APS NEWS

The official Publication of the Auxiliary-powered Sailplane Association, Inc.

Volume XIX Issue #122 **ASA Web Site: <www.motorglider.org>** **Nov-Dec 2008**

DG-1000T in flight

Eric Greenwell leaves contrails over Parowan

In this Issue:

Safety Column - Taxi that Beast

Tech Talk - Winterization

Pete Williams - Self-Launch! DVD Available

A Vroom with a View

Don't forget to signup for Parowan 2009 forms at www.motorgliding.org

NEWS FLASH

Hot off of the Digital Presses

Self- Launch Retractable Engine Sailplanes

Pete Williams definitive book on SMG's

is now available on DVD with bonus features

President’s Corner

Pat and I are on our Christmas trip to New York and New England. This message comes from the ferry, Grand Republic, crossing from Port Jefferson to Bridgeport. There are 30 knot winds and 5 foot seas. **I’d rather be soaring !**

The ASA board has been busy over the holidays with planning for Parowan 2009. The dates are 15-25 June 2009. Download the application from www.motorglider.com and send it along with $150 deposit to Eric Greenwell. All of the details are on the website. Send your entry form and deposit on or after 15 January 2009. Postmark date will determine your placement on our list of participants.

There is a cancellation policy in place this year. The main purpose of the policy is to give us time to notify wait listed pilots of an opening. Last year some notices were sent during the week before the fly-in. This year we hope to be able to give more notice.

HAPPY NEW YEAR

Rick Howell

EDITOR NEEDS HELP

Thanks to the folks at Pipistrel, Terry Edmonds, Rick Howell and Brian Utley for contributing to this issue. For the rest of the readers I could really use your help with articles and photos. There’s lots of flying being done and a lot of us have digital cameras so it is easy to submit photos. I am always looking for content so please contribute to the newsletter.

SAFETY COLUMN

Oliver Dyer-Bennet, CFI/CFIG
Safety Director ASA

Devoted to the enjoyment and safety of the sport of high performance powered sailplanes and motorgliders.

In the last three safety columns we have talked about pre-flght, take offs and landings.

In today's column we will discuss taxing the motorgliders from the assembly / tiedown / hanger areas out to the runway and safely back to the gliders home.

Be it a DG-800 / ASH26E / Carat or Stemme, the first thing that you notice are the long wings.

Whether you taxi out with one wing down or with the wings level there is a lot of wing out there that can grab things, or be affected by errant winds.

Most airports are designed and layed out with power planes in mind. Shorter wings and higher wings are the norm for power planes.

This means that the tie down spaces between aircraft are closer. Also the space between the rows of tied down aircraft is tighter than we might like, for our longed winged "birds".

When we take our longed wing motorgliders into this environment we have to plan ahead and be extra vigilant. If we are not sure that we can taxi, or tow our birds between two lines of tied down aircraft, it is best to stop and reassess the situation.

If there is a mid span taxi line between the two lines of tied down aircraft it might be best to walk the distance between the center taxi line to the aircraft on each side.

Counting the strides will work, as each stride is about three feet in distance. Knowing the span of your glider, in feet, will give you a pretty good idea as to the advisability of taxing or towing out in that direction.

Wing walkers are a good idea the first time that you move the glider through a long line of aircraft. After you do it the first time you will know if that route is a good way to the runway.

Turns while taxing out can be a huge issue if your glider does not have a good means of turning while taxing. If your glider does not turn well, there will need to be a good plan to deal with this.

Also keep an eagle eye out for taxi and runway signs, as well as taxi and runway lights. They can be higher and closer than first appears.

If you are towing out the glider while using a tow rope, remember to use a rope of adequate length. We have all heard the story of the high performance motorglider that was being towed out to the runway with a ten foot rope. About halfway to the runway the pilot who was walking the wing tip, barked an order to the crew member driving the van. The crewmember could not hear the pilots order and promptly

FROM THE DESERT BETA TEST FACILITY

TECH TALK

by Gary Evans

SEASONAL MAINTENANCE

With the holidays behind us we all need something to think about beside April 15 and this is my contribution.

