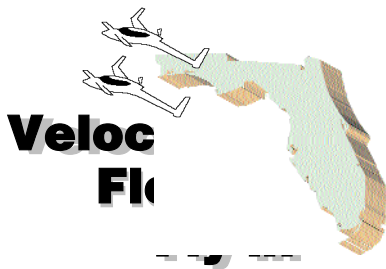


VELOCITY VIEWS

Volume 6



First Ever Event a Huge Success!



A group of Velocitites gathers to say good bye Sunday, prior to taking off from the Winter Haven Airport. A great time was had by all!

EIGHT Velocities and 53 Velocitites participated in the first ever Velocity Florida Fly-in held on February 24th and 25th in Winter Haven, Florida. The Swings brought two very special guests along with them, Danny and Barbara Maher.

The day started with early morning heavy fog, which delayed or prevented many Velocities from landing at Winter Haven. Most attendees decided to drive it, rather than wait for the fog to lift. Things cleared up around 11:00 am, and eight Velocities eventually landed. We all boarded the bus and headed

out to "Fantasy of Flight". It turned out to be a beautiful day. Fantasy of Flight had a number of walk through WWI & WWII historic re-creations. The best exhibit was a walk through a flying B-17. There were also 2 huge hangars with lots of vintage aircraft on display.

We loaded up the bus and headed out to the Winter Haven Holiday Inn. A few brave souls (Jean Prudhomme and I) even went for a swim in the pool. Jean being from Canada thought that 60° water was warm.

After a social hour, we gathered

Continued on page 2

In this issue

- Velocity Florida Fly-in.....1**
First ever event a great success. More fly-ins to come!
- Factory News2**
KPC policy, new phone #, & Avionics shop talk, Sun n Fun Dinner sign up, Franklin Engine update.
- Views from the West.....4**
Open house schedule and other news from Mark & Nancy at Velocity's West Coast Service Center.
- Safety Corner5**
Accident & Incident Reports and Maintenance Service Difficulties.
- Factory KPCs6**
Kit plans changes to keep your manual up-to-date!.
- Short Circuit7**
Electrical, instrument, and avionics related tips from Martin Hadley.
- Bahamas Fly-In '969**
Last call to sign up for the 2nd annual fly-in.
- Whites Lightning.....10**
Don White shares his experience.
- Builder Forum12**
Tips, information & letters.
- Buy Sell or Trade19**

Florida Fly-in

Continued from page 1

for a buffet dinner. Duane and Scott updated us on current events and fielded questions from the group after dinner. Jim Campbell gave a fine talk about aviation current affairs and what the future may hold. His revelations about future navigation and flight instrumentation were exciting. Jim predicts that in about a year, flight instrumentation (attitude, altitude, vsi, airspeed, et al) will be driven by GPS technology. There are companies perfecting such systems that have sensors at the extreme ends of an aircraft to determine changes in things like attitude. These systems will be driven by an on board computer with a color monitor (glass cockpit). Flight, engine, navigation, weather will all be driven by computer technology. Jim predicts that a base system will be out in a year or so for about \$10,000. If you ever need an interesting aviation speaker, Jim is the man. Jim has flown just about every type of aircraft, including military fighters. Hey it's a tough job, but somebody has to do it!

Many thanks to the Swings for sponsoring this fine weekend! Velocity Inc. charged \$100 per couple and subsidized the rest. Bonnie did her usual outstanding job of organizing things. Thanks again to Bonnie, Duane, Amy, and Scott from all the builders and their family members.

Rick



KPCs (Kit Plans Changes) Policy

A few of our builders have questioned us about how KPCs should be distributed to builders by the factory. On the one hand, a direct mailing to everyone would work but why bother with plans changes on a flying airplane? Another question is, if 70+ airplanes have been completed, what reason do we have to make any changes to the plans? Can't the airplane be built with what you now have? The answer is, of course, yes. Plans changes are, in some cases, for our benefit, that is, if we get a lot of questions from builders about the same problem, related to the plans, then we need to make a change to clarify the plans to eliminate the question. This makes life easier for you and for us. On the other hand, if we have something critical to flight safety, how do we get the message out? Do we do a direct mail? Can we force the FAA to send out an AD? (Airworthiness Directive) Well, to answer the second question first, the FAA will not issue an AD note on an Experimental aircraft. An AD note can only come from the manufacturer and we are not the manufacturer, YOU ARE. The answer to the first questions is, yes, however not without some serious liability considerations. For instance, let's say you sold your airplane and we sent to you a notice requiring some sort of immediate action. You don't own the airplane and fail to send the notice to the new owner. If something happens to the airplane the new owner may try to hold Velocity responsible for failure to notify him (her) of the action necessary. For certified aircraft, the FAA does this thru the records held in Oklahoma and at the taxpayer's expense. We don't have access to these records. Another common problem would be if a notice was sent out by us and the airplane owner elects not to take the necessary steps to correct a problem.

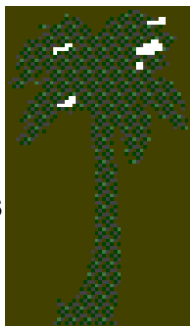
If later something happens he (or she) could claim they never received the notice. This person may try to hold Velocity Inc. liable. Certified mail could be used, but again what about the airplane that was sold? There are many other cases that I could point out that make direct mail a problem. If we stick our neck out too far and end up going bankrupt defending ourselves, think of what will happen to the value of your airplane. It will plummet downward just like the Wheeler Express buyers found. Whether you like it or not, Velocity Inc. drives the market UP by adding inflation to the cost of the kit periodically. A kit that some of you paid \$26,000 for at Oshkosh 95, would pay \$30,000 for today. Your airplane, therefore, is worth \$4,000 more today than just a few months ago. Each of you holds a vested interest in keeping Velocity Inc. alive and healthy. Just look at what happened to the value of Long EZs after Rutan Aircraft Factory filed for bankruptcy protection due to possible liability.

What, then, is the best way of handling KPC's and other safety related issues. After consulting with our legal advisers, we wind up with the following: The only way to protect ourselves and your investment, is to maintain the following policy regarding KPCs and Safety Service Notices:

Velocity Inc. makes KPCs, Safety Service Notices, and Factory News items available to our builders through the Velocity Views Newsletter. It is the responsibility of the manufacturer (you the builder) to keep your builders construction manual current by obtaining and subscribing to the factory's official newsletter "Velocity Views" to obtain KPCs, Safety Service Notices, and Factory News items. In the instance that after subscription, you do not receive your quarterly

Velocity Bahamas Fly-in

**Last call
for Sign
up!
See page
9 for details**



issues by mail, it is the builder's (subscriber's) responsibility to notify the publisher that his (or her) subscription has not been delivered by the postal service.

We suggest strongly that our builders subscribe to the Velocity Views. We are not trying to sell the Velocity Views, this is just the best and easiest way to get the message to our customers. If you elect NOT to subscribe, and this is an option some of you may elect to take, we, at Velocity will not be held responsible for providing KPC's and other safety related notices by direct mail or by any other means. If you decide NOT to subscribe to Velocity Views, you do so at your own risk.

This brings me to my final point concerning the newsletter subscriptions. Builders who bought their kit direct from the factory have had their first year's (calendar year) subscription paid courtesy of Velocity Inc. Now that we are in our second year of the newsletter publication, I need to clarify this policy for the most recent kit purchasers (purchased kits since January 1, 1996). The factory will continue to pay for a one year (calendar year) subscription for new kit purchasers, however, that subscription will be for the same calendar year as the purchase date. For example, if John Kitbuyer purchases his factory kit in August of 1996, his complimentary subscription will be for the 1996 calendar year. John Kitbuyer would be responsible to buy his future subscriptions (1997 calendar year and beyond). If John Kitbuyer wants the 1995 back issues, he would need to purchase those back issues as well. If John Kitbuyer is already subscribing to the newsletter, then his current subscription will be extended by one additional calendar year.

If any of you have any questions regarding this policy or care to make comments good or bad, please let me know.

Duane

New Builder Assist number!

The other day I was away from the office and needed to call for

some information. Everytime I tried dialing 407-589-1860, our regular number, the line was busy, this in spite of having an automatic rotary second line. I felt that perhaps some of you have experienced the same frustration and it's time for a change. Mark your phone book with our new "builder assist number" 407-589-0309. This number is an unpublished number just for our builders. In the event this number is busy, you can still get us at the old number. We hope this will help keeping a clear line just for you.

We will also be extending our normal Monday thru Friday work schedule to include Saturday. Jeff, Scott or myself will be available to answer builders' questions, but only using the new builders number. Saturday hours will be from 9:30 to 4:30. If we don't answer, it's because we were out on a demo flight or some other reason, and you should try again later. There may be some Saturdays that we just can't be available and I trust you will excuse us for an occasional day off.

HELP HELP HELP HELP

We have a problem here Houston!!! Where have you heard this before? In our case it has to do with our radio shop. Martin has been taking a lot of calls from you regarding your radio needs. In many cases you are asking for assistance in determining just what you want on the panel. Notice, I didn't say "need". Many of you think that if someday you're going to fly IFR you need a stormscope, HSI, ADF, 2 axis autopilot with all the couplers, dual comm receivers, dual nav receivers, moving map, etc. etc. Elsewhere in this newsletter Martin has addressed this issue and should help in this important decision regarding your panel needs (WANTS) Before you call Martin, think about this. He is a very busy guy who cannot spend too much time helping you decide your panel needs without you first deciding what your going to do with your airplane.

Martin has also been spending a lot of his time talking to you about general wiring of your airplane. This

takes him away from the radio and panel wiring that must be turned out to justify his existence. If you have questions for Martin, please keep it brief and to the point. In that way, those of you who are waiting for Martin to complete your panel won't have to threaten him with death.

Duane

Avionics Shop News

We have struck up a deal with Navaid Devices Inc. to become a dealer for this very inexpensive unit. We have also added the Electroaire electronic ignition system to our list of options. In addition, we should have a working altitude hold for the NavAid within a couple of months. The next options catalog will include these new items.

Current prices on the NavAid Autopilot (less altitude hold) is \$1400.00. A handheld GPS interface is available for \$125.00

Current price on the Electronic Ignition- Jeff Rose (4 cylinder) is \$785.00

We will inventory at least one of each for immediate delivery.

