APS *NEWS*

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

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How to get a motorglider the Hard Way!
FREE - Get yours now - ASA Decals!!!
Membership Roster

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

The NTSB has issued recommendations to the SSA and the FAA as a result of the August 28, 2006 midair collision near Minden, NV. For full text go to: http://www.ntsb.gov/Recs/letters/2008/A08_14_15.pdf

The ASA agrees with the NTSB's recommendation to the SSA for the voluntary use of transponders. As required by FAR 91.215(c), any glider equipped with a transponder must operate with the transponder turned on. We also recommend familiarization with local ATC traffic flow before flying at a new site.

Please go to the PASCO website, safety section, to view a very good example of airspace briefing and procedures. Every club and soaring site can use this example to create better procedures at your home soaring sites. PASCO website: http://www.pacificsoaring.org

That said, are transponders ***required*** in all gliders? The FAA will decide to accept or not to accept the NTSB's recommendation to remove the exception that we now have. We should be ready to reply to that decision when made.

On a lighter note: Spring is here……at least it has arrived in TEXAS.

Make your "First Flight" with an instructor this year when the snow melts !

Great Soaring !!

Rick Howell

Name that Farm - Get a FREE Pete Williams Self-Launch! DVD
Send an email to asa_editor@mindspring.com with the owner's name of the farm near the triangular pond.
First correct entry wins.

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 todays column we will look at the check list for takeoff. Every manufacturer has his own published check list for takeoff.

Using a typical flight manual for the Carat motorglider, we have the following points. In addition we have added comments and additional points.

Check list; Take-off

1. Sufficient fuel?
   It's a good idea to not only check the fuel gauge, but to also visually check the level of the fuel, if possible.

2. Fuel cock open?
   The general procedure is to not turn off the fuel cock, unless there is an emergency, or the pilot detects leaking fuel.

3. Engine oil temperature, (Carat), min 50 degree C, (122f).
   This would be in the case of a 4-cycle engine, such as the Carat.
   A 2-cycle engine, such as the DG-808B engine, has the oil mixed with the fuel and can go to full power more quickly. Always follow the \owners manual as regards to initial full power.

4. Battery voltage lamp off?
   This shows that the electrical charging system is working correctly.
   If it stays on there may be a faulty generator or regulator.

5. Take-off rpm, in the case of the Carat, min 2,400 rpm?
   Some self launchers, at higher density altitudes may not be able to reach the min take-off rpm's. In this case it's up to the PIC, pilot in command, to make a decision if it's a density altitude issue , or a mechanical issue.

6. RPM drop between dual ignitions?
   Each manufacture has a maximum allowable drop betwen the "left right", ignition system's. In the case of a DG-400M its 300 rpm's @ 3,000 rpm's. In the case of a Carat its 150 rpms @ 1,800 rpm,s.
   Follow the your owners manual as to maximum allowed rpm drop.

7. Altimeter set to field elevation?
   In a low altitude emergency, the altitude above the ground needs to be quickly, and correctly determined. The pilot options may be based on his altitude above the ground.

8. Correct frequency set on radio?
   This is especially mportant with the self-launchers, and motorlgliders, that operate out of a control tower, or pilot advisory airport.

9. Electrical fuel pump on?
   If the mechanical fuel pump fails, the pilot needs the electrical fuel pump on to keep the aircraft engine running. This would be especially important just after takeoff.

Each manufacturer has the data in the Flight Manual for each of our self-launchers or motorgliders. For safety, Its up to us to follow these guide lines.