We all follow, I hope, the manufactures recommended maintenance schedule which should be considered the minimum requirement. Some of the replacement parts and consumables however are inexpensive enough to warrant more frequent attention. Some things also require extra care and steps can be taken beyond factory recommendations.
A few examples would be –

SPARK PLUGS

I use what I consider to be the best spark plugs available, which are Iridium, but they are still replaced way before the maintenance manual requirement. Every time a plug is changed you always apply a slight amount of anti-seize to the threads right? If you don't you will begin that practice the first time you try to remove a plug from an aluminum head and find that it has galled and is taking the threads out with it. With the aluminum cylinder heads you never want to over torque the plugs so if your not real confident use a torque wrench. With aluminum heads another no-no is putting a cold plug into a hot head because when the plug heats up it is going to tighten.

COOLANT

Straight water provides the best heat transfer but regardless where you live you should be using a mixture of water and antifreeze. The antifreeze raises the boiling point of the mixture and provides corrosion protection both of which are important. I fly in a very high summer temperature and for that reason have reduced the antifreeze percentage down to 25% plus add a product called Water Wetter which improves the heat transfer between coolant and the metal surfaces. These two changes lowered the cylinder head temperature considerably. Water Wetter is available in most auto parts stores.

Because the anti-freeze corrosion additives degrade over time I would error on the short end for replacing coolant and it would be a good idea to also replace the radiator cap at the same time with one which is rated for the OEM pressure.

BUNGEE CORD

You find bungee cord all over the place at least on DG motorgliders. Bungee cord like wire rope degrades from the inside out so while it may look great on the surface it may have degraded on the inside. It's cheap to replace so why wait until it breaks? On the DG 800 series there is a long section hidden in the tail that keeps the motor stop wire cable tight when the engine is retracted. Mice love to climb in through the tail wheel area and munch on the cord during winter. This is not something you want to try replacing on the ramp at Parowan and the mice also appreciate fresh cord each year.

LUBRICATION OF FITTINGS

Does your manual call for lubing all fittings annually? Have you done that? Do you even know where all of the fittings are located? While it may not be critical to hit ever fitting every year you sure don't want to wait until a joint starts stiffening up. Some of the fittings are difficult to reach and require disassembly

but establish a reasonable time limit and stick to it.

SAFETY TAPES AND SEALS

I'm not sure which of these degrade faster but for me it was the safety tape. If operated in high temperatures like we have here in the Desert Beta Test Facility the safety tapes service life is relatively short. It might still look good on visual inspection but may almost fall off when tested. The only way to know is to pick up a corner and see how much adhesion remains. If you find one bad section it all should be replaced. Seal replacement is more a matter of maintaining performance but safety tapes are in fact a safety item. If the tape starts coming off in flight it can negatively affect the airfoil. If you have someone else replace tapes or seals I suggest discussing exactly what their procedure will be as your due diligence.

I make this point because I have seen a pretty poor job done on one glider where new tape was already loose in less than a year. I would only use factory OEM tapes and seals made for the specific application. My procedure for replacing safety tape is to first outline the existing tape with masking tape. Then the old tape is pulled off and the adhesive residue completely removed with solvent. Next I lightly scuff the gel coat with a fine scotch pad (reason for the masking tape now becomes clear) followed by another cleaning with solvent. After the new tape is applied it should be rolled to ensure 100% contact. This should not be done in a cold temperature as the adhesive works best at room temperature or above. I'm not going to get into seal replacement since that job should be left to your aircraft mechanic.

FUEL

If fuel was stored in the tank over the winter it should be dumped in the spring if not before especially if your using auto gas, which will degrade during storage.

Fuel left in the carburetor can get gummy over time and plug up jets for next season. For this reason draining the carburetor before storage is a good idea and you don't want to allow any fuel to enter the carb during storage which would constantly evaporate leaving residue. The first jet to be plugged will be the smallest which is normally the idle fuel supply. Y ou could add a fuel stabilizer to help prevent gumming but it is just as easy to drain the fuel from the tank and carburetor before storage.

BATTERIES

The sealed batteries available from local sources or on-line are cheap enough to replace as preventive maintenance. I have never gone more than 2 seasons max on a set and they get pitched at the first sign of deterioration. During storage the best solution for my money is to leave the batteries connected to an automatic charger like the "Battery Tender" brand. At the end of the charge cycle they automatically switch into a safe float mode so there is nothing to monitor during storage.

Safety Column Cont.....

stepped on the vans brakes to hear the order more clearly.

The air was soon rent by a thud from the back of the van and loud and verbose noises emanating from the agitated pilot at the wing tip of the glider.

Another thing are errant winds while taxing. If you taxi out with one wing down and a windblast picks up that wing the opposite wing may be forced to the ground with unintended results and a loss of control of the direction of the glider.

