

VELOCITY ONLINE

Vol. 3 August 2005

Velocity's Quarterly Newsletter



Velocity Fastbuild Wing and Fuselage section Hard at Work.

Features This Issue

- [News from the Factory](#)
- [Production News](#)
- [KPC's](#)
- [Scott's Builder Tip's](#)
- [Mechanics Corner](#)
- [Flight Instructor Input](#)
- [Completions](#)
- [Builder Articles](#)
- [Items for Sale](#)

[Downloadable Version](#)
in PDF format [VOL3August2005.pdf](#)

[News From the Factory](#)



by Duane Swing

True Airspeed

How do you determine “accurate” true airspeed of your aircraft? This is a question that has been asked by just about every airplane owner I know. Many will try to do a two way run using the GPS as a guide with one run into the wind and one with the wind at your back. How accurate is this and can I use this method on my Velocity? The answer is “yes” and “no.” On a no wind day it is probably good enough. I have been flying for over 40 years and have never found this condition. What happens when the wind is blowing strong? Let me give you an example where this method has the greatest error.

Lets say you are flying in a Piper Cub and your brave enough to challenge a really high wind of 100 mph and you want to take a trip that is 100 miles from your departure point. A direct tailwind of 100 mph in an airplane that cruises at 100 mile per hour gives you a ground speed of 200 miles per hour. This translates into a trip of 100 miles that takes only 30 minutes to get there. (100 miles at 200 mph = 30 minutes) Now lets turn around and start back. 100 mph into a 100 mph headwind give us a ground speed of “0.” In this case our return trip in time is infinity. That is, we will run out of gas and still be where we started. True airspeed in this case is impossible to determine, as we will never get home.

Even mild winds will slow our ground speed, and thus our attempt at figuring true air speed, on a round trip because we must either “crab” into a crosswind or face the headwinds as described above. Any deviation from a “0” wind condition will alter what we might call “true air speed.” Is there a way to figure just what the true air speed is on our Velocity by using only a GPS when we must fly with some winds aloft? The answer is “Yes” and will require a fairly complicated computation that has been simplified by David Cox for a Kitplane article several years ago.

The importance here is to accurately fly three cardinal headings and record the GPS speeds for each leg. Rather than trying to explain the rest, I suggest you go to www.reacomp.com and click on the True Airspeed Calculator. Follow the instructions to the letter and just plug in the three readings you received and your true air speed will be shown. There is admittedly a small error but not enough to really count.

It might also be important that if you want to know the “maximum” cruise speed of your aircraft, you must fly at a density altitude of approximately 8000 feet. To do this you need to know the indicated altitude, (your altimeter) and the temperature at that altitude. Using your E6B computer set the air temperature in degrees C over the indicated altitude and read the density altitude in the lower box. As an example, if the temperature at an indicated altitude of 6500 feet is + 15 degrees C, (60 degrees F) the density altitude is 8000 feet. In this case, flying at 6500 feet wide open throttle and about 2500 rpm (constant speed) or whatever the prop will spin if a fixed pitch prop, will be approximately 75% power. (Remember to lean to best power)

Give it a try in your spare time and see what you find out.

Production News



by Scott Baker

Production at the Velocity factory continues to grow in response to the large volume of sales orders. The manufacturing lead-time for orders featuring fastbuild options stands at 7-months. Orders without fastbuild options are shipping within 2-months from time of order. Velocity, Inc. continues to hire new and promising workers to help shorten the delivery lead-time for orders with fastbuild options.

On top of this, orders for engine installation kits are at an all-time high. Velocity, Inc. uses outside shops to make engine mounts and exhaust systems. It seems that these specialty shops are also backed up with business – which has resulted in back orders for Velocity customers. We realize that back orders create problems with builders. We apologize for these delays and wish to assure all who are affected that we are working hard to alleviate back orders. We encourage you to keep communications open with our parts department as we work to fulfill back orders. Thank you for your understanding and patience!

New orders for Velocity aircraft include an independent rudder pedal assembly with toe brakes on both the pilot and co-pilot sides. The master brake cylinder assemblies on the toe brake system allow Mil Spec 5606 hydraulic fluid (the same red colored fluid used in the Velocity retract gear system).

