

The Freedom of the Heavens

Interview with the Aerial Photographer Albrecht Brugger



Albrecht Brugger.

In 1948, at the tender age of twenty-three, *Albrecht Brugger* set himself up as a freelance architectural, industrial and animal photographer. He found premises for his studio in the building of the Stuttgart airport, which had been badly bombed during the war. Logically enough, it seemed only natural for him to use not only ladders and trees, but also the occasional airplane when he wanted to shoot a photo from a height. Photoflights in chartered airplanes led *Brugger* towards a career as an aerial photographer at an early stage. He persistently followed this path and

Albrecht Brugger's Piper Cup which has flown him to his subjects for many decades stands on a small airfield on the escarpment of the Swabian Jura, near the small town of Bad Urach. We visited him in his home not far from the airfield and saw his satellite receiver station for the weather forecast, his photo lab with his self-built film processing machine and his engineering workshop, where the shelves are stacked with cameras, camera parts and optical components. This is the birthplace of *Albrecht Brugger's* aerial camera. It is a camera for the 7 cm x 10 cm



Fig. 1: Albrecht Brugger and his Piper airplane.

Background:
Isny in Allgäu/Bavaria.
The view ranges from the morainic foothills of the Alps to the far-off promontory chain and on to the high ridges of the Limestone Alps at a distance of 50 km.

format featuring a focal-plane shutter and a device for film suction. Its lenses, in his opinion, are probably the best available for this format: two **Planar®** f/4 lenses with focal lengths of 150 mm and 300 mm. They were specially developed by Zeiss for this camera. With its symmetrical design, the **Planar®** lens type is ideally suited for aerial photography, permitting superior symmetrical imaging performance with good field flattening. Aberration correction was helped by the fact that no allowance had to be made for any limitation of the cross section by a central shutter. The lenses display an extremely low level of straylight – a property of vital importance for *Brugger*.

was soon flying his own airplane.

Albrecht Brugger owes his reputation as one of the big names in aerial photography primarily to his unique landscape pictures, his photos of cities, mansions and castles which have been printed in well over 1000 books. They not only testify to the photographer's expert eye for pictorial effect, but the unparalleled definition of the photos also reveals his uncompromising search for technical excellence which culminated in the building of his own camera to attain maximum quality.

For almost half a century now, *Brugger* has been a keen observer of the changes wrought in our environment by urbanization, the expanding traffic network and industrial utilization and has documented them in his photos. More vividly than words could ever do, the photos taken of the same countryside at intervals of 30 years and more implore us to treat nature with greater care [1].

Just why a photographer should build his own camera despite the wide choice of photo technology available, what the special attraction

of aerial photography is and why he adores his Piper Cup airplane – these are the topics about which Professor Werner Schmidt, former head of research at Carl Zeiss, and Kornelius Fleischer from the Camera Lens Division talked to Albrecht Brugger.

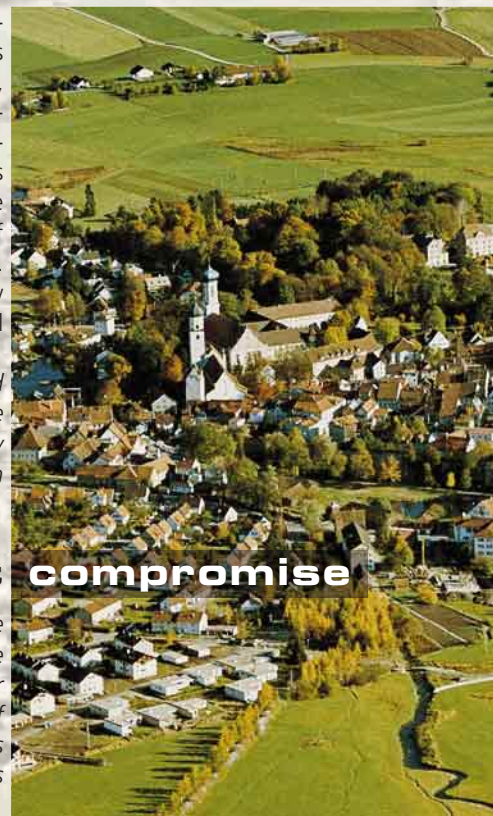
Photography without compromise

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Many aerial photographers use standard medium- or large-format systems. Why did you go to the trouble of designing and building your own camera?

In my very first aerial photos, I also used the medium format. I soon noticed, however, that roll film with paper backing was not sufficiently flat to get the excellent detail definition I wanted. I also found the film flatness to be unsatisfactory in large-format cameras. Film flattening by suction against the pressure plate wasn't yet state-of-the-art at that time, and so I decided to build my own magazine with vacuum.

