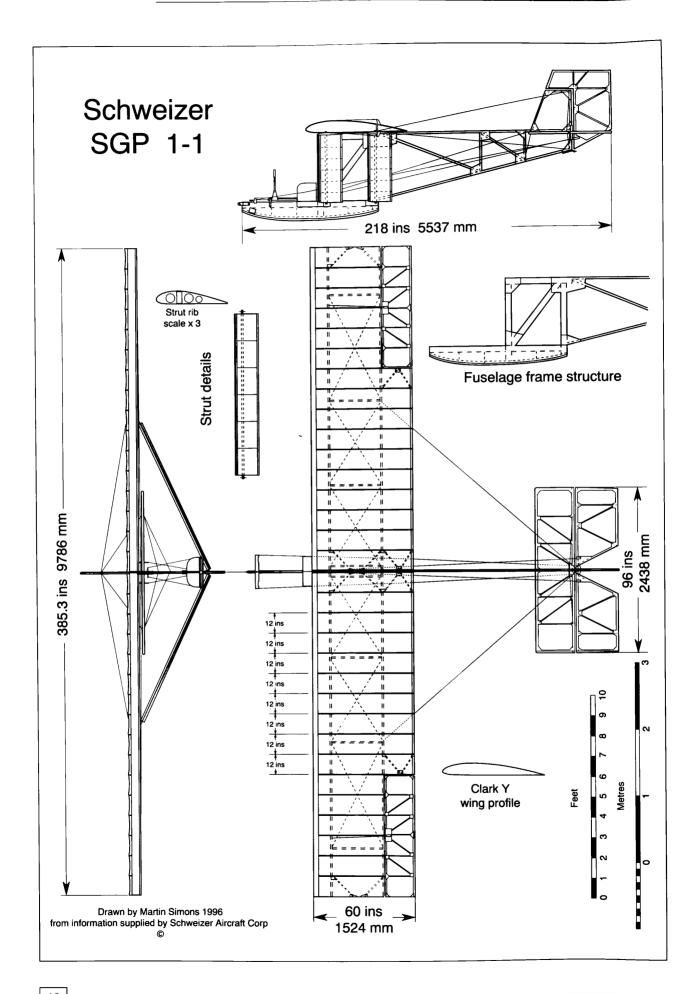
In 1927 there was much publicity about a proposed non-stop flight across the Atlantic to Paris. Lieutenant-Commander Clarence Chamberlain and Capt. Charles Lindbergh made preparations, and our interest in aviation was again aroused. When 'Lindy' reached Paris our enthusiasm turned again to aviation. There was little chance for us to fly in view of the high cost, so we turned to model aeroplanes. *American Boy* magazine published an article by Merril Hamburg on how to build a Baby ROG. The ROG (rise off ground) was a 12 in. model that could take off from the floor and fly for half a minute or so in a living room. Ernie made a 5 ft version which flew well outdoors.

We three brothers, with some school friends, formed the Mercury Model Airplane Club, and acquired balsa wood from the discarded insulation of ice cream trucks. We started a small business, buying a small circular saw and cutting strips and sheets from the scrap insulation and some bulk balsa we bought, and selling them to other modellers. This was our first trading venture.

Although model flying was fun and kept us up to date in aviation, it was not flying. One day we saw a report in the *New York Times* of a record soaring flight made above the sand dunes of Cape Cod. Peter Hesselbach, a German instructor at the Glider School founded by J.C. Penny Jr remained aloft in his sailplane for over four hours. But the thing that really got us hooked was an article entitled 'On the Wings of the Wind', in the June 1929 *National Geographic Magazine*. It told how young German students about our age were learning to fly inexpensively in gliders. We quickly converted our model aeroplane club into a glider club.

The great financial crash of 1929 had an impact on our home life, as Papa suffered losses on his investments and business at the Carnegie Hall restaurant was much reduced. The Cadillac had to be sold, and the Packard was put on blocks in the barn. We ended up with a Ford model T, a 'Tin Lizzy'!

Ernie and I were not allowed to have bicycles, which Papa thought too dangerous, so we walked the two miles to and from school to save the bus fare. (School buses were not available at that time.) With the money we saved, by combining all our assets we were able to start building a glider. It was a tough time to try to get into aviation, but we were enthusiastic and willing to work.



