

STEMME

STEMME S10-VT technical data

Dimensions, External

Wing span	23.00 m (75 ft 5 1/2 in)
Wing aspect ratio	29.29
Width, wings folded	11.40 m (37 ft 4 1/2 in)
Length over-all	8.42 m (27 ft 7 1/2 in)
Fuselage max width	1.18 m (3 ft 10 1/2 in)
Height over-all	1.80 m (5 ft 10 1/2 in)
Wheel track	1.15 m (3 ft 9 1/4 in)
Wheel base	5.42 m (17 ft 9 1/2 in)
Propeller diameter	1.63 m (5 ft 4 1/4 in)

Dimensions, Internal

Cockpit width	1.16 m (3 ft 9 1/2 in)
Cockpit height	0.93 m (3 ft 1/2 in)

Areas

Wings, gross	18.70 m ² (201.3 sq ft)
Horizontal tail, gross	1.46 m ² (15.8 sq ft)
Vertical tail, gross	1.51 m ² (16.3 sq ft)

Weights and Loadings

Weight, empty	660 kg (1,455 lb)
Max T-O & landing weight	850 kg (1,874 lb)
Max wing loading	45.5 kg/m ² (9.31 lb/sq ft)
Max power loading	10.06 kg/kW (16.53 lb/hp)

Performance, general

Never-exceed speed (VNE)	146 kt (270 km/h; 168 mph)
Manoeuvring speed	97 kt (180 km/h; 112 mph)
Stalling speed (flaps in landing position)	42 kt (78 km/h; 48 mph)
g-limits	+5.3/-2.65

Performance, powered

Max cruising speed (MSL)	121 kt (225 km/h; 139 mph)
Max cruising speed (FL100)	140 kt (248 km/h; 154 mph)
Max rate of climb (MSL, MTOW)	4,14 m/s (817 ft/min)
Service ceiling	30,000 ft (9,140 m)
T-O run (MSL, ISA, MTOW)	205 m (675 ft)
T-O distance (MSL, ISA, MTOW)	447 m (1470 ft)
Max range with standard fuel (2x45 ltr)	697 nm (1,290 km)
Max range with extended fuel (2x60 ltr)	929 nm (1,720 km)

Performance, unpowered

Best glide ratio at 57 kt (106 km/h; 66 mph)	Up to 50
Min rate of sink at 45 kt (83 km/h; 52 mph)	Down to 112 ft/min (0.57 m/s)

Operational Noise Level, according to

German light aircraft rules LSL, chapter X	71.3 dBA
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The propeller blades extend into the airstream automatically by centrifugal force when the engine is started.

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STEMME S10-VT

the high-performance motor glider



S10-VT

All specifications subject to change without notice. See purchase contract and options list for details. Images may show details which are not part of the standard equipment.

STEMME S10 the high-performance motorglider

The company and its flagship

The STEMME Company was founded in 1984 in Berlin as a joint venture of experienced entrepreneurs to develop new markets in sports aviation. Aircraft production in Berlin was still prohibited by Allied mandate in effect since World War II. It was STEMME for whom the first and only development and production licence was issued – a real adventure at that time.

The next challenge was the development of our first aircraft: the high-end motor glider STEMME S10 is the synthesis of the revolutionary mid-engine – front propeller drive combined with the latest state-of-the-art aerodynamics of sailplane technology. The result was a quantum leap for sports aviation, just as we had intended. To this day the STEMME S10-VT is still unique among all motor gliders worldwide.

A dream comes true

The philosophy

Uncompromised performance, independence, safety and convenience – all this amounts to the underlying philosophy of this dreamship.

The most spectacular proof of its fantastic gliding performance was the sensational world record of Klaus Ohlmann in the Andes of Argentina: 2,463 km (1,331 nm) of pure gliding in 14 hours in December 2000 with a STEMME S10-VT.

Soaring at its best – but power has its own appeal

The unique propulsion system and the twin-undercarriage offer you a fully fledged power plane which enables taxi, take-off and landing without outside help – on any grass strip as well as on the biggest international airports.

