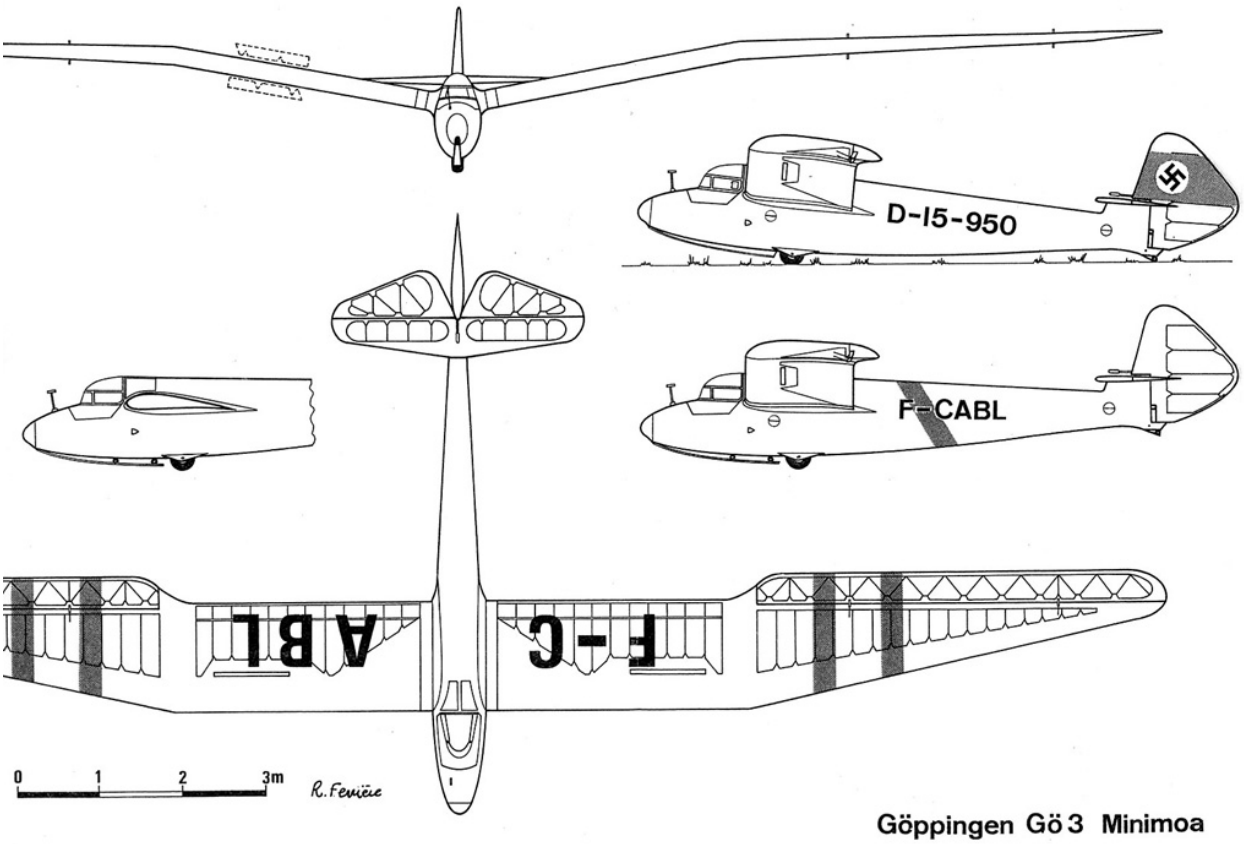
1930s High-Performance Glider for REFLEX XTR²

Göppingen Gö 3 Minimoa

Very good also as a scale model

Minimoa is one of the famous sailplanes for several reasons: With her characteristic gull wing she's a beauty, she became generally known for successful contest and record flights, and as the first high-performance glider she has been produced in larger quantities. Despite of her complex design and elaborate construction, 110 of them have been built. The type designation Gö 3 means the third aircraft of the newly founded Göppingen Sport Aircraft Works. In 1935 it was designed and built in record time so Wolf Hirth had it for the Rhön contest the same year. Information is at Wikipedia and at the website of the still existing manufacturer Schempp-Hirth (video1, video2).