SGP 1-1 Primary

The first Schweizer glider, usually referred to as the Primary, was a single-seat primary trainer generally similar to the Zögling type used in Germany. Its original designation was HG-1, to tie in with our club name, the Mercury Glider Club, as Hg is the chemical symbol for mercury, but soon, in a fit of optimism, we established the numbering system that is still used today. The primary became our SGP 1-1. The club had eight members: the three Schweizers, Ernie, Paul and Bill, plus five school friends, Atlee Hauck, Ernie Whidden, and Aaron, Bill and Bob Yellott. There was also a group of eager young camp followers.

Ernie, a senior in High School, was the oldest, and it was he who designed the SGP 1-1, using such general information on gliders as we could find in books and magazines. He chose the Clark Y aerofoil section used on Lindbergh's Ryan monoplane, the Spirit of St Louis. The unusual thing about the Schweizer primary was that it had parallel wooden struts to support the wings, rather than the wire bracing with a cabane of the Zögling and most other primaries. Ernie felt that the struts would simplify the assembly and disassembly of the glider and would make it more rugged, eliminating frequent replacement of wires that would break in hard landings. As shown on the drawing, these struts were later made into lift struts similar to those used on the efficient Bellanca aeroplanes, which we greatly admired.

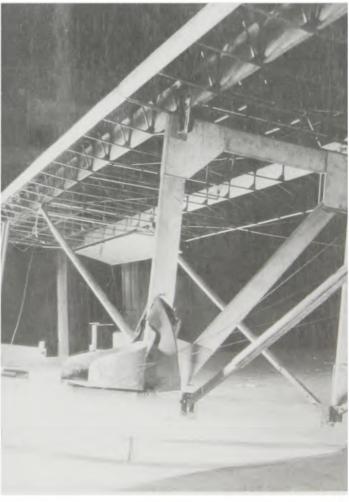
We started building the glider in the barn behind the family home. In view of Papa's attitude to bicycles, we feared that he would object to us trying to fly. Except on Sundays he was not at home during daylight hours, so we worked on the glider only when he was not there. We hoped that if he did not see it until it was nearly complete, he would not then have the heart to stop us from trying it. He never came to the barn.

Producing the wing ribs was the first project. They were made of white pine strips with ½16 in. mahogany gussets. Casein glue was used. The wing spars were made from aircraft-quality spruce, and the tail surfaces were a wooden truss construction. The fuselage followed the typical primary glider design, using spruce for the frame and plywood reinforcements at all the joints.

Most of the metal fittings were of commercial mild steel, and were formed at a local blacksmith's shop where some welding was also done for us. (Some of the welding turned out to be less than adequate, as we found later.) To save costs we made whatever parts we could for ourselves, even the pulleys. The pulley sheaves came from a discarded aluminium kick plate from the kitchen door of Papa's Carnegie Hall restaurant. We used shoe leather for the centre of the pulleys, all riveted together. We also used the kick plate aluminium for the seat back. Stranded, flexible aircraft cable was very expensive, so we used short lengths of cable to go round each pulley, then joined it to hard wire for the straight runs. The drag bracing in the wing was also hard wire, purchased from Karl Ort, the First World War surplus aircraft supply dealer in York, Pennsylvania.

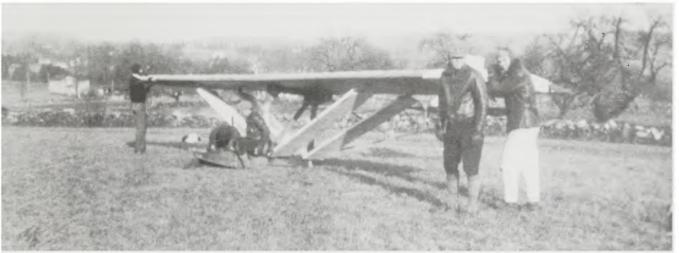
The wing and tail surfaces were covered with unbleached muslin sewn on the family sewing machine by our sisters, Helen and Emily. The fabric was tautened and made airtight with uncoloured dope.

The total cost of the materials was about \$135, with a few more dollars required for a launching



First assembly of the SGP 1-1 in the barn loft.





