

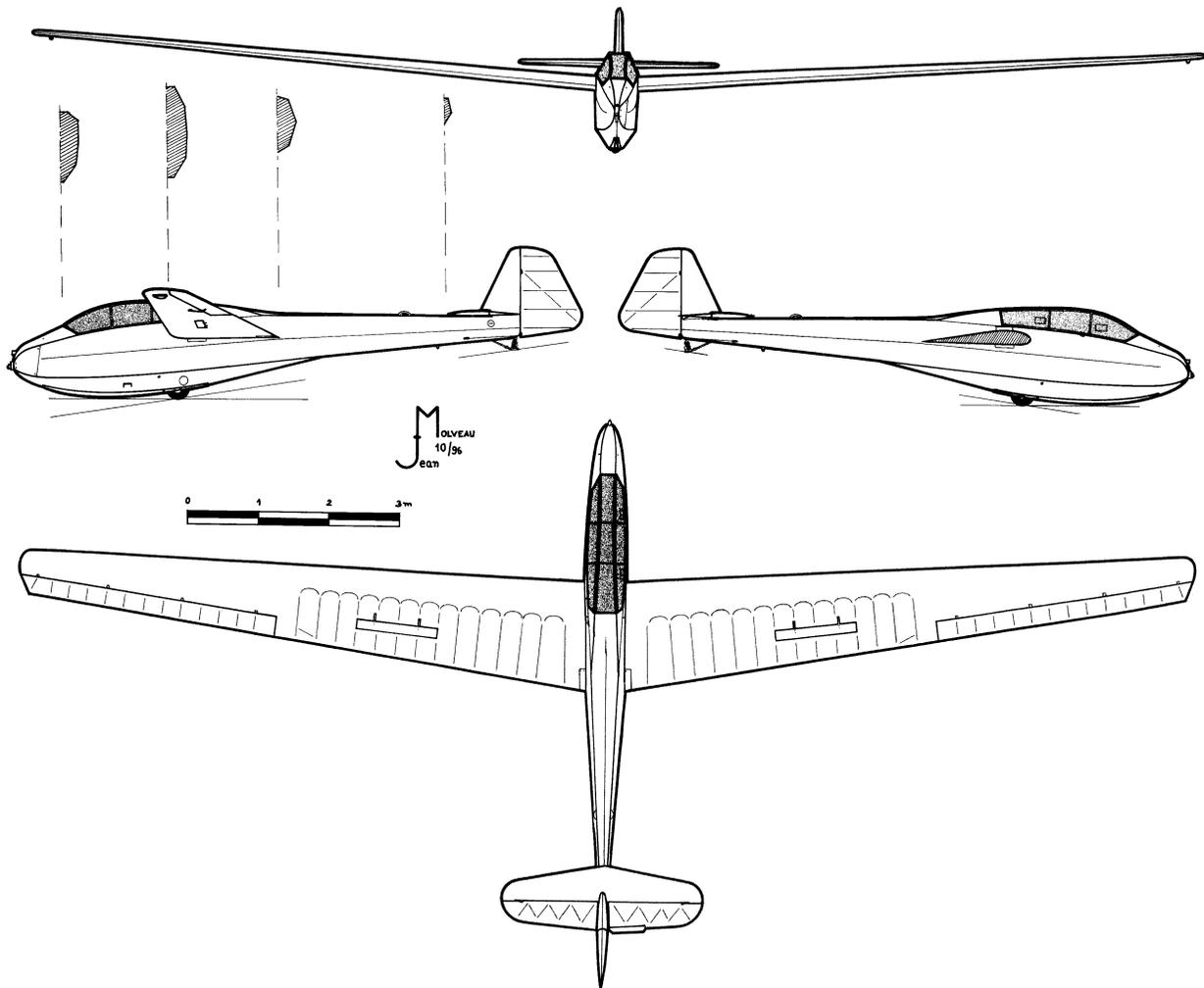
Two-Seated Training and Soaring Glider for REFLEX XTR²

Scheibe Bergfalke II/55

good thermaller and slope soarer also as a scale model

From 1952 till the 1970s, the Bergfalke (English: Mountain Hawk) was a common and popular two-seater for glider training and for performance soaring as well. Characteristics are the forward wing sweep, the mid-wing configuration, and the angular fuselage cross-section, which came from the steel-tube construction. That made for an overall simple design, while the aerodynamic layout and the special Mü 14.5 airfoil made for both well-mannered flight behavior and good cross-country flight performance.