OEM wheel and brakes - The standard brake for Velocity-SE and Velocity-XL models is the Matco Mfg. W600-XT wheel and brake. The “Dash-5” version of the Velocity XL features heavy-duty Cleveland main wheels and brakes. The Cleveland wheels and brakes are available as an option for Velocity XL models with 4-bucket seats. Velocity does not recommend the two-piston Cleveland brake option for the Velocity-SE models.

Special orders - In the past, Velocity has been open to assisting customers with special orders that are outside the norm. Examples of this include the modification of the intake tubes on Lycoming IO-360 engines to allow a better fit inside the engine cowl area; providing oversized oil coolers; and custom molding thicker side windows. Whenever we can do so, we are glad to help. Custom orders sometimes takes extra time and usually involves extra costs. Production delays of standard orders has exacerbated the time it take to fulfill special orders. We ask customers to keep this in mind – and again, we appreciate your patience.

Deltahawk Engines, LLC recently shipped one of the first production run versions of their 4-cylinder aero diesel engines to the Velocity Service Center – where it will be installed in an optionally piloted, UAV aircraft based on the Velocity design. Deltahawk is also producing a “firewall aft” engine installation kit, which will include the mount, exhaust, engine cooling system, and fluid lines – all in a near “plug and play” configuration. The Deltahawk installation in this aircraft will be the same for the Velocity-SE. Details and costs of the Deltahawk installation are pending. We look forward to featuring details and photos in a future edition of the *Velocity On Line* newsletter.

Velocity Open House – August 20

Velocity enthusiasts are cordially invited to attend a Velocity Open House on Saturday, August 20th. The program begins a little earlier than normal – 8:00 AM – to help beat the summertime heat and to allow the program to end (hopefully) before the inevitable afternoon thunderstorms.

Agenda

8:00 *Welcome* – Coffee, juice, and treats

9:00 *Factory tour*

10:00 *Service Center tour*

11:00 *Guest Speaker* – Greg Richter, Blue Mt. Avionics EFIS systems

12:00 *Lunch* – courtesy of Velocity, Inc.

12:45 *Workshop* – Scott Swing, Fundamentals of Composite Construction

2:00 *Program Ends*

Demonstration rides in our Velocity XL-RG-5 aircraft will be conducted throughout the morning. Demo rides are discounted to \$100 during the Open House program. Customers earn back the full amount of the demo ride when they purchase a Velocity kit within one-year.

Open House Sales Promotion Special – Velocity, Inc.

- Reduced deposit \$2,500 (check or credit card)
- \$1,000 Off the cost of Basic Kit orders
 - Customers agree to accept delivery within 8-weeks
- \$2,000 Off the cost of Fastbuild Kit orders
 - Customers agree to postpone delivery until April 2006
- Promotion is open to everyone

- Attendance at the August Open House is not required
- Promotion may not be combined with other promotions
- Applies to orders placed between August 1st and August 20th.
- Promotion ends August 20th

Special Items of Interest at the Velocity Open House –

We are especially happy to have Greg Richter, owner of Blue Mountain Avionics and developer of the popular and affordable EFIS/One system that is designed for the experimental, general aviation market. Guests will see Blue Mt. EFIS systems working in several aircraft during the Open House. Weather permitting, Greg plans to bring his jet powered Cozy aircraft to the program.

Proxy Aviation Systems will have their *Skywatcher* aircraft on static display. The *Skywatcher* is an optionally piloted, UAV aircraft developed from the Velocity-173FG airframe.

Weather permitting, Bill Mulrooney is scheduled to bring his 450-hp, custom V-8 powered Velocity XL-RG to the Open House program. Bill and his partner, Dan Horvath, displayed their aircraft at Airventure Oshkosh 2005 – where it received considerable interest and favorable comments. Don't miss this opportunity to see talk with Bill and to see the exceptional workmanship that he and Dan put into their Velocity.

Airventure Oshkosh 2005

This report is written immediately following our return from Oshkosh – where we were happy to see many Velocity owners, pilots, and enthusiasts. We spotted about 10-Velocity aircraft that flew into Oshkosh. We want to make special mention of Ken Mischler (SUV), Rene Dugas' (XL-RG), Jack Atkins (XL-RG), and Jack Sheehan (XL-RG) who had their aircraft on display. Thank you!

