

# VELOCITY VIEWS

Volume 11

## Update on Velocity's New XL

**W**E CONTINUE TO PUT TIME ON THE XL AND MAKE IMPROVEMENTS AS WE GO. We are still working on the cylinder cooling design and have seen improvements each time we make a change. Our main goal is to be able to aggressively lean the engine to the best power without seeing excessive cylinder temperatures. We are presently running about 15° below maximum allowable under these conditions and our goal is to get this to about 45° below maximum for continuous operation. The latest change we made was to provide a small airfoil shape to the inlet of the arm pit scoops. This made about a 5 to 10° reduction to the CHT's. Next will be to place an air deflector in front of the exhaust and open up the area in front of and behind the exhaust to form sort of an augmentor arrangement. These were suggestions made by our good friend Jim LePresti, who works with his father Roy in all those Piper speed mods.

With the addition of the second oil cooler, oil temperatures have never gotten over 200°. Most of the time, we will see about 185° in normal cruise. The plans will show a front mounted oil cooler (for cabin heat) and an engine mounted oil cooler as a supplemental. I am presently heating the cabin with a high output electric heater and it seems to work fine at high altitude where OS temperatures may be in

the 40° range. I don't know how well it will work at 0°.

We have tested the airplane into the pitch-buck phase and find a stable buck at about 58 knots with one person and about 65 knots with about 450 lbs in the front seats. All tests have been done with about 40 gal. of fuel in the tanks. The airplane seems to be more stable in pitch at the aft limits than any of our other airplanes. Not sure why.

The change in aileron size and position wasn't particularly impressive and we will go back to the original 173 size and placement for production kits. A noticeable improvement in rudder response gives the airplane a very positive roll control when used at low speed in conjunction with aileron input. Flying in rain gives the airplane a slight pitch-up and is easily controlled by a slight trim change.

Cruise performance has been just about as predicted. I did find an unusual situation when flying at a density altitude of 10,000 ft. Normally, anything above a density altitude of about 7500 feet will result in a power loss of about 6 to 8% per thousand above 7500 ft. While 7500 ft will result in a power output of about 75%, 10,000 ft should result in a power of about 55 to 60%. This is verified when leaned to peak EGT and fuel flow is reduced from 15

*Continued on next page*

## In this issue

- New XL model .....1**  
*New XL well received at Sun N Fun, ready for Oshkosh!*
- Factory News .....4**  
*Builder notices, Franklin engine changes, California trip, Oshkosh Dinner, and other news from the Swings*
- Safety Corner .....6**  
*Accident & Incident Reports and Maintenance Service Difficulties.*
- Factory KPCs .....9**  
*Kit plans changes to keep your manual up-to-date*
- Short Circuit .....9**  
*Electrical, instrument, and avionics related tips from Martin Hadley*
- Views from the West .....11**  
*News and builder tips from Velocity's west coast service center*
- Bahamas '97 Fly-in .....12**  
*What happened???*
- Medsker's Helicopter .....13**  
*Oshkosh will never be the same*
- Builder Forum .....14**  
*Tips, information & letters*
- Buy Sell or Trade .....17**

Continued from page 1

GPH to 12.2 GPH. The strange thing was that my true air speed stayed the same. That is to say my true air speed at 7500 ft at 75% power was 205 knots, and my true air speed at 10,000 was also 205 knots. More testing is in order to see what is going on here. These tests were made with

about 45 gal. fuel and two souls on board.

All the test information is made using the Lycoming IO-540 260HP engine. Jean Prudhomme will be testing his 300HP version soon and a comparison can be made between the 260 and 300 engines for your benefit. Just for your information, the XL

empty weight painted and complete with everything was 1640 lbs. We have set the gross weight at 2700 lbs. I have flown the airplane at 2700 lbs. and find the airplane easy to handle and runway lengths of 2500 feet should be adequate for all but the higher density altitude situations.

Duane

## Aircraft Specs:

	Production Standard Aircraft	Production I73 Aircraft	Production XL Aircraft RG
Length Overall	19'	19'2"	20'
Height	7'9"	7'9"	7'9"
Wheel Base	100"	100"	110"
Track Width	80"	80"	80"
Wingspan	29'4"	31'	31"
Canard Span	1'64"	1'88"	1'88"
Wing Area	102 sq.ft.	122.5 sq.ft.	122.5 sq.ft.
Canard Area	19.8 sq.ft.	22.8 sq.ft.	22.8 sq.ft.
Total Wing Area	121.8 sq.ft.	145 sq.ft.	145 sq.ft.
Empty Weight	1300 lbs.	1350 lbs.	1640 lbs.
Gross Weight	2250 lbs.	2400 lbs.	2700 lbs.
Useful Load	950 lbs.	1050 lbs.	1060 lbs.
Useable Fuel	65 gals.	75 gals.	70 gal. standard (100 opt)
Wing Loading at Gross	18.37 lbs./sq.ft.	16.5 lbs./sq.ft.	18.09 lbs./sq.ft.
Design Load Factors	+12 G's/-9 G's	+12 G's/-9 G's	+9 G's/-7 G's
Tested Airframe Load	+6 G's	+6 G's	+6 G's
Cabin W/L/H	42.5" x 84" x 42.5"	42.5" x 84" x 42.5"	47.5" x 94" x 43.5"
Seating	2 + 2	2 + 2	2 + 2

## Actual Performance at Gross Weight (200 HP Lycoming)

	Velocity	Velocity RG	I73	I73 RG	XL <sup>†</sup>	XL RG <sup>†</sup>
Take Off Distance	1400 ft.	1400 ft.	1250 ft.	1250 ft.	1400 ft.	1400 ft.
Rate of Climb (sea level)	1000 fpm	1200 fpm	1000 fpm	1200 fpm	1200 fpm	1300 fpm
Landing Distance	1500 ft.	1500 ft.	1300 ft.	1300 ft.	1500 ft.	1500 ft.
Cruise (8500 ft.)	170 kts	187 kts	162 kts	174 kts	188 kts	200 kts
Max. Speed (sea level)	180 kts	198 kts	172 kts	184 kts	200 kts	210 kts
Ceiling	20K	20K	20K +	20K +	20K +	20K +
Range at 75% (NM)	1000	1150	1150	1240	1065	933
Minimum Speed	65 kts	65 kts	60 kts	60 kts	65 kts	65 kts
Landing Speed	75 kts	75 kts	70 kts	70 kts	75 kts	75 kts

\* XL with Lycoming IO 540 - 260 HP.

† Fixed Gear standard fuel cap. 85 gal.



## XL Ready for Oshkosh

Big. That's the best way to describe Velocity's newest aircraft, the Velocity XL. Big cabin. Big engine. Big fuel tanks. Big range. All this and more highlight the Velocity which many potential kit builders could only dream about until now.

The Velocity XL offers features not previously available in a kit four-place home-built composite airplane. Specifically, the XL cabin width measures a wide 47-1/2", comparable to the Rockwell 114B and the Piper Lance. The rear seat is as wide as the front seat, and the cabin boasts an extra 10" from the standard kit, for additional luggage. A new plenum along the roof of the cockpit provides separate air ducts and individual reading lights for each front seat. The extra width also allows more switch panel space on the panel above the windshield, so now all the function switches can be located there, eliminating the need

for any on the instrument panel. With the width to straighten the instrument panel, the co-pilot side enjoys increased leg room. The XL also features extended carbon door beams (roll bars) across the entire fuselage top.

The performance of the Velocity XL is big, too. Powered by a Lycoming IO 540 - 260 HP, the performance range of the retract gear model is a cruise speed, at 75% power, of 200 kts with a fuel burn of 15 GPH. The aircraft's range with the same engine and 70 gallon fuel tanks - 100 gallon tanks are optional - at 65% power is over 5 hours at 190 kts, equalling over 1000 nautical miles.

The Velocity XL kit, like the standard Velocity and the big wing Velocity 173, is available with fixed or retract gear. The Elite option easy-entry gull wing doors are standard on the XL.

### Factory Updating Builder Data Base

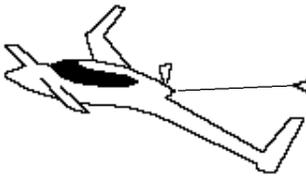
If you did not complete the builder info sheet at the Sun N Fun Banquet, we are asking all other builders to help us update our records. If you plan on attending Oshkosh, we can give you the input form there. Otherwise please call us and we will mail one to you.

*Thanks, Bonnie*

### Oshkosh Banquet

*Please be sure to sign up for the Oshkosh Velocity Banquet. See page 5 for details*

*Thanks, Bonnie*



by Duane & Scott Swing

## FRANKLIN ENGINE INSTALLATION INSTRUCTION CHANGE

Many of you have received our Franklin engine installation instructions that were used on an earlier version. Also many were sent out without the photographs of the completed installation.

