

# VELOCITY VIEWS

Volume 10

## Velocity Aircraft Unveils “XL”



The new XL gets a 320 wet sanding from Chad Holland, while Duane shows off his true strength.

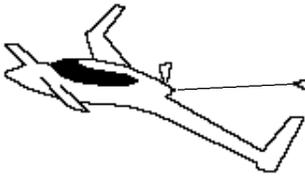
**A**S I WRITE THIS, it's March 4th, just one month from when we leave for Sun-N-Fun. As is common in this business, we're burning the late night oil getting "Bubba" ready. Many recent visitors have said, "You're going to have this airplane ready for the big show? You're out of your mind!" Well, perhaps so, but were going to give it our best shot. Bubba, (N97XL) only lacks about 500 hours to completion. This seems about right to finish in 30 days. In any case, some of the features of Bubba not found in our standard Elite include the Lycoming IO540 260 horse power engine, a 6" expansion in the width of the fuselage along with a 10" stretch. There is also a plenum running along the roof of

the cockpit with separate air ducts and individual reading lights for each seat. The air for this duct is provided by a NACA inlet in the aft top of the fuselage. We have also extended the carbon door beams (roll bars) across the entire fuselage top. While we were at it, the extra width allowed us to provide more switch panel space on the upper panel above the windshield, and we now have all the function switches located there; no switches on the instrument panel at all. I also straightened the instrument panel on the co-pilot side to allow extra leg room. The instrument panel mold was trimmed to the exact size of the opening to minimize trimming and a glare shield was

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## FACTORY NEWS

by Duane & Scott Swing

### Manuals Note:

We realize after spending a lot of money on updating the construction manuals, that some of you still think they need some work. Some of you expect a lot more out of them than they are ever going to deliver. Nevertheless, we really would like to improve them as an ongoing process. We are right now developing exploded views of the airplane for different sections of the manual. These will not be scale drawings, but they will help you visualize what you will be working on and give you a better understanding of what the

final product will look like. We may put these in the newsletter or we may just send them out. Also, it has been mentioned that although the manual looks as though it is written in a step by step method, it is not. You will need to read through at least the whole chapter you will be working on before starting – so you get an overall look at it. The little lines that you put a check on are only put there as a reminder that you have already done that work – not for sequential purposes. In most cases, it is sequential...but do not take that for granted.

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### XL unveiled

*Continued from page 1*

fabricated and a mold made so the glare shield will be supplied as a molded part with the airplane. We also have made a molded air plenum chamber for the engine cooling similar to the one used on the Franklin. Air for the induction system and the oil cooler (mounted in the engine compartment) is supplied by a molded duct that gets air from a NACA like scoop (big) mounted on the bottom of the airplane. This is also a molded part supplied with the XL kit. We will be using an electric heater in the cabin taking a lot of current from the 70 amp alternator.

There are many other changes being made and you will just have to see the XL to appreciate all that was done in this short 5 months it has taken to build this airplane.

We have set the price at \$36,000.00 for the XL RG (\$32,000 for the FG) until after Sun-N-Fun and then an across the board \$2,000.00 price increase for all our airplanes will go into effect.

That's it for now, see some of you at Sun-N-Fun.

*Duane*

### Elite Seat Spring Note:

Adding a spring to the seat rail system will allow easier adjustment of the seat. Two holes are drilled, one in the center of the front mounting bar and one in the center of the front bar that the seat is attached to. A spring is added to help pull the seat forward.

### Elite Door Note:

Fitting the door in the Elite. If your door doesn't seem to match the fuselage exactly, do not fret. Try to minimize the differences so that there are no large mismatches. If the bottom of the door seems twisted, don't worry about that since you can force it flush with the fuselage later. The upper part of the door will not move very much so concentrate on that the most. When you put your pin tubes in the fuselage, your door will be locked into position and in time will take a set to that position. After the seal is installed, it will also help hold the door into position for latching. With the door latched, you can duct tape the high areas, door or fuselage, and micro the other surface to make the door flush. If you have a varying gaps around your door, you can fix those by duct taping the flange of the door, microing the door pocket near the edge, and closing the

door. This will later be opened and cleaned up to give you the perfect, ball bearing tested gap of about 3/32". This takes a piece of 80 grit paper doubled up.