From the French [Retroplane Website](#):



The REFLEX Models

Since the 1950s the Bergfalke was also a popular model. Like many others at that time, I too had a Hegi Bergfalke model with 90 in wing span what was big back then. Of course, the model had only a rudder and actually had to be a free-flight model. It was directed by rudder but otherwise it flew automatically. That's why in some respects it differed from the original, in stabilizer and rudder size, wing plan form and airfoil, and especially dihedral.

Today people build true scale models, like Vincent Besançon built a [Bergfalke II/55](#) model. Following this example the REFLEX models were built, scaled 1:3.5 (28.6%), 1:4 (25%), and 1:5 (20%) instead of 1:4.3 (23.3%) like Vincent's model. The original's wing span was not assumed to be 17.2 m, as specified for the aircraft shown in the [German Museum](#). Most of the sources specify 16.6 m as wingspan for the II/55 version. Obviously, the (later so called) version I had 17.2 m wing span and an only slightly swept-forward wing leading edge (see [Retroplane Website](#), "La dynastie des Bergfalke").



The 1:3.5 scale gives 186.75 in model wing span, the 1:4 scale 163.4 in, and the 1:5 scale 130.7 in. "Bigger flies better" is an old saying, and indeed scale-like flying models would have to be built so lightweight that it is hardly achievable for small models. That's why the Hegi Bergfalke had an enlarged stabilizer because otherwise the pitch damping ratio would have been too small for inherently stable flight on slopes or in thermals. Besides, they used a wing airfoil suited to the low model Reynolds numbers, a modified wing plan form, and some wingtip washout.



Accordingly, the two smaller REFLEX models have a SD 7062 airfoil, which is rather thick (14% what allows for a lightweight wing) but has super-critical airflow already at smaller Re numbers. The Goe 769 airfoil for the bigger REFLEX model is rather similar to the original's Mü 14.5, not only in thickness but also in shape and characteristics. Maybe the model would need trip strips, but it should behave similar to the original (also regarding the pitching moment) and perform decently.



Given the true-to-scale small stabilizer, low weight and small static stability margin (moment of inertia) are necessary to achieve a greater than 1 pitch damping ratio. Accordingly, the "light" 1:3.5 scale version flies best. The assumed 11 lb weight (to stay below the 5 kg weight limit for flying off airfields

in Germany) seems to be very low for 187 in wing span, but it should be achievable also in wood construction applying consistent lightweight construction methods. A 15% static stability margin - a common "stable" value - just gives a 1.05 pitch damping ratio.



The 15% static stability margin was not changed for the "medium" (15.75 lb) and the "heavy" (19.75 lb) versions. Due to the bigger moments-of-inertia, the pitch damping ratio is reduced to 0.88 and 0.78, respectively. That would be still not bad for an aerobat, but what that means for a soarer can be tried out in REFLEX.



The smallest REFLEX model weighs 6 lb what is easily achievable in reality at that size (130 in). The setup is "the other way around". The static stability margin was reduced to 10%, giving a 1.02 pitch damping ratio. In the simulator, the model behaves noticeably different from the bigger version.

All variants of the REFLEX model have been staffed with pilots now; both are "borrowed" from REFLEX. The front pilot actually sits in the pilot's seat of the SG-38 training glider, exposed to the weather without a cabin. That's why he wears his blue jumpsuit and red bobble cap. The bobble has been removed, the cap had to stay there, but that's even pertinent. As an example, in the Hörnle scenery it's winter and gets cold in the unheated glider. Anyway, the pilot had to be made only a bit thinner to fit well into the Bergfalke with his arms and legs. Just the same holds for the back pilot who comes from the Grunau Baby model and twiddles his thumbs. Maybe the trustful instructor?





In honor of Vincent Besançon the medium-size REFLEX model was "painted" to replicate [his model](#). It is scaled 1:4 (instead of 1:4.3) giving 163.4 in (instead of 157.5 in) wing span. Wing airfoil is SD 7062 (instead of E 205). The original model's weight (13 lb) was assumed for the virtual model and the same trim was applied, giving an 8.5% static stability margin and a 1.04 pitch damping ratio. This setup and the size make for a quite realistic flight behavior of this "medium" weight version.