Martin A. Hadley

Sun 'N Fun '96

Sun 'N Fun is being held from April 14 - 20. Velocity will hold its annual banquet on Monday April 15th at 6:30 pm with dinner starting at 7:00pm. This year's banquet is at a new and much better location. The Imperial Golf & Racquet Club is located at 6 Country Club Lane in Lakeland Florida (see map printed in Volume 5, page 4). Please RSVP asap but no later than Sunday April 14th. Adults @ \$20 each, with Kids (age 10 or younger) @ \$10.

If you need a ride, be at the Velocity booth by 5:30 and we will get you there. If you have a car with extra seats, please stop by the booth to help us shuttle people to the banquet.

Bonnie

Franklin Engine Update

Continued on Page 19

Views from the West



Greetings once again everyone! March 2nd was a big event around here. Scott Swing, our company President, greeted everyone and generally made himself available as the main attraction at our monthly Open House here at Velocity West. Scott's visit not only gave him an opportunity to inspect the local facilities for his first time, but also gave some of our new kit buyers here on the West Coast an opportunity to talk "up close and personal" with one of our bosses. The most asked question (according to an informal exit poll) was: "What day am I getting my kit?"

Can't hardly blame them. Everyone had the opportunity to view two Velocitys under construction, one FG and one RG and watch Scott and I give demo rides all day in N131MM, the current demo plane here at Velocity West. Makes the "drool" factor go up and the "patience" factor go down real quick!

In addition, our chief panel maker in Sebastian, one Mr Martin Hadley, had the finished panel for the new 173 FG Elite we're building literally flown in "in-the-nick-of-time", so we could proudly display it where it belongs (on the airplane). Nice job Martin! Everyone was quite impressed!

Because of all the activity around here, it was only a matter of time before Nancy and I needed help. That time started on January 2nd when we hired John Kiss to help us in all aspects of the business. Although John's background is in house construction, essentially he had never worked on anything "epoxy-like." Being a general contractor myself, I was convinced John knew what it meant to build something "straight and level" and because of that, coupled with my intuition

about his personality, I figured he would be easy to teach. Being right is downright fun! Along those lines, within a short period of time, he'll be one of the resident "experts" around here. So if you call in and if John answers, don't be surprised! John is also a pilot.

Our **Open House schedule** for the next four months includes:

- **May 4** (cancelled due to conflict with SoCal AeroFair Fly-In in Chino, CA)
- **June 1** - Hands-on lessons on how to do a great epoxy lay-up
- **July 6** - Upholstery techniques and tricks
- **August 3** (cancelled due to conflict with Oshkosh Fly-In).

You can also catch us at the following **fly-ins**: April 13 - 17 Sun 'N Fun; May 4 SoCal AeroFair Fly-In in Chino, CA; May 18 & 19 West Coast Pilots Expo in Pomona, CA; May 24 - 26 Watsonville, CA; June 29 - 30 Rocky Mountain Fly-In, CO; July 10 - 14 Arlington, WA; and August 1 - 7 Oshkosh, WI. Hope to see lots of Velocitys in attendance with us!

Now for some updates on the technical matters we are working on here at Velocity West:

Shimmy Damper: My request for some additional field input on any problems with shimmy has yielded very few responses. One might suppose that shimmy is not a issue with any Velocity aircraft. We certainly don't want to create a problem where one doesn't exist. On the other hand, please be advised that if any help is needed along these lines, don't hesitate to give us a call. We have modified a few nose gears now and there does seem to be an improvement.

Video Taping: The process continues. We are video taping most everything we are doing here, including the gear work on both the 173FG and the Standard RG under construction. The first set of edited tapes, covering the Wings, Winglets and Canard, should be available by Sun 'n Fun. The first set of tapes also has an educational section covering the materials you will be working with and general information about safety, Velocity office locations, rec-

ommended equipment, etc.

Fuselage Cradles: We have developed a rather inexpensive set of fuselage cradles that have proven to be "right-on" in keeping the lower fuselage nice and level during the initial work on that portion of the kit. The plan is to sell these cradles as a mini "kit", where their final completion would be the kit buyer's responsibility. Total time to finish them out would probably be in the 2-3 hour range. In addition, the cradle work would give the new airplane kit buyers an opportunity to work with some of the materials before attempting to work on the "critical" stuff (like the airplane!). Will probably bring a set to Sun 'n Fun and if the reaction is good, we'll setup a price and go into production. More later!

EAA Meeting Presentations: Nancy and I have been making presentations to various groups lately regarding Velocity in general and specifically about the function of this office here on the West Coast. The most recent presentation was to local EAA Chapter #393 in Concord, California, where we were fortunate to speak to approximately 70 very interested members. If anyone belongs to an EAA Chapter and would like a program for the evening, feel free to give us a call. If our schedule permits, we'll do our best to put on an entertaining and informative, Velocity oriented, "dog-and-pony" show!

John Travolta: Still working on him!

That's it for now. Please remember, we're here to help. If any of you have questions, need information, need to order something and we're more convenient for you, don't hesitate to call. It's what we get paid to do! With that, we'll leave you with this thought to ponder:

If you want to go up, PULL BACK. If you want to go down, PULL BACK SOME MORE!

*Mark & Nancy Machado
Co-Managers
Velocity Inc West*



Safety Corner

Accident & Incident Reports,
Maintenance & Service Difficulties

We can all learn from this

I know, I know, this type of thing should not happen. But, this is not a hypothetical scenario. This chain of events took place and a pilot and three passengers are lucky to be alive to talk about it.

Here is the story as told to me by one of the passengers. The canard was removed by a mechanic to make some adjustments. The canard was re-installed by someone who had never installed a canard on a Velocity. For the installation to be completed, the pitch trim was extended to the full elevator down position in order to get the elevator torque tube to slide over the mating aluminum plug. Those of you who have done this work know what I am talking about. When this individual put the bolt through the torque tube he was behind the hole in the aluminum plug and only butted up against the aft end of the plug and not through the hole. What now happens is that when you pull the control stick back, the elevator would normally move down as expected. However, when the elevator stick is moved forward, the torque tube slides on the aluminum plug and there is NO nose down movement of the elevator.

Now comes the heart wrenching part for me. The pilot/owner loaded up the three passengers and taxied out for takeoff. Apparently, the pre-flight didn't catch the problem and a take-off was made. The trim was still in the full nose-up position as required for canard installation and once airborne, moving the control stick forward resulted in no change in the pitch of the airplane. The trim switch was then activated but the trim motor apparently failed to operate.

At this point a rapid reduction in power would have caused the air-

plane to go into a pitch buck decent so a climb was continued until things could be sorted out. The back seat passengers were instructed to slide forward as far as possible to shift CG's and a power reduction made to hold altitude. A successful landing was completed with no damage to the airplane. (perhaps a few wet seats but I don't know for sure)

What can we all learn from this? First of all is the lack of supervision on behalf of the pilot/owner to insure that the bolt was installed properly. If someone else was given the responsibility for this work then that someone else should have insured that the bolt was installed properly. Most important of all is the need to pre-flight anything that has been worked on or changed prior to flight.

I realize that we don't always do an adequate pre-flight of our airplanes prior to flight. The question is, why not? Can we all spend just a little more time checking things out prior to launch?

Duane

Aileron Flutter?

A question has been ask about how heavy can the ailerons be and still be safe and free from flutter. From the factory prospective this is a question that is very difficult to answer. The only official answer I can give our customers is that unless we tested, lets say, a 10 lb. aileron up to 200 kts. indicated for flutter, and found no flutter or indication of flutter, we would not be able to safely give you our approval. How, then, can a builder who has a mass balanced 10 lb. or 11 lb. aileron be sure he won't get flutter at some speed up to 200 kts? The answer is thru testing. The same type of testing that the factory did on the original ailerons. Video #6 shows how Dan did all the

aileron testing on the prototype Velocity. This is the exact procedure needed to insure that your ailerons will not flutter at a given speed. Flutter testing is a progressive thing that requires nerves of steel and the willingness to do things you're not normally going to do. If tested at progressively faster speeds in 5 knot increments, flutter will not be a catastrophic procedure. That is, an immediate return to neutral stick indicates no flutter. A slight shaking prior to neutral stick indicates the beginning of flutter. If a faster speed is tried, the shaking will be more pronounced and for a longer duration. The faster one goes the more the flutter will progress until a violent aileron departure will take place.

On the first Velocity Scott and I built, our ailerons, with mass balancing, weighed 9.5 lbs. At this time no official weight was given for the ailerons and our testing procedure was exactly as outlined in video #6. We found no flutter up to 200 kts. It should be made perfectly clear that EVERY Velocity should be tested this same way, even if your ailerons weigh 8.5 lbs. This is the only way you can be sure that your aircraft will go 200 kts. indicated without a problem.

As a final thought. When Dan arrived at the 8.5 lb. limit, he had mistakenly thought he had observed the start of flutter on N81VA. The problem ultimately was traced to a resonance frequency between the Lycoming running at about 2350 RPM and the wing of the Velocity. This was later confirmed by the first Velocity to fly with a constant speed prop. I could simulate this shaking by flying in smooth air at 2350 RPM. Reducing or increasing the RPM would stop this shaking.

So, there it is, use your best judgment and be prepared for some actual testing. It should be done anyway.

Duane

Continued on page 6

Safety Corner

Continued from page 5

Shipping Error

Affects: All Velocities

Approximately a dozen kits were shipped out with non-precision bearings in the nosewheel. They are great for shopping carts but don't hold up too well at 70 knots! The correct bearings are black in color and are sealed ball bearings. If you have the wrong ones, contact the factory.

Service Caution:

Affects: All Elite RG's

The main gear cylinder rod end assembly passes very close under the aileron bellcrank. If the rod end assembly rotated during retraction and extension, it could interfere with the bellcrank. Although it is unlikely that this will occur, the possibility still exists. Therefore, test your system thoroughly. If you find a problem, here are some things you can do.

Possible Fixes:

1. Shorten all three aileron bellcranks by 1/2" to get more clearance. We have not tried this as of yet.

2. Fabricate a guide to insure that the rod end assembly does not rotate.

We are looking into developing a fabricated part to insure that this problem will not occur.

Service Note:

Affects: At a minimum kits DMO 135 through 158. May also affect kits shipped before and after these kits.

Kits shipped around the time DMO 135 through 158 were shipped may have received 7/16" aileron counterweight rods instead of the required 1/2" rods.

Action Required: Verify that you have 1/2" rods. If not, contact the factory.