A good cure for this is to keep the speeds down while taxing out. To keep the upwind aileron up when taxing out. And to keep the steering tire weighted by pointing the control stick at the steering nose wheel, or tail wheel of the motorglider.

In general slower is better when taxing out to the runway, or back to the tie down spot, before and after a fine day of flying your bird.

This is a photo of a Zaon PCAS (Portable collision Avoidance System) in my DG-800B. My glider has the solar panels mounted on top of the instrument pod so I had to overhang the PCAS. I flew all last season with this unit and can highly recommend it. Flying with an instrument like this makes you aware there is a lot more traffic close by than you noticed without it.
Terry Edmonds

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Auxiliary-powered Sailplane Association

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Self-Launch!

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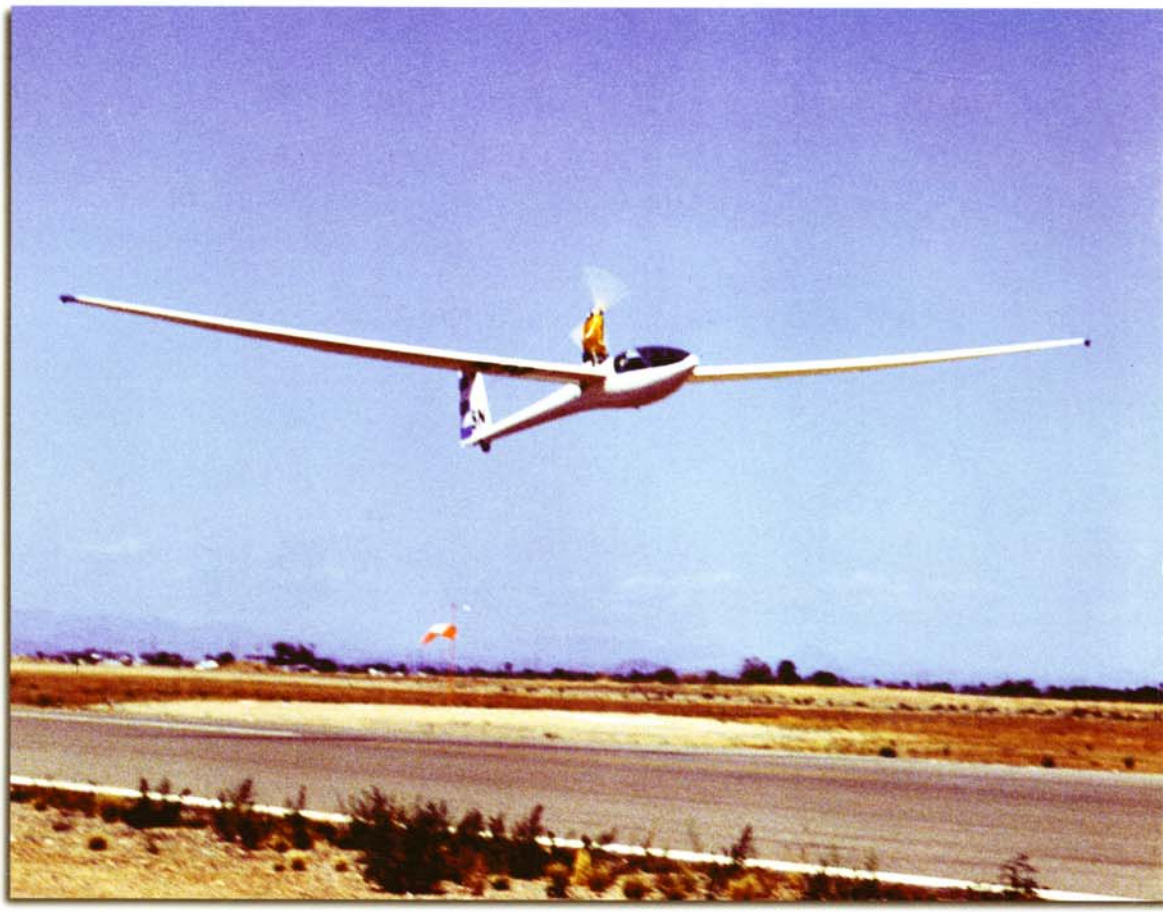

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Foreword by Donald D. Engen, Current Director,
Smithsonian Institution National Air and Space Museum

Peter A. Williams

ASA with permission of Charm Williams is re-publishing Pete Williams definitive book on Self Launch Motor Gliders.

