



EAA602 Log Book

Adirondack Chapter Newsletter

March 2009

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HOMEBUILDERS



From The Presidents Desk

by Tim Cowper

We had a great turn-out for our 2nd Annual Ice Fly-in on Sacandaga, at Sport Island Pub. We had a half-dozen planes along with about 25 drive-ins, and all went well. Thanks Gary for letting me get some flight time in the Challenger! Things got a little interesting when Mark landed in the Wilga, on wheels, and sunk down into the packed snow runway. After lunch, he lightened the payload a bit, and the amazing power of the Wilga dragged it upward and off the ice. All in all a good day. It's great to see all the flying activity going on with our club members. Almost every weekend somebody is posting a fly-out to somewhere on our Yahoo message board. This is really good and will hopefully continue right on into the warmer weather. Flying is awesome, but when you go flying with friends, it's the best! We have a good group of flyers now so let's keep this enthusiasm going and plan some "missions" for the 2009 flying season. All ideas are welcome. Wayne has been helping me make repairs to the Zodiac. Ok, lets face it, Wayne is making the repairs. Every time I touch something he cringes and yells at me.

Anyway, hopefully it will be back up and flying soon. In the meantime, there are other flying possibilities for me... This months meeting will be held at our old spot, the Town of Edinburg Town hall building, on Monday February 23 @ 7PM. Come and participate in the fun!

Tim

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Notes From Your Editor

by Doug Sterling



What a gorgeous day for our fly in at Sport Island Pub this month. The skies were clear, the ice was smooth and the winds were nonexistent (at least at the lake). Reports from down in the valley were not so benign, but everyone who came got home safely (that's what is most important). We had a half dozen planes come (there was another event scheduled for the same day) but we had almost 30 there for lunch. Joe Lanzi was good enough to let us use his upstairs room for lunch so that we could all be seated together. All in all it was a nice time for all who attended.

Another gloomy winter month is almost passed. Just puttering with the interior on the GlaStar for now (ambition is slow during the winter). The winter has not slowed up flying for some of our members. Tim Devine seems to be up every weekend. He really got carried away with his article this month but that comes from doing a lot of flying when most of us are just grumbling (I have GOT to get skis for the GlaStar).

Darryl & Kevin have been flying with their new skis which seem to work very well. They are also working like crazy on Kevin's new plane. Looks like they are almost done with the restoration and will be ready to go as soon as the runway clears. Gary Collins has been flying a lot with his ski equipped Challenger, and we even saw Mark Murphy try out his Polish thing in the snow. Good thing it is a fantastic stoll plane as the tires aren't very wide and tend to sink a bit in the packed snow. No problem though with high lift wings and lots of power he was off like a feather at Sport Island.

Enough talk for now - I've got to get back to the plane so that I can be ready for spring (also hope to have the Pulsar paint job finished for summer).

Fly Safe, Doug



Winter Flight Time

by Tim Devine

Its 10:00 AM on Sunday January 4th and despite the fact that it's only 12 degrees outside, as I pull up in front of the hanger at Edinburg I have four people waiting to give me a hand installing my ski's on the Champ.

As a testament to the great people that we have in EAA 602 and the fact that we have some really dedicated flyers Fred Blowers, Darryl and Aaron White and Kevin Dibartlomeo have all shown up to give me a hand.

The skis are finally complete after an off season rehab of new bushings, mounting hardware and a brand new coat of paint. There is about six inches of snow on the ground and ideal conditions with clear blue skis and light winds.

Installation goes quickly with all the help it only takes about 45 minutes and we're pushing the Champ out of the hanger so I can preheat and pre-flight the airplane and get airborne.

As usual the Champ lights right off and after some taxiing I do a couple of circuits around the pattern and two landings, I taxi back to the hanger and thank the guys for their help. It's a nice day so I decide to head down the lake, buzz Murphy's and Johnson's and then head home.

I decided against touch and goes at both field's as I had to carry a lot of power just to taxi at 1F2 and I don't want to get stuck. The current snow conditions are about six inches of powder, covered with a two inch crust and then another two inches of loose snow. The main skis glide very nicely, but the tail wheel keeps breaking through the crust making taxiing and maneuvering difficult at best.

The next few weekends are spent finishing my wheel dollies and I have decided to build a tail ski. Refining some ideas I find on various ski flying web sites I construct a rugged but light tail ski to fit my Maule tail wheel.