Service Note:

Affects: All Velocities

If your fuel cap o-ring does not

seal properly, a slight vacuum will be created in the tank. This will cause uneven flow from the main tanks into the sump tank.

Recommended Action: Keep your o-rings lubricated with Vaseline or grease. Also, as the o-rings age you may have to adjust the tension on the cap. This is done by loosening the nut on the bottom and turning the portion of the cap under the o-ring. Now tighten the nut.

Service Note:

Affects: All planes with molded stick grip

When securing the stick grip to the steel tube many of our customers have just glued it on. This does not always work too well. A more secure way of doing it is to drill a #21 hole (near the bottom of the grip) through the grip and steel tube, tap with a 10-32 tap, and secure with a screw or set screw. You should use Loctite especially with the set screw. You can get fancy and counterbore for the screw.

Service Note:

Affects: All planes with the speed brake

You have noticed that you have to space the channel away from the surface in order to get the actuator to line up properly. A few of our customers have drilled and tapped the end of the actuator (shaft end) for a 1/4" 28 male rod end. This seems to work well for spacing and adjustment but you will need to remember a few things. If you drill all the way through the aluminum plug, clean it out as well as you can and make sure that the rod end does not protrude past the aluminum into the hollow underneath. Also, use a jam nut to secure the rod end since it will try and turn at the end of its travel.

Kit Plans Changes "KPCs"



KPC 005c

Correction to KPC 005 as published in Volume 5 page 9, wiring of RG hydraulic pump

Affects: RGs

Manual section: 9.6.3

Figure 9-47 Gear electrical system

The diagram as published in the original KPC005 will not turn the Hobbs meter on. The corrected diagram (to the right) resolves this error. Thanks to Larry Cohen for finding this mistake.

Figure 9-47, as drawn in the manual will work, however it is a very basic warning system. This minimum system shows only that the gear is down & locked, and that the pump is on. The diagram in this KPC is a better choice, as it tells the pilot a lot more about his gear position (nose gear down & locked, and main gear down & locked) and gear pump on and gear unsafe. Thus, we recommend using this drawing for your gear electrical system.

KPC 010

Affects: RGs

Manual Section: 9.1.2

We have had a few of our customers pop the torsional wraps on the gear. This can be caused by a combination of things. The sanding may not have been done correctly, the plane could have been landed at a severe angle to the runway or with the brakes on, the brakes could have frozen tight after takeoff which causes an extreme torsional pull on the gear on landing. Any number of things could contribute to this as well as not having enough torsional wraps. Because of this, if you have not finished out your gear leg, you may want to add 2 more uni each direction on the gear leg from the

pivot location to just over the bend. This area is fairly flat and that causes most of the torsion or twisting to occur there. So, instead of having 8 total layers on the gear, you would have 12 in the area we have described. If you have been flying for a while and never had a problem, chances are you never will, but you should check your gear for delamination if you get in a situation as mentioned earlier. Tapping on the gear with a coin will tell you if you have a problem. If you find you have a delamination, you will have to remove the layers and lay it up again.

KPC 011

Affects: All new FG Velocities
Manual Section: 10.2.7

One of our builders had a good suggestion about the stiffening lay-ups

in the keel for the nose gear. It is easier to put in the 3 triax that go from the floor onto the canard bulkhead before you put the keel in place. Make sure you stay within the confines of the keel front so the lay-up doesn't interfere with the placement of the keel.

KPC 012

Affects: All Velocities
Manual Section: 14.3.5

In order to insure a good seal around your fuel and vent lines where they exit the tank, remember the following:

1. Scratch the contact surface of the tubing with rough sandpaper
2. Make a healthy fillet of wet micro-glass around the tubing
3. Add a layer of fine BID over the fillet to strengthen it.

Short Circuit



by Martin Hadley

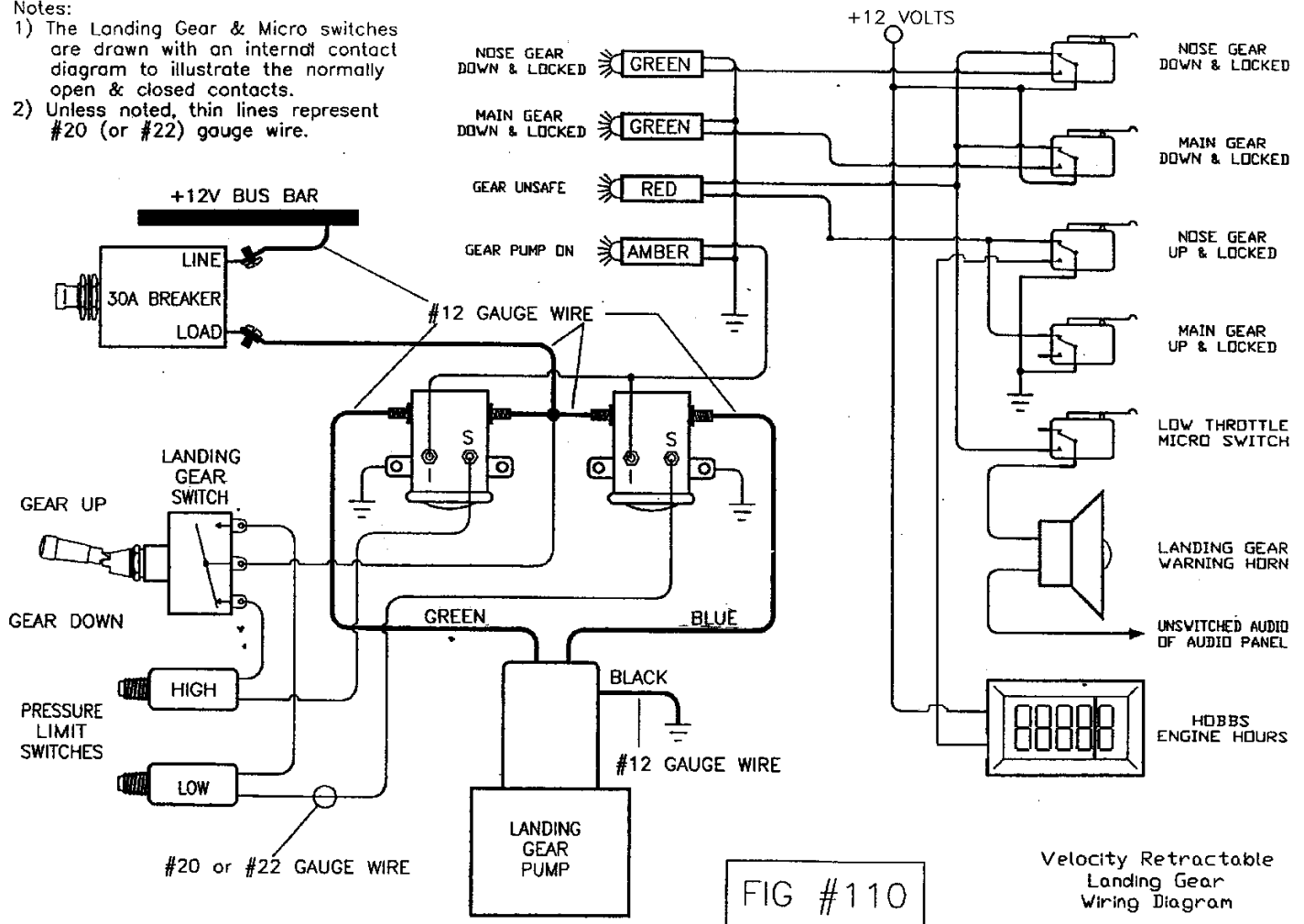


Even though there are many things that need to be considered in selecting your radios for your airplane, the most important thing is "What kind of flying are you going to do?". Anyone who has talked to

Continued on page 8

Notes:

- 1) The Landing Gear & Micro switches are drawn with an internal contact diagram to illustrate the normally open & closed contacts.
- 2) Unless noted, thin lines represent #20 (or #22) gauge wire.



me about radios has heard that question at the beginning of the conversation .

Are you going to fly for purely recreational purposes, you know, it's a nice day, let's go somewhere and get a hamburger! Do you want to do more serious cross country traveling somewhat routinely for pleasure purposes in VFR only? Or, are you IFR rated and plan to be flying IFR because 'I have to be there Thursday morning!?' Let's examine each of these situations.

First, pure recreational flying. To fly safely anywhere today you almost have to have three pieces of equipment. They are a communications transceiver, or COMM, and a transponder with Mode C capability. Mode C, in general aviation, is produced by a separate altitude digitizer. There are several names for this device. Some call it an encoding altimeter, a blind encoder, or a mode C converter. If you think you might get lost flying around 'your neck of the woods' you should consider a GPS. Forget a Nav radio. VOR will tell you only one of two things. "Fly this direction to go to or from my spot on the earth", or "My spot on earth is in this direction from your airplane, but I'm not going to tell you how far." And a Localizer is not needed in VFR conditions. Couple that with the FAA's intention of phasing out VOR's and the only rational conclusion is that a Nav radio, in a VFR only, recreational purposes only aircraft, is a waste of \$1,500.00 or more! The worst GPS available, on the other hand, will orientate you (radial and distance) to any "spot" YOU tell it, within 30 - 50 meters! Your house, your airport, your buddy's house, your buddy's airport, even someplace you've never been before! Definitely a better investment for your tight dollars.

Second, serious cross country for pleasure in mostly VFR. Simple. See purely recreational flying, and the GPS becomes a must. Add a Nav radio if you're IFR rated to do that LOC approach, or ILS approach (if you spend the extra \$\$\$ to get Glideslope and Marker Beacon).

For the person that "has to be

there", you need two COMM's, one Nav radio with Glideslope, Marker Beacon, GPS (Doesn't have to be IFR "certifiable"), and Transponder with a Mode C altitude digitizer. This is where a lot of discussion takes place.

The reason I say two Comm's is, more often than not, the one time your single radio will quit (according to Murphy's Law) is when you are deep in JFK or LAX airspace, and/or in thick soup at low altitude. Sure, you have your handheld COMM as a backup radio. And like 95% of the pilots who do, yours is in your flight bag or brief case in the back seat. Isn't this exciting...2000 feet, with a heading that will set you up to sequence you for vectors to the final approach, and your panel comm goes out. Now you get to "let loose of the airplane" so you can turn around, open your flight bag, dig around in your flight bag, find and turn your handheld right side up, turn your handheld on, adjust the frequency (What was that frequency? And when was the last time you checked the status of your battery?). Does this make any sense? Let me tell you, it only has to happen ONCE. In hard IFR, it is just a lot less trouble, and a whole lot safer, just to flip a transmit select switch, and start talking on Comm #2 !!! It isn't as cheap as a handheld, but it is a cheap form of insurance.