This DVD has the complete book, cover to cover, as well as an added bonus of every ASA newsletter ever printed through the fall of 2007.

You can get your copy for only $14.95 + $4.05 in postage/handling by sending a check to:

ASA - Pete Williams DVD
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Also available from Cumulus Soaring.

2009 Rules for the Stevenson Trophy

The objective of this trophy is to recognize the highest level of soaring performance by a motor glider at the annual ASA flying camp.

The following rules follow the 2008 rules except for the use of the cylinder for triangle flights. Suggestions for changes will be considered up to the publication of the next newsletter.
General Rules:

OLC handicap standards apply.
OLC distance measurements will be used where practical as outlined below.
The flights used to establish flying performance are designed to stress a variety of challenges in planning, decision making and flying performance.
A pre-flight declaration is not required.

Tasks defined:

The best of each of the following tasks will be scored to establish the winner:

1. An out and return flight
2. A triangular flight according to FAI triangle rules
3. A classic OLC flight

Scoring:

Flights will be scored daily for interim results.
The maximum number of points for each daily task is 1,000.
Points will be awarded as a percentage of the winners points based upon relative performance.
The maximum number of points that can be achieved over the contest is 3,000.
Handicap factors shall be applied to the distance achieved before scoring.
Multiple attempts at each task are permitted but only one flight in each task category will be included in the final score.
Interim scores may be superseded by later flights
Points will be calculated at the end of the contest based upon the cumulative results of daily flying.
The scorer will interpret each days flight by inspection against the task definitions. The pilot may request a revision at the pilots meeting when the interim score sheets are distributed.
After the meeting there will be no further revision to tasks already flown.

Tasks:

Out and Return:

The start and finish gate will be a 5 mi cylinder wall centered on the published coordinates for the Parowan airport. The cylinder is capped at 12,000'.
The distance will be adjusted according to the OLC handicap for the sailplane used.
Points will be awarded for distance and speed. The maximum points for distance will be 600 and the maximum points for speed will be 400. Distance and speed will be scored separately.

FAI Triangle:

The start and finish gate will be a 5 mi cylinder wall centered on the published coordinates for the Parowan airport. The cylinder is capped at 12,000'.
The OLC triangle measurement adjusted for the start/finish cylinder shall be used for distance and speed.
The distance will be adjusted according to the OLC handicap for the sailplane used.
The shortest leg of the triangle must be at least 28% of the total distance.
Points will be awarded for distance and speed. The maximum points for distance will be 600 and the maximum points for speed will be 400.

Classic OLC:

The OLC distance calculated shall be used for scoring.
The distance will be adjusted according to the OLC handicap for the sailplane used.
Points will be awarded for distance only.

A Vroom with a View

The Pipistrel Taurus Electro

information courtesy of Pipistel

In 1995, Pipistrel d.o.o. Ajdovšina were the first in the World to present a two-seat ultralight aircraft with a wing-span of 15 meters, aimed also at glider pilots. The aircraft was the Sinus, still going strong in production. The idea for this aircraft grew from the fact there was a large number of glider pilots, who wished for cheaper and independent flying without being stuck to aero-towing.

However, this very idea of producing a microlight aircraft with a ‘glider soul’ seemed rather bold and everything else but promising. The general opinion amongst the pilots back than was that the glider pilots will not decide to fly an aircraft of inferior category, and that the pilots of existing ultralight were believed
not to be capable of piloting a high-performance aircraft that would resemble a glider a great deal. Not even the legislation on this field had been determined then... But as it turned out, the owner of Pipistrel and co-constructor of Sinus, Ivo Boscarol was correct.

One has to know the development of an aircraft is a huge project which requires experts from all branches. To develop a never-seen-before concept of an aircraft was even a great challenge. With the Sinus, the team aimed at the following:

- to present a two-seat composite-built aircraft with 15 meters of wingspan, which requires 100 meters of runway to take-off and reaches 200 km/h in horizontal flight, all on a 50 HP engine;
- the aircraft must be completely safe – intended for gliding it is constructed according to EASA CS-22 rules (classic gliders), although it fits into the microlight category;
- the aircraft must have a comfortable cockpit with seats in side-by-side configuration, since microlight pilots rarely fly alone;
- the aircraft must provide a low stall speed and at the same time be a high speed cruiser – this enables the pilots to go gliding over terrains away from their home base without the need of road transport;