It's Saturday January the 17th and now the temp is only 9 degrees, but I am anxious to see how the tail ski and wheel dollies fit. Amazingly as I pull into the airport Pat Morris and his Dad pull in behind me. Pat and his dad are just out for a ride to grab lunch and they stop to lend moral support. His dad tells me that

one time Pat's grand father who used to keep a Cub at Edinburg had an engine failure and had to land on the ice. They talked a local farmer into towing them back up the lake and then they towed the cub across the Bachlerville Bridge with the wings on. They had to zigzag to avoid the light poles.

After a brief stay, they are off to lunch and I get busy with the wheel dollies and the tail ski. Progress

is slow, as I can't leave my gloves off for more than a minute but I prevail. The tail ski fits up perfectly, except for the retaining cable that I cut to short. The wheel dollies need a little more adjustment but they to have come out well. I am tempted to take the AC out for a spin to try out the tail ski but I am frozen to the bone and need to thaw out.

Saturday the 24th is grey, blustery and low ceilings, but I am itching to see how the tail ski performs. After all the necessary preparation and installing the new retaining cable I taxi out to give it a try. What a difference! I don't need to carry nearly as much power and it greatly decreases the turning radius. But how does it fly? The gods of flight must have wanted to know also, as the sun broke through for about a half hour allowing me to do a half dozen touch and go's and the tail ski handles well.

At 06:30 high gray clouds and chilly temperatures are the order of the day as I pre-flight the Champ in the dark on February 1st. Gary Collins put out a notice earlier in the week about a pancake breakfast at Bear Gulch Pond near Summit NY.

It's cold but the wind is perfectly calm as I try to depart Edinburg. Unlike years past snow mobile activity on runway 24 has been quiet and I'm breaking trail as I taxi to let the Champ warm up. On my first try to take off, I'm still at full power and passing the intersection and don't have enough airspeed. It takes me four more tries to get the snow packed down enough to get airborne and into ground effect.

I'm running late now but with the calm winds I figure I can make up some time. As I pass over the southern end of the lake I make a call to Sharon and who answers me but Fred Blowers. It seems he heard me passing over his house and ran inside to get his radio. Just as he turned it on I was calling Gary so I was startled to hear Fred's voice. I even took a quick





scan to see where he was. After I figured out that he was sitting in his kitchen drinking coffee, I chided him for not having his skis on yet and went on my way.

As I proceeded west over the Mohawk Valley things began to change dramatically. While my airspeed indicator held steady at 95 MPH, my GPS was showing ever decreasing over the ground speeds and the "time to" indicator was actually rising. I was headed into a serious headwind. I never did raise Gary on the radio and when I flew over Sharon there were no signs of activity so I figured that he was still home flying his Serta Perfect Sleeper.



I turned South West towards Cobleskill and the West Wind gave me a welcome push towards my destination. Unfortunately when I arrived over Cobleskill the winds shifted to the Southwest and got very bumpy. I was considering turning for home when Glen Guilfoil of 1072 called to see if anyone was in the area. I was only about five miles from Summit so I decided to press on and almost immediately spotted Glen turning base to final over the pond. I followed him in and had to carry lots of air speed as the wind was really blowing right down the pond and the way that the hills close in at the West end it was like flying through a venturi. All together five airplanes made it to the Breakfast. Gary Collins gets an A for effort as he actually did try to make it but the wind over Cobleskill was just to much for the Challenger.

The Summit Conservation Club puts on one heck of a feed and nobody went away hungry. With the wind still howling I was off the ice in about 100ft for a very bumpy climb out.

With a stiff tail wind four of us proceeded up to the Great Sacandaga Lake to buzz ice shanties and by the time we got there the wind was perfectly calm again. Some challenging flying, but I'm glad I went.

February 7th saw our Sport Island Pub fly in on an amazingly mild day considering what the temps had been at mid week. The winds were light, with great visibility and plenty of ceiling. Doug and some of the other club members did a great job at setting up and prepping a runway so landing was easy. Not as many aircraft showed up as last year but we were competing with an event out West so I'm sure that factored into attendance numbers. We had a fantastic

showing of drive in club members so all in all it was a great turn out.

February 15th brings a new challenge. I'm headed to the hamlet of Ames which is about 10 miles south of Canajoharie on route 10. My plans are to meet up with Gary, Kevin and Darryl to attend the Ames

Volunteer Fire Department monthly pancake breakfast. We are going to land in a big cornfield which is located behind the fire house.