But: even the best camera can only be as good as its lenses. Optics of the quality I required was not on the market for my 7 x 10 cm format.



Literature
[1] Book of photos
"Baden-Württemberg:
Landschaft im Wandel",
Theiss-Verlag 1990.

But fortunately, Zeiss was there to help.

I used Zeiss optics before, and my relations with the Zeiss Camera Lens Division were so good that I could discuss the design of a customized lens using all possibilities of correction with the then manager of the division, *Dr. Saur*. You've seen the result: three models of a 150 mm Planar® f/4 lens for my camera alone. A further *Brugger* lens – a 300 mm Planar® f/4 lens – was manufactured later when the division was headed by *Dr. Kämmerer*, who was also very supportive. I was absolutely overjoyed to see that its optical performance actually surpassed that of the earlier lens it was modeled on.

The first time I held the lens in my hands, I remembered how, in 1951, I once stood with a colleague in front of the shop window of the Swissair branch in Stuttgart marveling at the

aerial photographs on display there. They'd been taken with one of those extremely heavy aerial survey cameras which, of course, provide incredible image definition, but need to be installed in a fixed position. This makes creative photography virtually impossible. Now the Zeiss lens allowed me to take photos of the same quality using my compact camera.

So you were unable to meet your customers' requirements using the technology then available on the market?

It's not customers' requirements that are my standard, but my own. My customers would often have been quite happy with a result which I rejected in my quest for perfection. I always demanded that each photo should be of such quality that

there'd be no problem enlarging it to a size of ten meters, which means one hundred times linearly. This is precisely why I have the stereomicroscope here. I use it to examine every negative at a 30x linear magnification. If I detect even the slightest flaw, I cut the negative up so that I'm not tempted to use it nevertheless.

But who needs ten meter pictures?

Well, a mayor, for example, who is proud of his municipality and wants such a photo for the town hall. Or the Meteor Crater Museum in the German town of Steinheim where a view of the Steinheim basin fills a whole wall.

The crater white with frost; a very well-known picture!

Fig. 2:
Hohenzollern castle near Hechingen. It is situated on an isolated hill, a former part of the Swabian Jura plateau which remained in place when the mountain edge receded. In the background, the forest rising to the plateau.



Fig. 3:
Brugger's automatic aerial camera with a magazine for 30 m of unperforated 70-mm film which is flattened by vacuum against the pressure plate. The camera in this photo is fitted with a special 300 mm Planar® f/4 lens from Carl Zeiss.



Special Planar® lenses for Albrecht Brugger

Three different types of camera are mainly used in aerial photography:

1. special cameras for cartography or reconnaissance which are installed in a stationary position in the airplane,
2. special handheld cameras for aerial photography and
3. cameras also used in general photography.

The first type is always, the latter never equipped with special aerial photography lenses. For the handheld cameras used for aerial photography, manufacturers would like to offer special aerial photography lenses, but are reluctant to do so because of the high development costs resulting from the small quantities involved.

For the handheld aerial camera built by himself, *Albrecht Brugger*, the perfectionist, wanted optical systems which would offer the same level of performance as typical aerial photography lenses. These are characterized by the following features:

- an image field in the range of large-format photography
- a relatively high maximum aperture permitting exposure times of 1/1000 s and less with film speeds of about 100 ISO
- high imaging performance even at full aperture
- high resolving power for fine details, limited only by the performance of the film used
- uniform high performance across the entire image field, not only in the center.

Brugger first fitted his cameras with serially produced Zeiss lenses for large-size photography in the 9 x 12 cm format. These lenses were – and still are – very popular among aerial photographers, as they offer very good imaging performance even with f-numbers around 8, whereas common large-format lenses have been optimized for working apertures of 22 to 32.

Brugger mainly used a 75 mm **Biogon®** f/4.5 lens and a 135 mm **Planar®** f/3.5 lens, both with a central shutter. After testing the prototype of a 150 mm **Planar®** f/2.8 lens, a heavy lens of the central shutter type, he ordered a lightweight 150 mm **Planar®** f/4 lens where no central shutter had to be taken into account in the beam path, which only had to cover a relatively small image format of 7 x 10 cm, and which did not need to provide any reserves in the image field for setting possibilities. In addition, it was designed for subject distances in the infinity range. At full aperture, it was supposed to offer a similar performance as the 150 mm **Planar®** f/2.8 lens at an f-number of 8. *Brugger* received three lenses of this type in 1972 and used them as his preferred optics for many years.



What is the difference between an aerial photo specialist and other photographers?