Top: The SGP 1-1 being bungee-launched with Aaron Yellott on board. **ABOVE:** Assembling the SGP 1-1 at Todd Field. From left to right: Aaron Yellott, Ernie Schweizer, Bill Schweizer (in the seat), Paul Schweizer, Atlee Hauk.

shock cord, or bungee. A glider launching bungee consists of a multitude of rubber strands making a rope a little less than an inch in diameter and 150 ft long, enclosed and protected against wear in a braided cotton covering that extends with the rubber as the cord is stretched. A 2 in. steel ring is fastened at the centre of the cord and attached to an open hook on the nose of the glider, free to fall off as soon as all the tension has gone from the rubber.

Papa surely must have known, from Joe, what we were up to, but probably neither of them expected that we would finish the glider. When at last he did come to the hay loft in the barn, when the glider was almost completed, he said nothing at all. We took this to mean that if he did not actually support us, at least he had no objections. We completed the glider and took it out for our first flights on 19 June 1930. Quite a large crowd of local people came to watch, and our adventures were reported in the local newspaper, the *Peekskill Evening Star*.

With the bungee stretched out in the form of a V, three or four kids took hold on each side and one or

two held the rope attached to the tail of the glider. At a signal, those pulling on the cord started to walk out and then ran, stretching the shock cord. At the appropriate time the pilot called for the tail holders to release, and the glider would shoot forward, like a slingshot. The pilot had to brace his head against the headrest so that it would not jerk back when the tail was released. On the early launches the shock cord was only stretched sufficiently to enable the glider to slide along the ground on its skid for a short distance, maybe rising into the air very slightly. This gave enough airflow over the control surfaces for them to work, and the learner developed some feel for them. The ailerons could be used to keep the wings level and the rudder for keeping straight. Since all of us did a lot of sleigh riding, it took a while to get used to the reverse action of the rudder bar compared with the sleigh steering bar.

As we learned to control the glider in a ground slide, each launch was increased in tension so that we would get five or ten feet off the ground, flying forward a hundred feet or so. We then had to master the elevator.

All of these early flights were made from a small field on the Enoch J. Tompkins estate near the Schweizer home. Successful hops were made, but one resulted in some damage, without harm to the pilot. Bill Yellot had urged his more conservative brother Aaron to pull up higher. Aaron did so and the glider stalled, descended sharply to the ground and had to be returned to the barn for repair. After the mishap, Ernie put a restraint on the elevator control to prevent the less experienced from getting the stick too far back during their early flights.

As our skill improved we moved operations to Todd Field. None of the club members had a driving licence, so to transport the dismantled glider we built a wooden framed dolly with motorcycle wheels, and dragged it by hand. The trailer had no licence, but a sympathetic policeman who was passing helped us to tow it to the field. Now we were

able to make higher and longer flights, but it became difficult to get enough kids to pull the shock cord. Todd Field was farther from town, and the novelty was wearing off. It was hard work for the bungee crew, who began to lose interest at the very time we needed them more, since we wanted to be launched to higher altitudes.

Ernie then got his driving licence and the rest of the club members learned to drive on the flying field, so we changed to a combination of shock cord and auto-tow, using the car to stretch the rubber. Flights of 50 ft altitude and 500 to 700 ft in length were possible. It took a lot of effort for a short time in the air, but it was flying, it was fun and our enthusiasm continued. To pay for using the field we helped the farmer, Les Sebold, take in his hay that summer.

On one flight one of the welded joints holding the main controls failed and Ernie, who was flying at the



Tor: Paul Schweizer in the SGP 1-1 Primary. Note the rope on the tail for holding the glider back during the first phase of shockcord launching.

Above: The Schweizer SGP 1-1 after it was repaired and the fuselage faired with fabric in 1931





Top: Bill, Paul and Ernie with the replica SGP 1-1 in 1989. **ABOVE:** Paul A. Schweizer flying the replica SGP 1-1 at Elmira/Corning (Chemung County) Airport.



The replica SGP 1-1 in its final resting place in the National Soaring Museum on Harris Hill

time, suddenly had neither ailerons nor elevator. Fortunately he was able to get the glider down safely. He was anxious after this to learn how to weld.

When the summer vacation ended, Ernie entered the Guggenheim School of Aeronautics at New York University (N.Y.U.) to study aeronautical engineering. Before the economic crash Papa had talked about sending us boys to the Zürich Technical Institute, the leading engineering school in Switzerland, but his losses in 1929 made this impossible.