Oliver Dyer-Bennet

FROM THE DESERT BETA TEST FACILITY

TECH TALK

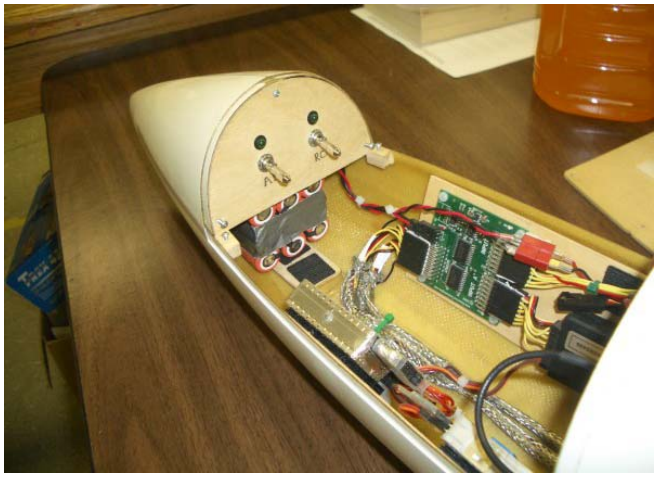
by Gary Evans

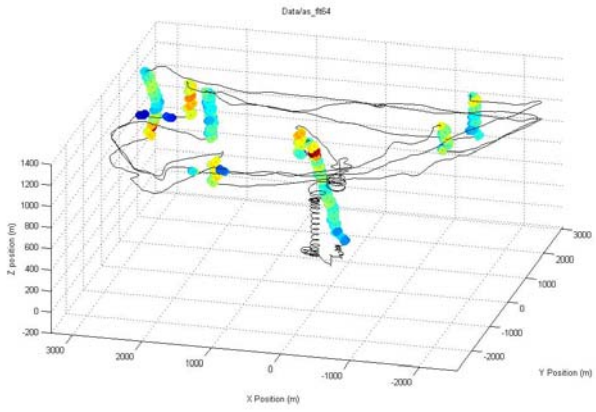
AUTONOMOUS SOARING

The purest among us need to brace them selves for the next technology wave that removes the pilot from the equation. vA model sailplane has flown a world's record of 29.4 miles by thermaling without human intervention and the next goal is 147 miles. The builder/designer was Dan Edwards, a grad student at North Carolina State University. This was accomplished by using an off the shelf relatively inexpensive autopilot system and two additional algorithms containing rules from "Centering Rules of Reichmann" and "McCready's Speed to Fly Theory". This is the link to details of the flight and autopilot.

http://tinyurl.com/4yb2zc

It will soon be possible for you to enter the waypoints you want the glider to fly and then have it towed up and released by the tug pilot. While the autopilot flies the task you will be free to eat lunch or hang around the airport and tell flying stories of how it used to be back when you had to fly the glider yourself. It is also easy to install a camera so you can watch the view from the vacant pilot seat with your buddies in the office. If you don't need the airport camaraderie you could just E-mail the coordinates to the flight line and let them send the glider off while you relax in a recliner and watch it on your wide screen plasma.





Bad batteries, then more bad batteries

Bad batteries...

My ASH 26 E uses two 12 volt, 18 amphour batteries. When I tested each battery for amphour capacity, I was stunned to find one had only 7 amphours and the other only 14. At at only year since installation, both should have had most of the orginal 18 amphours.

Granted, I had not measured the capacity the year before when I installed these Powersonic brand batteries, but I could not imagine two new batteries could be bad. I went looking for problems.

The date codes showed they were only four months old when installed, so age did not seem to be a likely cause.

Because I used a solar panel and regulator almost exclusively for charging the batteries, I looked at the regulator specifications very closely. I was surprised to discover it was a constan voltage output regulator with no "float" stage once the battery was fully charged. So, it's output voltage was 14.1 volts whenever there was sunlight.

According to Powersonic, the charge voltage should be 14.4 to 14.8 volts for charging, and 13.5 to 13.8 volts after charging (the float voltage). This regulator was not using a high enough voltage to fully charge the battery and remove the sulphation that ocurrs with normal use, and it was keeping the voltage too high after charging, leading to premature aging. By contrast, my previous three sets of batteries were all charged with a good two stage AC powered charger, and would still have about 15 amphours after three years.

Even though unit is a good quality regulator (Morningstar Sunsaver 6 charge controller), it is not suited to the batteries we use in our gliders, or the intermittent usage they receive. I replaced it with a Stecca Solsum 5c controller, which uses voltage settings (14.4 volts charge and 13.7 volts float) in the range required by Powersonic. I've monitored it's operation over several weeks now, and it seems to supply the correct, temperature adjusted voltages to the glider battery.

More bad batteries...

I ordered new batteries to replace the two damaged ones. Before installing them, I tested their capacity: 10 amphours and 16 amphours! How could this be? These were supposed to be 21 amhpour units.

The date code showed they were already 19 months old, indicating they were damaged by being stored for so long without any charging. Fortunately, the vendor (Allied Electronics) agreed with me, apologized for sending outdated units, promised to remove all the remaining outdated batteries from their stock, told me I didn't need to return the bad batteries, and had Powersonic send me fresh replacements directly. No additional charges, either.

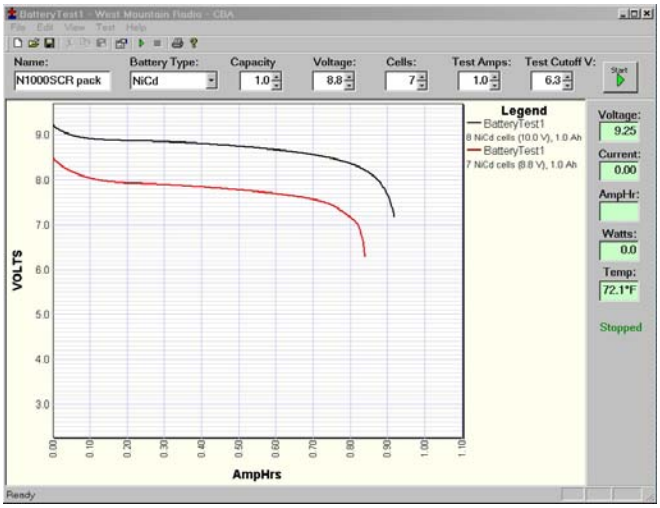
Yes, I tested the latest set! They weren't 21 amphours, but close enough, and only two months old by the date code. I'll test them in a few months to see how they are holding up.

