# Auxiliary-powered Sailplane Association

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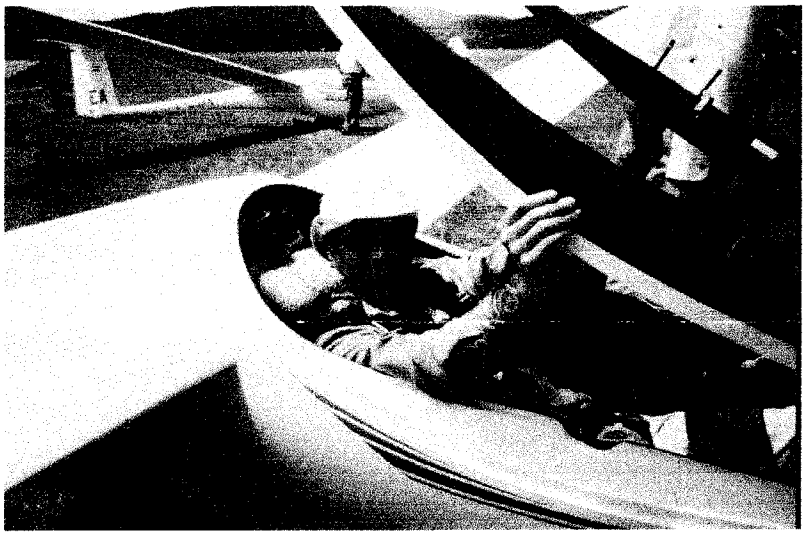
## MOTORGLIDERS FOR ADVANCED X-C AND GLIDER RACING TRAINING

People have been adding propulsion systems to gliders for a long time but about twenty years ago things got serious when the major competition glider manufacturers started adding auxiliary power to their most advanced designs.The impact of this change in the sport of gliding has been great and is ongoing as the percentage of gliders that are aux-powered continues to increase. It's ironic though that the appeal of motorization has been less strong to the ranks of the competitition pilots who normally drive the technical advances in the sport. There is one use of auxiliary power that should appeal to all glider racers and that is for competition flight training.



Right up front, I want to make it clear that this sort of training involves significant risk of land-outs and is emphatically not for the neophyte x-c pilot. This is not to say that an aux-powered glider isn't a good choice for a pilot learning how to glide cross country, my first forty hours in the Alps were done in an Ventus CM and it allowed me to venture a lot further than I would have in a plain glider. But training for glider competitions in an aux-powered machine is serious business which potentially introduces the additional stress of operating the propulsion system at the moment of highest workload in a flight. It is rarely a simple matter to balance engine checklists, a pre-landing checklist, and a low altitude lift search.

This is why all pilots who want to use aux-powered machines for competition training need to go into every flight with the understanding that a land-out is a very real possibilty. There will be times when pilot workload will simply preclude even pulling out the engine checklists, much less looking at them, if you train aggressively. Most training flights will not involve the high workload, low saves that are the stuff that competition legends are made of, but practicing down low is a very important part of competition training. This is one regime where aux-power can be more of a drawback than advantage.

For training in the low, NOE ("Nape of the Earth" mode is what Army helicopter pilots call it.) flight, only in the exceedingly rare instances where fortune places runways suitable for self-launch exactly on our intended course when we finally reach, let's say 500 ft. pattern altitude, could any benefit be derived from training in a aux-powered machine. Going only 1/4 of a mile out of our intended way or giving up as little as a hundred feet to place ourselves on the imaginary airfield only cheapens the training value of the flight, as you'll always be lower, without an extended propulsion system in an aircraft that glides well.

Of course if we happen to find ourselves stuck at a self-launchable field just sustaining at 900-1000 ft. in weak, suppressed thermals,the temptation to use the engine to avoid the practice landing and re-launch will be great. Maybe there is no one down there to run our wing or maybe we've really screwed up and there is no suitable "down there" at all. This is exactly the situation that demands the most caution as the workload is already very high keeping a heavy motorglider up in 1 kt. lift. Throw in pulling out a checklist and cranking up an engine can upset the equation and have a bad result. If you succumb to the temptation once and survive, you probably won't have to worry about this problem anymore.