The snow conditions have changed dramatically in the last week. The warm weather has melted the top three inches

of snow and now it has refrozen as glare ice. Taking off on glare ice is good. Very little drag so you get airborne quickly. Landing on glare ice is easy it's the stopping that gets tricky. After touching down and pulling the throttle all the way back I was still moving along at a good clip. As Route 10 grows closer I begin contemplating how I am going to explain to the local authorities why there was a small aircraft on skis parked in the middle of the highway.

Fortunately there were a couple of bare spots that I managed to steer over and that slowed me down enough to stop. Gary, Dale Wilcox and I enjoy a great breakfast, but there is no hanging around as a huge crowd is demanding every seat. As we are leaving Kevin and Darryl are in line waiting to be seated. It seems that they had to make some minor adjustments to the Hawk so they were running late.

Gary and Dale head back to Duanesburg and I catch a nice tail wind back towards the lake. Its such a nice day that I decide to do a little more flying and swing over to Blowers International airport to see if Fred is around. Fred has his runway groomed to perfection and with a light headwind landing is a piece of cake. The cub is in the hanger all covered over and Fred is out flying his tractor working on next year's fire wood. ("I have got to talk to that boy about his priorities".) After a cup of coffee we check out the cub and it's all ready to go. With a little luck Fred will have gotten in a little ski time by the time you are reading this article.

Fred helps me spin the Champ around and provides a hand prop and then I'm headed back to Edinburg. I am hoping we get more snow as I was not that crazy about landing in glare ice and it's only the end of February. I am hoping to enjoy some more ski flying before the spring mud season arrives.



Circuit Protection Devices and Avionics Master switch

by Paul Messinger

There are different types of circuit protection devices. Fuses and circuit breakers are well known. In recent years another device has seen increasing use. This is a Positive Temperature Coefficient (PTC) device. It is a solid state device that uses current to self-heat and its resistance suddenly changes from low to high as the device exceeds its design current limit. They stay in the high resistance condition by allowing a small current to pass into the load that keeps the device hot. The problem is with the use of the term "high resistance" which normally assumes (incorrectly) a low current. The current is lower than the protected current but still high as it can take as much as 3 watts to keep it tripped in the high resistance condition. 3 watts is ¼ amp at 12V and that is more than enough to burn low current circuits in modern avionics and produce smoke in the cockpit.

All of the above over-current protection devices use their internal resistance to heat up their internal trip component. This means they must have significant internal resistance to provide the required heat source.

Each of the above over-current protection devices are compared in this section. In order to make the comparisons meaningful, the common 5 amp load circuit is used as an example.

	CB 1 W23	CB 2 7277	F 1 3AG	F 2 ATO	PTC RUE500	SSS 1404Z
Max Voltage	50	28	250	32	30	40
Max Current (A)	2.000	10,000	10,000	1,000	40	790
Max resistance (Ω)	0.03	0.05	0.025	0.018	0.03	0.003
No-Trip current (A)	5	5	5	5	5	5
Must Trip Current (A)	10	10	10	10	10	10
Time to Trip (sec)	22	35	5	5	100	0.1
Tripped Power (W)	0	0	0	0	3W	Neg.

This figure includes two types of circuit breakers, two types of fuses, a suitable PTC device, and the modern SSS device (which uses voltage not heat).
Over-Current Protection Comparison

The PTC device has features that make it a very poor choice for aircraft use. The maximum current of 40 amps is far lower than an external accidental or intentional short (crowbar) will produce. Crowbars can produce up to 400 amps and all known aircraft

crowbar applications produce well over 100 amps. The 40 amp maximum is the highest current the PTC can withstand without damage. The time to trip is very long (worst case times shown) and has the potential to damage the load. The 3 watts power dissipated in the device during the tripped mode requires careful packaging and cooling design to prevent damage to other physically close components.

The ON resistance of up to 0.05 or more ohms for the traditional circuit protection devices results in a significant voltage drop of as much as 0.25 V. Including the total voltage drop from the battery to the end user including wiring losses, connections, etc. can add up to more than ½ V and that can result in a power loss that is equivalent to a 10% loss in flight time remaining.

Looking at the time to trip it's clear that fuses are faster acting than Circuit Breakers with small over currents but the difference is less with larger currents. Only the SSS parts are the same speed regardless of the over current. The other devices respond faster as the over current is larger as they are thermal driven based on their internal resistance and the heat generated by the current thru this resistance. Circuit breakers are intended to protect the wiring where an over-current is less likely to cause damage with a longer delay in tripping. The traditional use of circuit protection devices is to protect the down stream wiring not the end using device.