You first need to check your engine mount to see if you received one of the new style. The easiest way to do this is to measure the distance between the two bottom legs that attach to the firewall. They will be approximately 26" hole to hole. If this checks out, look at the instructions in the second paragraph and see if there is a reference to a 1 1/2" measurement from the spar to the co-pilot side upper attach hole. If so, change this to 1". This now makes the pilot side and co-pilot side the same measurement from the spar to the holes. Also, with the new style mount, you will not need to add the triangle gussets to the forward face of the firewall as noted in the previous news letter. This is because the spacing of the bottom legs brings the mount into the same area as the triax layouts used to strengthen the landing gear attach.

We also have added a fiberglass engine oil cooler adapter, 2" of SCAT hose and an aluminum 3" adapter, to the supplemental oil cooler kit. This forces the heated air from the outlet of the oil cooler down through the bottom of the cowl instead into the engine compartment. Instructions are also included with this change.

If you want any or all the instructions on the above, just call Pat or Gail. If you want the added parts for the oil cooler, call Daren. They cost \$33.00.

We have also found that not all firewalls are installed exactly the same as the one we used for our Franklin installation. Once the engine is installed, check to see if the crankshaft sets close to the center of the cowling opening. If not, you may have to place spacers between the engine mount and the firewall to insure proper alignment. If the engine is installed properly, the top cowling will just clear the aft spark plug on the pilot side. Shim the mount to provide the proper clearance. If there is a big difference, it could be that the carry through spar was installed improperly. In this case, it would be necessary to hold the engine in place with the crankshaft in the center of the cowl opening and drill through the holes in the engine mount through the firewall. This would eliminate the need to place the mount 1" above the carry through spar. If in doubt, call us.

## FACTORY POLICY CHANGE

The other day I received a call from a gentlemen who had just purchased a kit that had been dormant for about 7 years. Not a lot had been done on the kit and evidently he thought several parts may have been lost and wanted to know about replacements, he had the old plans and wanted to know if he should purchase the new ones, he wanted to know about the epoxy, the glass we use, hints and procedures he should take to speed the build process etc. etc. All in all, I spent the better part of an hour talking with this man. The point is this, we have to educate this new Velocity owner all over again. This takes time and time is money. A call to some of my friendly competitors resulted in this revelation, they all have a charge they impose on kits that change hands. If the new owner needs factory support, he has

to pay for it. If he purchases a flying airplane, perhaps he doesn't need our help, on the other hand, if he still lacks 800 hours to complete, he will surly be on the phone to us often. So, what is a fair price for this support? After looking at the competition we have decided to set this cost at \$275.00. If you should decide to sell your Velocity, please inform the new owner that it will cost him \$275.00 to obtain the same level of factory support as before. This policy goes into effect immediately.

## California Here I Come

I got a call from Mark and Nancy Machado of Velocity West asking if I would like to fly the XL to Chino California to the Chino Air Fair. This seemed like a good place to get some cross country time in the XL and report back to you some of my observations during this flight.

First, a word on the Chino airport. Chino is the home of the Planes Of Fame air museum and home also to many warbird restorers and owners. Anyone interested in the old WWII airplanes will go crazy here. I've never seen so many P 51's, B 26's, P 38's, P 39's and other warbirds as on this airport. There is one man there who owns several lumber companies who has at least 25 restored WWII airplanes in his two large private hangars. His collection isn't even open to the public except by special invitation. Oh, what a place.

I left Sebastian at 6:30 AM and climbed directly to 10,500 feet to fly above the Class B airspace in Orlando. A radio call to them and I discovered that my transponder was not working (King). Ground speed worked out to about 175 knots into a 20 knot headwind. I later dropped down to 4500 feet and my ground speed went up to about 185 knots. With a couple of enroute fuel stops, I decided to terminate the flight about 1-1/2 hours short of Chino. It was about 4:00 local time and I would have had no problem of landing in

Chino by 5:30 if I had decided to proceed. The motel was only a short walk from the airport and I decided to finish the trip the next morning. Anyone who has flown the afternoon excursion through the New Mexico and Arizona mountains know why I decided to call a day.

The winds shifted the next day and the flight through the Banning Pass and Palm Springs was not only gorgeous but the ground speed was over 200 knots; not bad for a power setting that used under 12 GPH.

Upon landing I ask for taxi instructions to the Aircraft: Spruce radio center for replacement of a faulty transponder and a complete IFR certification check in case I needed to file for the return trip. Aircraft Spruce also let me use their hangar while there to keep the XL and Nancy and Mark's Velocity out of the weather.

The Air Fair was a nice place to meet many of our "Western" builders and a great time was had by all. I took several "demo" rides during the two day event.

A flight on down to Remona to visit the Sparrows and Lehrers, more Velocity builders, and then on to San Diego to see Jimmy Haynes and inspect his Chevy powered Velocity RG. Jimmy should be flying by the time you read this. Some time was also spent with Dave Martin of Kitplane magazine who will be doing an article on the XL in some future issue.

A late afternoon departure from San Diego eastbound to get away from the normal early morning fog in that area resulted in a landing in El Paso Texas before sunset. It was necessary to deviate several times to get around some rain and T storms in the area. Flight time from San Diego to El Paso was 3:30 for an average ground speed of about 185 knots.

The next morning was picture perfect and the weather channel

gave me a clear shot all the way to Florida. The FAA Flight service, however, gave me the old "VFR not recommended", briefing. I departed anyway and with the exception of a few low level clouds, made it to Louisiana for my first fuel stop. From there to Sebastian was uneventful and I landed at 5:20 PM. I flew most of this day at 10,500 to 12,500 using a portable oxygen system and averaged about 190 knots on less than 12 GPH.

A few observations can be made from this trip. First, my old style "no good by many of our builders" foil antennas worked great. At 10,500 altitude, the VOR would come in strong in excess of 100 nautical miles and at one time flew direct to a VOR that was 140 nautical miles away. (My GPS was not coupled to the Nav-Aid autopilot). Working center was never a problem and I regularly tuned in the ATIS frequencies for altimeter settings from 75 to 100 miles out. At one time I tuned in the

Orlando ATIS 150 nautical miles away and had no trouble understanding everything they said. As some of you may know, ATIS usually use a rather low power output to transmit.

Another observation I can make is that flying from middle Texas to California in the afternoon is not the most comfortable way to travel. Surface winds combined with the mountain wave effect make vertical excursion the norm. I've seen as much as a 2000 feet (the max my rate of climb would register) climb or decent with no power change many times. I even climbed to 17,500 feet to try to find a smooth ride but it just wasn't there.

One other observation, don't take along chocolate covered peanuts on a trip like this. I had the biggest peanut cluster I have ever seen after the first fuel stop in Texas in the 95 degree heat!

*Duane*

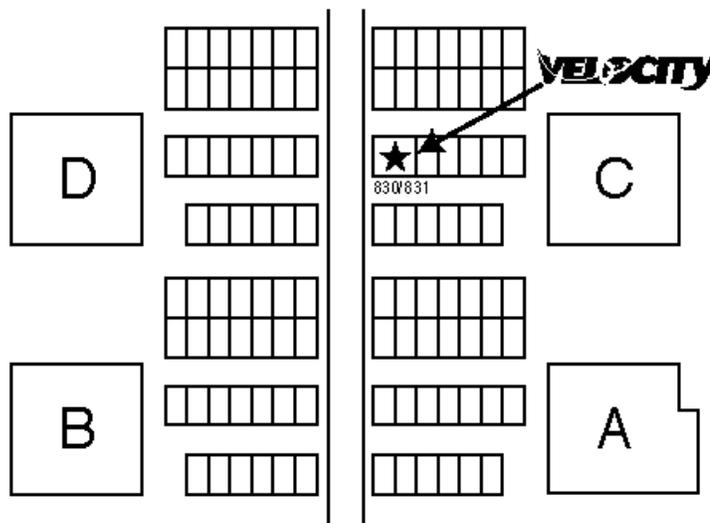
### Some Notes on Oshkosh

The Velocity Oshkosh Dinner will be on Friday, August 1st at the Hilton Convention Center in Regatta A Room. Social starts at 6:30 pm, with dinner served at 7:00pm. There will be a choice of 3 entrees, at \$18 per adult and \$9 for children 4-10. Please call the Velocity factory office to be put on the dinner list or stop by the booth at Oshkosh.

Don't miss us at Oshkosh - our booth location has changed. We are now 830-831, between buildings C and D (see map). We hope to see you there!

*Bonnie*

### New Velocity Booth Location at Oshkosh





# Safety Corner

Accident & Incident Reports,  
Maintenance & Service Difficulties

## What's the Point?

There are times I get very frustrated in this business when I hear about, or read about, a customer who is putting us down for not reacting to his particular problem. It all started when Martin responded through the Reflector that a properly functioning and maintained retract system in the Velocity was perfectly safe and should never cause a problem. The word "never" was a mistake and Martin has been beaten severely with a 22 gauge wire until the word "never" would never be uttered again. In this case, a Velocity customer (he is building a fixed gear or was and purchased a retractable gear flying Velocity) had a main gear collapse on taxi. The overcenter linkage was of the old style with a three or four year old gas strut holding the overcenter linkage to the overcenter position. The previous owner of the airplane was aware of the requirement to replace this gas strut but did not do so prior to the sale, and never mentioned it to the new owner. The new style overcenter linkage was not yet developed. Velocity was blamed for not letting him know about the potential problem. We were also accused of withholding accident information from Velocity customers and challenged to publish ALL incidents/accidents involving Velocity airplanes.