Next, one Nav with Glideslope and Marker Beacon. The only time you will need this setup is for that IFR approach. Period. With a working GPS in the panel, I know of no professional pilot, or private pilot for that manner, who uses VOR as a primary source of navigation. 40 miles from a VOR, you can be as far as 4.5 miles off course to be within IFR standards. Again, the worst VFR ONLY GPS on the market for general aviation is accurate within a 30 - 50 meters of course even if your destination waypoint is hundreds, or even thousands of miles away. For three or four times the price of a VFR ONLY GPS, you can get some IFR GPS's that are accurate to within a few meters. I say "BIG DEAL!" 4.5 miles for IFR VOR tracking vs. 165 feet error in a VFR ONLY GPS does

not justify spending four grand or more just to have an IFR "certifiable" GPS. Fact of the matter, most homebuilders who put in IFR certifiable GPS's don't take the time or the trouble to get their units "Certified". Contrary to some beliefs, just having it in the panel doesn't make it "Certified"! The FAA or one of its designees gets to fly with you in your plane, checking all the bells, whistles, and switches, fills out a couple of notebook pages of information, and THEN if all the i's are dotted and the "t's" are crossed, you should get a piece of paper that says your unit is certified for IFR use in your airplane only.

I AM NOT SUGGESTING YOU FLY IFR with a VFR ONLY GPS's! I am merely making you aware of a few things. Myself...if most of the time I were to take off, knowing that most of my trip was going to be "in the soup", I'd have an IFR GPS. If I anticipated little or no actual IFR on most of my trips, I'd opt for the VFR version. That is my own personal judgment. You do what you want.

Autopilots: VFR, recreational? Purely optional. Maybe single axis without Heading. If your airplane flies 'wing low' all the time (NOT a common occurrence in a Velocity!), or your really bad with your occasional instrument scan, get it with Heading. Only real justification for Heading in a single axis autopilot is if you fly in an environment where ATC is always vectoring you around. VFR, long cross country? Go ahead, two axis autopilot with Heading and Altitude Hold. Make those hours of shear boredom even more boring! The positive side...It'll free up your hands so you can drink sodas and easily change CD's in the stereo! IFR?...Two axis autopilot with Heading and Altitude Hold is almost a must.

Intercom: Don't leave home without it! Sure beats shouting.

HSI: Most of the people that have asked me about HSI's for their airplane aren't even sure what they are, what they do, or how to use them. I concur that one will never learn to appreciate the virtues of an HSI if you never fly behind one. But

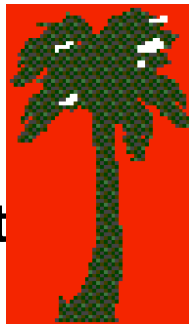
let's keep in mind, HSI's were developed because large corporate aircraft and commercial air carriers airplanes, their instrument panels were getting so cluttered with so many gauges, dials, switches, it seemed like miles between the D.G. and the primary Nav indicator. In an effort to REDUCE THE SCANNING DISTANCE on these large panels, the HSI was developed. On the Velocity, historically there is a maximum of 7" between the D.G. and the Nav indicator. With your head 2 - 3 feet away from the instrument panel, there is no reason to even rotate your head to "see" both instruments. And if you are 'building on a budget', an HSI is definitely a luxury item.

Strike Finder/ Stormscope: This is another item that most Velocity builders don't really need. Most don't understand what it shows, its virtues, and its limitations. Again. I will concede you won't know unless you use one. I constantly hear, "I plan on using it to keep clear of weather". After 22 years in the business, I know what the majority of them are really saying is, "It doesn't look TOO bad that way. I'll go there." For those who know exactly what you are looking at (and most of the time it is NOT lightning!), it is a valuable tool for IFR flight. If you encounter a LOT of severe, clear air wind shear in VFR conditions, you might also want one.

ADF, R-NAV, and DME are dinosaurs. Don't waste your time or your money. I MIGHT recant on ADF if you are planning on flying in most third world countries. But every GPS, with a good data base, that I am aware of, has NDB's as waypoints. And any cheap GPS will outperform and provide any functions or information that ANY ONE of these 'relics' will provide.

Audio Panels: It'll save a lot of installation hassles, and is a great convenience item, if you have multiple audio sources, COMM 1 & 2, Nav audio, Marker Beacon audio, GPS aural alert, gear warning aural alert, Digital voice recorder, or any number of aural warning systems. If you just have two Comms, a single switch can be used for transmitter select.

Second Annual Event! Last Call! Sign up for Velocity Bahamas '96 Fly-in



Sunrise view from our room at Coconut Cove Hotel



Words can not describe the peaceful and relaxing atmosphere at the Coconut Cove Hotel, located right on the water.

Pictured above is the view from the end of the dock, looking back at the resort's wrap around deck, outdoor and poolside bar and of course the beautiful sandy beach.



View from the deck looking out at the ocean. Coconut Cove serves breakfast 7:30am - 10:00am. The resort next door has a restaurant that serves lunch and dinner. Coconut Cove provides free transportation to and from George Town for dinner.

Only 3 Rooms Left!

As of this writing, Coconut Cove has 3 rooms still available. If you plan to go, call Coconut Cove today to book your lodging. If they are booked by the time you call, don't worry, because the resort next door is also very nice.

The second annual Velocity Bahamas Fly-In is scheduled from Friday, May 17th with return departure on Tuesday, May 21st. Pamela has blocked off all ten rooms at Coconut Cove, so make your reservations now by calling 1-809-336-2659. Feel free to alter (early or late departures) the schedule to fit you needs. You do not have to fly in a Velocity to attend. Judy and I flew over last year in our Long EZ. You just need to be part of the Velocity family (builder, etc.). For particulars on room types, etc., please refer back to Volume 1, page 9. If you plan on attending, book today by calling Tom or Pam at Coconut Cove. Once the 10 rooms at Coconut Cove are full, Tom will book any overflow at the "Beach Inn", which is right next door to Coconut Cove.

Just about every back issue has information on the Bahamas Fly-in (info on the resort, how to obtain permission to fly an experimental into the Bahamas, etc.) If you are interested in going, please take a few moments to review this data, then give me a call to get on my list. Color brochures of Coconut Cove are available for Velocitites interested in attending.

We most likely will be leaving in two groups from Florida. For pilots departing from southern Florida, Jean Prudhomme's home airport (Hollywood) will be a good jumping off spot. For the rest of us, we most likely will depart from Sebastian. Be sure to call me so I can coordinate things! (904)461-3146

Join the fun, make new friends, and plan on lots of relaxation!

Rick

WHITES LIGHTNING

Donald R. White
Orchard Park New York



Don White with "Whites Lightning" in Buffalo New York

JULY 23rd 1991 was one of the most exciting and nervous days of my life. You may have guessed that this was the first day of flight for my Velocity "WHITES LIGHTNING". The airplane's name was picked 20 years prior when I began building a BD-4. Scott Swing was the test pilot and this flight went so well that I was co-pilot (and necessary crew member) on the second flight. WOW, what a high.

The story began at Oskosh '86 where I was sold on the Velocity after talking to Danny and taking a demo ride with Neil Hunter. My kit arrived in June 1987 and I managed intermittent work on the fuselage, wings and canard. Winter progress here in Buffalo, NY was very slow because I did not have an insulated and heated work area. My business left little time so in December 1990 I contracted with Scott and Duane Swing to do the finishing work and engine installation in Phillipsberg OH. I stayed with the Swings the final 2 weeks and worked long hours on the interior and trim design. They did an excellent job in getting the airplane airborne. My log book showed about 500 hours of VFR flight in the previous 20 years. Time was logged in Bensen Gyrocopters, C-170, Mooney, C-172 and Taylorcraft with cross country flights to Florida, Texas, California and Vancouver, Canada. However my

flying was rusty due to very little recent time. (A good test pilot and instructor is highly recommended for this situation.) Duane's patient dual instruction got me up to speed and we flew off the necessary hours. Duane co-piloted our flight back to New York in August. A final KICK was my first runway pass and then landing at home base, Buffalo Airfield (9G0).

Whites Lightning has logged two trips to Florida, two trips to Oshkosh and single trips to North Dakota and Williamsburg VA. In January 1992 wife Louise, daughter Michele and I landed at Pompano Beach airport FL with our 2 weeks of vacation luggage. As we unloaded a bystander commented "I can't believe that 3 people and all that luggage came out of that airplane." An amazing amount of "stuff" can be crammed in if you use soft bags.

Our Velocity is powered by an LIO-360-C1E6 (left turning, fuel injected, 200hp) engine and Aymar-Demuth wood covered with fiberglass prop, originally 68-76. Still flying the original prop although it has been refurbished and shortened slightly. The kit was #13 out of the molds so is fixed gear and has the

narrow cord wings, with no leading edge cuffs. I carry 20#'s of ballast when alone in the front seat so believe me there is no way to "accidentally" end up in a deep stall. Cruise is 160 knots burning 9.5 gph from a fuel tank capacity of 65 gallons. The canard stall speed is under 60 knots with 400# in front seats which, according to Duane, is about the slowest stalling Velocity he has flown.

Now to the service experience recommendations:

- (1) If you have one of the original nose gears with the 1" OD tube welded inside the 1 1/4" OD strut, replace it with the later 1 1/4" OD strut top to bottom. In May 1995 my nose gear broke off just below the weld point due to fatigue resulting in a nose gear up landing in a fixed gear airplane. The upper end gear box ripped out about 3/4 of the canard bulkhead so was not able to make repairs in time for Oshkosh '95.
- (2) Connect rudder cables to rudder horn using the thimble pivoting on a bolt with spacer and washer. Both my original rudder cables broke at outboard end due to excessive bending with thimble through hole in rudder horn.
- (3) Use proper size aileron hinge pins and be sure the pins cannot come out. Twice an aileron hinge pin was lost in flight, causing some aileron binding but fortunately not loss of roll control. #41 drill stock is the perfect size for my hinges with a drilled hole and cotter pin at each end of each hinge.



Upper left side panel shows red lights for canopy & speed brake warning lights.