Testing batteries...

All this testing would have made me nuts, doing it the usual way: putting a resistance load on the battery, timing the discharge, measuring the current every hour or so, then calculating the amphours. Happily, this time I had my Computerized Battery Analyzer (CBA) to do the testing for me. Basically, it's a box about three inches on a side, with two wires that connect to the battery being tested, and a USB cable that attaches to your computer. A program lets you set the discharge current and end voltage.

by Eric Greenwell

During a test, the program plots the voltage versus the amphours, then stops the test when the voltage drops to the selected end point. You can save the plot, print it, overlay tests, and be quite geeky, and for only $110!



You can check out the CBA at http://www.westmountainradio.com/CBA.htm

I figure I got my money's worth testing the six batteries on my way to getting good ones installed in the glider, especially since good batteries are so important to a motorglider. Most pilots will only need to test a couple batteries a year. For that, the manual method is fine, or better, share a CBA with some other pilots, or talk your club into getting one. Since it's so easy to use, you are more likely to actually check your batteries and avoid problems with bad ones, or good ones on their way to becoming bad ones.

It can also be used testing many types and sizes of batteries, including lithium and NmH, as is intended for radio control model airplane and car people.

From the Membership Chairman

I have been taking a look at some of our demographics and would like to share them with you. The ASA currently has 382 members including business members. These members reside in 15 countries although the USA has by far the largest population. So far this year 25 pilots have signed up for membership, 15 of them at the SSA convention in Albuquerque. Our roster lists 57 qualified motor glider rated instructors. The US membership is found in 48 of the 50 states and Washington DC. North Dakota and Rhode Island are the only states with no ASA members. The most heavily populated states are:

1. California 62
2. Texas 30
3. Washington 23
4. Colorado 20
5. Florida 20
6. Nevada 13
7. New York 12
8. New Mexico 11
9. Oregon 10

Our membership has listed a total of 205 owned sailplanes, they are listed here by manufacturer:

Manufacturer	Model	Qty
Aeromot	Ximango 100, 200	7
Aerotechnik	Vivat L13 SE	1
Alisport	Silent-2	2
AMS	Carat	7
Apis	Apis M	3
DG	DG-300, 301	2
	DG-400	17
	DG-500, 505M	6
	DG-800 Series All	15
Diamond	Dimona H36	1
	Xtreme	2
Eiri Aviation	PIK-20D	1
	PIL-20E	5
Fournier	RF 4D, RF 5B	2
Group Genesis	Genesis 2	1
Glasflugel	Libelle 201, 301	3
Grob	Grob 102	1
	Grob 103 SL	2
	Grob 109A, 109B	5
HpH	Glasflugel 304CZ	1
Issoire	PIK-30	2
Lange Aviation	Antares 20E	4
Lithuanian Aviation Constructions		
	LAK 17, 17 AT	3
Maupin	Magic Dragon	1
	Woodstock 2 SLS	1
Pilatus Aircraft	Pilatus B4	1
Pipistrel	Taurus	4
PZL Bkelsko	SZD-48 Jantar	2
	SZD-51-1 Junior	1

	SZD-59 Acro	1
Rolladen Scheider	LS-4, LS-6, LS-8	3
Russia	AC-5M	5
Rutan	Solitaire	1
Schempp-Hirth	Discus BT	1
	Discus CS	2
	Discus 2T, 2CT	2
	Duo Discus, Duo Discus T	3
	Nimbus 2M	1
	Nimbus 3 & 4 Series	4
	Open Cirrus	2
	Ventus BT, CT, CM	11
	Ventus 2B, 2C, 2CT, 2CM	10
	Ventus 2BX, 2CXM	6
Schleicher	ASKa-6E, ASK-14	2
	ASH-25	1
	ASH-26	16
	ASW-20, ASW-24	4
	ASW-22 BLE	2
	ASW-27	3
	Rhonbussard	1
Schweizer	SGS 1-26E, SGS 1-35	2
Stemme	S-10	4
	S10VT	8
Strojnik	SA-2A	1
Twi	Taifun	4
Urban Air	Lambada UFM-13	1
Windex	1200C	1
	Total	205

I will be sending out renewal notices for expiring memberships in July. Please make sure that your information is correct. On occasion I find that someone has moved or an e-mail address has changed and we must spend time trying to find out why we get returned mail or rejected e-mails. Spring is late in Minnesota this year but I am looking forward to Parowan in June and hopefully seeing some of you there.

Have a good and safe soaring season.

Brian Utley

Get a free ASA Decal.