The 4-cyl./4-stroke turbo-charged engine (Rotax 914F with 84.5 kW / 115 HP) delivers ample power to yield convenience and independence equal to any mainstream power plane.

Together with the variable pitch propeller the powerful engine provides for short take-off runs. You can take full advantage of this independence to spend your precious time soaring – not waiting for crew and ground procedures. The convincing performance in powered flight makes the STEMME S10-VT the optimal aircraft for record pilots like Klaus Ohlmann, it enables you to be in the right place at the right time. And good fuel efficiency gives this motor glider a range of 1,700 km (920 nm) with extended fuel tanks.

The STEMME S10-VT boosts you to a sailing paradise even over long distances. Fly the crown of soaring as far as the wings can take you – returning home again after a beautiful day in the sky. The STEMME S10-VT is the aircraft which really allows you to go to new heights.

Safety & sensation... 5-sec-restart

Nothing in life is certain – thermals aren't either. Only this motor glider offers this quick restart procedure: push the nose forward, turn the key and feel the power when the propeller blades extend into the airstream. Easy to handle and safe as there is neither significant drag nor trim change during the restart period. Compare with the situation of a fold-out engine motor glider, in particular when it fails to start. And it's true – you don't need more than 5 seconds to transform the STEMME S10-VT from soaring configuration into powered flight – a record of its own.

Performance... the sailplane

The soaring performance of the S10-VT makes it a member of the top class. With its huge 23 m (75.5 ft) wing-span, it achieves a glide ratio of up to 50:1 at 106 km/h (57 kts). The STEMME S10-VT will give you challenging experiences of thermal soaring as well as in waves, but even weak thermals can be exploited with ease. The wing (state-of-the-art HQ41 profile) is optimized for both – thermal circling and fast forward flight. Six position flaps yield excellent flight qualities for all speeds between VSO at 77 km/h (42 kts) and VNE at 270 km/h (146 kts).



Go to the thermals and riffs – don't wait for them to come to you.

The STEMME S10-VT is the easiest to handle and most good-natured open class sailplane. Decelerating to 75 km/h (40 kts), it banks very gently without spinning. In all flap positions it is easy to control. You can easily follow the lift distribution. For a sailplane of this size, the STEMME S10-VT has a respectable manoeuvrability – taking only four seconds to bank through 90° from one side to the other. There is nothing left to be desired.

Comfort and profession... the side-by-side cockpit

Apart from ideal soaring and power flight performance, the STEMME S10-VT ensures the ultimate pleasure of flying in unparalleled comfort. Easily adjustable rudder pedals and six point adjustment of the seats match the needs of both short and tall pilots, while special seats for very tall pilots are available. The ergonomically designed cockpit provides the pilot with unmatched comfort on even the longest flights. Unique among high performance sailplanes, STEMME pilots enjoy side-by-side seating, a configuration common among power planes and the ideal environment for social, competition or instructional needs.

This seating configuration offers numerous advantages:

- the efficiency and safety of training flight students is improved through clearer verbal communication, a shared cockpit, direct eye contact, direct observation of students' behavior and actions.
- side-by-side is optimal for communication and load sharing between pilots, whether for competition, navigation, flight operations or any flight task. Improved cockpit resource management optimizes overall performance of the flight crew.
- flying side-by-side enables you to show the fascination of flight to passengers in a way that makes them feel more comfortable and safe.
- and last but not least, it's just more fun enjoying a fantastic flight side-by-side.

The handling – uncomparably safe and easy

The 23 m wing span looks really impressive. But the engine and the twin-undercarriage provide a maximum operational independence while taxiing and flying. In any situation the STEMME S10-VT could not be easier to handle. The undercarriage seems to be narrow, but ground handling only requires low speed taxiing on grass strips. For narrow taxiways and hangaring a wing folding system is available, with which a single person can reduce the span from 23 m (75 ft 5.5 in) to 11.4 m (37 ft 4.5 in), which is not more than the span of a normal power plane.

In powered flight as well as soaring, the flight performance could not be better: The STEMME S10-VT is stable in thermals, stall is most docile without total loss of control! You should be an expert to be able to get it into a real spin.