- the L/D ratio of the aircraft must be close to 1:30, which makes it a decent glider and provides extra safety in case of engine failure, since the engines for microlights are not certified;
- the aircraft must present Short Take-off and Landing (STOL) characteristicts. Thus the aircraft is to be equipped with airbrakes, which enable the pilot do descent rapidly and use a high angle of approach onto typical ultralight airfields - short runways with plenty of obstacles below the approach path;
- the aircraft must fully comply with all criteria of a microlight – the reason for this is inexpensive maintenance and the fact also pilots, who cannot be issued an aviation medical certificate any more can fly the aircraft. Many countries issue a microlight license on basis of only a driver’s license. This
however meant that the empty weight of the whole aircraft must not exceed 285 kgs!
- Special attention must be given to ensuring the fuel consumption stays at the lowest possible level to preserve the environment.

The small Pipistrel team eventually managed to combine all desired features into an aircraft that first seemed impossible. They were able to do it by developing an own airfoil and wing shape as well as an own propeller with feathering capability, all drastically decreasing the drag and providing for a satisfactory glide ratio.

As the Sinus flew for the first time she was a subject of all aviation magazines around the World and despite being doubtful in the published performance figures the glider pilots began placing orders. They were willing to trade the imperfect glide ratio for the low cost of flying, freedom and independence from glider tow.

Sinus became an instant hit Worldwide, she took the World Champion 2001 title, triggered a wave of imitators and set new foundations for a new category within the definition of microlights. She flies on all the Continents of the world and is used by flight schools, national aviation associations and even militaries for training of their pilots.

After such a success it was quite realistic to expect there is also a market niche for a real microlight two-seat glider, as well as it’s version with an auxiliary, fully retractable engine. Hard-core glider pilots were not convinced by the glide ratio of 1:30 that Sinus has to offer. The ‘real’ quality gliding goes together with glide ratios of 1:40 and more.

This time, the main idea of construction was completely different from the one with Sinus, but the aims remained sky-high. The world’s first side-by-side microlight motorglider, later named Taurus was to:

- offer the pilots a REAL glider or it’s self-launchable version with an auxiliary, yet fully retractable engine and glide ratio of at least 1:40;
- make gliding cheap;
- provide a fully equipped aircraft, including a total rescue ballistic parachute system which saves the aircraft and both pilots, all instruments, radio etc. at a reasonable price;
- provide the owner with complete freedom and independence – even the helper holding the wing tip during take-off is now not needed any more by providing two main wheels in parallel configuration;
- have the most comfortable cockpit on the market with a separate ventilation system for each pilot and side-by-side seating arrangement;
- be pilot-friendly oriented without simple & straight-forward systems handling.

The fuselage of Taurus uses a special lifting body shape concept and features enough room for an auxiliary, yet fully retractable engine and an incredibly spacious cockpit. It was not easy to decide how to shape the pilots workspace, but in the end the fact that World’s population is growing in all measures prevailed. The pilots in the Taurus are placed side-by-side for comfort and ease of communication.

Taurus is also intended for training, therefore all control levers must be within reach of both pilots. Both pilots have individual control sticks and rudder pedals. The landing gear operation lever, flaps, airbrakes, tow rope release and trim levers are there for common use to both pilots and therefore found in the middle, between both seats. For added comfort pilots enjoy adjustable headrests, in-flight adjustable rudder pedals, separate vent window and nozzle for each pilot and along with a central ventilation system for efficient de-fogging of glass surfaces.

The version of Taurus with an auxiliary retractable engine comes with a ROTAX 503 which is modified and redesigned by Pipistrel. The engine is twin carbureted engine and drives a Pipistrel’s own developed propeller. This power configuration provides the aircraft with short-field takeoff and very decent climb performance.

The system for extending and retracting the engine and propeller is fully automated. The pilot takes advantage of a dedicated interface on the instrument column and all he/she has to do is to flick the switch to ‘engine IN’ or ‘engine OUT’ position – everything else is done completely automatically. When retracting, the propeller is first positioned vertically, the engine then gets retracted and the engine bay covers close. To restart the engine on ground or in-flight the pilot selects the ‘engine OUT’ option and the engine extends and is ready for start-up in only 12 seconds. The entire engine retraction system is incredibly light and reliable, all switches and sensor used to monitor the operations are electromagnetic induction type and as such not sensitive to vibration, mechanical damage and/or dirt. This system has also been developed in-house by the Pipistrel team.