I responded to this customer indirectly through Velocity Views by requesting that anyone out there who had an incident or accident should report this to the Velocity Views directly (not through Velocity) and it would be published exactly as reported. Guess what, no one responded. Should I glean from this that no one has had an accident or incident? Of course not. What it does

show, however, is that most accidents/incidents have a cause that is not necessarily directly related to Velocity. An engine failure resulting in an off field landing with substantial damage to the airplane should not be blamed on the airplane.

This same Velocity customer who had the main gear problem, more recently reported in the Reflector that he had a nose gear collapse. His conclusions were that the nose gear system is no good and the gas strut, which he erroneously claimed was all that keeps the overcenter linkage from collapsing, was a poor design as verified by at least two IA mechanics who looked at it. He also stated he would not fly his family around in a Velocity and that we should not advertise the airplane as a "family" airplane. In addition, he said the Velocity was causing him serious financial problems (consumed his life savings he said) because of the high cost of all the problems he had experienced and he could no longer get insurance on his airplane. (I assume due to the claims). He also indicated that Velocity was withholding accident information from our customers and that he had ask for full disclosure over two years ago and Velocity did not respond to his demands.

Before I go on, let me point out that the Reflector is an e-mail type correspondence that was designed for Velocity builders to share information with each other. For the most part, this information is very constructive and worthwhile. Contributors are encouraged to be positive and share building experiences with others. To this end I applaud the effort. In this case, it got out of hand.

So, what's the point? If this builder has had a problem, why not help us solve the problem instead of a condemnation of Velocity and the

design? This individual claims he is an aeronautical engineer. Why not find a better way if the present design is so bad? Why does he think an aircraft IA mechanic is so smart to claim the present system a poor design? The whole point is constructive criticism not condemnation.

What would happen if potential Velocity customers were to read his letter? Velocity could conceivably close its doors due to these kinds of comments. Who then would suffer? Not having builder support would be the first of many problems you, our customers, would feel. A plummet of the value of your airplane would be no small matter to most of you. Of what value do these, and other negative comments directed at Velocity, have? Must some of us have such a vindictive attitude that all common sense gets thrown out the window? So again I ask, WHAT'S THE POINT?

*Duane*

## Service Caution

Emergency Notice: 173 Fixed and Retract Gear

We have had one confirmed with two more possible elevator flutter incidents. In the confirmed case, the elevator moved up and down with enough velocity to almost yank the control stick out of the pilot's hand. The incident happened while cruising at 140 knots with a slightly unloaded condition (nose starting to drop). Slowing the airplane down with power reduction and nose up elevator did not stop the flutter. An aggressive down movement of the stick loaded the elevator enough to stop the flutter. The pilot reported an up/down deviation from neutral of approximately 6" (12" total). Only a small amount of structural damage was found. After checking the balance of the elevators, it was found to be heavy on the trailing edge and required considerable lead weight to balance. It should be noted that the 173 elevators are considerably longer than the standard elevators and the supplied lead counter weight material is the same for both elevators. It is evident that it should take more

weight to counterbalance the 173 elevators. If you have not checked yours, do so immediately.

## Service Notes

Reminders - These items were mentioned before but since some of you have not seen them, they are worth repeating.

### 1. Flight critical

a. The inboard counterweight arms have bushings attached to them that are inserted into the elevator. These bushing (Pre -1992) were attached to the arms by two 10-32 screws. The bushing were tapped to accept those screws. Some of them were found to have been installed without Loctite and had worked there way out. This caused slop in the elevators - right to left. This problem was solved by using longer screws that went all the way through the bushing with nuts on the other side. If you have an older kit, it would be a good idea to check this.

b. No aluminum fittings into the engine. Oil line fittings, fuel fittings, etc. that go directly into the engine should not be made out of aluminum. Let's just say that we have had a few customers that have had a problem in this area.

c. Nose tire tube, small tire only, replace at least every 5 years because a few customers had the stem break off.

d. Control sloppiness and binding. In the aileron system, if you have more than 1/8" slop in the system then you must find the problem. It could be bolt hole sloppiness, too many curves in the cable, bolts and nuts not tight, bad bearing, etc. If there is binding it is usually at the ends of the ailerons or elevator where there is not sufficient clearance when loaded. In the elevators, the screws may be too tight, lack of lubrication, misalignment, counterweights rubbing, etc. In the ailerons it is common to have misalignment of the cable as it connects to the bellcrank. This has a built in ball joint at the end and it will allow some movement. You must remember that this cable needs to be aligned in both directions not just one. If you exceed

that movement there will be stiffness or binding in those ailerons. The stick needs to be bolted to the aileron torque tube tight enough to eliminate slop but not so tight as to bind the elevator movement.

### Other items

- When we added the gusset in the top of the main gear linkage, it made it necessary to round off the top of the gear leg and steel ring to gain clearance. If you do not check this, it could bind up and damage the linkage. This is in the plans but it wasn't when we first made the changes to the linkage. The gusseting was mentioned in an earlier newsletter and is only done in the new style linkage. The new style linkage has a different fork end on it for connection with the gear leg. It has four individual tabs welded on the linkage instead of the two u bend pieces.

- We have noticed that if you screw the CAV - 110 fuel drain directly into the sump tank, it can interfere with the fuel outlet fitting. It does not allow movement of the drain valve to let fuel out. The fix would be to remove the fuel outlet and remove some of the threads so that it does not reach as far into the tank.

- Earls Oil Coolers - As used in the Lycoming engine supplemental oil cooler installation. We have had one customer have problems with the cooler (leaking) after about 9 hours of operation. This customer had two of them do the same thing. Normally the cooler is mounted to the baffling and this is where it was. This has not occurred with anyone else but we think it may be related to vibration. Because it has happened twice we discounted the idea that it was damaged when installed so we would like all who have this installation to inspect the cooler for signs of leakage. If all is okay, we would appreciate some feedback as to the hours in service so we can find out if this is more isolated. Alternate mounting methods could also be used to isolated the cooler from the engine. Since the engine mount is close by, that could be used to hold

the cooler. Also, some kind of rubber mount could be utilized to cushion the cooler from the vibration of the Lycoming. More will be mentioned in the next newsletter as to a more specific solution. The jury is still out.

-The really big hatch or as some refer to it, the RBH, has been a topic of discussion and I have been asked to give my opinion more than once. I think that if you have the single gull wing design and would like to be able to remove the canard more easily or be able to access the radios etc., than an extra hatch would be a good idea. The down side to it would be that it doesn't look all that good. The more cuts, you make the more screws you have, the more spots you have to worry about fit and finish, etc. As long as you flange and screw it back together right, you should be okay structurally. For those who have the Elite door set up, it is much easier to reach in and remove the bolts and I do not feel the pros outweigh the cons. A small hatch as Mark Machado did with the 173 FG Elite was nice because it allow limited access to the radios and connections but was not so large as to be real noticeable.

- For those who would like to know a little history about the RG system, I will give an overview. This was brought on by a customer who bought a flying RG from another customer and had some problems. I am sure many of you know what I am talking about.

1. System originally developed using the same bolt size as the FG, 3/8" that goes through the main gear pivot. The linkage was using a gas spring that would bring it to the overcenter position. The nose gear utilized the same channel of the FG and had oillite bushing in it.

2. Through builder experience, since we never hurt the system, we went from 3/8" bolts to 7/16". In order to get a solid fit into the bushing we tried machining the bushings to accept a bolt from each end. We

added some area to the gear in the bushing area so we had less room between the gear and the bulkhead. This would insure less bending of the bushing. We also added some extra triax on the canard bulkhead and went to a heat treated nose gear. A captivator was added to the top of the gear to eliminate side play and to give the gear more support when turning. The fixed gears were never heat treated.

3. The 7/16 bolt set up didn't work very well because the bushing could bend in the middle. We then made the final change to the 1/2" bolts with a tight fit into the bushings. We also change to steel bushings into the Channel turned inside out so that the gear would have a surface to rub against that wouldn't wear like the aluminum did. The steel also would last a lot longer than the oillite did. We went away from the gas spring in favor of a spring and lost motion lock device. This was first thought up by one of our builders who is an engineer with a toy manufacturer, Don Myers. We then modified it and incorporated it into the system. When we started work on this, we had had one of our customers report a collapse of the main gear. Investigating some more, we found that he had never replaced the gas spring and it was down to less than half of its original strength. At this point we started working on a new system and put a note in the newsletter about this – to monitor your gas spring and make sure your system was adjusted correctly. The system is supposed to be tight. By that I mean that the gear legs must be forced against the backstops of the sockets so that the gas spring had to work to get the linkage to over-center. This was done so that if the spring started losing its pressure, you would see longer and longer gear lock times since the spring couldn't overcome the tightness of the system. This tightness also helps to keep the plane from rocking do to the slop after the linkage goes over-center. This method is used today. This tightness also would insure that the linkage would have less chance

to come up on its own even if the gas spring wasn't there. My point being, if the system was right, it was safe. Just ask Doug Doers, an engineer, since he was the first one it happened to and he has yet to change to the new design. This happened to one or two other customers and one of them claimed to have a gas spring that had more pressure in it after several years in service than it had new. This is the only customer, to my knowledge, that blamed everything on the design. Enough said on this matter.