Meanwhile (2014) the VTH-Verlag (VTH publishing company) offers the [plan](#) by Gernot Hubinger which renders the Bergfalke in 1:4 scale and with 15 lbs weight. As already 1999 on his Minimoa model, here as well Gernot Hubinger used the original wing airfoil. That's why for this version in REFLEX the similar Goe 769 has been used. The 15% static stability margin results in a 0,74 pitch damping ratio and enjoyable slope soaring with quite some speed due to the quite "heavy" construction.

The smallest version has 50% aileron differential but still needs substantial rudder with ailerons. The combi mixer in the transmitter may come in handy. The bigger versions have even 70% differential and at a push may be flown without rudder, at least at normal flight speed. It's even possible to do without elevator to a large extent. You may try it in REFLEX: A model trimmed moderately stable flies automatically and has to be only directed in a proper way. Of course, in some situations one appreciates to have all controls. But that only goes to show how anticipatory one had to fly the old rudder-only models. That may be tried out in REFLEX as well.

The REFLEX models have spoilers like the original, even though these are modeled not entirely realistic regarding both design and effect. That's not possible in REFLEX, but realistic flight is not noticeably affected. The effect seems to be small, but that should be realistic. At least you may push the model into a steep descent and it will still not get too fast, and any excess speed is easily dissipated in flare.



Initially, the original was entirely painted with beige color, as was the Hegi model. I set off the tips of wings, vertical tail, and fuselage with matching red color to make it look more interesting. The smallest version is painted like the aircraft in the [German Museum](#), which is quite colorful and makes the small model more visible in flight. The medium-size version replicating Vincent Besançon's (and Gernot Hubinger's) model shows a modern paint scheme. All variants may be exchanged, though (hit F5 "Model parameters", select another "Model appearance").

Also in the simulator, the Bergfalke turns out to be a very enjoyable flyer with pleasant performance. It flies nearly automatically, quite slow, and is easy to land. Circling in thermals requires substantial top aileron, what is easy to do, though. Slope soaring is great as well, even if not in strong wind. That and aerobatics should not be demanded from Bergfalke.

By the way: There are several examples of Bergfalke models (some version I, some version II/55), by [Modellbau Benja](#), [plans by Chris Williams](#), [FraesFritz](#), [Albmodellbau](#), [Eckard Taubert](#), and of course [Vincent Besançon](#) and the [plans by Gernot Hubinger](#).

Demo Flights

There are two slope soaring demo flights, one on the Mill Hill and one on Mount Wasserkuppe, and there is one thermalling demo flight in the lowlands on the MFC Coesfeld field.

Thermalling Sceneries

Bergfalke is suited to thermalling, what most of the REFLEX sceneries are suited to as well. There are very nice sceneries made by independent authors available for download from www.Szenerien.de or sceneries.paulduerr.info as well as from RC-Sim. Most of them have no default thermal settings, so simply hit F6 "Simulation parameters" and in "Wind and Thermals" set "Thermal current" to 2 m/s or more (click on the 0, enter the 2, hit the up key, only then hit or click "OK").

There is no winch-launch or aero-tow in REFLEX, but you may set the "Launch initial altitude" to an arbitrary value, not only the 2 m default. Again hit F6 "Simulation parameters" and now in "General" set "Launch initial altitude" to 20 m or 50 m. That should be enough to find any thermals.

Now hit the down key to go to the next parameter and set "Launch speed" to 10 m/s. Again down key and then select an "Aircraft initial position" with the mouse. The model will appear not only e.g. 50 m above the initial position but also quite a bit behind it, pointing to the initial position. You will always find the model in the center of the display, though.

If you like to watch how the model rolls, falters, and finally tilts to one side after landing, you should set the "Delay time from crash to restart" to 7 s or more. (Never mind the word "crash".) Again don't forget to hit the down key or up key, only then hit or click "OK". In case it takes too long till restart just hit the "Del" key for instant restart.

A real "thermal ambiance" shows the "MFG Heist e.V." REFLEX scenery with its drifty cumulus clouds.

The "MFG Uetze e.V." scenery by Horst Lenkeit, downloadable from [RC-Sim](#), is shot in November but has much room and blue sky.

The "VTFE" scenery by Dieter Meier and Harald Bendschneider, downloadable from www.Szenerien.de, is an evening scenery but just too nice to ignore it.