(4) Be extremely aware that any external parts or fasteners coming off in flight could hit prop and cause serious damage. The original engine air inlet scoop under right wing was installed with 3 small sheet metal screws and silicon. One day scoop fell off on the ground due to vibration during a hot engine start up. The fix was bonding in aluminum doublers at screw locations and using much larger screws with the silicon. On every preflight I grab every externally attached part plus exhaust pipes to check for security.

(5) Install an alternate engine air source to operate in the event a bird strike or ice blocks the inlet scoop. This would be especially important for IFR flights. This source is usually a spring loaded door inside engine compartment which allows air to be sucked in by engine if external inlet is blocked.

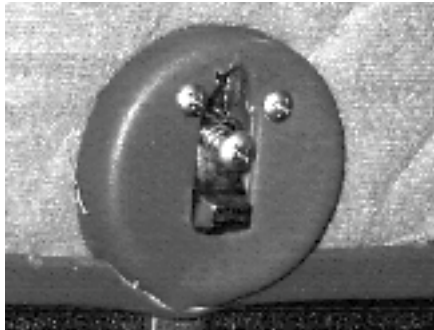
These last two items I consider mandatory because they could prevent a serious or fatal accident.

(6) Use only aircraft certified hoses and fittings for your entire fuel system. Another day I started up my engine and a bystander noticed something dripping from my engine cowling. Upon removal of the cowling we discovered the stainless braided fuel line from the firewall to the fuel pump had disintegrated and fuel was spraying all over. The original braided line was automotive and apparently not compatible with aviation fuel. So I replaced all the lines including the rubber hoses between tanks. A reminder that aircraft and automotive fittings have different flare angles so can be dangerously incompatible. Finally, as suggested by my mechanic, a bulkhead fitting was installed in the engine firewall to prevent the fuel line from being cut open by a crushed firewall in the event of a crash landing.

(7) My strongest advice is to install additional canopy latches plus a large panel warning light which is ON whenever canopy is not closed and locked. The canopy can open during flight if not locked prior to takeoff, if latch pin breaks or if latch mechanism is improperly adjusted. On a beautiful Saturday in May 1994



Forward canopy latch with micro switch to turn off red light when latch is engaged



Rear canopy latch with cover installed

my wife, daughter and I flew to Jamestown, NY airport for a late afternoon picnic. Upon departure for home I was some how distracted and missed the last item on my checklist: canopy was closed but not locked. Just after lift off canopy flew open and aircraft became almost uncontrollable. With throttle and stick I got partial control and decided to attempt to land. Thank God runway was long enough that I was able to touch down twice very hard and finally stopped almost at the end of the runway. The two main gear mounting bolts sheared and right side gear leg broke off just above right axle. We were shaken but OK. This could easily have been a serious or fatal accident. Using my previous engineering background, the following changes were made: (A) Added two additional sliding canopy latches at front and rear of canopy and about 12 inches left of canopy hinge line. (B) A microswitch and large red warning light on panel that guarantees at least the forward sliding latch is locked when light is OFF. (C) Added an extension and warning sign on inside main latch handle to help insure original side latches are

locked. (D) Revised my take-off check list as follows: (3rd last item)- Canopy 4 latches-LOCKED, (2nd last item)- Seatbelts- ON, (last item)- Canopy & Speed Brake Warning Lights -OFF.

The two added latches are Stanley Surface Bolts #76-3610, modified with a spring loaded pin to lock in latched position (see pictures). The panel warning light with microswitch from Radio Shack is only OFF when forward sliding latch is in locked position. The only negatives to these modifications are that added latches can only be opened from inside and would take longer to exit in an emergency situation. However I believe the canopy opening during flight is a much greater hazard than an emergency exit situation. I am aware of a least one other canopy opening in flight. In this case latches were not properly adjusted and latch pins popped out just after take-off. Pilot, who was alone, had to continue take off and was able to gain some altitude. He slowed plane down and was able to hold canopy near closed with left hand then land safely with right hand only. Early on Scott had suggested that I add additional latches. I now believe additional latches and a warning light should be mandatory

In summation, I still believe the Velocity is one of the best designed and safest homebuilt aircraft flying today. The stall resistant canard design has a definite safety advantage over conventional designs. The factory support with Dan Maher and now with the Swings has been excellent. The Swing family, Duane, Scott and Bonnie, are some of the best people you will ever meet in or out of aviation. No flying machine is perfect, therefore all must be treated with care and respect for continued safe flight. Also be sure to join and be active in your local Experimental Aircraft Association chapter. So far I have given 44 kids ages 8 to 18 rides in my plane for the EAA Young Eagles program. The challenge is now out there for you to match or beat that record. Sharing our joy of flying with young people is an especially rewarding experience.

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 Jeffrey M. Clough, Greeley, CO:
Removing Cowls

Just a quick builder tip/suggestion for removing the upper and lower cowls. Before doing the layups which form the cowl lips, mark your cowl cut lines. Beginning 1" from the end of cut line, use your hacksaw or dremel cutting wheel to cut through the cowl for about 8" length – then skip a 1" segment and cut another 8" through the cut line. Repeat all the way around the cowl, but be sure to leave an uncut 1" segment at each end so the cowl will retain its shape. Now proceed with the usual duct tape and bid layups for the cowl lip as described in the construction manual. After cure you need only cut the 1" segments through to the duct tape rather than cutting the whole cowl line. This can save you some time as well as reduce chances of ruining your cowl lip should you cut too deeply.

My garage is pretty cold and my alphapoxy resin tends to crystallize between infrequent uses. A couple of minutes in the microwave – dispenser pump and all – liquefies it very nicely. If you overwarm it you should let it cool a while, otherwise you will get an exothermic reaction when you add your hardener.

The metal cans of safety-poxy hardener decrystallize nicely in a tub of hot water – put some weights on the can to keep it from floating.

•••••

From Bill Wade, Unity, Maine:
Oil Cooler & Brake Lines

I just discovered a possible problem with the RG. Hopefully my mistake can be avoided by other builders. Due to the relocation of the oil cooler to the pilot's side, the oil cooler lines would naturally run through the pilot's duct rather than the copilot's as in the original fixed

gear version. The plans call for the Nylaflow brake lines to run through this duct as well.

The problem is that Nylaflow becomes brittle if continuously operated at above 180 degrees (see the Aircraft Spruce catalog, pg. 95). The oil cooler lines could be up to 245 degrees for extended periods during normal operation. Putting both together in the same duct as I originally did doesn't seem like a good idea anymore.

A solution would be to run the brake lines along the outside of the duct (I plan to use the lower corner where it intersects the fuselage) and/or use 5052 tubing instead of Nylaflow.

•••••

From Dave Black, Woodbridge, VA :
Tipover Cradle, Jacks, & Standard Door Support



Tipover cradle

After you complete building your strakes, the manual says “Turn the airplane over.” Inverting the plane is virtually essential in order to finish the strake and to work on the fit of the retractable gear. But we had never thought of turning an airplane over before. We considered sky hooks, the multi-person brute-force method, and even a rotisserie before

designing the tipover cradle shown here. The concept seemed so simple we were worried it would not work. But as you can see from the photos, it works very nicely and easily.



We designed the tipover cradle to bolt to the existing inboard wing attach points. There is no other fastening, so absolutely no damage is done to the airframe. The cradle is designed to transfer load to the reinforced areas of the firewall. The outside dimensions of its main frame are 32.5" wide x 72" high, including





wheels. The 54" wide crossbar is mounted on the centerline. The cradle's primary structure consists of 2x4 lumber, held together by construction adhesive and lots of screw nails (we wanted it strong). Wheels were mounted on the top of the cradle to facilitate ground operations in the inverted mode. A short 2x4 was clamped to the canard bulkhead to provide an upside-down "nose peg." And finally, we taped small blocks of wood (pontoons) to the outboard ends of the carry-through spar to prevent damage to the outboard skin during the actual turnover process. By the way, when you flip your plane, be prepared for the nose to become quite heavy, as the tipover cradle supports the fuselage well aft of CG.

Inexpensive jacks

The list of "nice to have" tools certainly includes a set of aircraft jacks. If you are building an RG, jacks



are essential. But if you have checked Trade-A-Plane recently, you know a set of three jacks will set you back around \$750. So we saw an opportunity to save major money by building our own.



Bottle jacks rated at 2000 lbs were available at Pep Boys for \$10 each, so we chose those to do the actual lifting. All we needed was a tall and stable support to allow the jack to do its work. We settled on the arrangement pictured here because it is incredibly strong, as well as simple to build. The center post is a 4x4, while the supports are 2x3s. Splice-plates are 1/4" plywood. All cuts are at 45° or 90°. (Construction could have been simplified by making the supports from 3/4" plywood cut into 16" right triangles.) The pieces



are held together by construction adhesive and screw-nails. The bottle-jacks are secured to the center posts by (what else?) several layers of fiberglass uni.

The height of the center post could easily be modified to accommodate individual bottle-jacks and plane heights. In our case, the center posts are 32" for the wing jacks and 16" for the nose. The width of the supports is 28" which makes these jacks extremely stable. All told, our set of three jacks cost \$50.

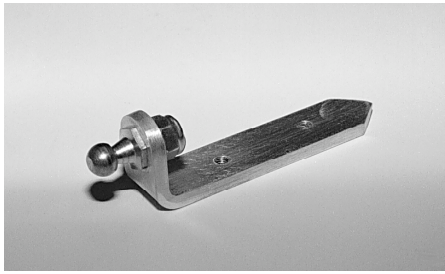
Standard Door Support

Once we had the cockpit door installed and held open by the air-spring, we noticed a good amount of flexing in the rear hinge-pad area.



This is caused by the leverage on the lower air-spring attach bracket, which connects directly to the fuselage hinge-pad. Although this flexing has never been known to cause any problem, we thought we could improve on it, and maybe reduce the plane's weight by an ounce or two in the process.

We eliminated the lower attach bracket entirely, replacing it with a smaller L-shaped piece mounted directly to the fuselage door-frame.



The new "L" goes through the door-frame fiberglass and into the foam behind. It is secured by wet bubbles in the hole, plus two screws from inside the cockpit. Another screw from outside could add even more strength. Since we had previously reinforced the door cutout area with carbon fiber, this new support has proven extremely secure.

For more information on any of these items, or if you can share information on inexpensive aircraft scales, please call Dave Black at (703) 590-2221.