4. We then went to the keel design which put the nose gear system in shear like it should be.

5. That is most of what has happened during the life of the Retract system. We have also made changes to the fixed gear system just not as many. I hope this gives you the idea that we strive to improve our products as much as we can while not making things complicated. Most of the changes that were made were the result of customer input.

- We had another incident of melted gear. Remember, if you taxi for a long period of time or if you tend to ride the brakes (you better not), lift one wing until the tire is off the ground to unload the gear. This will set the gear back in with its camber and will lessen the chances of the gear moving. This is particularly important when you are learning how to taxi the plane and doing high speed taxi testing. You should not do much of this at one time so you can let the brakes cool down. If you sell the plane to someone who is not used to brake steering tell them about this please! I just flew in a customer's plane with the customer and he was riding the brake the whole time. You cannot do this with a fiberglass gear so don't. It is not all that hard to replace an RG gear but it is really hard to replace a FG and you should never have to.

- I want to encourage your input into the newsletter directly. I get good ideas from you builders when you

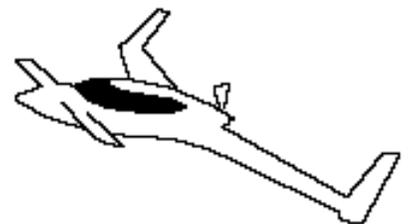
talk to me but I am very busy and I tend not to take the time to write down the builder hint so as a result the other builders do not get this info.

Scott

## Incident

Some of you may have heard that we had to make an off-field landing in our Elite N82VA. What you heard was correct. After a fuel related engine stoppage, the Elite was landed gear down in a field near the Sebastian airport. On the landing rollout, the plane went through a drainage ditch and broke the gear off where it exits the fuselage. There was surprising little damage to the main gear supports and no damage to the canard bulkhead. Most of the damage was confined to the belly of the airplane and will probably be flying again by the time you read this newsletter. The prop was damaged and we have ordered three new blades from M-T that have a wild cord design near the hub. We will report to you on this prop in the future.

The plus side of this report is that the Elite fuselage held up surprisingly well. Even setting on the belly, the doors opened and closed perfectly and we could find no misalignment with anything. At the time of the accident, there were three people in the airplane and no one got



## Looking for First Flights and Flying Velocity Stories

When you get your project airborne, send photos and information about you and your Velocity to Rick Lavoie at *Velocity Views* Newsletter.

# Short Circuit



by Martin Hadley



Well, I am not any less busy than I was at the last issue deadline, but I don't want anyone to think I am gone! Panel sales have been quite

good as I have delivery dates into September.

On a couple of occasions since I have been working for Velocity, I have had individuals tell me of their plans for a 100% all electric instrument panel. Their plans include dual alternators, dual regulators, and dual batteries. The flight instruments would all be electric. One person even considered going with the Rocky Mountain Instrument Micro-Encoder for his sole source of air-speed, altimeter, VSI, and all of the other information that the unit offers. Oh, and let's not forget, dual electronic ignition systems.

I guess that I must be a real old fashion kind of guy. After evaluating the practicality and economic benefits of a dual electrical system and an

all electric panel, I concluded that it is a bad move. In fact, potentially a very bad move.

First, I considered these things to be an advantage:

- It allows for two less types of systems (vacuum and magneto) to be used and maintained in the aircraft.
- It offers 100% redundancy for the electrical generating / source system.
- It guarantees (provided there is adequate DC voltage) a "hot" spark during all operational settings of the engine from startup to full power.

I could not think of any other real advantages, but I am open to more ideas if any of you have them.

Then I considered the disadvantages:

- Complexity of the system components integration if it is to be truly a fail safe system.
- Initial and long term costs.
- Having "all of my eggs in one basket".

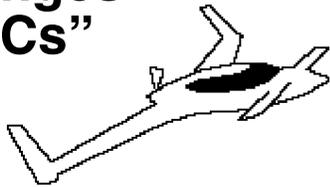
Since I am of the mind that the advantages are self evident, I will not go into detail on those items. I would like to break down and examine the disadvantages.

1) Complexity...

While it may be true that there are 2 alternators, 2 regulators, and 2 batteries, I have to consider the following; Will one system be a standby backup system in the event the first one fails? Do I wire it up similarly to a twin engine aircraft electrical system so that both systems function at all times, so as to not lose power in the event of one system failure? The smarter choice would be to run the systems simultaneously. Of course, now I have twice the batteries and alternators and regulators to buy or repair during the life of the airplane.

Since I have two batteries, do I isolate both systems so that there are no ties between the two? For example, if one alternator regulator quits, do I lose the battery on that system also? Or does the other alternator continue to keep both batteries charged? At least in most twins, that decision is made for you since you have only one battery for the entire aircraft. Next, is my second battery

## Kit Plans Changes "KPCs"



Note: Check the date at the bottom of your page. If it matches the "Date of Change" shown in the KPC, your manual has already been corrected.

### KPC 053

Affects: All RG's

Manual Section:

Std. RG: last paragraph on page 8-6

173 RG: first paragraph on page 8-7

Date of change: 15 June, 1997

Change these paragraphs to read:

"Cut two pieces, one for each side, of 3/8" PVC foam, 6.25" wide by about 9" to fit between the top forward edge of the spar cap angling down onto the top of the gear bulkhead at the fuselage flange. Taper these pieces to fit. See Figure 8-4. It fits so that the inboard edge is aligned with the inboard edge of the gear bulkhead."

### KPC 054

Affects: All 173 RG's

Manual Section: Figure 8-4

Date of change: 15 June, 1997

Change the wording for the horizontal foam bulkhead to:

"3/8" PVC foam fit from bottom spar cap to just below bend in gear bulkhead. Template provided.

### KPC 055

Affects: All RG's

Manual Section: Chapter 9

Date of Change: 15 June, 1997

Add the following information:

"Use only red 5606 hydraulic fluid in the hydraulic system. It can be obtained at any aircraft supply house or your local FBO can help."

### KPC 056

Affects: All Velocitys

Manual Section: 13.3.3

Date of change: 15 June, 1997

Change the second sentence of the first paragraph to read:

"If you are installing just the trim motors, you will need a 5-amp circuit breaker."

Continued on next Page

going to be big enough to handle everything? Or is it going to be big enough just to handle a few essential items? If it is going to be just for a few essential items, what type of "essential bus" design do I want? Can I drive the essential bus off of either power source? Or will it be dedicated? How do I isolate my essential bus from the other circuit breakers tied into the system? Will I use power relays? Power diodes? Some type of switch configuration? Just exactly how redundant is my dual power source going to be?

## 2) Costs

For the price of one freshly certified, overhauled, electrically driven attitude gyro, I could afford both a new vacuum driven attitude horizon gyro (A/H) AND a new vacuum driven directional gyro (D/G). For the combined price of a new electric A/H and a new electric D/G, I could buy a complete flight instrument package of new equipment from Velocity (airspeed, electric T/C, vacuum A/H, vacuum D/G, altimeter, VSI, suction gage, vacuum regulator and filter, gyro install kit, pedestal mounted compass, and 2 ea. swivel vents) and still have enough to buy the Whelen Strobe/Nav light system and have over \$100.00 left in my pocket! Check for yourself!

Approximately \$1,500.00 each for the electric gyros vs. \$2,258.00 for the P/N #FLPK and \$625.00 for the Whelen wing tip/strobe light system.

Historically, electric gyros have less time between failures than a vacuum driven gyro. While both type gyros have a gyro mechanism in a gimbal mount with bearings, etc., to go bad, an electric gyro also has many electrical components which do go bad. Since they are harder to work on, cost more to purchase new or used, the repair and overhaul cost of these units strongly reflect those facts.

When I had the restoration shop in Kissimmee, the average vacuum gyro sublet repair / overhaul invoice was \$175 to \$250. The cheapest I have personally ever gotten an electric gyro out of an instrument shop (my cost) for just a repair, not an

overhaul, was \$375.00 some years back. Today you can purchase a new vacuum A/H or D/G for a little over \$400.00. The cost of an adapter pad for a second alternator, a decent voltage regulator, a small (20amp?) alternator to fit the adapter pad, and a small second battery will easily pay for an engine driven vacuum pump and a vacuum regulator.

3) ...eggs...