Additional Decals $1

Send a self addressed, stamped envelope with postage attached

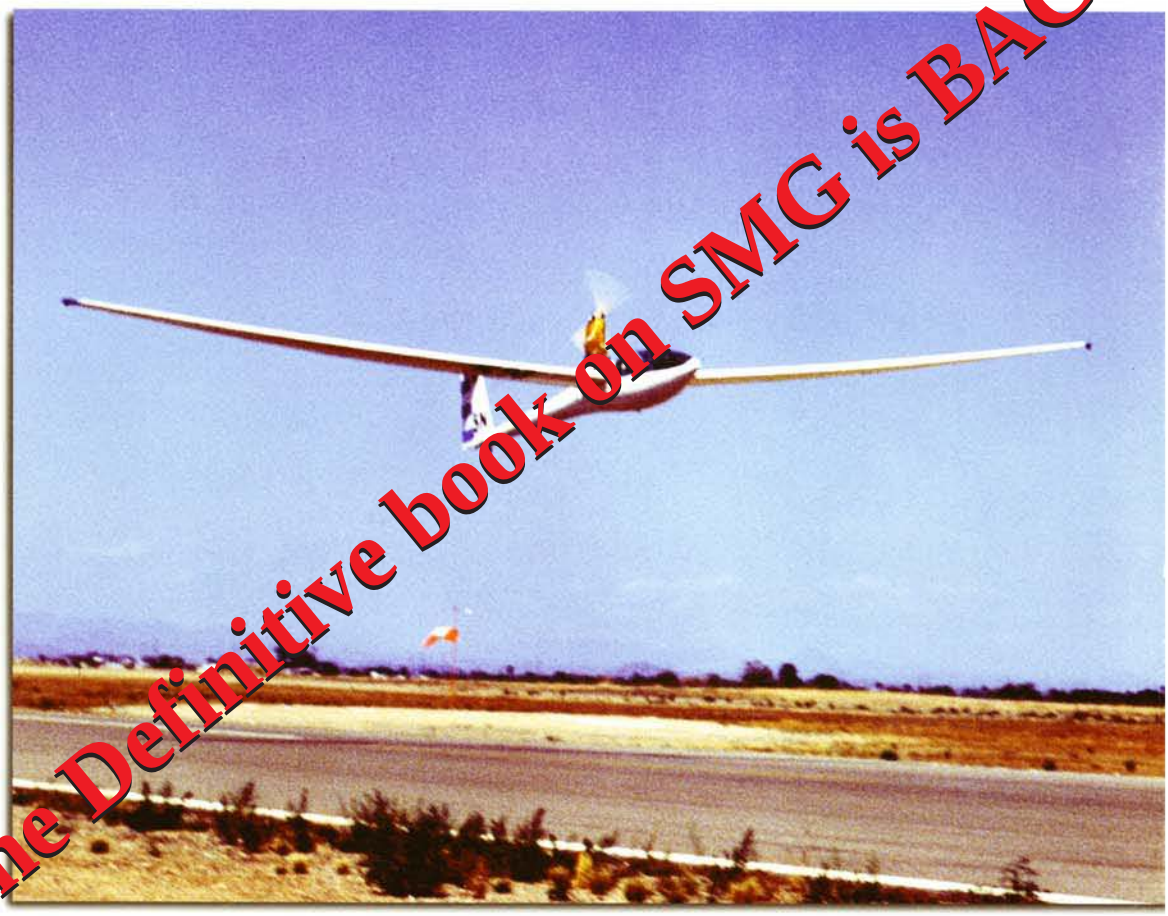
<u>(remember the new postage rate is 42 cents)</u> to:

Brian Utley
9541 Virginia Avenue South
Bloomington, MN, 55438

Birth of Glider

Self-Launch!

Retractable Engine Sailplanes



The Definitive book on SMG is BACK

- Development
- Buying & Flying
- Maintenance
- Makes & Models
- Power Plants
- Flight Safety

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
c/o Eric Greenwell
222 Thayer Dr
Richland, WA 99352

Also available from Cumulus Soaring.

2008 Aux-Powered Handicaps

by Olive Dyer-Bennet

Back in the late 1990s and early 2000's, Stan Nelson, past president of the Auxilary-powered Sailplane association and Oliver Dyer-Bennet, ASA safety director, worked out a formula for handicapping high performance self-launchers, sustainers, and motorgliders.

At that time we based the formula on our experiences and observations flying Regional and National contests. Mixed with our observations was the basic Carl Herold formula for all gliders.

The fun of the formula is that it makes all high performance self-launchers, sustainers, and motorgliders, close to equal on a sailplane XC flight.

You simply multiply your speed around a course and compare it to a buddy's multiplied speed around the same course.

If you go around the course at 62 mph in your DG-400/17, the base norm for calculations of the formula, and your buddy goes around the course at 44 mph in his Lambada/13, the Lambada wins the bragging rights at a handicapped speed of 62.92 mph, the DG-400 driver buys the beer.

It makes for a lot of Saturday afternoon sailplane entertainment.

Enclosed is the formula, much as it was in the early 2000's,

Please feel free to contact me at, //amsaero.aol.com//, with any additions, new motorglider performance information, or comparison observations that you may have made.

Edition 2 of the 2008 Aux-Powered Handicaps will soon be at your newsstand, so lets go out and have some fun with it.