The STEMME S10-VT is the undisputed champion in a wide variety of audiences: with private ownership, partnerships and flying clubs. It is the perfect cross country aircraft, whether soaring or under power. Above all, the S10-VT is a plane which offers the gift of flight in perfect harmony with nature.

STEMME S10 a revolutionary propulsion system

STEMME RETRAC propeller folded



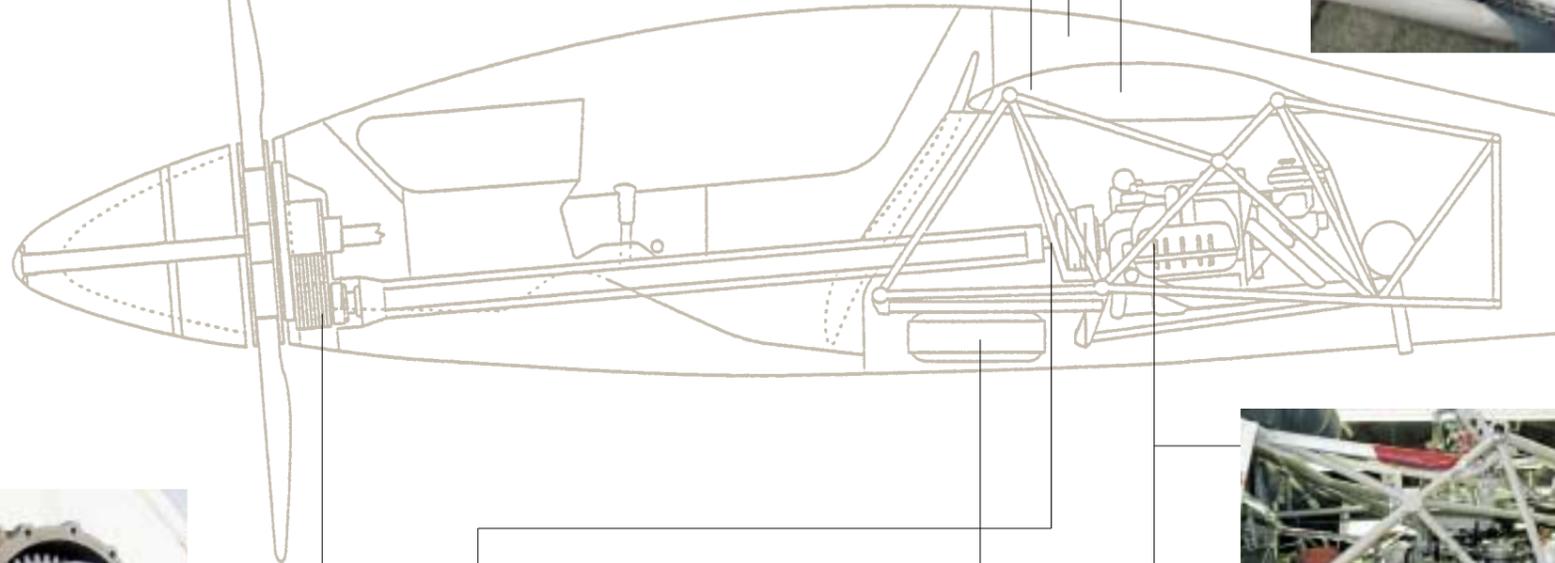
Upper end of special light weight electrical gear drive (left)



Water cooler and exhaust



High precision mixer and control push rods to ailerons, flaps & airbrake



Front gear, opened, for optimized propeller speed and opening for nose cone support



An unconventional gear, to be folded into a minimized fuselage cross section.



Engine without cooler and firewall



Turbo-oil cooler - intercooler (from left to right)

Engine

STEMME decided for a turbocharged FAR 33 certified engine, the Rotax 914F. Its features are impressive: charged for 4,000 m full power to ensure that S10-pilots will not miss the most hot & high airfields of the world, enabling the pilot to cross the highest mountains. The Rotax 914F produces 85.7 kW (115 HP) and is equipped with watercooled cylinderheads, automatic adjustment by hydraulic valve tappet, electronic dual ignition, intercooler and integrated reduction gear. Air cooling is achieved by air inlet and outlet ducts which are opened automatically by the extension of the nose cone.