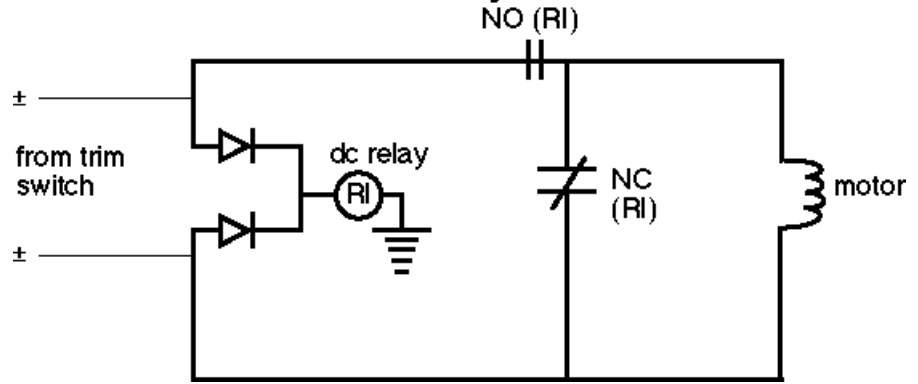
.....

*From Bob Ginsberg,
Fuquay Varina, NC:*

Pitch Trim Motor Dynamic Brake

The Warner motor supplied with the kit has considerable "coastdown" when you release the switch, making

Pitch Motor Dynamic Brake



it sometimes difficult to get the trim fine-tuned. I solved this problem, with the help of Bill Betts of Sparkchasers avionics shop, by the use of a dynamic braking circuit. What this circuit does is short the motor windings when you release the trim switch, thereby making the motor its own load. This stops the motor almost instantaneously, but does not change the motor's speed when it is operating.

The circuit is show below. It taps into the two leads going to the motor from the switch. Each of these leads can be hot or ground, depending on which way you have the switch. The relay is picked up by power from the motor leads, but is grounded separately, making sure it releases when you release the switch.

I mounted the relay and the two diodes on the fuselage wall, just behind the pilot side of the instrument panel, with a 4 pin connector and a separate connector for the relay ground. This way, if the relay fails, I can open the connectors and pull the relay and the diodes all at

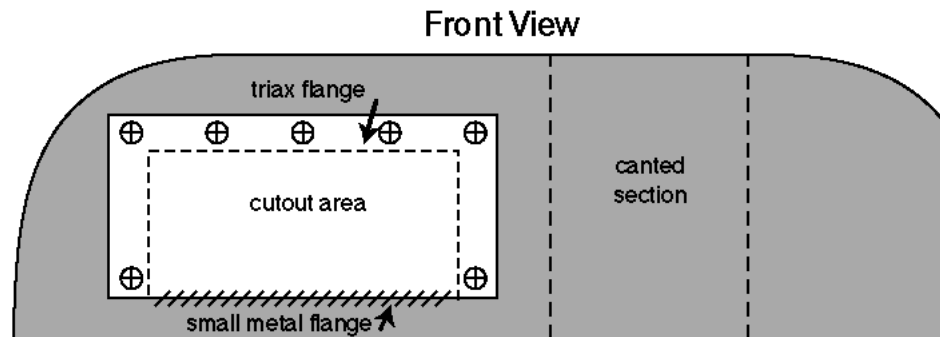
once, facilitating a relay or diode replacement.

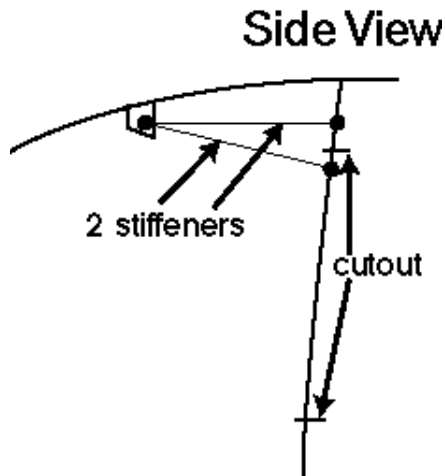
Instrument Panel Cutout

Since I fly IFR, I wanted to make the biennial altimeter certification as easy as possible, i.e. I didn't want to have to remove the canard to do it. To do this, I created a removable flight instrument section in the Instrument Panel. This section is about 17 inches wide by 8 inches tall, which is big enough for 8 standard instrument holes, 3-1/8" each.

To make the cutout, I first marked and cut the rectangular cutout. Then I used the grey tape trick to layup a two ply triax flange around the top and sides of this cutout. After it cured, I put in 7 mounting holes with 1032 nutplates behind the flange. This allows the cutout to be removed by unscrewing those 7 screws.

The top of the cutout is reinforced with some sheet metal braces which are attached to the area in front of the windshield, similar to the





braces for the avionics racks. The bottom of the removable section has a small sheet metal flange on it, which serves as the flange for the bottom. I didn't put the triax flange there to avoid excessive thickness where my breakers go.

Of course, only the future will tell how good an idea this was, but it sure made IP construction easier when you could reach through this big cutout. The disadvantage is that you lose a little IP space where the flange and all its nutplates are. I still will be able to get everything I want in this panel. You should look carefully before you do this though – you may want more gadgets than I.

•••••

From James F. Agnew, Tampa, FL:

Thirteen Hints from a Velocity 173 Elite FG Builder

1) A 150-300 watt Quartz Halogen work light is very useful for many things. The one I purchased (at Sears) has a low stand (about 12" high), can be conveniently placed under, around or inside the fuselage. It cost about \$12, is very bright and can be used for the following:

- a) A great light especially for looking through fiberglass to see inside things.
- b) It makes a good heat lamp to speed up epoxy curing on cold days when placed close to the layup. Be careful, don't put it too close since the surface can get very hot.
- c) When fitting bulkheads etc. place the lamp on one side of the seam being fitted and look at the light

shining through on the other side. Mark the high areas where the light isn't coming through and happy sanding. The width of the light stream coming through will give you a good idea of the amount to remove from the high spots.

2) If you want an easy way to find the ABSOLUTE centerline of the hull try the following. You must do this before you install the bulkheads. Drill a small 1/8" hole in the center of the rear of the cowling and insert a small bolt and nut. Stretch a piece of chalk line (I use nylon) very tightly between the nose bolt and the bolt in the cowl. I just wind it tightly around the rear bolt and run another nut down on it. This line represents the ABSOLUTE centerline and may not match up with a center point found by measuring across the hull. It can be used to find the difference between the two so you can split the difference or to accurately place your bulkheads perpendicular to the true centerline. Place a piece of 2x4 across the hull flanges to support your hand and you can use a plum bob to project this centerline to the hull.

3) Aligning bulkheads, I used 1x1" aluminum angle Clecoed to the fuselage flange to establish the top position of the bulkhead. You measure per instructions to each side from the nose bolt. I then drill through the angle and flange and Cleco one side and attach the other side with a Cleco side clamp. I then mark the measured center, and the ABSOLUTE center using the centerline string. If they are both the same great. I then place two Cleco side clamps on the vertical part of the aluminum angle to make a "hinge point" Using a 16"x24" framing square held with the short side against the Clecos and the edge aligned with the center of the marked center of the bar I swing the square down to see how it aligns with the string. If it lightly brushes past the string when swung from both sides of the center you're as perpendicular as possible. If not you can adjust as necessary. When aligned, drill and Cleco the remaining side of the angle to the flange.

4) Installing nutplates, buy 6-12 1" to 1 1/2" # 10-32 stainless steel

machine screws and nuts at your local hardware store. Drill the center hole for the nutplate, insert the machine screw with the nut run up the shaft from the inside of the hole and screw the nutplate on the projecting screw hand tight. Align the mounting tabs and tighten the nut from the inside to hold the nutplate firmly in place. Drill one rivet hole and stick a rivet in the hole from the outside, drill the remaining rivet hole and remove the machine screw. Presto, perfectly aligned holes ready for rivetting.

5) Leveling the fuselage the easy way - My fuselage cradle is made of 3/4" plywood ends bolted to a frame of heavily cross braced 2x4s with heavy duty casters at the corners to allow easy movement. The cradle outside dimensions are 36" wide by 7' 1 1/2" long. At my local Recreational Vehicle dealer I found a set of 4 aluminum tripod screw jacks for \$30. I mounted these jacks to the ends of the cradle 2" in from the sides to the center of the adjusting screw by bolting the top plate to angle iron pieces. Everything worked out to be 1 full turn of a jack is one tenth of a degree movement laterally or 4 turns for one tenth degree longitudinally. If you are using a Smart Level you can level the plane in no time at all.

6) Water Levels - I bought an electronic water level at Home Depot for less than \$15. This level has an electronic beeper that beeps when the water reaches the centerline so you can level something by yourself without running back and forth. I mounted it on a L shaped bracket even with the sensors centerline so I could Cleco or side clamp it to one end of the object being leveled.

7) Dremel Tools - don't go to work without one or two. I have two tools, one AC powered and one rechargeable and find them very useful. Harbor Freight sells a set of 5 diamond coated saw blades with an arbor that are great for less than \$10. These saws cut a very fine line, are easy to control and will cut just about anything. They cut and trim fiberglass like butter and stay sharp.

8) Sanding irregular shapes before glassing - I found "Ali-Gator-

Grit" sanding sponges 3"x5"x1" made by Ali Industries, Inc., Fairborn, OH 45324. These are grit impregnated sponges that sand on all sides and since they are somewhat soft will conform with irregular surfaces. They are great sanding around bends, into the groves in TriAx, the ducts (inside & out) – use your imagination.

9) For those of you electronically inclined - If not so inclined get a copy of Radio Shack's "getting Started in Electronics" for a simple primer on basic circuits. The ones that you will most likely use are the Light Emitting Diode (LED) for indicator lights with almost unlimited life and Power MOSFETS (transistors) that make great high power ON/OFF switches that can be controlled by minuscule switches and wire with one resistor. Get a DigiKey Electronics Catalog by calling 1-800-344-4539 also on Internet at <http://www.digikey.com> with their full catalog. Also an Allied Electronics Catalog by calling 1-800-433-5700. Both catalogs are free. Why, you ask? Read on.

a) Allied - 3M #FP-301 heat shrink tubing kit. A great assortment of sizes and colors useful for insulating or color coding wires. Slip it on, heat with a flame or heat gun and it shrinks to fit.

b) Allied - Potter & Brumfield Relays,

the Allied # 886-2107 (P&B # T9AP5D52-12) is a great flange mount push on terminal heavy duty relay (30 Amp Single pole double throw) for driving such things as your Elevator and Roll & Trim motors from low amperage switches like "coolie hat" switches. The trim motors can draw up to 6 amps for the 12 volt or 3 amps for the 24 volt linear shaft type used on the elevator trim. The use of two relays allows quicker stopping of the motor to prevent overshoot and multiple trim switches. See the diagram below.

c) Tired of landing lights burning out quickly - you can buy a commercial device for \$18 or order a "Keystone Carbon Inrush Current Limiter" from Digikey #KC001L-ND for \$2.35. Epoxy it on a small aluminum mounting bracket (epoxy over it with one side against the aluminum since it will get warm) and place it in series with the plus lead going to the landing light. When you turn on the landing light it will not snap on, it will take a fraction of a second to reach full brightness.

d) All solenoids, relays and electric motors create a voltage spike when they are turned off that can potentially damaged electronics. A surge absorber can be helpful to eliminate these spikes. You can purchase

Panasonic ones from Digikey # P7005-ND for 42¢ or 10 for \$3.60. Just place them across the coils switched or motor leads.