The rest of the club members returned to high school or grade school. We did not fly the primary again until the Thanksgiving Day weekend. The day after Thanksgiving was very windy and we should have stayed at home, but we were so eager to fly that we went anyway. The wind was so strong that we could fly the glider like a kite on strings, not needing the bungee, but on one of these flights a side gust caused a wing to strike the ground and the glider broke up around me. I was unhurt.

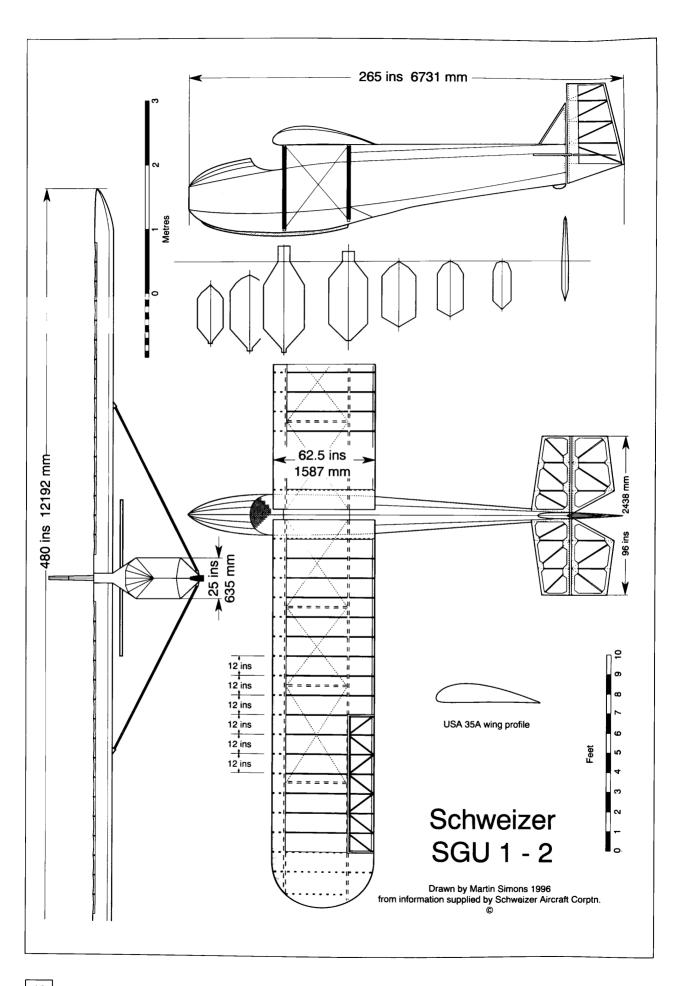
We rebuilt the primary during the winter and spring. To improve its performance we enclosed the fuselage with some light structure and fabric covering. It became a secondary glider, and we designated it SGU 1-1A. We flew it in the summer of 1931, making flights from Todd Field over a stone wall into a nearby pasture that was about 50 ft lower. Flying ended for the year after the second time we hit the wall, and the damaged 1-1A was put in the barn loft. It was left there, and was still there when father sold Bonnie Brook in 1945. Soon after it was destroyed when the barn burned down.

That is not quite the end of the story of the SGP 1-1. In 1989 Schweizer Aircraft Corporation celebrated fifty years since incorporation, and fiftynine years after the first few hops of the Schweizer's primary glider, a full-scale flying replica was built. The original plans had been lost, but Ernie redrew them from memory and the second SGP 1-1 was constructed by a group of fifty volunteers from the Schweizer plant, which stands now on the edge of Elmira/Corning Airport. After completion the new primary was granted an experimental licence by the Federal Aviation Administration (F.A.A.) and was flown on the airport by myself and Bill, who had helped make the original, and afterwards by three vounger members of the family. It was then taken to Harris Hill and hoisted into position in the National Soaring Museum, where it remains on exhibition.