The problem with fuses is that some must be in-flight replaceable for essential-to-flight equipment. Essential to flight to me means anything required for that mode of flight. I also include any equipment that will help the pilot safely complete the flight. The result is most aircraft use circuit breakers.

The solid state switch (SSS) I use contains an internal current sensor that uses voltage, not heat, to determine when the design current level is exceeded. The internal series resistance of the SSS is far less and often 1/10th the resistance of the fuse or CB.

The SSS normally trips almost instantly when the current exceeds the 10 amp design limit (in the example). To allow for surges like the inrush current with landing lights there is a design provision for a



short term, much higher inrush only current. The disadvantage of SSS is they use small parts designed for printed circuit mounting that normally builders cannot produce on their own. The packaging of a single device costs many times more than the device itself so the solution is a prepackaged group of many individual SSS into one unit.

Regardless of what device is chosen, the selection must consider more than just the current rating. A lot of devices are used in the typical experimental aircraft. This means the power and voltage drops are small in an individual case basis. When the power loss powering the coils of contactors and relays is included, the loss is significant.

The old traditional way of designing electrical power distribution systems can use as much as 10% of the total power available in power losses in relay coils, lighting, and current protection devices.

The use of a single avionics master switch to turn on all the avionics is generally accepted as a pilot workload reducer. This allows a single pilot action to turn on many NAV and COM radios, and other avionics equipment, that already have the volume controls etc. to preset levels.

There is a lot of controversy regarding the use of an avionics master. I feel it's a valuable increase in safety by retaining the volume settings on communications equipment as well as forgetting to turn them on at the beginning of a flight. My system design addresses the major issues pro and con for an avionics master. In my system it's easier to consider the avionics master as a switch that turns the power systems avionics bus on and off.

The alternative approach is to set many individual volume controls with associated switches by guess. This is the result of the control also being the unit's power ON-OFF switch. Initially the pilot must adjust the volume to the usable level. In an IFR environment that is an additional pilot action when any extra pilot action is a distraction from an already high workload.

I have personal experience flying a friend's aircraft with him in the right seat and often have observed him fail to turn on and/or set the volume properly because his aircraft is older and does not have an avionics master. The rentals I fly do have an avionics master while my current personal aircraft is VFR only. I still prefer an avionics master.

There are several reasons offered to support not having an avionics master. First, they say the volume controls etc. will get noisy from non-use. I know of no such problem with the avionics in use today. In fact

even 30 years ago when I had a full IFR radio stack installed in my Bonanza I flew for many years with no avionics problems associated with volume control noise. Today's avionics use controls that are rated for tens of thousands of wiper movements. That is several lifetimes of our use. There is the concern of a single switch failure. I use a double pole switch with the contacts in parallel. The switch I selected is industrial rated making it far less likely to have a mechanical failure of the contact mechanism. If the builder is really concerned, a second switch located somewhere as a backup can be installed. I always recommend a back up master off in a corner just in case. It's important to note the avionics master is turned on before flight and once on switch failure is exceedingly rare.

There is a concern (by some) that having the avionics ON during engine starting can damage the avionics from starting transients or recycle the avionics, thus resetting some pilot settings. My suggested system blocks any transients that can cause brownout or recycling because the starting battery is not supplying power to the avionics or anything else other than the starter during starter operation by the use of smart solid state switches. This protects older non DO-160 compliant equipment. (the specification that covers the avionics requirements for modern aircraft).

By using the system design shown in prior articles it's possible to eliminate as many as 36 circuit breakers and associated wiring. The use of the avionics master switch as well as grouping other related systems and backup systems for single failure subsystem protection the number of panel switches can be greatly reduced. The end result is a large reduction of dedicated panel space and the need for the pilot to carefully select the desired switch from a large number of choices. The complexity of the wiring is greatly reduced. For example all or most of the front panel switches have a common power connection and simply provide 12V to the input of the associated control unit housing the appropriate SSS.

Even the use of traditional wiring and relays and CB's can result in a significant reduction of wiring complexity by intelligent combinations one switch controlling related functions like the avionics master. In a future article I will show how the three design approaches compare: The traditional approach, the modern approach, and the SSS design approach.

Questions are welcome paulm@olyphen.com

Paul



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that you don't need anymore or anything
you need, list it here. You may help
someone who might need it or may find
it at a reasonable price.*

**The Meeting This
Month Will Be At:**

**Edinburg
Community
Center @ 7pm on
Mon. Feb. 23th**

EAA602

819 North Shore Rd
Hadley, NY 12835



GOD BLESS AMERICA
September 11, 2001
We will never forget.

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