2008 Aux-Powered Handicaps

Sailplane	Span meters	K1 Index Factor
Eta	30.9	0.860
ASW 22/BM/WL	26.4	0.875
ASW 22/BE	26.4	0.875
Nimbus 4T	26.4	0.875
Nimbus 4M	26.4	0.880
Nimbus 4DM / 750 kg	26.4	0.880
ASH 25M/WL / 750 kg	25.6	0.880
Nimbus 3T	25.5	0.885
Nimbus 4DT	26.4	0.890
Nimbus 4DM	26.4	0.895
ASH 25E/WL	26.4	0.895
ASH 25E/M/WL	25.6	0.900
Nimbus 3T	22.9	0.900
Nimbus 3DT	24.6	0.905
ASH 25E/M	25.0	0.910
Nimbus 3DM	24.6	0.915
DG-800/808 WL, A/B	18.0	0.930
Ventus 2CM WL	18.0	0.930
ASH 26E WL	18.0	0.935
DG-800/808 A/B	18.0	0.940
Ventus 2CM	18.0	0.940
ASH 26E	18.0	0.935
Ventus 2CT	18.0	0.940
LS6 CM	18.0	0.940
DG-1000 Turbo	20.0	0.945
Duo Discus	23.6	0.945
Stemme S-10 / 750 kg	23.0	0.950
Nimbus 2M	20.3	0.955
DG-600M	18.0	0.955
LS6 CM	17.5	0.960
Ventus CT	17.6	0.960
Ventus CM	17.6	0.970
DG-600M	17.0	0.975
DG-500/505M / 750kg	22.0	0.975
Ventus CT	16.6	0.980
Ventus BT	16.6	0.985
Janus CT	20.0	0.985
Janus CM	20.0	0.990
DG-400M	17.0	1.000*
DG-800/808 WL A/B	15.0	1.005
LS 6CM	15.0	1.010
Ventus 2CT	15.0	1.010
DG-800 A/B	15.0	1.010
Ventus CT WL	15.0	1.010
Ventus BT WL	15.0	1.010
Ventus 2CM	15.0	1.010
Ventus CT	15.0	1.015
Ventus CM WL	15.0	1.015
DG-600M	15.0	1.020
Ventus BT	15.0	1.020
Ventus CM	15.0	1.025
DG-400M	15.0	1.030
ASW 24E WL	15.0	1.045
Pik 30E	17.0	1.050
ASW 24E	15.0	1.050
Pil 30E	15.0	1.055
Pik 20E	15.0	1.055
Carat A WL	15.0	1.080
Carat A	15.0	1.100
Grob 103 IIISL	18.0	1.145

*WL = winglets
*Base norm

ASA FLY-IN at PAROWAN

10 - 20 June 2008

SOLD OUT. WAITING LIST AVAILABLE.

Flights over the Grand Canyon, Zion National Park, Bryce Canyon, and Cedar Breaks are breathtaking !!

Dinners will be served at the airport.

RV and Camping spaces are available on the airport. Shower available. Motel and B&B's in town.

Tow planes available for non-powered gliders.

Fees: NO FEE REQUIRED IFYOU ARE ON THE WAITING LIST.

Questions? Call Rick Howell, 972-245-0830 or email PatRickHOWELL2@earthlink.net

Region 9 Contest (6/21-6/28) (good info on site-seeing and accommodations:
http://parowan.soaringweb.net

How to get a self launcher – the hard way

Peter How
Composite Technologies
South Africa

It's April 2008, and I'm climbing out solo, heavy with water ballast. It was supposed to be a good day, just before a cold front – winter is on its way. At a 1000ft, the engine slows and I think "now what?" I always climb out over the airfield, so its wheel down, stop engine, start dumping, try to retract the engine – it won't – and set up a tight circuit. The Orion's sink rate with engine out is less than 2m/s so the landing is uneventful. Just my pride is hurt. I've had 9 months of excellent reliability. I soon find the fault – a tripped circuit breaker caused by the failure of a commercial grade electronic component. I re-launch…….

Almost 4 years ago to the day, I had approached AMS with the proposal to use their APIS-M pylon as the basis of a conversion of my Orion to self launch. Their pylon looked compact and simple and all it needed was more power than the Rotax447. I estimated that the 50hp Rotax 503 would be good enough, and be simpler than the larger water cooled motors, and I did not want to over stress the drive train any more than that.

We struck a deal and AMS sent me the assembled pylon, and composite components for the engine bay and doors. I thought "this is going to be easy". Little did I know just what lay ahead.

Cutting a large hole in the fuselage, using the engine bay doors as a pattern, was the point of no return. Then the messy part started. Formers had to be cut back to make room for the engine bay sides. The elevator push rod had to be re-routed closer to the shell. I spent hours with my head down in a cloud of dust, with a forced air supply keeping me healthy.

AMS wanted extra carbon applied all over the place and most importantly long, wide, tapered carbon rovings had to be laid along the entire engine bay, extending well beyond the cutout each end. I managed this by laying up the carbon on a long plywood pattern and transferring to the fuselage directly off the plywood. I had 3 goals at that stage – keep it strong, light and have engine doors that did not need tape to cover the gaps.