I owe thanks to Rick Douglass for some of B, C, & D. Some other things that I'm working on or have done that you might be interested in just let me know.

Hall Effect Sensors, these are solid state devices about the size of the head of a match that switch 250 Ma of current when in the presence of a magnet. This is more than enough to drive a lot of LEDs

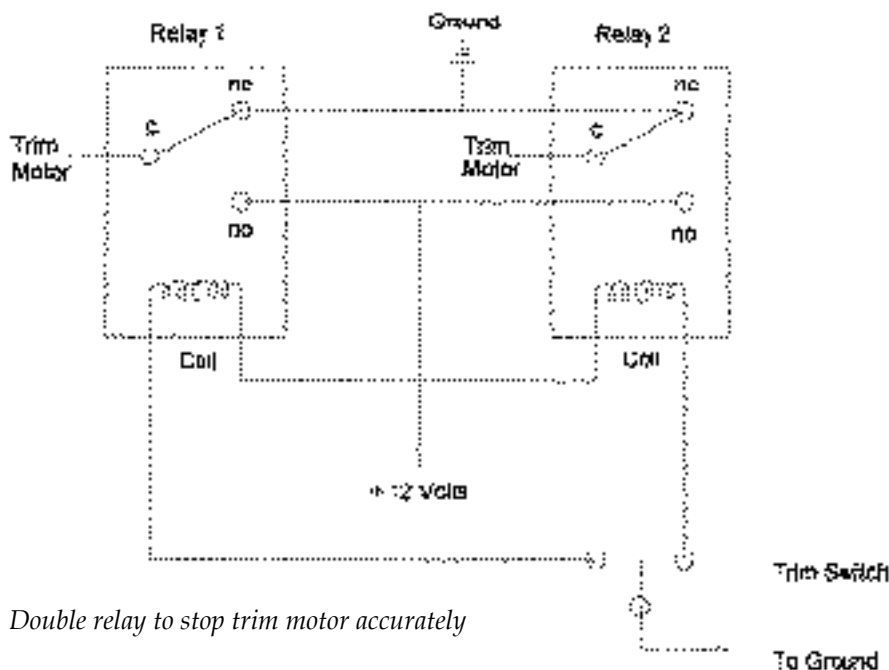
10) or a low current relay. I plan to attach a small magnet to my speed brake to show it is closed. They can be imbedded in fiberglass or held in place with silicone glue. They should be great to replace all of those trouble prone micro switches especially on landing gear.

11) Did you ever wish for a low power taxi light rather than using your landing light? Here is one for less than \$10. From the Allied Radio Catalog, order a LEECRAFT # 28-07 (Allied # 931-7002) Halogen Cycle Bi-Pin Base Socket for \$4.26. Next get a Radio Shack #272-1177 12 Volt 20 Watt Halogen Bulb for about \$2.00. Warning, do not handle the bulb with your bare hands, the oils from your skin will cause short bulb life. You will need some light wire (22ga will do) and a small switch. This setup will only draw less than 2 amps.

The back of the socket has two small vertical tabs (small push on terminals) or it can be soldered. Cut two slots in the center bottom of the landing light housing so the top of the socket is 1/4" below the cutout, put some epoxy on the socket and push the terminals through the slots from the inside. The bulb will stick up in front of the landing light about 1/4" and uses the reflector to reflect its light forward.

Run a ground wire up to the ground terminal on the landing light and another wire to the Taxi Light switch.

This is not a bright light, however, it will give a wide soft light for about 25-35 feet in front of the plane and should be more than adequate



for taxing at night.

12) Following is the parts list and construction details for large (4' x 5' surface) folding cutting bench that I designed. It has space for 4 rolls of cloth. It can be built in a few hours from 12 - 8' 2x4s, a sheet of plywood, some plastic pipe, chain, 4 hinges, screw nails and very little cutting. I weigh about 225# and I can stand on the table. It is very strong, can be disassembled in minutes and has a surface large enough for the widest cloth you will use.

This table can be constructed with either a folding or non folding top and legs. Optional items are shown.

BASIC PARTS LIST

12 - 8' 2 x 4s

1 - 4' x 8' sheet of 3/4" Plywood (make sure one surface is "A" grade and smooth if it will be your cutting surface).

1 - Pint of hard varnish or other sealer for the wood cutting surface, if you do not use the replaceable hardboard cutting surface.

1 - Box of 3" Drywall Screws

1 - 1 3/8" wood power bit recommended (a hole saw may work and 1 1/2" will do).

4 - 65" long pieces of 1" heavy wall plastic pipe or any suitable, replacement to be used to hold the rolls of cloth.

OPTIONAL

1 - 4' x 8' sheet of 1/4" hardboard (like pegboard without the holes) for use as a table top replaceable cutting surface especially if you use a rotary cutter to cut your glass cloth.

For folding top version

2 - pieces of medium weight open link chain.

10 - 3" x 1/4" flat head bolts

2 - 3" x 1/4" round head bolts

14 - 1/4" hex nuts

2 - large strap hinges (sometimes called gate hinges). Mine are 6" wide at the wide point and the long leg is 8". Don't try to save money here, the table top is HEAVY!

2 - 4" galvanized hinges (for the legs)

2 - 3" barrel bolts (the kind you slide over to lock doors)

CONSTRUCTION

Building this table is quick especially if you gave a heavy duty



variable speed drill and a phillips bit to drive the drywall screws.

Start at the lumber yard and buy the lumber. Most of the larger ones will even make most of the cuts for free saving almost all of the cutting. Cut as follows; the 4' x 8' sheet(s) cut at 5', 3 - 8' 2x4s cut at 5'1", 1 - 2x4 cut at 5'4", 2 - 2x4s cut at 4'10", 2 - 2x4s cut into 3 (three) 3'9" pieces. Save all pieces.

You should now have left from the above cutting (sizes approximate) 1 - 3'x4' piece of 3/4" plywood, and the following pieces of 2"x4" 3 - 35", 1 - 32", 2 - 38".

Determine the height you want the table top and subtract 4". I wanted my top at approximately 37 1/2" (I'm 6' tall) so my dimension was 33 1/2". This will determine the height of the top of the center cross piece. The front legs will have to be adjusted accordingly.

Mark the 3' x 4' piece of 3/4" plywood diagonally from corner to corner and saw in half to form 2 - 3' x 4' triangles. You then cut the following pieces from the 2"x4" pieces. 1 - 35" piece cut to 32", 2 - 35" pieces cut to 24", 2 - 38" pieces cut to 37" (these are the legs and are the height that I used for a 37 1/2" table top height). You are now ready to build the table. If you are building a fixed table top, just eliminate the hinges etc. and screw the pieces together.

FINAL ASSEMBLY

Please refer to the pictures while reading these instructions. I will be

referring to the "long" or "short" side of the "L" in these instructions. The "L" is formed by two 2x4s screwed together to form an "L" shaped piece. The "long" or "short" side of the "L" refers to the inside of the L shape.

BACK ASSEMBLY

Take 2 - 8' 2x4s and one shorter piece, lay one 8' side by side vertically with the shorter piece (spacer) and place the 2nd 8' horizontally on top of the two. Use at least 5 (spaced equally) drywall screws to fasten the two 8' pieces to form one "L" back piece. Make another of these 8' "L" pieces. Lay the two back pieces with the "long" side horizontal to the ground. Place 2 of the 5' 1" 2x4s flat on the long side flush with the top and bottom to form the top & bottom cross pieces. Use drywall screws (3 at each end) to screw the cross pieces to the "long" side. WARNING - the screws may go all the way through the 2x4s and need to be cut off, so don't screw the parts to the surface underneath. Install the center cross piece at the height you previously determined (33 1/2" in my case). Take one of the triangular pieces of plywood and attach it to the outside (short side) of the "L". The 3' side should be flush with the bottom of the back assembly and attach the 4' side to the back assembly with at least 5 evenly spaced screws about 1" in from the back side (screws go through plywood, short side and into long side). Do

the same on the other side. Stand the back up. The two 24" 2x4 pieces go vertically inside the plywood triangles butted up to the back short side and screwed through the plywood. The 5'4" 2x4 is butted to the front of the 24" pieces and screwed in place to form the bottom box section of the frame.

TABLE TOP ASSEMBLY

Take the two 4'10" 2x4s and place them vertically and parallel to each other about 4' apart. Take the three 3'9" 2x4s and place them vertically BETWEEN the above 2x4s, one centered and one at each end flush with the ends to form a rectangle. Insert 2 drywall screws through the longer pieces into the ends of each cross piece. Place the 4' x 5' piece of plywood on top of the above rectangular frame. It should fit flush with the front and back (longer side of frame) and hang over each side by about 1". This overhang allows you to clamp a 5' ruler (I use an aluminum one) or any other straight edge over the cloth for marking or cutting. Now go around the entire outside edge of the plywood and insert drywall screws about every foot into the center of the underlying 2x4 frame. Make sure that the heads of the screws are flush with the top. You may want to insert them part way, remove them one at a time, countersink the hole then drive the screw in completely flush. Turn the top over and place the legs (4" side) flush against the inside of the front frame member and a 1/8" from the frame side. Mount the 4" hinge to the back of the leg and the underside of the top. Make sure that the hinges let the legs hinge back, they will not go all the way back, however they will be within the perimeter of the table base. Come down 2 1/4" from the underside of the top to the centerline of the barrel bolts and mount them so bolt almost touches the side 2x4 when retracted. With the leg tilted straight up, slide the bolt over so it touches the side 2x4 and tap the end with a hammer to make a mark. Remove the bolt, drill a hole at the mark large enough to accommodate the bolt and reinstall. These bolts just hold the leg in the extended position during raising or lowering.