In the event of an electrical fire, what are you going to do for flight instruments? You can't say "needle, ball, and airspeed". You've only got the ball and airspeed. Or are you going to risk reintroducing voltage and current into a potentially burnt wiring bundle in an effort to find out what you have still got? But of course, the worst never happens when we're VFR on top, or scud running on the deck trying to get home, eh? (None of us would ever do that, right?) And anyway, we will have a second charging / battery source. But that is on the other side of the firewall isn't it!? We just had a cockpit fire. That second source isn't worth a flying flip at this point. And speaking of second source, what just happened to our dual electronic ignition? Dog gonit! What I would do for just one good ole fashion, it either works or it doesn't work, magneto! In fact, the only thing I had to worry about that magneto system was making sure I could turn it OFF, not ON!

In the real world, the likelihood of a behind the panel fire is rare. But even rarer is a simultaneous electrical / vacuum failure. Virtually every single or multi-engine aircraft manufactured with both an electric A/H and D/G in the pilots panel has another backup system, be it electric or vacuum, on the co-pilots side.

I hope it is clear that my concern is not the fact the primary gyros are electric, but rather that they are the ONLY gyros in a panel that is otherwise 100% electric. A behind the panel fire does not typically result in the immediate loss of vacuum to the gyros. A panel with typical pitot / static barometric sensitive gauges, and a combination of vacuum and electric flight instruments still pro-

vides the best overall redundancy in flight information. Regardless of any partial or total system failure, there are other systems in place to provide backup information.

Of course, all of this has not been without some humor. When asked why he elected to go with a 100% electrical panel, one person responded he had experienced two complete electrical failures in the aircraft he had flown (he did not lose vacuum or pitot/static!) over the years and it wasn't going to happen again! Which brings to mind another thought. For those of you that have experienced a total vacuum system failure, would you consider a dual vacuum pump / regulator / filter system?

I thoroughly understand that a custom instrument panel is an extension of one's ego. I, along with several other people, would not like to have to eulogize someone's premature demise as a result of what I would consider as short sighted ego.

As always, Safe and Speedy Construction!

*Martin*

## Things you can do to help Velocity Views!

- Sign up for 1998 Calendar Year Now (see page 19)
- Pay by check versus credit card
- Spread the word - We still need 500 subscribers to become financially viable.

**Thanks for your support!**

*Rick L.*



# Views from the West

By Mark & Nancy Machado

Now that the 1997 fly-in season is in full swing (no pun intended ...honest!), it has given Nancy and me a chance to put a few hours on the company demo plane we have here at Lincoln, a Velocity 173 FG ELITE, N94VA. We finished building this Velocity in October of last year and since that time have zero-timed the engine, flown it with an IVO prop (more about that later) and racked about 100 hours of total flying time. We have flown it in clouds, departed off runways where the temperature was 110 degrees F outside, flown it in two hours of non-stop rain, flown it to Florida and back from California, flown it at night several times and given countless demo flights to dreamers, kit purchasers and future kit purchasers (hopefully!). The bottom line: it just keeps going and going! Oh, it isn't the "hot-rod" I became used to flying with my Standard RG for 350 hours, but it still goes faster than most and, if you do the arithmetic for most trips, the extra time required with a fixed gear Velocity really is peanuts! There is some serious comfort knowing that on downwind the gear is already where it's supposed to be!! For those of you who are building FG's, rest assured, you may be a few minutes behind but the trip will be just slightly less stressful.

Traveling about this spring, we have also had the opportunity to visit many Velocity construction projects as well. By and large, what we have seen is generally quite good. Certainly everyone has been very gracious when we visit their projects, for which we are thankful, but in thinking about some of the visits recently, a few common problems seem to be evident:

1. First, I think I can say most everybody is using too much epoxy!! If it isn't just kinda "spilled around", then it's "pooled-up" on top of a lay-up. More epoxy is not better! It's WEAKER! There is an optimum amount of epoxy necessary to

achieve maximum strength for each lay-up, whether it be the epoxy used to make the bid tapes or the epoxy used in the triax when building your wings. More than this "optimum" amount just makes the lay-up heavier, with no increase in strength. When your lay-up's are heavier than need be, they do more work just supporting themselves, rather than ultimately supporting us!

It's difficult to describe exactly what that "optimum" amount is for each particular lay-up, but I can tell you it isn't a standing pool of epoxy sitting on top of your glass... absolutely never! Try to get a feel for the correct amount of epoxy for each lay-up. Enough epoxy must be applied to completely fill the glass weave or matrix, bubbles should essentially be gone (use a little common sense judgement here) and most of the time, if you look at the lay-up at an angle, you'll still see the weave pattern. If you look at that angle and you see something that looks like a mirage in the desert or the Great Salt Lake on a calm day, you've "got too much juice in there."

I have always used a lot of peel ply when I'm building composite airplanes; have from day one and plan to continue the practice. Peel ply not only will soak up excess epoxy (when used properly), but when used on the edges of a lay-up, will make for very smooth transitions from the new lay-up to the old material you were working on. These smooth transitions not only eliminate the fiberglass daggers that keep your knuckles looking like you've been in a fight recently, but they also increase the strength of the lay-up by decreasing its likelihood of separating due to poor edge adhesion. This is good!

Peel ply doesn't come with your kit supplies and it is not something that is necessary for the successful completion of a very strong airplane, but it can help. It is available thru most of the composite suppliers

(Aircraft Spruce, etc.), but you can also purchase it as polyester curtain liner material from any local fabric store. Buy a little if you haven't already and give it a try. Hint: try it on a small area first.

As far as the "spilled around" look I have seen on a few projects, our suggestion here is to treat the area you are working on like you're some kind of doctor and you have a surgical site in front of you. Be neat! All those little areas of spilled epoxy add up, weight-wise. In addition, the neater you are, the more likely you'll be able to accurately evaluate whether what you just did was good or not.

If you still aren't sure what a correct amount of epoxy is or how to use peel ply, make sure you have reviewed the new construction videos, Tape Series 1 & 2, where we attempt to give you a visual look at what I have been discussing here. If all else fails, don't hesitate to give us a call (we'll read this back to you... just kidding!)

2. My second area of concern is builders not using the available resources around them to make sure they haven't "missed the forest in the way!" I have built a few airplanes in my life so far, and never have I gone very far in the construction of any of them without inviting a few of my peers over for a look-see, just to get another person's perspective on things. Usually these people are follow builders, local EAA members, members of some canard builder's cult or just someone in aviation whose opinion I respect. There is a lot of talent around us. Use it! It may save your life.

From a purely financial standpoint, if you use the EAA Tech Advisor program in the construction of your airplane (an EAA Tech Counselor visits your project a minimum of three times...I think ), AVEMCO will discount insurance to you for the life of the airplane to a tune of 10%. Adds up!

For those of you who are reading this and think I'm talking about

*Continued on next page*

## Views from the West

*Continued from previous page*

your project...DON'T. You are all doing good work. I just want you to do GREAT work!

The last thing we will be talking about in this column is variable pitch props. For those of us who have flown Velocitys for a few hours, while they are wonderful airplanes in the sky, like most laminar flow wing designed airplanes, they tend to take up a bit of runway on takeoff. The solution is a variable pitch and/or constant speed prop. Wow, what a difference! Now that we have an airplane that's easy to get into (the ELITE), an airplane that's big enough for those of us who can slam-dunk a basketball (the XL), we all need an affordable way to get off the ground quicker. This, in my opinion, is the last major obstacle in making the Velocity truly a great all-purpose airplane.

The factory has worked with MT constant speed props for some time and if you have a spare \$10,000 it is definitely the way to go! If you're like me and simply don't...try an IVO! With Duane's permission (it was his money!), I have installed an electric IVO on N94VA. If you don't know already, N94VA is equipped with a 200HP Lycoming (actually an LIO-360-C1E6). While the IVO's have flown successfully on the Franklins, testing on Lycomings is relatively new. IVO has made several changes to their prop/hub system to make their props compatible with the 4 cylinder Lyc's. One of those new versions is currently flying with us.

I have probably performed 300-400 takeoffs in Velocitys, but I will honestly admit, that first run down the runway with an IVO turning at 2700 rpm was somewhere between frightening and exhilarating. Wow...what acceleration! These IVO's have tremendous thrust!

Since that first run down the runway, we have accumulated about 12 hours on the prop. Although we are not quite ready to give the "big green light" for IVO's on Lycomings, the

future looks bright. Next issue we'll give you a complete rundown of our testing to date and hopefully tell you all this is without a doubt the way to go. Till then ...remember "Be precise, not perfect, just precise."

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### Construction Manual Errors

When you find an error in your manual, please call Jeff at the Factory. Jeff will review your input with Scott, correct the master version, and issue a KPC for all builders to benefit. If we all work together as a team, we all win!

Thanks...

## Bahamas '97 ... What Happened?



*Three Velocitys on the ramp at Moss Town International airport in Great Exuma, Bahamas*

A few months prior to our planned departure for Bahamas '97 Velocity Fly-in last May, we had ten (10) rooms booked for the trip. What happened? We ended up with just three (3) couples going. The worst part is that Tom & Pam Chimento had booked their entire hotel (Coconut Cove) for our group. They blocked off that time period a year in advance. What really was aggravating is that two parties never even cancelled – they just didn't showed up! Being Velocity builders themselves, Tom and Pam had been giving our group special rates and booking terms. They had been waiving their usual terms for advance deposit, etc. What happened was just not fair to them at all!