Converting the airframe took about 3 months, working evenings and weekends. Summer was approaching so working temperatures were ideal and I post cured by creating a tent over the part I was curing. Then came the scary part – I had to perform static load tests. AMS sent me a schedule and it took me a week to understand the process and to decide how to perform the job. A friend let me use a warehouse with a concrete floor onto which I could bolt down all the fixtures. The fuselage was supported on its wing lift pins on a very strong structure. I built beams to apply the various loads and hired some load cells.

I drew up spread sheets listing required loads and deflections, and underneath those, I could write the measured ones. This way I could start applying forces and compare the deflections with what was to be expected. The tail and nose had to be bent downwards and the tail twisted by apply side and twisting loads to the fin to angles that you just don't ever want to see again!

My wife Fran helped me and she often recounted how I would watch the strain gauge reading as I applied the load with a chain block, but kept my back to the fuselage because it was too scary to look at. But what was so amazing, was that after all that twisting, when the load was released the fuselage went right back to zero. We had to test to 1,5 x max flight load. Things did break. Not the fuselage, but pulleys would explode under the load. Bolts would start pulling out of the concrete and some of the load beams had to be trebled in size. It took 5 days and I lost about that number of kilograms at the same time, but I know that I have a very strong fuselage.

The actual pylon assembly arrived 2 months late. It should have just dropped into place. The fuel tank, plumbing and a kilometer of wiring was all ready. But at the last minute, AMS decided that the electric actuator to lift the motor out of the bay, could not go under the motor, like the APIS-M, but had to positioned horizontally, like most other self launchers. So I had to cut a channel through the top of my fuselage tank to accommodate this. Since this cut my fuel down to 17 litres, I added a section to the rear and ended up with 22 litres. I did not want wing tanks, due to bad, messy experiences with those.

What about the centre of gravity shift ? That turned out to be no problem at all. I removed the standard Orion tail fin battery and fitted an 18AH battery box at the base of the rear instrument panel. I projected the Orion's loading graphs and also double checked them against the DG505-MB. The empty weight rose to 525Kg and the minimum front cockpit mass rose to about 78Kg. For a self launching two seater with a 20m span, this empty weight is quite acceptable. I've limited the water ballast to 100 liters now.

I've built 4 aircraft, and I should have followed my instinct and experience in several aspects of the installation. Instead I followed the "proven" Apis-M ideas for the fuel system. The result was that 6 months later I threw it all out and added an electric pump, electric solenoid primer valve and revised throttle.

I used the 57mm Motor Control Unit (MCU) by Ilec. It was well made and fully programmable, and as I debugged the installation, revised the fuel system and found MCU logic errors, Ilec just emailed me revised firmware for me to upload. It's a great little instrument, requiring only a few external relays and the extension and retraction process is almost as good as a DG800, and there are plenty of interlocks to avoid mistakes. But the instrument was positioned at the bottom of the console, so I had to resort to a row of super bright LEDs on the front of the control stick to illuminate it. It really did need a back light.

Retraction and extension of the pylon is super fast – probably twice as fast as any other self launcher. A 700N gas spring helps balance the load. The APIS-M door system was not deemed acceptable for these long doors, and the suggested scheme was over complicated, so I devised my own, with light gas springs holding the doors open, and cables pulling them down, actuated the top of the pylon pushing some levers down. Either side of the prop hub are two carbon fibre door deflectors and I fitted small nylon wheels to the doors to roll over them as they finally closed.

Propeller centering is very simple with a spring loaded arm pushing a ball bearing into a notch on the top pulley. This is coupled to a microswitch which signals to the MCU to continue with the retraction. Unless the prop is centered, retraction under MCU control is impossible. A single steel cable restrains the pylon, and this is pulled back into the fuselage by a shock cord up to the tail wheel well.

So far this might sound all nice and rosy. It should have taken 6 months, but instead it took a few years and a lot of extra gray hairs. I've told you about the fuel system. You just can't start a two stroke with a manual primer when the line is totally 5 metres long. And trying to get it running using just the vacuum fuel pumps on the carbs won't cut it either. I like a motor to start on the first blade. So the fuel system redesign did the trick. Ilec added the extra logic. AMS followed suit later. After an hour, the Rotax failed to start easily again, or run below 4000 rpm. I'm a radio engineer, not a mechanical engineer and not a motor mechanic, but the internet turned up a few hints, and after spending a couple of hundred dollars at a Jet-Ski shop on jets, needles, springs, etc, I became an expert at measuring "pop-off" pressure and EGT tuning with a probe in the exhaust manifold. The problem was mostly the Rotax bedding its rings in, and starting to run too rich. EGT tuning is one of the most important things to get right if you want easy starting, idling and maximum safe power. I only have a theoretical 50hp and a glider which can be 750Kg at gross, so I need everything available.

OK, so 3 months after the initial engine installation, the engine is starting and running well. What's left – VIBRATION, plus a few other things like the worst propeller ever designed.