Intercooler

The intercooler gives the engine more power over all. You will need this in particular when the conditions are hot & high, and the airstrip short. Finally it heightens the service ceiling ahead of all other motorgliders.

Propeller

The patented propeller consists of the central section and two jointed blades. In gliding configuration the blades are folded into the contour of the fuselage and are covered by the movable nose cone to leave an aero-dynamically clean fuselage.

Start-up readiness is achieved by simply pushing the nose cone forward via its lever with no perceptible change in trim or drag. Therefore a critical situation at low altitude does not emerge from a sudden reduction in gliding performance. The propeller blades extend into the airstream automatically by centrifugal force when the engine is started.

Once the engine has been stopped and the prop has come to a rest, the blades fold inwards automatically by spring loading. As soon as the blades are aligned, the nose cone is retracted enclosing the propeller completely and forming again an aerodynamically clean fuselage. The pitch of the propeller with two positions improves significantly take-off runs and cruising performance.

Undercarriage

The electrically retractable undercarriage is sprung, using two 5 inch wheels with a track of 1.15m (3ft 9 1/4 in) and is fitted with disc brakes. There is a manual override system to lower the gear in the event of electrical failure. The tailwheel is steerable with the rudder. An optional wide-tired landing gear is available (using two 6 inch wheels) for shorter take-off runs on soft grass fields.

Fuselage

A central steel tube framework forms the mountings for the wings, undercarriage and fixed engine, and gives unobstructed access for engine servicing. All control linkages and connections for the wings are located above the horizontal firewall separating them from the engine compartment. Onto this central framework the rear fuselage is bolted as a carbon fibre construction.

Wings

The wings are a special development, which incorporates the very latest technology and aerodynamics, achieving significant benefits in handling and performance - confirmed by more than 160 owners in 2002.

The wings are made of carbon fibre constructions in three sections. Two 45 liter fuel tanks and Schempp-Hirth air-brakes are installed in the central wing section. Optional 60 liter fuel tanks extend the range to 1,700 km (920 nm).



STEMME S10 first-class features



A **panel** which fits all wishes of an advanced instrumentation (and you don't need a second one for the rear seat!).



The **cockpit** is a carbon fibre shell, kevlar-lined for impact safety. Inside width is 1.15 meters (3 ft 9 1/4 in) and the one piece canopy hinges from the front with supporting gas springs. The seat backs have six mounting positions, and are further adjusted for angle.



Easy-to-handle **controls**, dual, for manoeuvring that 23m-ship.



Rear console plus a glance into the "small" **baggage compartment** behind the seat (an optional compartment is available for the tail section).



A comfortable and robust **trailing arm** ensures always good landings.



The "T"-tail has a **dampened elevator**, and the rudder size is ample for good control coordination.



Optional, removable **winglets** improve again the excellent flight characteristics when thermalling, and diminish the sink rate without impairing the spectacular gliding performance in straight flight.

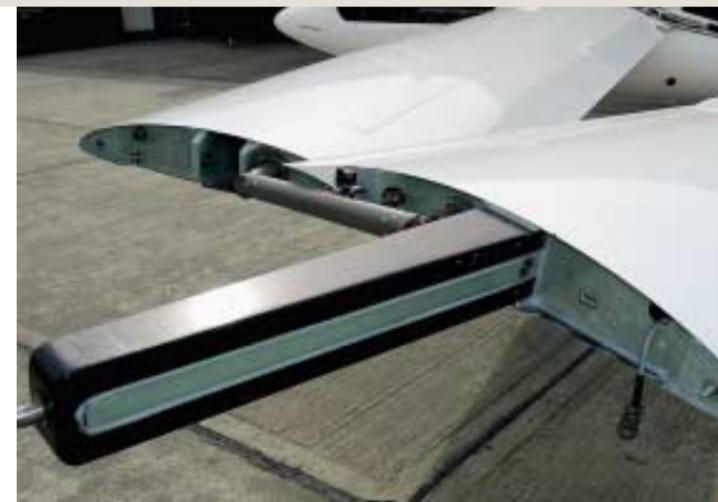


An optional **wing folding system** for taxiing, service, refuelling and lower hangar cost.