Over 50-Velocity owners and guests attended the Wednesday evening Velocity social gathering at the Hilton Airport Inn. It was great to see so many Velocity owners reunite and share stories of what's been going on this past year. Diane Doers gave the group an update on the Deltahawk engine production program – and Bill Mulrooney gave a captivating talk about how he and his partner, Dan Horvath, developed a 450-hp V-8 engine for their Velocity XL.

Several guests at the social expressed an interest in having a sit-down dinner at Oshkosh next year. We are open to the idea and would like to hear more opinions about this subject. A sit-down dinner would cost about \$17. An outdoor tent type of BBQ or fish fry dinner would run about \$12.

Send us an email with your thoughts on the subject.

Scottb@velocityaircraft.com

[Top of the Page](#)

KPC's are listed in downloadable PDF form on the Builder Construction manual page.

KPC 184

Affects: All RG's upgraded to carbon wrapped legs
Manual Section: .6A-5
Date of change :7-30-05
Section 6A-5 was added showing carbon torsional wraps

KPC 185

Affects: All RG's
Manual Section:7.9.2
Date of change: Added section on how to install nose gear safety stick hole.

[Top of the Page](#)

Scott's Builder Tips



by Scott Swing

Newsletter article

For those of you who can't put your wheel pants on because of the fear of shimmy or yaw, or you just want to set your dampener a little lighter for taxi reasons, one of our builders has come up with a solution . Ken Mishler has made a nose wheel lock that will allow you to keep your nose wheel casting loose without fear of shimmy. The only draw back is another cable to actuate. If you forget to unlock it, you can still steer the plane it is just more difficult. You basically line up for take off and engage the lock or on the take of roll you engage the lock so that it holds the nose gear centered. After landing you unlock it.

If you have switched over to the dash 5 version of the XL, make sure that you switch your bellcrank on the ailerons

to the opposite direction.(the aileron bellcranks in the wing root are 180 degrees different) If you do not, your controls will be backwards. Always make sure you check that your ailerons are working in the correct direction or you could have a ride like I did a month ago. One of our builders switched to the dash 5 here at the builders center. Of all the people that looked at the plane, no one noticed the problem. Fortunately, during the fast taxi runway hops it was caught and fixed. I should have caught it before it was taxied. Lesson learned, don't assume anything.

The guys found out on the way back from Oshkosh that if you lose your screw or screws in you upper cowling/plenum runner area, you could lose half your cooling. On a Top NACA engine cooling setup the front of the plenum runner is held in place by the cowling screws. If you only have one screw in that area and you loose it the leading edge of the runner folds down and blocks off the air. The solution is to add another screw if you only have one, or beef or stiffen up the upper lip of the runner so that it keeps its shape if you lose a screw.

Work is still progressing on the turbo continental installation. We should be starting the engine by the time you see this. The plenum chamber is built in 9 pieces. We have a special box for duel air cleaners that get air from a scoop on the bottom and from there, feed the turbos. I had to make special brackets to hold the intercoolers, move things around and add some heat shields. We will be probing the interior of the engine compartment to monitor the temps. We should fly soon.

An interesting thing happened to the trainer (94VA) the other day. As you know, the trainer gets plenty of abuse in its day-to-day life. After the plane came back from training both pilots got out of the airplane and went inside. Soon after that, the gear bolt that wasn't already broke, broke, the main gear crept forward lowering the back of the airplane enough to shift the weight and raise the nose so that the propeller was holding the plane up in the back. I had just repaired the prop the day before and it was damaged in the same place again. What happened? Well somewhere along the way one of the two bolts that hold the gear in the fuselage broke. Normally if you have been flying the airplane, you would be able to feel the difference but we think when Sam and Tom (our new instructors) started to fly the airplane, one was already broke and they didn't know any better. After many hours on only one bolt, it finally let go. The key here is that if you repeatedly make bad landings and or you land with the brakes on, etc. you should check to see if you have damaged anything. One way to check is to rotate the bolt on one side and make sure it rotates on the other. Another way is to measure the distance from the corner of your door to the leading edge of your wheel pant or tire and monitor that dimension. You can also tell based on the paint line around the fairing. In any case, it is best to replace one before they both break. These were the 1/2" bolts so it took a lot of force to break them. The good thing was that when they broke, they broke the bushings loose. If they didn't you would not be able to get the bolt out of the bushing. As it was, all the bushing came out so we cleaned everything up and glued it all back together, glassed over the bushing and that was it. Oh yea, I had to fix the propeller again but that damage was only half as big as it was the previous day. This was a fixed gear airplane in case you where wondering. On the RG, the gear leg goes up into a socket, which further enhances the torsional strength of the set up in case of landing with the brakes on.