FITTING THE TABLE TO THE FRAME

Extend the table legs and have someone help you place the back of the top into the frame resting on top of the center cross piece. Take the large strap hinges and rest the hinge portion on the table top with the wide section down between the table back side and the "LONG" side of the "L" upright. Mark 2 holes on the upper and lower hinge halves and drill for the 1/4" bolts. Using the flush head bolts come from the hinge through the back of the table frame and from the front through the vertical L and fasten with nuts. You may want to drill the hinge holes larger than 1/4" so the bolt heads are more flush with the hinges. They don't have to be totally flush. Next you drill the 1 3/8" holes in the short side of the vertical "L" frame. The first hole is centered 12 1/2" above the table top and the next 3 holes centered at 12" intervals above the first. Slip the pipe through the holes with a small amount protruding from each side. From the front of the "L" drill a 3/16" hole through the frame and pipe the full length of the drill. You push a drywall screw in these holes through the pipe to hold it in place. Your top should now fold up to about a 30 degree angle and out of the way. Go to the back of the vertical frame and using the 2 - 32" 2x4s screw them at an angle to the back of the lower and center cross pieces so they form a V with the top toward the center piece. Measure back about 7" from the front of the table and drill a 1/4" hole through the side 2x4 centered. Take a flat head bolt and insert it from the inside out through the end of the chain and hold the chain in place with a nut, make sure head is flush inside so leg will clear it when folding. You may want to cut this bolt off flush with the nut. I put large key rings (about 2") on the free end of the chain. Have someone hold the table folded back (I suggest that you place your rolls of glass on the pipe first to see how far back you can go) and holding the chain tight mark the short side of the vertical L. Drill a 1/4" hole where marked and thread one

nut on a round head bolt about 2", insert in hole from the outside and run a nut on the back side. The chain will hook over these bolt heads to hold the table up.

OPTIONAL

If you are going to use the replaceable table top, lay it on top of the plywood and secure the corners with 1 drywall screw. You can make a table top that will rest on the lower 2x4 frame for storage if you like.

13) Would you like very nice conforming layups especially with Triax over irregular surfaces (e.g., the plywood stiffeners on the keel)?

Try the following, obtain some 1" thick dense foam like that used to pack delicate items or possibly for upholstery. This foam needs to have some spring yet not too soft. Cover it with VISQUEEN and tape with duct tape. I have several pieces of plywood about 12" long and 2,4,6,8, & 10" wide as well as several foam pads. Change the VISQUEEN pad covers when they get torn or covered with epoxy.

After you do your layup, cover with visqueen, place the foam pad over the layup then a piece of 3/4" plywood and clamp tightly in place. Viola, when the layup is cured you will find that the foam conformed to the underlying surface and makes a finely conforming layup.

Clamping may be a problem, however, try the following tricks; Common bricks on top or short pieces of 2x4 with wood wedges between the plywood and the hull or whatever.

The spring clamps that look like large clothespins work well and inside of things, like the keel, you can spread the jaws and clamp them on a small piece of wood. Place them between the plywood and something and pull the piece of wood out of the jaws so the handles snap apart and provide outward pressure. Happy clamping. The foam works well over peeply as well.

Enjoy.

•••••

Factory News

Continued from page 3

Franklin Engine Update

I had hoped to have completed ALL the testing on the Franklin engine by now but this was not to be. The major problem I have been struggling with is that the Franklin doesn't develop as much power as the Lycoming. When I say struggle, I mean big time struggle. I have devoted at least 200 to 250 hours, over the past four months, trying to make the Franklin work. Here was my problem: the Lycoming 200 HP engine will swing our prop at 2540 RPM static. The Franklin 220 HP engine swings this same prop at 2400 RPM static. When we look at the power curves for the Lycoming vs. the Franklin it would appear that the Franklin should be developing somewhat more power at any given RPM from 220 on up. Keep in mind that the Franklin is rated at 220 HP at 2800 RPM vs. the Lycoming 200 HP at 2700 RPM. At 2500 RPM the Franklin should be producing about 10 to 15 HP more than the Lycoming at this same RPM.

Actual flight testing resulted in a longer runway requirement, less rate of climb and a slower cruise speed when using the same prop as the Lycoming. I tried an IVO prop and set the static RPM to 2400 and got my take-off ground roll along with the rate of climb to be close to the Lycoming; however, the prop would reach 2800 RPM red line with only 19" manifold pressure. By changing the pitch to 2200 RPM static, I was able to get my cruise manifold pressure up to 23" at 2800 RPM, but a long take-off was an unacceptable tradeoff. Speed for this last test was 170 kts.

We then sent the prop to Atlas Motors, the Franklin importer, and he ran the prop on his engine. The only difference (we believe) is that his engine uses a carb and my engine uses the fuel injection. Well, guess what - our static was 2150 on this prop, his was 2700...a whopping 550 RPM difference. Atlas then sent me the prop back along with a carbure-

tor for further testing. When I ran the engine with the carb, my RPM went up to 2300. Remember, his was 2700. We are still some 400 RPM short of what the Atlas engine produced. We are questioning the RPM tack used by Atlas and they are sending us their portable unit to see if the 400 RPM is an error in the gauge.

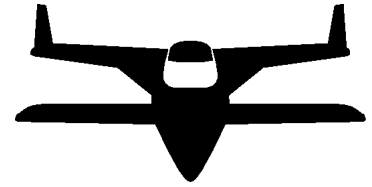
Soo-o-o, until we get the gauge for verification we can only assume we have a sick Franklin. If this proves to be the case, Atlas will bring down a new engine for us to test. In the meantime, I am convinced that the fuel injection system will NOT give us as much power as the carb and therefore we will concentrate our efforts at developing a carb heat box and exhaust muff to include with the Franklin engine install package. If any of you care to continue work on the fuel injection system, you are on your own, as I just cannot devote any more time to this project.

We will be flying the Franklin powered Velocity to Sun-N-Fun for display in our booth and should have ALL the information available at that time.

Duane

Buy Sell or Trade

Free and exclusive
to all *Velocity Views* Subscribers.



FOR SALE VELOCITY RG KIT

Partially built standard RG Velocity kit, Completed and primed are the canard, elevators, wings, ailerons. Rudders are 1/2 done, Instr are included (except engine instr.), with 2 GPS (Garmin & Trimble), & Instrument panel is cut to accept them, bulkheads all done. No engine or eng. MC. I feel it is worth \$36,000 or best offer. The kit is in storage near Velocity factory and Scott can recommend workmanship so far. Reason for selling: My wife became ill & has passed away, thus I must stay in Canada for a few years to tend to my young 3 year old. Contact James B. Batten, Box 57 Manuels, Newfoundland Canada AOA 240 Phone 709-739-0100 or 709-834-3569

FOR SALE VELOCITY Gold Charms

Velocity 14kt gold charms with spinning 3 blade prop \$85.00, could also make tie pins or earrings. Call Moses Ezekiel @305-389-9011 eve

FOR SALE DSP Electronic Tach

DSP electronic tach and sender less then 40TT \$75. Call Moses Ezekiel @ 954-389-9011 eve.

**Help us reach
our goal of 500
Subscribers!**

**Know someone that
is interested in
Velocity? Why not
suggest that they
subscribe to *Velocity
Views* Newsletter, or
give a gift subscrip-
tion (we will send a
gift certificate in your
name to the recipient)**

Velocity Bahamas Fly-in



See page 9 for details

If you are going, here is your check list of things to do:

- ✓ **Call Coconut Cove for room reservations.**
- ✓ **Call Rick Lavoie to get on his list (to coordinate things), and to discuss first time jitters...**
- ✓ **Fax your paperwork to Bahamas Civil Aviation Dept. for experimental aircraft approval (see Volume 4, page 12)**
- ✓ **You are required to have a coast guard approved life vest for each person aboard, even though your Velocity floats.**
- ✓ **Buy your VFR or IFR charts.**
- ✓ **Here is the route if you plan on departing with me from Sebastian (X26): ANGEE, Freeport (ZFP), Nassau (ZQA), Mosstown (ZEM)**

Velocity Views
is published Quarterly by:
Lavoie Graphics
26 Marshview Dr
St. Augustine, FL 32084-5873
Rick Lavoie, Publisher
904-461-3146
(voice or fax)

Velocity Views newsletter is published in cooperation with Velocity Inc. (the factory). Prior to printing, the factory reviews each volume published for accuracy.

Velocity Views newsletter material has been supplied voluntarily from the Velocity Factory, Builders, & Vendors. This material is printed for informational purposes only. Opinions expressed are those of the author. Lavoie Graphics & Rick Lavoie do not endorse and are not liable for the contents of such material. Use of this material is at your own risk. Any variance from the factory plans is a high risk endeavor. Any contemplated modifications should be reviewed and approved by Velocity Inc.

Velocity Views is a Trademark of Lavoie Graphics

Copyright © 1994 - 96 Lavoie Graphics All Rights Reserved.

No part may be reproduced or translated, stored in a database or retrieval system, or transmitted in any form by electronic, mechanical, photocopying, recording, or other means, except as expressly permitted by the publisher.

Subscriptions

- **1996 Calendar Year Subscription** (Volumes 5-8): The annual cost is \$35.00 for mailing addresses within the United States. For all other mailing addresses, the cost is \$43.00 in US funds (covers air mail & special handling).

All subscriptions are sold on a calendar year basis. New subscribers joining mid year will be provided with back issues for that calendar year.

- **1995 Back Issues** (Volumes 1-4) are available for sale at \$35.00 in US funds. Specify that you want 1995 back issues when ordering.
- Look at the top of your mailing label for the final volume number your subscription covers. To help keep our costs down, no invoice will be mailed to you. Simply mail a check to Rick Lavoie each year to keep your newsletter coming.

It is more cost efficient for us if you pay by check, but if you elect to pay with Master Card/Visa, be sure to include the following:

- Name as it appears on your Card.
- Credit Card number
- Expiration Date
- Master Card or Visa?

NOTE: On your statement, the charge will be processed in the name of Lavoie Graphics



Rick Lavoie, Newsletter Editor
26 Marshview Dr
St. Augustine FL 32084-5873

FIRST CLASS

FORWARD & ADDRESS CORRECTION

"Paid thru Vol ?" on your label indicates the final volume your subscription covers.