A single person can reduce the span from 23m (75ft 5.5in) to 11.4m (37ft 4.5in).



Solar panels... providing you with over 30W electrical power during your soaring flight.



AN EVALUATION OF THE S10 COMPETITION CAPABILITIES

from *Richard H. Johnson*, 21st May 1994

Having recently flown the STEMME S10 as co-pilot with Marc Arnold during the 11 day (2 practice and 9 competition days) U.S. Motorglider Nationals, held 16–28 May at Winterhaven, Florida, it is perhaps appropriate that I present my impressions of the S10's capabilities demonstrated there and the contest in general.

First, the soaring conditions there were only fairly good with tropical humid/soggy cumulus forming early every day. Cloud bases were usually about 3000 ft AGL at the starts, increasing to perhaps 4000 ft in the mid-afternoons, except for the last day where about 5000 ft was achieved in the best portions of the task area. Achieved thermal climb rates were generally 2 to 3 kts with occasional 4 to 5 kts encountered during most mid-afternoons.

Summertime showers formed during most days after about 3 pm. Though the thermal conditions were somewhat weaker than expected, the STEMME S10 proved to be capable of climbing with the best. The competition fleet consisted of 8 extended wing Ventus's, 2 Nimbus 3DM's, and 1 each S10, PIK-30, and DG-800. Most of the S10's thermalling was performed with +10 deg flap, but occasionally +16 deg flap was used where smaller turn radius was needed. Marc and I shared the piloting about evenly, with each flying for roughly 30 minute periods. Though Marc had no prior contests and little thermalling experience, he proved quite capable under my coaching.

I insisted that thermalling airspeeds be kept below 55 kts, and I complained when airspeeds exceeded that. Though airspeed sometimes dropped momentarily as low as 45 kts while thermalling, I do not recall that the S10 ever once stalled. The gentle low speed flying characteristics of the S10 contributed greatly to its excellent thermalling capability. Most inter-thermal cruising was performed at 70 to 80 kts with the Mac-Cready set to 1 to 2 kts, and again the S10 demonstrated that it could cruise with the best. Many long glides were made with just a straight-ahead pull-up made in weak thermals, when altitude permitted that.

Admittedly our S10 pilotage included a number of errors, but none of them were serious enough to prevent the S10 from placing high in the standings. Unhandicapped scoring placed the S10 in first place overall, with a 17.7 metre Ventus CM in 2nd place.

Unfortunately, the current U.S. Motorglider National contest rules include unrealistic handicap factors for several types of sailplanes, including the STEMME S10. Under the current rules a 16.6 metre Ventus CT is provided 14.5 percent more points than the S10, when each flies the task in the same time. That handicap defies reason because each is flying at about the same wingloading (8.84 psf Ventus vs 9.17 psf S10 actual). Even under the current U.S. Handicapping, the S10 still placed at a creditable 6th out of the 13 entries.

The S10 was the only motorglider competing there that was equipped with a four stroke engine, and its Limbach 2400 engine performed flawlessly. There was never any doubt about its starting at any time. The side-by-side seating provided excellent cockpit visibility for both pilots, and a pleasant environment for coaching and team flying. Thank your Dr. Stemme for creating such a fine motorglider. ◀

"RETIREMENT WITHIN UTOPIA"

This report from *Tug Willson* is an addendum to his article in the August '92 *Sailplane & Gliding*

On 10th June I departed from Quesada (near Alicante) at 2.14 in very good weather on a 500k out and return. The outbound track was directly inland towards Madrid and straight into a headwind of 20kts at cloudbase of 11,000ft. The clouds were streeting well and lift was so good that exploratory turns during dolphin flight were only considered when the Cambridge maximum reading coincided with a particularly strong surge.