Schweizer SGP 1-1

Total number built: 2

Specification		
Span	32.1 ft	9.78 m
Length	18.17 ft	5.54 m
Wing area	$160.5 ext{ ft}^2$	$14.9~\mathrm{m}^2$
Aspect ratio	6.44	
Aerofoil section	Clark Y	
Empty weight (est.)	200 lb	90.7 kg
Pilot weight	180 lb	81.6 kg
Flying weight	380 lb	172 kg
Wing loading	2.30 lb/ft ²	$11.23 \ kg/m^2$



SGU 1-2 'Yellow Peril'

We missed the first National Soaring Contest held at Elmira in 1930, because we did not hear about it in time. We learned later how the famous visiting German pilot, Wolf Hirth, had made a flight of 33 miles using thermal upcurrents, but at the time very few people understood how this had been done.

In the summer of 1931 the second national meeting was organised, again at Elmira. We were eager to go, and drove the 230 miles in the family Ford. The event was based at Caton Avenue Airport, where there were facilities for auto-towed launching, but most soaring flights were done from sites high on the various ridges in the surrounding district. Sailplanes and bungee launching crews were taken to whichever slope faced the wind at the time. The South Mountain ridge, a mile south of the airfield, was the most used.

The contest gave us our first chance to see other gliders. Five of them were true sailplanes capable of extended soaring flights, and the rest were 'secondaries' and 'utilities' which could soar quite well in favourable conditions. We talked with enthusiasts, soaring pilots and designers, and attended the many informal discussions held by the pilots when the wind was not on any of the ridges or was not blowing strongly enough.

There were several accidents. The first occurred a few minutes before our arrival at Caton Avenue, and the ambulance was leaving as we drove up. The wings of a Bowlus sailplane flown by Capt. Phillips had parted from the fuselage as he was trying to land on the airfield after being launched from the south ridge. On his approach Phillips decided to dive to get under some electric wires, and upon pulling up the wings failed. He broke both legs. This, and two later incidents causing serious injuries, impressed on us the need for structural integrity, stability and pilot protection. Ernie took the lead and became the chief proponent of safety in American glider design.

Some ridge-soaring flights of over 7 hrs. endurance were achieved by American pilots, and a cross-country distance of 15 miles was covered by Martin Schempp flying the Schloss Mainberg, a very superior sailplane designed by a graduate of Darmstadt Technical University. Schempp was a German who at this time resided in the U.S.A. These flights increased our enthusiasm, and we returned home eager to get on with our second glider. By this time Ernie had completed his first year at N.Y.U. and was better qualified to design it.

We started the SGU 1-2 as a larger primary, but

having seen some of the German types we were impressed with the Haller Hawk's construction. We decided to enclose the basic open fuselage with a mahogany plywood structure to streamline it and to give it the better performance of a 'secondary'. The 1-2 had a 40 ft-span wing with the U.S.A. 35A aerofoil section as used on some of the Bowlus sailplanes. It was an 18%-thick section, which enabled us to use a built-up I-beam spar. This saved weight and material cost but added many hours of work. The fuselage was also more complicated, and was quite heavy because it had the strong primary frame within the enclosing plywood shell.

In September 1931 I started the same aeronautical engineering course as Ernie, commuting daily to the Guggenheim School in the Bronx of New York City. The journey by train took about an hour each way, and we rode in first-line New York Central coaches which had upholstered, comfortable seats so that we were able to do school work *en route*. The pleasant N.Y.U. Heights campus was separated from the surrounding apartment buildings of the Bronx and included the original Hall of Fame with its colonnade around the Gould Memorial Library, where we could study when not in classes.

There was an N.Y.U. Glider Club. Ernie and I were not members, but we joined in some of their activities. The club, operating from fields around the outskirts of the city using bungee and auto-tow launching, had an Evans all-steel primary glider. On the ROTC Field Day the club flew the Evans primary from the Ohio Field football field. Although the club had bought a Bowlus Paper Wing sailplane, only one flight was made before it was crashed, without injury to the pilot.

Papa did not remarry, and was anxious to start his own restaurant in the country so that he could spend more time with his children. In 1932 he sold his interest in the Carnegie Hall restaurant and started the Bonnie Brook Restaurant on the ground floor and large verandah of our home. All of the Schweizer children, when available, were expected to help with the work there. The economic depression was still on, and we learned to do without many things.

Progress on the SGU 1-2 was very slow, partly because we had little time to spare but mainly because the structure was so complicated. It was still unfinished by the summer of 1932, when the third national contest was held at Elmira. We made our pilgrimage but had nothing ready to fly. On

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