The same goes for the undercarriage retracting system, which is fully mechanic but needs very light force on the cockpit lever during operation. There are two main wheels in parallel configuration which ensure for comfortable taxiing despite the fact they are not suspended. The tail wheel is not retractable but fully stearable instead, which makes taxiing a walk in the park. The airbrakes, flaps and the elevator trim are all mechanical pushrod type. Upon customers wishes a tow-rope release mechanism can be fitted as well.

The next interesting step in further-development of the Taurus is definitely the substitution of the internal combustion engine with its electric counterpart. Several teams and research laboratories around the World have been researching the possibility of producing and electric-powered aircraft. Using the latest findings in the fields of batteries and charge storage as well as the recent developments of synchronous electric motors with small mass and high specific torque, the flight of electric-powered aircraft can now become a reality.

However, to achieve electric powered flight, and doing this for a two person crew for the first time ever, there are quite a few hurdles to overcome. To name just a few:

- the specific weight of the batteries is still high and the number of charge cycles (life span) relatively low (measured in thousands of cycles)

- specific capacity of the batteries could be higher
- low efficiency of the existing solar cells and their current price
- aviation legislation, which is very slow to follow the advancements in this field
- customers being skeptic to the new type of propulsion.

The electric-motor propulsion has been tested successfully on four light aircraft until the Taurus Electro – as an auxiliary engine on self launching gliders Apis, Antares and Silent and on the MCR light aircraft where a full-cell based propulsion was used. Mentions of Sonax using an Electric engine as a means of propulsions also exist, but no proof of flying has yet been published. Recently a French-made single seat Electra also flew under electric power.

Because of all of the above the direct substitution of the classic aircraft engine with internal combustion on powered aircraft is not yet possible. The most plausible application of electric-motor propulsion however points to the powered-gliders. Pipistrel’s Taurus is a two-seat glider with higher approved take-off mass than the single seat gliders where the electric-motor propulsion has been tested so far. Therefore the Taurus requires a more powerful electric motor.

The motives to develop an electric-powered Taurus self-launching glider were the following:

- to offer the customers with a new, high-tech and innovative aircraft propulsion
- to reduce the pollution to the atmosphere
- to reduce noise when flying under engine power
- to reduce the cost of flying because of ever higher oil prices
- to become the first truly useful two-seat electric powered self-launching glider (aircraft).

The requirements upon designing the Taurus ELECTRO were mainly to:

- develop a system, that will enable the aircraft to climb to altitudes in excess of 2000 meters on a single battery charge
- keep the current market price of the aircraft
- keep the current take-off distance
- keep the empty weight of the aircraft within the values of the internal combustion engine powered Taurus 503 with fuel
- keep the current climb profile of the aircraft

Because of the fact that all current systems/aircraft only managed to succeed in the first of the above points they are not interesting on the market and even less as subject of serial production. They remain on the level of expensive piloting projects.

Pipistrel is aware that the development reaches its goal only when the customers’ orders confirm the idea as the correct one. Market research has undoubtfully shown a vast sales potential for this kind of aircraft, but only if all the mentioned conditions were met entirely.

We have therefore decided to focus on the development and strive to meet the other four requirements.

The task is of course unbelievably difficult as we are the first to attempt anything like this. We are fully aware that only (almost) unrealistic goals lead the way in a course of development.

To be able to make our vision a reality we need to:
- modify the existing Taurus aircraft for the application of the electric-based propulsion
- modify the existing system for extension / retraction of the engine
- develop a cheaper system to control the charge and discharging phase of the batteries
- develop a purpose-built propeller to maximize the efficiency at given constant torque
- organize an innovative way of serial production to reduce production costs
- use high-performance Lithium-polymer batteries with specific capacity touching 200Wh/Kg
- develop and use of a very light highly efficient electric motor with high specific torque
- develop a system to recuperate (charge) the batteries in flight

And to this end we had the maiden flight of the Taurus Electron on December 21, 2007.

Helmets optional!

ASA Mission

The Auxiliary-powered Sailplane Association, Inc. was founded in 1988 as a non-profit organization to encourage the design, development and safe use of motorgliders, self-launching and sustainer engine sailplanes.

ASA Membership

Membership in ASA is open to anyone interested in powered sailplanes. Write or call: Brian Utley, ASA Membership Chairman, 9541 Virginia Ave. South Bloomington, MN 55438
Ph: 952-941-5683 email:<Utleyb@aol.com> USA Dues $20/yr, $38/2 yrs, $55/3 yrs. International Dues $25/yr, $48/2 yrs, $70/3 yrs.

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