The first leg was flown between 8,000ft and cloudbase which rose to 12,000ft. I was over the T/P at 17.16 – not a particularly fast speed considering the day, but from this point on things truly began to happen. Conditions simply continued to improve and a superb street enabled me to climb directly on track without turning to 7,600 at which point I took a 1200 fpm climb to 11,000. From here I dolphined home at close to cloudbase until the descent point. The return downwind dash had taken 1hr 12mins for 254 kms!

Had the day ended there it would have been remarkable enough – but it was really only beginning. Directly over the A/F was the most remarkable sea breeze front stretching as far as the eye could see both to north and south. I set off to the south to explore it. The

frontal lift on it was very strong and consistent. I raced along it climbing all the time without turning and before long I was again at cloud-base which was variable on the front but mostly about 12,000' on the upwind edge. VNE at 12,000' in the S10 is 133kts indicated, so I encountered the problem of having to use air-brakes to prevent too much speed whilst remaining below cloudbase in moderate turbulence. Rather than use the A/Bs I opted to move upwind of the cloud for the hopefully smoother air. I suppose that on a god given day like this then the wave that was riding the front was almost inevitable! In the magnificent smooth air I was able to go to VNE beside the superb pure white billowing cumulus which were wonderfully outlined by the lowering sun.

In this sublime peace I was able to select a GPS waypoint just beyond Granada which was 252kms. I rode the wave to abeam the T/P. On the return leg the frontal wave died with the convection but I was able to use lee wave to complete 1012kms easily. The second 504kms had been flown in 2hr 34mins at 196kph, and the last 758kms in 3hr 46mins at 201kph (that is 108.6 knots!!)

Just what is possible in Utopia only time will tell – but on the morning of 10th June I played a golf fourball and the cumulus formed at 10.30hrs!

Oh what a day it was! ◀

MUNICH TO BERLIN IN A STEMME S10 MOTORGLIDER – OR: THE FASTEST RESTART EVER

Extract / by *Marc Arnold*, Nov. 1995

...Night was falling quickly as I circled and circled, waiting for the controllers at Tegel to give me permission to land at Holzdorf. As I waited for them to check the conditions at Holzdorf, I considered my choices. If they did not grant permission to land here, would I honor an instruction to fly on in the dark with low fuel and an impending storm? Or would I go ahead and land on this huge runway anyway? Before I decided, the Tegel answered, "The tower is closed and does not answer the phone. You may land at your own risk." I was overjoyed. I entered the downwind mid-field to avoid the heavier rain east of the field.

Power back to idle... landing gear down... flaps to 16deg... ignition off... retract the propeller... deploy spoilers on base leg. I established a stable final approach at the recommended 62kt approach speed plus 5kts in view of the light rain over the final approach path. Although it was getting dark, sufficient sunlight remained to make the landing. Touching down midway down the huge runway would provide ample room for the landing roll. Everything looked right. All that remained was to flair the graceful ship and land on the S10's sturdy landing gear.

The runway below looked like an long black rectangle reaching to a vanishing point over the horizon. And then, at fifteen feet above the runway, I experienced the greatest shock of my 20+ year flying career. At first I didn't believe what I saw ahead through the dark, rain streaked canopy. Stretching to infinity, were row upon row of steel spikes reaching upward toward the belly of my plane! The spikes were about three feet high and spaced about five feet apart. The grid pattern stretched across the 200 foot width and as far as I could see down the runway. There was no room to land without disastrous results.

I immediately initiated a go-around. Primary Controls: Fly the Plane! Nose Cone: Forward! Starter: Engage! Ignition: On! Throttle: Advance! Gear Selector: Up! Flaps: 5deg! Airspeed: Accelerate to 62kts! I can't be sure of the actual elapsed time, but I'm sure it was faster than the normal 5-second transition from gliding to powered flight.

As I flew down the runway, it dawned on me that the phrase "the tower is closed" really meant the "airport is closed". The airport was under construction! Taxiways were torn up. New concrete would soon cover the reinforcing bar "spikes" embedded in a base layer of blacktop.

Fortunately, construction of the runway's west end was further along than the rest of the runway. Four to five hundred feet of fresh white concrete lay at the end. After a careful flyby to confirm the surface condition, I made a short, but otherwise uneventful landing. ◀