From Richard Ferriere's website http://richard.ferriere.free.fr/:



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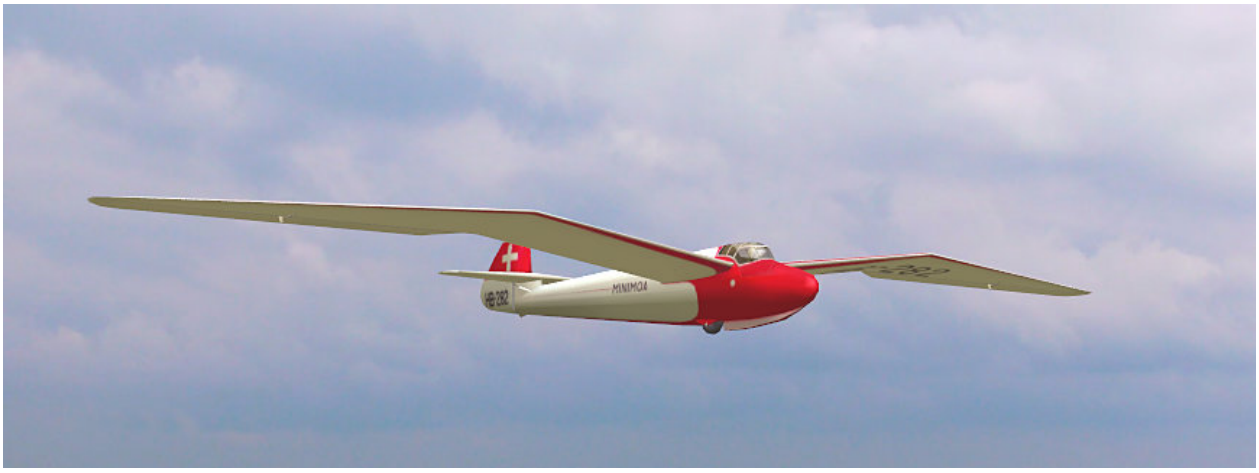
The REFLEX Models

Another reason for Minimoa's popularity is the very good flight characteristics. By all means, that seems to be a reason for the numerous model replicas since the Minimoa is not an easy build as a model, either. Well-known plans, kits, or ARFs have been or are (specifying scale, wing span, wing airfoils, and weight):

plans by Günter Obrecht (VTH)
(1:7.2, 93 in, E385 or Clark Y, 67 oz),
Graupner (1:6, 111 in, HQ/W-3/12, 85 oz, video) - discontinued,
Krick (1:5, 134 in, Clark Y ?, 125 oz) – available again,
Royal (Staufenbiel) – discontinued -
(1:5, 134 in, SD 7055, 125 oz),
Reichard (Staufenbiel) – new -
(1:4, 167 in, airfoils similar to original, 198 oz),
ICARE (1:3.5, 191 in, HQ 3/15 - HQ 3/12, 423 oz),
plans by Gernot Hubinger (VTH)
(1:3.4, 197 in, Goe 681- Goe 693 – NACA 0015, 351 oz),
Bayer (1:3, 223 in, HQ airfoils, 441 oz, video) - discontinued.

These models have been replicated in the simulator so the flight characteristics according to size and weight may be compared. On that score, quite interesting is a tiny model that has been built by someone using the drawing shown above (RC Universe thread, and here with video). Besides, opposed to the exceptionally heavy 1:3.5 version by ICARE are two others in the same scale but with medium and rather low weight.



These "REFLEX models" are mere parameter sets making the flight characteristics. The model's appearance comes from REFLEX as one of the stock models of the simulator is the Krick Minimoa, which is a classic (probably designed by Karl-Heinz Denzin around 1970) and on display in the German Glider Museum (as well as the full-size original of this and the Graupner model).

All the REFLEX models offered here emanate from the geometry shown in the drawing above, so they are "scale models" in this respect. The original's wing airfoils are Goettingen Goe 681 at the root, tapering to Goe 693 more out-boards, and to a symmetrical airfoil at the tips. The 1:3.4 scale version by Gernot Hubinger is "scale" also in this regard.

Since such airfoils are unusual at model Reynolds numbers, the well-known Clark Y was assumed for the bigger REFLEX models, which has a flat bottom from 25% chord to the trailing edge, just like the two Goettingen airfoils. Thus, they are similar in this respect and probably in characteristics as well. The tiny model (1:14.2) has been set up with a completely flat-bottom airfoil (e.g. Anderson SPICA) as usual for such small models.