Elevator balancing on the big wing or XL

We have always added the weight to the center counter weight arms since that was the most convenient. As it turns out, that is not the best place to add weight. You should add it to the outboard arms or both. We had a few situations with the 173 canards that would develop a flutter or oscillation. Those that had it, ended up over balancing to take care of it or in one case, built a new canard. So, you should see a plans change in the balancing technique of the elevators.

Vibrations in flight

The two biggest causes that we have seen are the gear doors, and out of round or unbalanced tires. Obviously the propeller and engine can cause strange vibrations as well but these things can be elusive. If you get a vibration soon

after take off then it goes away, it is probably wheel and tire balance. If screws get loose or come out of the gear doors, you will get a vibration as well. In the past we have had vibrations because of the lack of stiffness of the gear door hanging past the upper bracket. Actually it was more of a resonate frequency issue but it was annoying never the less. It was like having out of sink propellers on a twin engine airplane.

RG main gear replacement

In the unfortunate situation where a gear leg needs replacement, you may think that all you have to do is wrap it and install it. If the gear legs were computer bent out of steel I would say yes to that. Since they are not, there are a couple of things you need to do to the gear leg before the steel bushing gets glued into the gear. The gear comes with a molded hole in it. This is where the long steel gear bushing goes in. If you are using the one out of your old gear that is fine, if you are using a new one, make sure it is the same length as the old one. When you install the gear leg temporarily, you can see how well the gear fits up into the well. At this point the tire and axle are not in place and your axle bolt holes have not been drilled. The gear leg may not fit exactly as the other one. If that is the case, you can elongate the hole through the gear to change the position of the gear leg in the socket at the top as well as the fit of the gear in its well when the gear is up. I usually do a little at a time and insert little toothpick size pieces of tongue depressor to hold the bushing where I want it to stay while I insert and try again. You don't have to be perfect but the gear has to fit in the hole. Before you glue it in, you can check the tire fit. I usually clamp the axle to the gear leg about where I think it will be then slide the tire and wheel in place then rotate up and check for fit. I will then move the axle around until I get the tire in the middle then use the axle as a guide to drill the holes. If the axle is hanging off the side of the gear, that is too much and you must move the gear some more. When you are satisfied with the fit of everything you will glue the bushing in the proper position. You can now use your fixture again to drill the hole in the top of the gear for the linkage. All you have left is the tab on the gear leg for the gear door.

Fixed gear – nose gear slop front to back.

As you remember on a fixed gear the nose gear is captivated in the nose up against a rubber bumper with steel plates on each side. This will act as a shock absorber for taxiing. During a landing, the load goes both ways but the initial load is aft against a stop that will not move so we rely on the gear itself to give a little. In any case, in time, the metal plate on the rubber shock absorber will dent from the roundness of the gear. This will then leave about a 1/8" gap between the gear leg and the metal plate on the rubber. What we have done in the past was to insert about a 1/2" piece of aluminum angle into the gap between the gear and the bumper. That is the quickest fix but a better one would be to space the whole bumper away from the canard bulkhead until it pushed up against the gear. The bumper or shock doesn't seem to change shape after this initial denting process.