So I have enumerated the most important ways not to use an aux-powered racing glider for training, now how about a little on the unique things you can do with them. For starters, with a self-launching aux-powered glider you can take off at your convenience from the airfield of your choice. From a training standpoint this is going to be the biggest plus, just as for general gliding it's the main reason you put an engine in the first place. If there are tow planes where you want to train the motorglider still offers flexibility in being able to launch towards lift that would be above or out of gliding range for a plain glider from a standard aerotow or launching earlier than the pilot of an unpowered glider would. Record pilots may be used to flying in these normally infrequented flight regimes, but the average competition pilot may not have much experience with the way things work as the day gets started.

One of the better ways to learn how to glide fast is by

participating in as many soaring competitions as possible, but because of the constraints involved in an organized competition, we need to seek out the conditions we miss by flying the majority of our glider hours in a year at these competitions. The best way to do this is with an aux-powered machine. Sure you don't have to have a motorglider to experiment , but it can make it easier. Motor up to or even above cloudbase early in the day, fly to the other side of your state. Follow an interesting cloud street even if it takes you so late into the day that thermals alone couldn't get you home. These are all things a aux-powered glider makes easy to do.

Another use of aux-powered ships is to push a little further on a typical training flight that one might in a glider with it's higher risk of land-out. For some types of training flights taking the time to make the low save is counter productive to what we are trying to accomplish. If the conditions ahead are the focus of the flight or if flying with other gliders, the time spent making the save could really reduce the training value of the flight. In such situations, a quick powered climb back into the optimum lift band is offered by the aux-powered glider and should be taken. Obviously great care should be taken with this type of use a motorglider because it can easily be turned into a crunch instead of serving a specific training goal.

High-performance aux-powered sailplanes are often purchased by pilots who wish to use them in glider coemptions as well as motorglider races. competition we can expect the motorglider to become a more popular class at the races, many of us will continue to race against gliders. In the final preparation thinning leading up to a glider contest with rules that don't allow or put aux-powered at a disadvantage you must pull the engine out and do it early enough to allow a full tune up to peak glider contest form. Gliding is like any other sport in that proper training involves focusing on reaching a period of peak performance at the time of the most important competitions. Don't let the static looking nature of score sheets at many contests fool you; the Striedick's, Jacob's and Gimmey's of the world train to peak at the glider Nationals and no one can honestly expect to each their level if they are not willing to do a reasonable amount of training in actual race configuration, this includes flight with the engine removed.
Courtesy of Jason Gregg (YB)

## THE DG-800B
## A DIRT BIKE WITH WINGS

After enjoying owning a DG-400 for nine years my first impression during taxi tests of the Mid-West powered DG-800B was the instant throttle response and acceleration of this self-launcher sounds just like a dirt bike in the cockpit. However those on the outside said they

heard only a gentle purring with none of the high pitched propeller sounds normally emitted by the DG-400's exposed air cooled Rotex engine and propeller. Once airborne during climb out, ground listeners said they were hard put to hear the engine at all as the aircraft departed the field. Wilhelm Dirks quest for a quiet powerplant is clearly evident in the 3:1 gear ratio which produces about 2000 prop rpms during takeoff while delivering 50 hp. using a very broad bladed prop with lots of twist.

Contributing to this external quietness is the fact that once the engine is partially submerged, the fuselage walls act as sound barriers and trap a significant amount of noise within the fuselage. To the pilot this noise varies from a pleasant purring sound at 2500 rpms during taxi to a subdued growl at 6000+ engine rpms during takeoff and climb. The superior self-launching authority is there with a takeoff roll at least 25% less than the 400 followed by a leap into the air for the climb. And it all happens about 10 seconds after the throttle is firewalled (1,021 lbs. takeoff weight at 4750 msl, 78 degrees F; paved runway, no wind). Exhilarating to say the least.

There's more. Once the propeller and mast is stowed, the ship has excellent thermalling capability even at steep angles of bank in rough air. In the cruise mode at -5 to -10 flaperon setting, the ship stabilizes on the step between 78-80 kts. If more speed is desired push in -14 negative momentarily and gain 5-10 kts. very quickly. Of course this depends on the lift or sink the ship is passing through, but for all practical purposes, the 800B is about 10 kts. faster than the 400 in cruising flight. Add 50:1 glide ratio at about 58 kts. and you have, in my opinion, an excellent performing 18 meter sailplane.

*Please excuse me if this sounds like an advertisement for DG products, but the fun and excitement is there and waiting for any pilot to experience.*
*Pete Williams*

## 18 METER FAI CLASS

The German Aero Club was successful with it's drive to have 18 Meter Class accepted as an FAI Class. Many pilots have found 18M Class offers them an ideal alternative between large Open class ships and a little more L/D than 15M Class. Already over 1000 gliders exist in 23 countries round the world.