In the beginning, I could only manage one launch before the exhaust had to be re-welded. Like all the original APIS-M's, my exhaust system was totally useless. It cracked at the exhaust manifold, on the bend to the silencer, and at the top of the silencer. It's a tuned system and probably thumps around just from the exhaust pulses, but mostly it sits up the rear of the motor rattling around due to a number of reasons. There was a little, spring loaded, spherical joint between the manifold and the silencer, and this just did not allow enough flexibility in the system and in fact just fell apart several times. The top of the silencer was supported with rubber mounts, but these did nothing. After months, in desperation I emailed a photo of my installation to a famous Australian motor bike exhaust tuner, and asked for suggestions. His advice was to support the end of the silencer firmly and allow the parts closer to the motor to be really quite loose. He also wanted a vertical slip joint. So I bought a large spherical stainless steel exhaust joint from Aircraft Spruce, modified it to use two tension springs across it, made a loose vertical slip joint at the bottom of the silencer and made a padded cradle for the silencer at the top with a spring loaded stainless steel band to hold it into place. The rate of cracking on my exhaust system has now gone below that of a Solo installation. And this is despite me having to endure the original factory supplied assembly with multiple rewelds. There is a little exhaust leaking at the slip joint, but this has not affected the power at all, and does present less stress to the assembly.

But the vibration was still there, and causing other problems. The starter motor mount broke, so AMS devised a carbon side support for the starter (an APIS-M part). Initially the pylon was restrained by two cables, one to each side. But the high frequency twisting of the pylon caused the steel ferules at the cable ends to be worn through to the cable itself. So I quickly changed my installation to a single central support cable, like every other self launcher has – why did the designer try something different? I then added a lot more carbon and a removable front cover, in an attempt to stiffen the pylon. Examine one of Walter Binder's pylons and see just how much carbon he uses – its very stiff.

I checked the top pulley's dynamic balance, but that was OK. But the prop was super heavy, with narrow tips and low tip speed. It really did not have the expected thrust. Back to the internet and there was an interactive spread sheet on how to design a prop. I gave the design to a friend with a CNC machine and after a week he and his programmers had cut a new prop. It was half the weight and the difference in thrust was remarkable. But the vibration was still there.

I looked at every different self launcher installation that I could find. There was one obvious difference between the AMS pylon and everyone elses – the rubber mounted support and hinge point, was not in line with the center line of the belt, or in line with the crank shaft. It was in fact well forward of the belt and well below the crankshaft. This had to mean something, but I'm not a mechanical engineer. All I knew was that I had a crankshaft, belt and propeller thrashing around aft of the rubber mounts. So I decided to stabalise the rear of the motor with an alloy bar with adjustable rubber buffers at each end, which engage with tapered blocks at the top edge of the engine bay, as the pylon reaches the fully erect position. I thought it was so clever, that I should patent it, but then no one else could benefit and in any case, I got the idea from the rear door of my German van. I made a transducer from a spring loaded linear potentiometer and fitted this to the rear of the motor. I connected this to an oscilloscope. This was really quite interesting. I could see the crank shaft revolutions and superimposed on this, a lower frequency peak every 7th cycle. This must have been the prop blade passing the pylon. The sideways movement at the rear of the engine was 1,76mm peak to peak from the crank shaft and 4mm from the prop blade. By engaging the rubber dampers on my new contraption, I reduced this movement to 0,66mm and 0,77mm respectively.

Then a friend suggested that as the prop blade swept down past the front of the pylon, there would be a pulse of air onto the starboard side of the silencer (remember it is offset to that side). So I made a carbon fibre panel which deflected air off the side of the silencer. Using my home made low frequency vibration transducer, I determined that the rear of the engine deflected about 25% less than without the fairing. Not a big difference, but any thing is better.

By this time I was starting to get some enjoyment out of flying the glider. But occasionally I would scare the gliding club members with some sort of incident. For instance, the MCU programmer had decided that the ignition should be cut, it the engine exceeded redline RPM. This is all well in theory, but once I had got the EGTs right, I had a lot more power, and the initial rotating chunk of wood went too fast, so there I was accelerating above the end of the runway with the engine cutting and going again, until my brain clicked into gear and I reduced the throttle slightly. By this time the runway marshall had cleared all the runways of gliders awaiting an expected dramatic quick return. The MCU was reprogrammed to cut the ignition at 110% after that.

Then on 3 occasions in a row, the rear canopy opened during takeoff. The first time, I thought that I had stupidly forgotten to close it and made an incident report. The second time I knew I had closed it. On the third time, I had tightened the friction on the handle, but not enough. Luckily, the rear frame had come to rest on the wing and I did not loose it! But on the third time, in the mirror I watched in horror as the canopy cover got sucked out of the luggage bay and went through the prop. I did a quick teardrop turn and landing down wind, but there was no damage other than little bits of cloth all over the runway. Some quick telephone calls revealed that the rear handle of a DG500M canopy does tend to migrate towards the open direction. My extra vibration, just opened it completely. I now have a safety pin to secure the handle.