Flight controls

After flying many airplanes that come down to the shop, I usually find ways to make them feel better in the air. The aileron cables need to move freely in and out. If they do not, you need to find out why. It could be alignment issues with the cable clamp and direction of the cable. It could also just be the dust covers on the cables. You should remove the caps that cable slides through that are inside the cabin since they do not need them. I am not talking about the rubber sleeves that are at the knuckle. In the engine compartment, you may have to ream the holes in those caps to allow free movement then re-install them. These caps probably cause most of the drag on the cable. In the elevators, you need to make sure that the hinge screws are not too tight and that the system isn't rubbing on anything. You should be able to push the elevator down and have it return to exact position it was when you let go. It should feel like a spring. If your controls are binding, the plane will feel less stable in the air. Also, you need to be able to put an up load on the canard and make sure that the elevators do not rub anywhere. Do this by pulling up on the end of the canard at the same time you move the elevators and see if everything still moves smoothly without binding. The rudders should have a good return spring feel when you push a rudder out and let go. If it doesn't, they may not return as well as they should in flight based on their angle and shape and also they may not be consistently going back and therefore causing you to have a different yaw position every flight. If you have to, cut the spring (inside the rudder well) off a little and hook it back up until you get a good return on the rudder. If you don't have a strong spring and the shape of your rudder is such that it will not as easily be aerodynamically held back, you could get a rudder flutter or shake. There should be a slight scallop outboard on the outside surface of the rudder. This will load it up. If that has been taken out, it increases the chance of this situation arising. This may

not happen for years until the springs get weak then bam, there it is. So, check those springs to be safe.

[Top of the Page](#)

Mechanics Corner



by Brendan O'Riordan

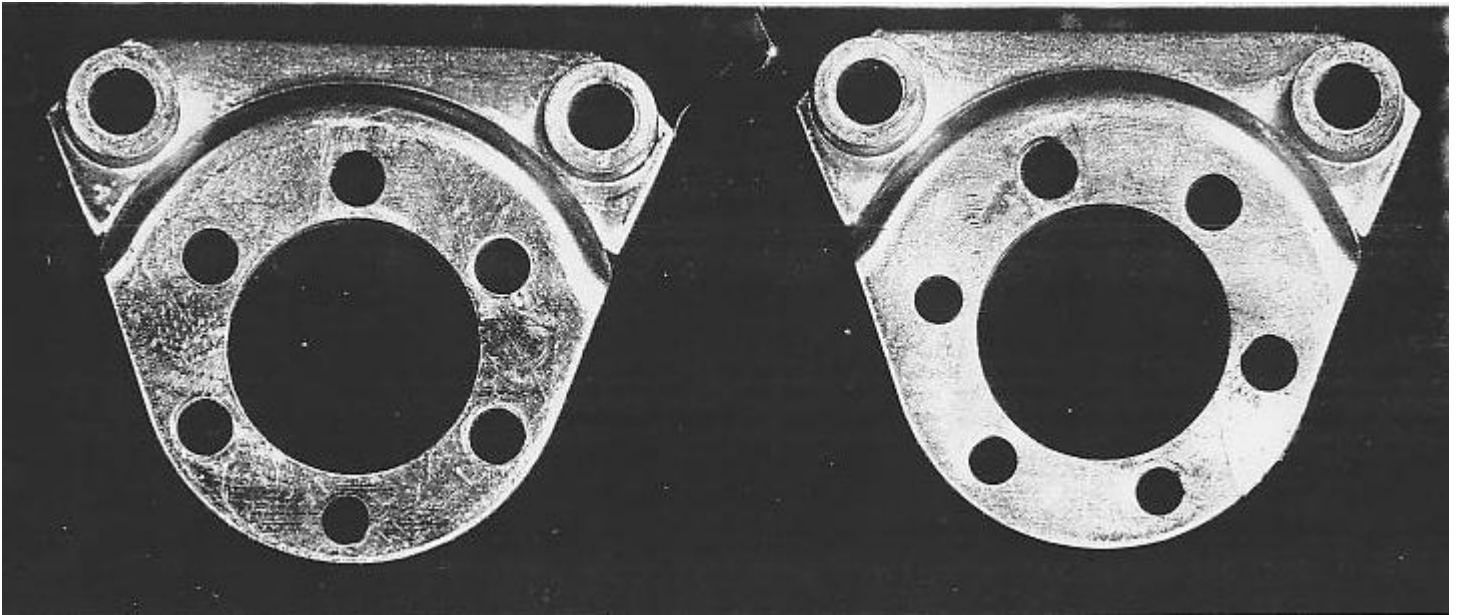
There are a few issues we have had builders run across on some of the parts we use on our Velocity's that we need to let you all know about so you can check your installations.