As the majority of 18M gliders produced have motors and trials show combining motorized gliders with pure gliders makes no difference in competition performance; motorized gliders will, for the first time, be integrated with pure gliders in this class. This is a radical but logical step.

Although FAI status does not mean a world championship in 18M Class, it means 18M championships may now be held round the world under the auspices of FAI. If the class grows in popularity round the world as it has in Germany, pilots may then request a world championship status in possibility several years down the road.
Courtesy of The European Gliding News
*Editor's Note: This years United Sates Open Class Championship shall also allow auxiliary-powered sailplanes to compete.*

-fending part will have to be replaced. Most inspectors check this VERY carefully. You may have difficulty getting an annual until problems in this area are resolved. If the main pin sockets in the spars are loose or damaged, repairing them will be expen-ive.

Also, check the attachment fittings for the horizontal stabilizer. These are usually smaller versions of the pin and socket assemblies found on the wings, and should be examined in the same way. Make sure that, when assembled, there isn't any play when fore-and-aft or up -and-down pressure is applied at the tip.

**Controls:**

Check all of the exposed control mechanisms (look at those under the seat pan as well if you can). Make sure they are not loose, are in good repair and that the connection points are not worn.

Hopefully they have been kept lightly lubricated with some kind of greaseless product (I like LPs). This helps to keep them from attracting dust and dirt.

Check for play in the control surfaces in their neutral position and gently moving the control stick. If the stick moves more than 1/16th of an inch, there could be problems (the owner's manual should have exact specifications). If this stuff is loose, I would wonder if someone has had flutter in the controls (and maybe elsewhere).

Check all of the control surfaces carefully. Look for cracking around the hinges and at the actuation points.

Gently tap the surface (especially along the trailing edge), and listen for buzzing sounds which would indicate de-lamination of the fiberglass. This can be another sign of flutter damage. On most fiberglass sailplanes the weight and balance of these surfaces is controlled carefully to prevent flutter.

Check for cracks around the spoiler boxes. These are usually found emanating from the corners of the boxes. This is an area of higher than normal stress, so many sailplanes develop these cracks over time. Since they are unavoidable, make sure they do not look severe as this indicates the structure under the gel coat should be repaired.

**Landing Gear:**

Off field landings can be hard on landing gears. Take a look inside the gear well at the gear mechanism. (Don't forget your flashlight!). Make sure that the tubes look "normal" (straight, un-dented). Carefully check the paint for cracks since they can indicate areas of over stress or bending. Ensure that the gear doors fit snugly when the gear is retracted. Ill fitting doors (slightly open due to interference with the tire) usually indicate something isn't the same as when the sailplane was built.

**Radio/Instruments:**

Make sure the airspeed, altimeter and compass are in good condition. These three instruments are required by the FAR's. If they are not functioning properly (like a dry compass), the sailplane is not airworthy.

Finally, try to determine how the batteries have been cared for. This will help you determine how much life is left in them. Some folks don't properly care for their batteries. So, while they may reach full charge, they die off real fast. Batteries should be stored at room temperature. Gel type batteries should be charged once a month, when stored. NiCads should be discharged to the point where the electronics don't work properly, then re-charged, periodically.

**Trailers:**

This is one of the most neglected glider accessories. In addition to checking the overall state of the trailer take a look at the tires. Usually tires rot from the sun before they wear out. I've had tires with real good tread disintegrate on the road. For this reason I replace them based on age and I like to have a spare. Another good reason to have a spare is that correct size rims can be hard (sometimes impossible) to find.

Find out how the running gear has been cared for. I have the bearings greased and the tires balanced yearly. Out of balance tires can do more damage to your instruments than anything else.

For the best UV protection of your sailplane, the trailer should have a metal top or have some kind of metalized paint applied to the upper surface.

**Parts:**

One important factor to consider is the availability of parts. Some manufacturers are no longer in business. This can make getting parts hard. So if you are planning to fly cross- country you might want to consider a sailplane whose manufacturer is still supplying parts.

**Documentation:**

Make sure there is an airworthiness certificate and note who the registered owner is on the registration. Finally, check the log book to see if the sailplane has a current annual. Also very important check the weight and balance.

Have a safe and fun summer soaring season!!