Both airfoils make the models quite fast like the original, which perhaps was one of the first sailplanes configured for cross-country flying and was even the first sailplane ever to carry water ballast. Especially the heavy models need strong thermal lift and have to be neatly circled to achieve a decent climb. On the other hand, they are quite efficient on a slope even with not much wind because they conserve energy well and can be flown dynamically.

The gull-wing shape had been chosen for easy circling in thermals, even in blind flight when climbing into clouds. That was really achieved as the simulator models are showing. They are "neutral" in circling if the right bank angle and speed are found. So no aileron is needed to maintain the circling and no top aileron, either.

Obviously, later has been found out that the complicated gull wing may be replaced by a simple straight tapered wing. In the simulator, one has to set up an equivalent simple wing, anyway, which now shows the same favored convenient behavior as well.

Due to the airplane's "fast" design, circling in thermals is still somewhat hard, especially with the heavy versions, of course. They fly quite fast and therefore the circling diameter is quite big. Besides, one has a hard time to find the best airspeed for fastest climb.

However, the airplane is easy and enjoyable to fly on a slope. Bank angle in turns stays constant so you may just watch how the model turns into the wind. If you turn it downwind you should watch even more and let the elevator alone. That is to say that it needs some time till there is enough airspeed again to pull into a tight turn. That is normal behavior (the dreaded downwind turn) but appears here distinctly.

The big and far-outboard ailerons make for good roll maneuverability. Only 20 degrees deflection are set but 70% differential. So using the rudder is not absolutely needed at decent speed, but at slower speed the rudder should be used coordinated with the ailerons to commence and terminate a turn.

Maximum rudder throw is set to 30 degrees due to the elevator cutout. Rudder effect is good and well sufficient for a side slip.

The visible model appearance has no spoilers like the second version of the full-size original, shown on the drawing above. Spoilers are provided in the parameters, though. Thus you may deploy spoilers on all of the REFLEX models even if you don't see them. However, don't expect a noticeable effect and rather practice side slip.

Maximum elevator throw is set to 30 degrees as well just to show a spectacular effect. Now full up elevator is well enough to stall the REFLEX models, whereupon they immediately tilt into a steep and fast spin, even without any rudder throw. Down elevator is definitely needed to stop the spin, and only then recovery is possible. Those who like to pull too much elevator should reduce maximum throw in the REFLEX parameters.

By the way, the small model versions need less control throw because they fly relatively faster compared to the full-size original and to the bigger models. Elevator has been limited to 25 degrees and ailerons to 15 degrees.

The REFLEX Model Files

The Installer program automatically installs all necessary files to the correct location. The model's appearance, the mod file, is already installed as part of the REFLEX standard installation.

Demo Flight

A demo flight "takes place" on the Mill Hill. To view it, hit F9 in REFLEX and under “Aircraft” select “Minimoa - Mill Hill”. By the way, it shows the big 1:3 version by Bayer.

Thermalling Sceneries

Minimoa 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 RC-Sim or www.Szenerien.de. 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.

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 50 m or 80 m. That should be enough to find any thermals.

The "Launch speed" has to be more than 10 m/s; a value suitable to model version and scenery has to be found out by trial. Finally, a suitable "Aircraft initial position" must be chosen. 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".) 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, has been 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 the "MFC Coesfeld e.V." scenery 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 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.

Slope Soaring Sceneries

As mentioned above, Minimoa is a good slope soarer. You may really enjoy the model because you can fly it near 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. Select "Parking area" or "Grass runway 19" as "Aircraft initial position" to give room for the big versions.

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 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 had its first public appearance in the 1935 contest at 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 Minimoa without further ado. You may tame them, though, by simply setting a bit less wind. Remember 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 new "Salzkammergut" (Austria) mountain slope scenery might be suitable, but there is no really proper place to land the model and one has to fly daring approaches.

But the "Gerlitzen Gipfelstation" (Austria) by Horst Lenkeit and Dan., downloadable from RC-Sim, is very nice; landing on the meadow on the left side.

The "Hoernle (Teck)" (Germany) scenery by Markus Vogt, downloadable from www.Szenerien.de or RC-Sim, has good upwash and also a good (though confined) landing area behind the pilot's position.

Like all REFLEX stock sceneries, the scenery "Rotes Kliff (Kampen Sylt)" (Germany) is perfect in every respect. 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. 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 (from REFLEX version 5.05.4 on, that is).

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 data 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.

Select "Parking area" as "Aircraft initial position" (F6) for the bigger model versions.

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

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