First of all, he must be just a normal photographer who has a good eye and masters all the technicalities involved. Seeing is the essence of photography; if you can't see, you'll never become a good photographer. Some people who were originally pilots think that taking a camera along in the airplane makes them aerial photographers. The airplane, however, is not the key; if I use a car or climb up a ladder to get to a subject, neither the car nor ladder will help me make a good photo if I don't have the necessary skill.

This means that a good photographer who specializes, for example, in architectural or theater photography and who has somebody fly him to a subject would have a better chance of making a good aerial photo than a pilot who takes a camera with him in the air.

He would have a problem. This is the same situation that I was in at the beginning. I had already built up a nice clientele in industry and architecture when I took up aerial photography. But I very soon noticed that aerial photography isn't suitable as a sideline. If you make critical demands on the photo, the right weather is absolutely vital for aerial photography. For example, you have made an appointment to shoot an industrial production plant. Everything in the company has been prepared for the shots and the weather is exactly right for aerial photography on the agreed date, but in the end the airplane has to remain in the hangar. What makes aerial photography so expensive is

not the actual flight, but the time when the airplane stays on the ground. So the day came when I had to tell people I'd enjoyed working with for a long time that I could no longer take any orders from them for industrial or architectural photography, and that I'd only be doing aerial photography from then on. I soon reached the stage where I was on the go every day, including Sundays and holidays, with the airplane constantly ready for takeoff – much like an interceptor – to make sure that I wouldn't miss a single one of those rare moments of favorable weather. If there were several good days in succession, my last deed of the evening – after perhaps 10 hours of flight and in a state of utter exhaustion – was always to make the airplane ready for takeoff and the camera ready for shooting so that I could immediately set off the next morning at sunrise. In this way, my effective production time totaled about 200 hours a year.

This was probably in years with extremely bad weather?

Not at all, it was the rule. We would have the most glorious summer weather for four weeks on end, and every day someone would phone me, saying: what, you can't do my order in this beautiful sunshine? However, high-pressure weather in summer is rarely suitable for aerial photography because the atmosphere is hazy. Clear atmosphere is often present after a cold front has just passed through, but this weather situation doesn't usually last very long.

How long does suitable weather for flights have to last to permit it to be used for aerial photography?

Needless to say, in a large airport like Stuttgart, where I used to fly from, a

lot of time is lost with administrative preparations. This is why I moved to Hülben. Here, takeoff is not delayed by technicalities, I don't need an air traffic controller and I'm in the air within 20 minutes. Nowadays, however, you can no longer simply fly to wherever you have a job to do. In earlier times, when I was just starting and still flying from Stuttgart, I reported off 5 km outside the control area of the airport and was then able to move in the air without any restriction, in accordance with visual flight regulations, up to an altitude of 10,000 m. Now the amount of air space with flight restrictions is increasing. At two and a half thousand feet above Hülben, for example, there is an air space extending from Stuttgart airport and monitored by air traffic control. If I want to fly there, I have to report to air traffic control via the radio. I've always got along well with these people and they've always been very cooperative. But faces



“At the beginning, I had a team of pilots...”

change from time to time, and occasionally there've been some initial communication problems.

You said that aerial photography can't be done as a sideline, and your own airplane makes you independent. So far so good. But you go one step further and fly single-handedly. Wouldn't it be easier for you to leave the joystick to a pilot and concentrate on taking photos?

Many people think I only fly my airplane to save the costs of a pilot. Far from it! At the beginning, I had a

Brugger's working conditions changed over the years, involving increasingly high altitudes for photography. Due to the good experience gained with his 150 mm Planar® f/4 lens, he ordered a lens with comparable imaging performance, but with a larger focal length. Carl Zeiss developed the 300 mm Planar® f/4 lens for the relatively small 7 x 10 cm format, designed for subjects at infinity and without any reserves for setting possibilities. Within the scope of these specifications, the correction was pushed to a remarkably high level. The chromatic longitudinal aberration was corrected by the use of special types of glass. With a Petzval radius of 20 f, field flattening attained a markedly higher level than in normal camera lenses (approx. 5 to 10 f). An outstanding value was also achieved for spectral transmission which totals approx. 0.95.

In the mechanical design of the 300 mm Planar® f/4 lens, all measures were taken from the outset to ensure extremely effective absorption of straylight and thus to achieve maximum image contrast. Recent comparisons with current camera lenses have shown that *Brugger's* 300 mm Planar® f/4 lens of 1982 still sets an extremely high standard for excellent straylight absorption.

Two lenses of this type were manufactured for *Albrecht Brugger*. They finally made his dream of 1951 come true, permitting him both to take photos with his hand-held aerial camera which displayed the same fascinating reproduction of detail as photos made with aerial survey cameras and to produce sharply defined pictures with a width of up to 10 meters.