Do we want to continue this fly-in for 1998? This is up to you. If you want to keep the Bahamas Fly-in alive for 1998, the ball is in your court! Call me or Duane and voice your opinion. If enough of you want to keep it going, then I will. In the future however, Coconut Cove will require a two night advance deposit, with a two week cancellation notice.

On the bright side of things, the three couples that went had the best time yet. This was the third year in a row for me and Judy, while Mark & Nancy Ewart, and Dale & Sylvia Ingram were second year returnees.

Tom and Pam Chimento were outstanding hosts as usual! Although Tom has not worked on his Velocity,

*Continued on next page*

## Bahamas '97 continued



Attending the '97 Bahamas Fly-in was a veteran group from 1996's Bahamas fly-in. From the left: Mark & Nancy Ewart, Rick & Judy Lavoie, and Sylvia & Dale Ingram



Dale & Sylvia Ingram attended last year's Bahamas fly-in as "wannabees." In '97, they are pictured in front of their own Velocity, which they purchased from John Phillips. Dale brags that it only took him one day to build his Velocity!

their new home is just magnificent! Right on the ocean with the perfect beach. Once Tom is finished with the landscaping, he will get back to his Velocity project. Tom and Pam stress that any Velocitite is welcome at Coconut Cove any time. They will honor a special discount for Velocitites whenever you want to come.

We did some flying one day. Pam got her first ever flight in a Velocity. Just a few hundred feet after take off, Pam grabbed the control stick, declaring "well are you going to let me fly or what?" With a student pilot, I figured I was in for a very boring ride. Wrong! Pam loves to fly low and buzz her friends!

- Rick

## Velocity Builder Bill Medsker's Helicopter Ride at Oshkosh

Bill always wanted a helicopter, so he took time off from his Velocity project to build one. The photo to the right shows Bill and his helicopter at the gate to Oshkosh. Believe it or not, the EAA wants him back in '98! Keep your eyes open for that deadly flying machine!



Velocity Builder and helicopter pilot Bill Medsker on a scouting mission at EAA's Oshkosh Fly-in. Will they be back in 1998?



Look closely! "Isn't a three bladed prop required?" asked a friend of Bill's.

# Builders Forum

Builders Forum is full of tips, information and letters (“material”) supplied to *Velocity Views* Newsletter from individuals that are Velocity builders (or want to be builders). It is provided as “USE AT YOUR OWN RISK” material. Neither Velocity Inc. (The Velocity Factory) nor *Velocity Views* Newsletter (Lavoie Graphics & Rick Lavoie) have endorsed this material, and disclaim any liability for the use of this material. Individuals who use this material for the operation, maintenance, or construction of their homebuilt aircraft do so at their own discretion and at their own risk. Any variance from the builders manual is high risk.

From Dave Black, Woodbridge VA  
REALLY BIG HATCH

*“My advice is to make your canard removal as easy as you can, because it will be removed a lot.”*

J Howard — on the Velocity Reflector

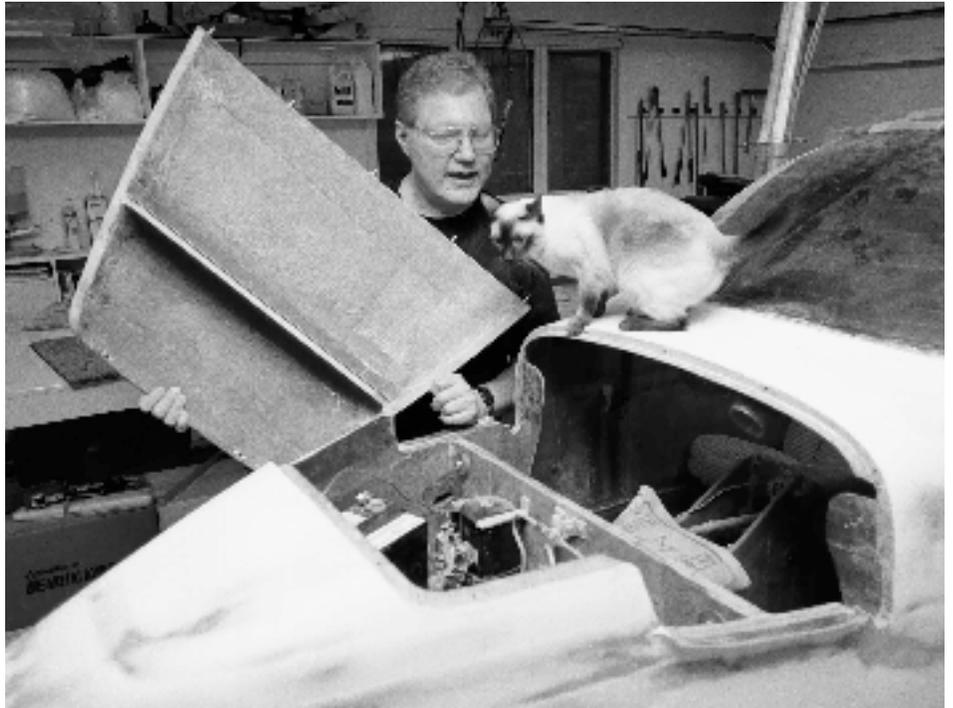
*“Having removed/replaced the canard many times during flight testing and instrument work, I think this idea of a removable top to the canard may be one of the truly great ideas I have seen in the last two years. I may do this shortly myself, even though I thought I was done with structural work”*

Bob Ginsberg — on the Velocity Reflector

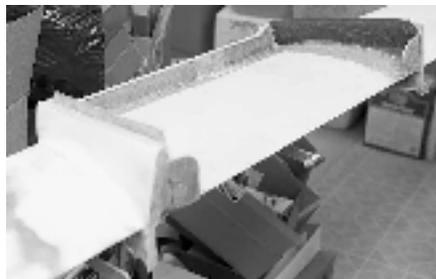
If you’ve talked to the owner of a flying Velocity, no doubt you’ve heard how often the canard must be removed for maintenance access to the nose area. And you may appreciate what a pain it is to remove the entire canard each time you need to access your instruments, radios, nose-gear mechanism, oil cooler, or gear pump.

My own experience with my plans-built Tiny Nose Hatch showed it to be, for most purposes, too small to reach through AND see through at the same time. It is located too far forward for convenient access to the hydraulic pump, and is too small to allow easy installation of the battery or canard lift bolts. For serious maintenance in the nose area, you must remove the canard and use the combination of the two holes for access. That often means reaching through one hole while looking through the other — working around that “bridge” in the middle.

Add to this the difficulty of removing the canard. In my Unidoor, I must climb upside-down



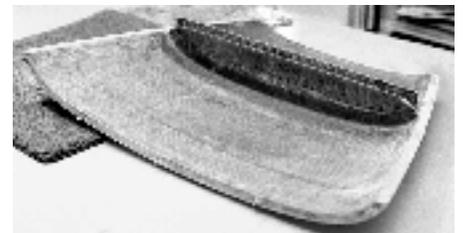
*Dave’s “Really Big Hatch” provides easy canard installation, plus access to instrument panel without removing canard!*



*Flange for “RBH” on Canard*

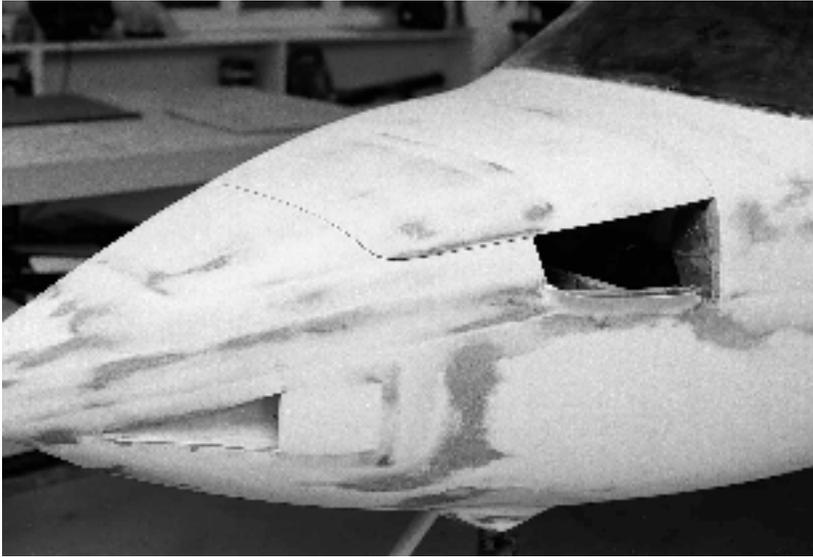
under the instrument panel to reach the canard bolts, the elevator linkage, and the trim wiring before I can even remove the canard. With an Elite the canard bolts are a little easier to get to, but you still must remove the entire canard for access into the nose. You only have to incorrectly reassemble the canard and elevator system once to ruin your day.