First off I had a builder with an Electric MT prop call me because he was having problems blowing circuit breakers on his prop. He also wound up shorting out the motor on the prop. After months of scratching his head and checking just about everything he found what was causing his problem.



There is a brush block that rides on a ring that is attached to the starter ring gear with an electric prop. This is how the prop motor gets its power. The wires that went from the brush block ring into the starter ring gear go over a hard edge on the starter ring gear. (See Picture Below.) Both wires had chafed right at this point allowing them to short out on the starter ring gear. New wires and two little pieces of rubber tubing were all that was needed to fix this.

Another problem we have run into is with the mounting plates on our Cleveland Brake upgrades on the XL's. We have receive a couple that have the wrong hole pattern on them from the factory. This was a photocopy of two mounting plates the one on the left has the proper hole pattern where the one on the right is about 10 degrees offset counter clockwise. If you have received a set of Cleveland brakes from us but have not installed it check the hole pattern before you modify it.



[Top of the Page](#)

Flight Instructor Input



by Sam Anderson

My first experience of Oshkosh was a positive one. We started our trip to Oshkosh, Wisconsin on the 23rd of July. From Sebastian, FL to Oshkosh, WI it took a little over 6 hours of flight time in the XL-5 “Childs Play”. We had one stop in Purdue to fuel up and to check weather. The entire flight was pretty uneventful until we reached Oshkosh. Having never flown into Oshkosh it was quite an eye opener to follow the arrival procedures in the notam.

Approaching Oshkosh you hear people making radio calls and you know that there are many airplanes around, but we could never see any. Once we reached Ripon that is when we caught view of the traffic. Ripon is the converging point and so your head is on a swivel because planes are coming from every direction. It was an exciting time from the moment we reached Ripon to the moment of touchdown. Luckily the whole procedure was completed without incident.

The first day of the air show was the 25th of July. Walking around the airport grounds I was amazed at how many airplanes actually are there. It is incredible; anything that can fly is there. For an aviation enthusiast I highly recommend making the trip to Oshkosh next year. For those of you who could not make it this year, you really missed some historical events. Space Ship One attached to White Night (the Mother Ship) flew in and landed after making several fly-bys. They parked space ship one in a central location so everyone could get close and see it. After the air show Space Ship One departed to Washington D.C. to take it’s place in the Smithsonian and remain there forever more. Oshkosh was it’s one and only public appearance before being retired. The Global Flyer was also there.

Oshkosh is always used to announce new and exciting things in aviation. Several VLJ (Very Light Jets) were unveiled there. Last year the new Sport Pilot rule was announced. There is always a good reason to come to Oshkosh. We had a successful show and I enjoyed meeting a lot of you at our Dinner that we had midweek. I look forward to meeting more of you as time goes by.

[Top of the Page](#)

[Completions](#)

Email us a picture of your airplane and a little background about it to newsletter@velocityaircraft.com

Usually this is where we would like to post completion pictures but I haven't received any lately. I have talked to quite a few of you guys who have just started flying recently. Drop us a line with a picture or two to share with the rest of the Velocity Builders.

This is a picture of Brent and Carrie Reinhardt. This was a few years ago when they were both based at Hill AFB flying F-16's. We would like to Congratulate them on the birth of their first child Ella Drew. Brent and Carrie have been working on an XLRG for a few years now and aren't too far away from getting it in the air.



[Top of the Page](#)

[Builder Articles](#)

If you have Velocity related information that you want to share with your fellow Velocity Builders send us an article to newsletter@velocityaircraft.com . Don't forget pictures.

[Items For Sale](#)

Wired Instrument Panel



Instrument Panel painted with upholstered glare shield for Standard RG or FG aircraft.

All the following installed and wired using an "Approach System" Hub.

- Apollo GX60 Com/GPS with moving map
- Apollo SL 30 Com/VOR
- Apollo SL70 Transponder w/encoder
- Apollo SL15 MS Stereo Audio panel W/ 3 LT
- FM/CD Player
- Circuit Breaker Panel W/Upper Switch Plate
- Warning Lights
- Blue Mountain EFIS #1 with Engine Probes
- Blue Mountain EFIS LITE

ALL NEW AND NEVER USED

Above items are now available for individual sale. Contact Duane Swing or Scott Baker for prices.

[Top of the Page](#)

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