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If anyone has information about motorizing a Woodstock contact:
John Walking
10601 Bob Gray Road
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615-675-5335

If anyone has information about the Silhouette MG contact:
Michael Shutter
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Vero Beach, Florida 3296o
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# THE NEW STEMME S10-VT

**by Bruce Templeton**

In April I traveled to Strausberg, Germany to see the newest addition to the product line from STEMME. The factory is located in several buildings on an airfield adjacent to the former German headquarters for the Warsaw Pact. Before flying the new S10-VT prototype, I interviewed Dr. Stemme in his office, which is adjacent to the final assembly line.

**Dr. Stemme, please explain the design philosophy behind the new S10-VT.**

We decided to consider the Rotex engine many years ago. The advantage of this engine (the Rotex 914) is that it is a certified flight engine according to the United States Federal Aviation Administration. While the Limbach is a fine engine, it only has a single ignition, unlike the Rotex. The Rotex has 115 hp compared with 93 hp in the Limbach. Because of the turbo charger, the Rotex engine is capable of 100 hp. up to 4,000 meter. This additional power results in a very short take off-less then 200 meters. The climb performance is substantially improved with the new engine. In flight tests, we have been able to obtain climb rates of four meters per second up to 4,000 meters. At 8,000 meters the ship will still climb at two meters per second. Based on this data, we believe that the service ceiling exceeds 10,000 meters.

**Is the new Rotex engine configured for high altitude operation ?**

As I mentioned, this engine has a dual ignition system. It also has water cooled cylinder heads and an oil cooler that is designed for high altitude operation. At high altitude, the density goes down and the cooling efficiency also goes down. This is one of the main reasons we are concerned to take the incoming air as cold as possible after the turbo charger. The water cooler and the oil cooler are both larger than would be normally be necessary for motor glider operations so that the engine can be operated continuously without harm, even at 10,000 meters.

**Will the owners of Limbach powered S10's be able to convert to the new Rotex version?**

In principle yes, but it will be very expensive. While the airframe on the original S10 is the same, everything else, including the fuel system, the electrical system and the cooling system has been newly designed or modified. The S10-VT is really the next generation of the S10.

For example, the S10 with the Limbach engine has a gear box with V-belts at he forward end of the drive shaft. We decided to replace these V-belts with gears on the new version. The gears should increase the time between overhaul from approximately 1,000 hours for the V-belt system to 2,000 hours with the new gear system.

**What is the TBO of the new Rotex engine?**

One thousand hours. That is twice the TBO of the Limbach engine.

**What other changes have you made in developing the S10-VT?**

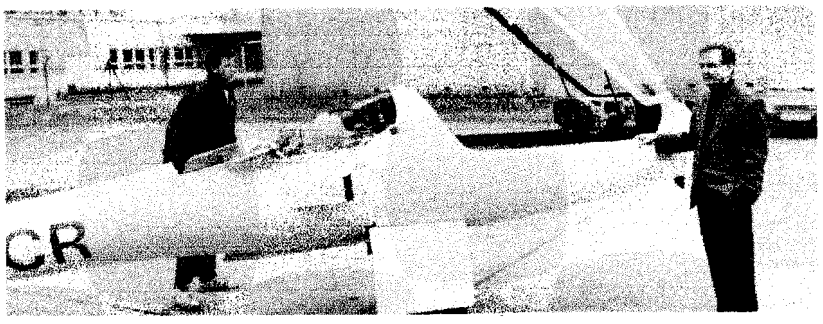
The S10-VT has a new cockpit vent system. Additionally, the Rotex engine has a more powerful heating system which should keep passengers comfortable at high altitude, provided the engine is running.

We have also changed to a new acrylic surface coating. Until now, the S10 has gotten the same coating as is typical for all German gliders. We changed to a new acrylic which is much harder. It doesn't chip. It's also resistant to varying weather conditions. It's more expensive for us for the point of view of production, but we think this is something the customers will really appreciate.

We have also adjusted the intake vents to further streamline the aircraft. The air cooled engine needs more airflow compared to the water cooled engine. With the new vents we obtain an additional advantage in cruise speed, of course. According to our measurements at 3,000 meters we will have a cruising speed of 216 kilometers per hour. Assuming one wishes to cruise cross country, the aircraft will have a range in excess of 1,000 kilometers at that speed.

**Where will U.S. customers obtain service for the S10-VT?**

First of all, most of the parts will come from here. They will call or fax us and we will send them the parts by Federal Express or other express delivery service. This will cover most of the minor adjust-



**DR. REINER STEMME AND S10-VT**

ments and routine servicing items.