The idea for a Really Big Hatch (RBH) evolved out of a roundtable



*Shown lying on its belly, the “really big hatch”*

discussion among several builders on the Velocity Reflector. In the end I decided to put my money where my mouth was and replace my beautiful (but useless) Tiny Hatch. The RBH effectively combines the Tiny Hatch and the Canard Cover into one convenient, easily removable hatch. The aft end of the RBH remains at the same location as the aft end of the Canard Cover specified in the plans. The side-to-side width of the remov-



able hatch is limited by the 3" layups of Triax on the inside of the Canard Cover. Those layups MUST remain attached to the canard as they are structural for the anti-torque tabs. (I took the precaution of running the Really Big Hatch idea past Duane, who gave it his blessing, with the caveat that I not cut within the triax layup immediately above the canard.) Thus the "Loose Ends" seen in the photo of our modified canard. The hatch turns out to be plenty wide.

Front-to-back along the skin centerline, the RBH measures 23 1/4". This size allows easy access to everything from the landing light to the instrument panel without making the hatch so large it weakens the nose structure. The width at the front of the hatch is 20". Its rear width is 33 1/4" (All measurements along the skin surface). All of our cut lines are straight; the front corners have a 2" radius. If you want an even larger hatch, the RBH could be stretched forward a few inches. It should still work as long as you put adequate reinforcement around the perimeter of the opening. I'd use the layup schedule of the "bridge" and between the canard cover and the windshield as a guide to reinforcing the perimeter.

By the way, the vertical elements at the front of our canard and inside the cover are the two halves of a bulkhead which separates the nose area from the cockpit. This keeps squirrels and birds out of our fuse-

lage, and reduces unwanted breezes during flight. It should be of great value in cold weather.

Here's a procedure which will allow fabrication of the RBH, flanges, and securing system just before permanently installing the Fuselage Top:

- 1) Install Canard in Fuselage Bottom. Bolt in place.
- 2) Fit Fuselage Top in position, relieving around the Canard.
- 3) With everything in precise alignment, draw where the canard cutout (rear of the RBH) will go.
- 4) Decide the size and shape of the RBH. Draw that on the skin.
- 5) Confirm that the geometry of the Loose Ends and the RBH will allow removal of the canard (with Torque-Tubes) once everything is completed.
- 6) Remove the Top from the Fuselage.
- 7) Cut out RBH (but not Loose Ends).
- 8) Finish RBH and fabricate flanges all the way around.
- 9) Install RBH securing system of your choice.\*
- 10) Fasten hatch cover in place on top.
- 11) Permanently install Fuselage top to Fuselage bottom.
- 12) Open RBH.
- 13) Tie Canard to Loose Ends with Triax layups outlined in the Manual.
- 14) Cut out Loose Ends and finish.

\* To reduce the number of screws while simplifying hatch removal, we used five 3/16" pins along the rear of the RBH. The front of the RBH is

secured by three screws, with two more screws along each side. This many screws may be overkill, since Bubba's Tiny Hatch is secured by a single spring-loaded latch. But I'd rather be safe than sorry, as you don't want a Really Big Hatch going through your windshield or prop. With a little inventiveness, you can make your latching system completely invisible. We fastened our RBH only to the Fuselage, not to the canard or Loose Ends, as that would cause the RBH to flex in flight when the canard does.

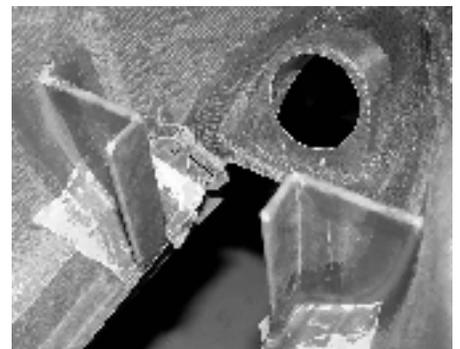
Benefits of RBH:

- 1) No "bridge" in the way of maintenance work.
- 2) Roomy access right where you need it.
- 3) Much simpler to remove canard.
- 4) 95% of the time you don't need to remove canard at all!
- 5) Much easier to access all systems in nose.
- 6) Save time on maintenance.
- 7) Easier to build than Tiny Hatch plus Canard Cover.

It's amazing how enlarging the canard hatch by only 9" can make such a difference in access to the nose. What's not to like? I just can't express how happy I am with this mod.

## ANTI-CASTORING GUIDES

Because of the free-castoring design of the RG nose-gear, it is possible for the gear to become stuck in the retracted position (I often cocked the nose-gear like this to assist during construction). With proper tensioning on the castle or friction nut, this "should" never happen in flight. But if it does, there's nothing you



*Nosewheel Anti-Castoring guides*

could do to get it to extend. But preventing it is easy. We installed this simple modification to stop the nose wheel from turning sideways once it is retracted. Our side-guides and supports are 2BID over 1/4" foam.

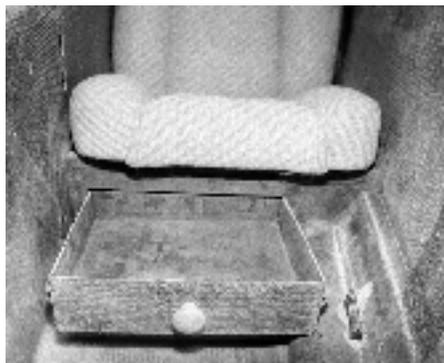
### STORAGE DRAWER

You can never have too much storage space. We came up with this method of reclaiming some of the space under the pilot and copilot seats in our Unidoor Velocity. The actual design was a little tricky, as the drawer must be a little less tall in the rear than in the front (due to the slope of the seat), and because we



*Drawer under copilot seat.*

needed to slope the side rails to provide clearance over the fuselage side channels. Because of their



*Finished drawer with seat in place*

unusual shape, we molded the drawers out of Triax. The drawers work smoothly and have sufficient room for two piles of charts side-by-side.

### SHOULDER-BELT HARD POINTS

Oops! No one told us back when

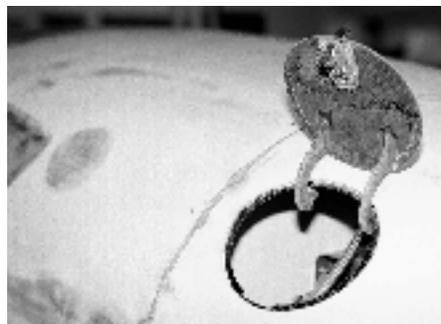


*Hard point ready for installation*

we were installing all those layups at the top of the firewall that we should first install a shoulder-belt hard point there. It turns out that 2" behind the rear window is the ideal location for the rear seat shoulder belt hard point. And with all those layers of Triax in that area, it'll be super strong! But how to retrofit that hard point when the Triax is already installed? From the outside, of course! We used a 2" hole-cutter to cut a plug out of the fuselage where we wanted the hard point. Using the same saw, we cut a 2" hard point out of 1/4" aluminum. We pre-tapped the aluminum for the shoulder belts and potted it in place with resin & fibers. Next we sanded it smooth and covered with 2BID.

### OIL ACCESS DOOR

This swing-arm hinging system allows for a completely circular opening (matching my similarly-shaped arm), while completely hiding the hinge. The swing-arms are similar to the ones used on the RG nose-gear door. We cut them from a piece of 1/4" thick fiberglass. As with all swing-arms, you should keep the fuselage mounting tabs as



*Completed hard point and oil door*

short as possible.

Questions? Comments?  
Contact Dave Black  
(703) 590-2221  
asterisk@idsonline.com



*From: Dennis Martin, Provo Utah and  
Jim Agnew, Tampa, Florida*

### SIMPLIFIED, STRONGER METHOD FOR WING SPAR INSTALLATION

Jim Agnew was finishing the installation of his main wing spar to the firewall when I visited his hangar in Florida a few months ago. He shared a great idea with me, and suggested I share it in *Velocity Views*. The idea is elegant, yet simple.

A team of two is helpful, but the beauty of this "bolt on" system is that it will allow one person to do it all.

Step 1: When you get the spar into its proper position against the firewall (with any necessary shims bonded or hot glued in place) support the spar from below with blocks and clamp it into place. Double check all your levels - fore and aft and horizontally. Double check your distances from nose bolt hole.

Step 2: Mark the firewall all the way across the top of the spar so you can relocate spar easily, but don't release clamps yet. Be sure all surfaces are sanded and cleaned off with alcohol.

Step 3: Cut three pieces of 1/2" or 3/4" plywood that fits inside the spar AGAINST THE SPAR, not the firewall side. Cut them 8" X 8" - they will become giant "washers." Place them where you drill your holes.

Step 4: Drill three to five holes all the way through the plywood, spar & firewall. Drill for 1/8th" or 3/16" bolts - bolts should be about 2 & 1/2" long. Drill one hole in the middle section, bolt it secure and check for level /after you drilled your holes - at least cover the 8" X 8" area where large plywood "washers" will press against the outside of the spar. Excess will squeeze out - so apply enough to fill in any voids. MOVE

FAST TO ALLOW TIME TO ADJUST AFTER YOU TIGHTEN THE BOLTS.