Really adequate is "MFC Coesfeld e.V." by Horst Lenkeit, downloadable from [RC-Sim](#). The pictures are shot in July in hot mid-summer weather. The airfield is in a vast, rural area in the lowlands and has two crossed grass runways. Recommendation: Hit F6 "Simulation parameters" and in "General" set "Launch initial altitude" to 50 m and as the "Aircraft initial position" select the "Headwind runway". In "Wind and Thermals" set "Thermal current" to 2 m/s and "Wind force" to 1.5 Beaufort. (Use the down or up key and only then hit or click "OK".)



Slope Soaring Sceneries

As mentioned above, Bergfalke is also a good slope soarer. You may really enjoy the model because you can fly it close to you. That's a nice experience even without aerobatics, that is without strong wind.



The "[Mill Hill \(Shoreham\)](#)" REFLEX scenery is perfectly suited. The 3 Beaufort wind set as a scenery default is just right.

Landing is possible left of the pilot's position and behind it. If the model gets too low, you may land it on one of the meadows below the pilot's position. The REFLEX folks kindly set model shadow casting for these areas to make that possible.



The new "[Wasserkuppe Fliegerdenkmal](#)" REFLEX scenery is, in spite of the 4 Beaufort default wind setting, perfectly suited as well. Here you may even land on the mowed runway, if only you can judge the downwind behind it (on approach). By the way, the original aircraft was introduced 1951 on Mount Wasserkuppe.

Other slope soaring sceneries, especially those from independent authors, are actually made for fast slope razors and aerobats and not well suited for Bergfalke without further ado. You may tame them, though, by simply setting less wind. Hit F6 "Simulation parameters" and in "Wind and Thermals" set "Wind force" to 3 Beaufort or even less. Always remember to use the down or up key and only then hit or click "OK". By the way, you may restore any default value by hitting Alt-0 (zero) when the parameter field is selected. Remember as well to select an "Aircraft initial position" where the model is far enough from the pilot's position to avoid a "collision" or the simulation won't start. Never mind if that is the "Parking area" as long as it works.

The "Salzkammergut" (Austria) mountain slope scenery by REFLEX might be suitable if set to only 2.5 Beaufort. But there is no really proper place to land the model and one has to fly daring approaches and will appreciate the tight turns and slow speed of the "light" Bergfalke version.

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But the "[Gerlitzten Gipfelstation](#)" (Austria) by Horst Lenkeit and Dan., downloadable from [RC-Sim](#), is very nice with only 2.5 Beaufort and some thermal; landing on the meadow on the left side.

The "[Hoernle \(Teck\)](#)" (Germany) scenery by Markus Vogt, downloadable from [RC-Sim](#) or [www.Szenerien.de](#), still has good upwash even at only 2.5 Beaufort and also a good (though confined) landing area behind the pilot's position.



The slope scenery "[Ahornkopf](#)" (Germany) has been virtually set up for the lightweight Bergfalke, with a breeze and light thermals. On this beautiful slope in the Black Forest you may fly as well as land stress-free. The author [Paul Dürr](#) has a terrific scenery website. [Download](#) this scenery directly from his website.

Make sure to check his [St. Peter Platte](#) and [Erlenbach](#) sceneries as well, and don't miss [Val di Fassa](#) and [Marmolata](#)!

Do you want a relaxing flight in the evening? Take the scenery "[Rotes Kliff \(Kampen Sylt\)](#)" (Germany)! It's the "red cliff", a famous location, one of the biggest coastal cliffs in Germany near Kampen on the island Sylt, perfectly aligned perpendicular to the prevalent westerly wind.

Like all REFLEX stock sceneries, it is perfect in every respect. You are looking into a nice sunset just in front of you over the sea. You hear the wind and the swoosh of breakers on the beach below. The model is landed on the huge sands below the cliff, flare and touch-down is done watching its shadow on the ground (or watching the telemetry display). You may fly the model over water to get it lower for landing, but the shadow is hardly noticeable there and the model will sink and disappear when hitting the water.

The default 3.5 Beaufort wind is too much except for the "heavy" big version. Reduce to 3 Beaufort for all Bergfalke versions, and even to 2.5 Beaufort for the "light" big version to have a really enjoyable evening relaxation. Select any "Model appearance" (F5) you like from the three Bergfalke paint schemes, and off you go...



Enjoy!

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<http://time.hs-augsburg.de/~erd/Modellflug/textReflex.html>

More REFLEX models and the latest versions are on my page

<http://time.hs-augsburg.de/~erd/Modellflug/textDownloads.shtml>

© November-December 2009,
April-May 2010,
August 2014,
November 2017