During an annual inspection, I noticed wear on the edge of the belt which indicated that it was jumping away from the idler deflection roller, on the tension side, by up to 5mm. I had one idler roller on each side. AMS had never specified any belt tension for the APIS-M pylon and had never included a belt tensioning system, other than providing slots for the bolts securing the spindle at the top of the pylon. Back to the internet. I decided that the belt flapping was a result of torsional vibration between the crankshaft and the propeller. The only way to reduce it, was to make the belt much tighter. I drilled a hole through the side of the pylon, to enable me to measure belt deflection halfway between the idler roller and top pulley. I press a pin against the belt using my wife's kitchen scale. During launch there was a small, but definite reduction in vibration after this and the wear from the belt flap has stopped.

Finally, I found that adding an elastic shock cord across the lower part of the pylon and connected to both doors, reduced a thumping noise from the right door banging against the pylon as the prop blade passed by.

I have about 50 hours on the Rotax now. The installation does not feel as smooth as some of the other self launchers, but the reliability is proving to be better than some of these factory jobs now.

So how does it perform? Our airfield at Magalies Gliding Club, an hour west of Johannesburg, has a soft grass mat surface and we are at 5100ft above sea level. Temperatures often reach 30deg. Solo, I need about 400m to rotate and from SeeYou, I have determined my average climb rate without thermals to be about 1,7m/s. At near gross weight (750Kg), the run is about 100m longer and the climb rate 1 to 1,5m/s. I try and find a thermal quickly, but obviously I can't do this until I've gained a bit of height first. My friends with Nimbus 3DM seem to get the same climb performance. Where I do have a disadvantage is that I don't have flaps, so I fitted a Tost tail wheel with bearings and I deliberately hold the tail down on the runway to obtain a high angle of attack. This helps me get off the grass quicker. What I need is a Harrier jump jet take-off ramp! But on tarmac, acceleration is quick and lack of flaps probably makes no real difference. Climb to 1500ft consumes

about 4 liters of fuel. I run avgas with a 50:1 mineral two stroke oil. The prop is designed to give me a 6250 static RPM and about 6700RPM on climb. I know that this does seem a bit hard on the motor, but I need all I can get. Everyone says it sounds really "strong".

As a glider, the 20m Orion is super, especially at full wing loading. Handling is excellent and its never dropped a wing or given me a fright and no doubt was a great benefit during some of the test flying. On long fast cross countries, the foreward stick pressure was tiring, and after discussing with Wilhelm Dirks, I decided to fit upwards fixed trim tabs on elevators. Its now very comfortable, with less stress through the control system and safer against inadvertent pull ups during high speed flight. My best flight so far has been a 750 at 135kph. It's a great pity that the DG505 Orion production has recently stopped. I have never had the chance to fly against a DG1000, but new Duo Discus models at Gariep never out climbed or out ran me. Maybe my wing loading was a little higher.

What's left to do? Well I did exchange the Facet pump the other day for a rotary vane type. It jammed just like my motor bike tuning friend says they have with him and I could not find the reason, and he just said "I told you so". AMS positioned the Bosch 75A starter relay on the bottom of the pylon, and a few have failed there. On mine, the whole cable lug broke off. I fitted rubber mounts, but I will fit a proper starter relay in the rear instrument console this winter. The original APIS-M inlet manifolds are long and have a right angle bend at the bottom, which my tuning friend says robs horse power. So I'm going to have made some with a nice radius this winter. If he's right, I will have to make a new prop. Will it ever end?

Footnote:
Many will have wondered how I was allowed to do all this. Almost all the gliders in South Africa have been classified under a non-type certified category and their airworthiness is administered by the Soaring Society of South Africa. This allowed me to undertake the conversion, subject to certain conditions, using factory parts from AMS and a successful static load test. Such a conversion may not be possible in many other parts of the world.

Gathering of Libelles

The First U.S. Libelle Gathering which will be held at Air Sailing Gliderport (ASI), Reno,Nevada.

It will be held July 3-7, 2009.

There are 235 Glasflugels in the U.S. and166 Libelles plus one registered in the U.S. which is in Switzerland.

There are 49 Libelles in CA and 6 in NV alone for a total of 55 with a total of 88 Libelles "in the West": CA, NV, AZ, NM, WA, TX, CO, OK.

So, we expect a great turnout of pilots with their gliders, pilots who have flown Libelles and just people who love these great ships.

There will be talks on the history of the machine, on the "flying, maintaining and care" of Libelles and a lot of "Do you remember when" stories over the bbq in the evenings.

We are planning a Dry Lake Landout Training Day and lots of fun flying.

We will be encouraging people to bring the history of their gliders typed up for our Libelle History Book including a list of the owner and a photocopy of their glider (8 x 11) or actual photo.

Many thanks!

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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.

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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
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EDITOR NEEDS HELP

Thanks to Gary Evans, Brian Utley, Oliver Dyer-Bennet, Eric Greenwell, Peter How and Terry Edmonds 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.