Step 5: Pre-Wax all of your 2 1/2" long bolts so they will release later. Raise the spar to its pre-drilled position, bolt it on with large washers against the plywood and large washers against the back side of firewall. Torque it firmly against the firewall.

Step 6: Check your distances from nose bolt hole. If not correct, ease up on one side a bit and tighten the other. Very slight movements will result in major movements on the outboard tips of the spar. If time allows, tighten enough to squeeze out excess adhesive. Measure again, and let cure.

Step 7. Remove the bolts two or three hours later assuming minimum of 70 degree ambient temperature.

Step 8: Now you're ready to apply bid tapes top and bottom. Sidebar: PTMW structural adhesive is exceptionally strong, and sticks to almost anything, including metal. Jim suggested I order at least a quart of each resin & hardner. My supply is now 98% used up. (Half of it is in the trash can from mixing too much). Jim, Simon and I have used it all over our planes. For example, it's under the keel from end to end. Under the ducts, etc. It's very messy, sticky stuff, but here's a great application tip suggested by Tom Miller, one of my building buddies. After you mix it thoroughly with a big stick, put it inside of a small, heavy-duty freezer zip-lock bag. Snip the end off, and viola, it's like icing a cake. For example, when bonding the keel flange to the fuselage floor, it's the only way to apply it. Be sure to wax the clecos unless you want to leave them there for conversation pieces.

Hope this provides some help.

••••••••

*From Hugh Hyde, Houston Texas*  
**Wire Ducting & Update**

We are moving slowly but surely towards completion. Actual construction is basically finished (lots of cosmetics left to do), the panel is back in and complete and I am picking up my engine tomorrow for

installation within the next few weeks. Hard to believe that the project will be four years old on September 1. I am targeting that date for first flight readiness, whether it is actually done by then or not.

I am at the stage that provides few new items for the newsletter and am also building a now obsolete model. However, there are a few things you may find of interest:

I accidentally (of course) made a hole in one of the oil lines inside the duct work with the bit on my hole saw and replaced the line. Instead of throwing the old line away (no oil has yet been through it) I have used it for snaking wire through the ducts. The wire bundles are much easier to pull through a smooth aluminum tube. It may be worth acquiring a cheap piece of 1/2 inch aluminum tubing just for that purpose. Put the tube in the duct, run the wire(s) through it and remove tube from rear of plane. Reinsert and do it again, when needed.

My Velocity is using an IO-360 with the plenum baffling. Therefore, I put the supplemental oil cooler in the left wing root. A plenum baffle was made using duct tape and foam and the hose flange furnished with the kit was installed in the plenum in a reversed position. The flange was inserted into the wing foam opening and glued / riveted to the inside of the baffling. Looks like it should work very well.

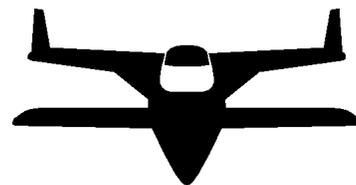
I was very impressed with the XL and, among other updates, I noted the center line air vents and lights for the back seats. I have obtained the NACA scoop and interior pieces and am working on adapting the concept to my Standard RG. I will send you pictures if it looks like it will work. My wife prefers back seat flying for reading, sleeping and working crossword puzzles, so I am trying to develop a comfortable "nest" for her for long cross country trips.

That's about it for now—keep up the good work.

••••••••

## Buy Sell or Trade

Free and exclusive  
to all *Velocity Views* Subscribers.



### For Sale Flying Velocity



DMO.#164, TT 120, Engine: IO-360 C1C 120 SMOH, IFR, Audio Panel, KX 155 & 125, Glide Slope, DME, Flybuddy GPS, Intercom, Navaid Autopilot coupled to GPS & VOR, 3 Lite Marke, Performance 3 blade prop, Full panel, Large capacity oil filter (Amsoil), High speed tires, 65 gallon fuel, Useful load over 1,000 lbs., Full trim electrics, Belly brake, Cruise well over 200 MPH, All equipment is new, \$104,000 or Call Pete evenings (612) 784-9195

### For Sale Props, Engine, etc.

Unused 8" prop extension and crush plate for a Lycoming engine, \$475. Unused Prince 68x76 prop with Q-tips for pusher, \$600. 300-hour Ed Sterba 68x76 prop for tractor, \$500. Low time IO-320-C1A set up for a Velocity, \$8500. Runout O-360-A1A with yellow tagged crank and cam, \$6000. Call Tim Troyer at (217) 242-2679.

## Buy Sell or Trade

*Continued on next page*

### **Velocity Repair & Modification Service**

- We will offer a complete repair and modification service, for Velocity, Glassair, Long EZ, etc. Location - St. Lucie Airport, Ft. Pierce, Florida, Hangar 10. We are planning to build a new 70x70 hangar and will also offer builders assistance for Velocity aircraft kits.
- Phil and Liz Corso have know the Swings since their arrival in Florida. Phil has worked closely – almost daily – with Scott, Duane and Bonnie, and is familiar with repair for all models of Velocity. Stop by to see us, have lunch and show off that fine plane! Quote - by hour or job.  
Home: (561) 336-2683;  
Cell: (561) 529-0008 (hangar).

### **For Sale Prop & Extension**

- New 3 Blade Wood, very popular and reliable, Performance Prop Never been used except for engine test. Still new and has full factory support. Purchase this very popular prop for Velocity aircraft for hundreds of dollars less than one you'd order from Performance today. Once you put this on your plane, run it, and get certain performance numbers, Performance Prop will customie this blade for your plane. They will put on a rain guard, and give it a permanent coat of clear protector. Great for IO-360, O-360 Lycoming, or Franklin Engine. Only \$1300 plus shipping.
- New Prop Extension for the Franklin 220 - great for a Performance Prop. \$200 plus shipping.
- Call Cory or Marlin Howe, (501) 835-5066, builders Velocity RG Elite.

### **For Sale Flying Velocity FG**

Velocity Standard FG, 175-180 KIAS, TT 41 hrs. IO-360 Lycoming 230HP has been reworked professionally. Full instruments day/night, 2 Terra radios, TX-7600, TRT 250D transponder, AT-3000 encoder, ELT, built-in extra antennas, lightning arrestor, annual 12/96, landing lights, extra strobes top/bottom, noise cancellation system, stereo cassette tape deck, extra insulation & sound proofing, heavy duty Vendix brakes. As fast as retractable because of extra horsepower, standard fast wing. Interior with Lexus light tan leather. Exterior Emron all white with turquoise and fuschia trim. Many, many extras. Lost medical. Call pager nationwide 1-800-560-9114 or (407) 290-8400 (FL) or (520) 445-7784 (AZ). Built by Velocity Inc. (Dave Lee) 1995. \$92,000.

### **FOR SALE Fuselage Stands**

Two stand level fuselage in four positions. They saved me many hours and made it very easy to level the fuselage time and time again. This is the stand that Roger Messenger builds and sells for \$125 plus shipping. See volume 3, page 31 for details. I will sell them to a Velocity builder (non XL fuselage) for \$75 plus you need to pick it up in St. Augustine FL (too big to ship assembled). Call Rick Lavoie 904-461-6912 or e-mail: lavoie@aug.com

### **For Sale Handheld Radio**

ICOM air band transceiver IC-A2 with leather case, battery charger & headset adapter \$200.00 or best offer  
Call Rick Lavoie @ (904) 461-6912

### **For Sale Velocity 173 FG Kit**

My deceased husband, Max Patch, was the builder. Max was meticulous and his craftsmanship on the 173 is excellent. Max worked closely with the Swings during construction (we had the good fortune to have them in Ohio then).

Airframe 50-70% complete. Ready for fuel tank & wing strake installation. I have the building logs of 478 hours of construction and videos of much work while in progress. Building tools included and have blue packing forms used to ship. This Velocity 173 FG project is well worth the \$26,500 tag. Call Diane Patch in Ohio at (614) 726-2927.

### **For Sale 2 David Clark Headsets**

Two mono headsets in perfect condition. I have to buy stereo ones, so these are for sale at a bargain price. Both are David Clark H10-40 that sell new for about \$235. I also have the AeroOregon Ear Cup Seals, soft tops and hush kits installed in both sets. These accessories make the David Clark headsets very comfortable! New that stuff costs another \$130. That brings the combined new cost to \$602 I will sell both sets for \$350.00  
Call Rick Lavoie @ (904) 461-6912

### **For Sale**

HI0-360-C1A-205HP, Dynafocal mount, includes Performance 3 blade prop and extension, one new Slick mag and one electronic ign. Skytec lightweight starter. Baffling and wiring. On engine mount - bolt to your craft and fly. 140 hours since Sacramento Skyranch O/H. It pushed my Standard RG to 213MPH. Call Joe at (505)450-7278 for more details. Complete for \$16,375.

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