Background: Stuttgart taken on November 1st, 1982. The exact time can be seen from the clock of the town hall: 1.38 p.m. The clock face has a size of a mere 0.3 mm in the negative. The diagonal from the upper right to the lower left corners runs from the railway station via Schlossplatz and the town hall to Oesterreichplatz.

Fig. 4: A burning timber storage yard which Albrecht Brugger came across.



Background:
The escarpment of the Swabian Jura from southwest to northeast near Eningen, 5 km east of Reutlingen. In the center of the photo, on the horizon more than 60 km away, the projection of the Jura near Heubach and, to its left, the Rechberg and Hohenstaufen mountains are visible. There are only a few days in the year when the atmosphere is as clear as this.

Fig. 5:
Ulm on the Danube.

“If the sun is shining at six o’clock in the morning...”



team of pilots for my own airplane, but one day, when the weather was good for flying, none of them was available. So I thought I should give it a try, and it really was a big improvement. For example, there is no need to communicate with the pilot to direct him to exactly the right taking position, and the small airplane is lighter with only one person on board, which means that it climbs faster and can be flown with less engine power and less noise. And above all: if the sun is shining at six o’clock in the morning and the weather is ideal, the pilot is also on the spot as soon as I’m ready.

The Piper is a good-natured airplane which I can steer with the pilot stick between my knees and my feet on the rudder pedals. This way, my hands are free to target the camera on the subject through the folded-up side window. As for the exposure data, I read them onto a tape using a throat microphone.

Many aerial photos are now taken from helicopters. You have remained faithful to your Piper. Is this out of understandable affection for an

instrument you’ve grown close to over the years or are there also practical reasons?

I’ve already photographed from a helicopter, and I know why I prefer my rigid-winged airplane. The fact that a helicopter is much more expensive and that it needs a pilot with his two hands always on the pilot stick would not be a reason if these drawbacks were outweighed by any advantages. In my opinion, however, a helicopter is less versatile than my Piper. Sometimes my photoflights take more than six hours, with photos being taken close to the ground and from an altitude of 6 km, and with long distances being covered in between. The small helicopters used for photoflights can’t cope with either the high altitudes or with the long flying times involved. They also make a lot of noise: my Lycoming engine sounds like a purring cat by comparison. The noise of a helicopter is not only a disturbance for the environment, but it also gets on the nerves of the crew. It’s hard work for the helicopter engine just to keep the craft in the air. My airplane, on the other hand, allows me to slip to the subject, and accelerate a bit and fly off after the shot. This is very important in a noise-sensitive environment.



Aren't the strong vibrations of the helicopter a problem also?

Very much so. The transmission of the vibrations to my (tuned-up) camera could only be suppressed with difficulty, if at all, to such an extent that its performance could be fully utilized in the picture. Here, the perfectionist in me knows no compromises.

But a helicopter can remain stationary on one spot.

Pilots are extremely reluctant to do this, for safety reasons. In the event of an emergency, if the power unit breaks down, the transition to gyro-flight, which is the flight mode permitting emergency landing, is extremely problematic without forward movement.

Mr. Brugger, you said you used the airplane as a means of transport to get to the subject and into the right taking position, in much the same way as other photographers use a car.

However, when we remember that you flew a one-engined airplane to the Canary Islands in 1973, a feat which requires not only daring, but also the full spectrum of aeronautical skills and which only very few pilots would ever venture, and also considering that you still fly although you ended your business activities in aerial photography 8 years ago, we cannot help suspecting that you very much enjoy flying.

I've enjoyed everything I've ever done, even flying in the toughest phases of my photoflight work, but this was always in combination with photography. True, I still fly and I've just had my license extended. Even now, however, my actual motivation is not the attraction of flying, but taking photos from the air. I no longer have to do the hard, commissioned work which I used to call the "compulsory program", to use a term from the world of ice-skating.

Now I only do the "free program" and I can afford to be even more choosing than during my active days.

Does this mean that all the unique Brugger photos which we know from many books have been taken on the side, as it were, in the "free program"?

Needless to say, the orders had priority. But the photography I did on the side was always very important for me and I enjoyed it very much.

We hope that taking photos from the air will continue to give you a lot of pleasure for a long time to come!

Fig. 6:
The Piper as seen from the subject being photographed. The camera projects from the open side door.

Photos 1, 3 and 6:
Albrecht Brugger's archive

Photos 2, 4, 5 and background photos: taken by Albrecht Brugger with the 150 mm and 300 mm special Planar® f/4 lenses.