If there is a problem which is beyond normal servicing, such as damage to the structure or something like that, we will send our mechanic directly from Germany to the customer. We plan to have our mechanic at least twice a year to offer our customers routine checks, slight repairs or checks, that sort of thing. However, if there is a special need he will come over immediately. Also, I would like to encourage our U.S. customers to work directly with STEMME USA.

**Thank you Dr. Stemme.**

Afterward I took a test flight in the prototype S10-VT with Harmut Winter, STEMME"S chief test pilot and former DDR Air Force pilot. Although the prototype did not have all of the soundproofing material that will go in the production ship, it was still relatively quiet for a motor glider, provided one wore headphones. Although I was unable to measure the take off distance on the grass strip on which we departed, the acceleration and initial climb were both very satisfactory, but probably not very challenging giving the near sea level conditions. I was able to confirm the four meter per second initial climb. However, our test weight was below maximum gross. The prototype had winglets, which the production versions will also have.

One significant improvement that I noticed that the S10-VT has over the earlier S10, is that on the restart there is no need to swing the propeller before turning on the magnetos (a process that I thought required three hands). The new system has a conventional key tied to the magnetos and the starter. This I believe is a significant improvement.

Dr. Stemme told me that he has 14 orders for the new S10-VT, all of which he hopes to deliver this year. From what I have seen, this aircraft is a significant advance over the previous model.

## SO YOU WANT TO BUY A FIBERGLASS SAILPLANE?

*Editor's Note: Following are excerpts of a fine article written by Aland Adams for the Soaring Society of America Magazine back in 1991. It contains information at that makes you think and hopefully will make you more safety conscious.*

Following are several items that I pay attention to when checking out a fiberglass sailplane prior to purchase.

**Finish:**

Check the finish carefully for fine cracks. These will be most noticeable along the the wing leading edge, and the top and bottom of the fuselage. This is where the fiberglass shells are joined. Extra filler is used to maintain the contour in these areas.

The gel coat most susceptible to cracking, Vorgelat, is used on many German sailplanes. Grob's and DG's have Schwabalac, which is less susceptible to cracking. Some sailplanes in the United States have been re-finished with Prestec, which stands up well. PIK's are unusual as they do not have gel coat. They were built with high temperature curing resins. After curing they were assembled, shaped, sanded and painted! This provided PIK with a long lasting finish.

Sometimes while examining the finish, you may notice broad lumps and bumps. You may see these, or they can be found by lightly rubbing your fingertips along the skin surface. (Cordwise on wings). These bumps may be most noticeable along the spars, especially on older sailplanes. They are usually a result of the sailplane manufacturer using room temperature curing epoxy. While manufacturers may speed up the cure process by elevating the temperature, these epoxies continue to cure with time and can (and typically do) change shape.

Again, Pike's are an exception since they were nearly fully cured when removed from the ovens. The resulting deformations shouldn't pose a structural problem, but can degrade performance, especially if they are along the leading edges or spar. Performance can be improved with careful re-profiling, but again, this is a labor intensive process (real expensive).

Try to determine how the finish has been cared for. For good longevity fiberglass sailplanes should be waxed at least once a year. Finally, find out how the glider has been stored when flown and how it has been stored when not flown. Hopefully, exposure to moisture has been minimal when not flown, and it has been kept in a hanger or trailer. While moisture is the major factor in gel coat damage, UV light and extreme cold temperatures are harmful as well.

**Wing Root Fittings:**

Check for fore-and-aft motion of the wings when the sailplane is assembled. There should be NO noticeable play. To check this, have someone apply about 20 pounds of pressure, fore and aft, on the wing tip while you watch for motion at the root.

Looseness indicates that the wing root pins and sockets are not where they were when the sailplane was built. This can be caused by people moving the sailplane by pulling on the wing tips (something you promise NEVER to do when you buy a glass ship).

Sometimes shimming can cure this, but many times the wing pins and sockets must be removed, the glass around them rebuilt and the pins and sockets put back in.

**Main Fittings:**

Check the main pin(s), their sockets and other wing fittings. The bearing surfaces are usually unplatted and need to be kept greased to keep them from rusting. Rust, or any other kind of marring, is a problem. Sometimes, these problems can be polished out (with emery cloth). If it's bad, like deep rust or a deep scratch, the of-