### Fuel Tank Leaks:

No fuel leaks in the tanks. I have to tell you that when we build an airplane here, we do not even check the tanks for leaks. We have done it a lot but there are procedures to follow that can give you more confidence in your finished product.

1. Take special care to fit the tops of your baffles within 1/8" of the top. More or less is okay but less may squeeze too much stuff out and too much more may cause a void. Obviously you won't get everyone the same but try your best.
2. Flanging is not a bad idea in certain places but the approach needs to be taken correctly. The only flanges we have ever used are around the wheel well ( outside) and at the fuselage side between the rear fuel bulkhead and the slanted inboard bulkhead (baggage area). The wheel well flange is nice since it is too thin to add goop to the top of it when closing the tank. The side of the fuselage helps since that is right over the fuel screen and you don't want anything falling through the crack after you close the top. Also, that area would always leave the possibility for fuel to get up into the crack and maybe work its way out if the flange is not done. Even with flanging, there needs to be some gap between the flange and the tank so make sure you have some.
3. When coating your tanks with epoxy, always use a squeegee wherever possible. If you can, it is best to coat in the morning then again in the evening when the epoxy is not cured, since this will allow better sealing of the tank. We also use our gloved finger to coat all the exposed foam. This is not necessary but it always makes us feel like we are sealing everything.
4. Use a freezer zip lock bag when gooping the top of the baffles and bulkheads. The job goes much faster and much more uniformly. You should still use a squeegee to work

the sides but mainly the cake decorating idea. 3/8" is what we work for on the bead. Remember to save the gooping of the strake leading edge for last otherwise you could be covered with goop like me when you lean over it.

5. When putting the top on, practice a little before the goop goes on. The rear of the top strake needs to stay up high enough so the leading edge contacts first so that it can be layed down on top of the goop – and not push it off. Be careful not to get too high as it will cause the strake to be forced away from the fuselage. This would require some side movement which would also scrape goop off the baffles and bulkheads.

6. Put a line along the fuselage at the strake top so that when you close it, you can tell if the strake is being forced up by the goop, or by the duct tape that you wrapped around the leading edge to hold the two halves together. If it is, you can put just a little weight about half way back on the strake at the fuselage to get it back close to where it is supposed to be. If you ignore this, you may end up with a void.

#### **Check your Exhaust:**

It is good practice on the walk around, to tap the exhaust with a metal object and listen. An exhaust without cracks will ring. If it makes a blunt sound, check it out. You will get to the point that you will hear the problem if there is a problem. The passenger side exhaust header has cracked on a few of our customers airplanes and in two cases actually broke off and went through the propeller doing some damage to it. The reason for the passenger side is because it is the longest pipe past the connection with the engine. It tends to work harder from heating and cooling and become more brittle. In time, from vibration, it can crack...so check it out.

#### **Franklin Update**

We continue to try new things out on the Franklin engine to improve upon an already good package. The latest is an attempt to reduce oil temps and cylinder temps

just a little more. At high power cruise, the oil temperature would stabilize at about 230 degrees, not much below the max allowable of 232 degrees. In the Franklin, we use a supplemental oil cooler in the engine compartment by mounting a small auto racing type cooler in the wing root and bringing air into the wing root by a scoop mounted under and just aft of the wing strake. The exhausted hot air from the cooler would dump into the engine compartment and ultimately find its way out the rear cowling along with the engine cooling air. By attaching a small fiberglass adapter to the exhausted side of the cooler and running a 3" duct hose from this adapter down and out the bottom of the cowling, the hot air from the cooler is sucked out the bottom cowling due to the low pressure created in this area. The result was a 25 degree reduction in oil temperature. Now at high power cruise, 205 degrees is the highest I have been able to get the oil temperature.

I have had a gut feeling that with the 6 cylinder engine, that a large amount of the cooling air is being restricted from exiting the cowling due to the pinching that takes place between the aft two cylinders and the lower cowling. There is just not enough room for the air to get out. To take care of this, I cut some slots on the lower cowling below the aft two cylinders making about 12 to 15 square inches of additional outlet area. The result was about a 15 degree reduction in cylinder head temperature. Max temp. at peak EGT now will show about 362 degrees. (Max. allowable is 392 degrees)

I now fly the Franklin powered Velocity with the same confidence I have with the Lycoming and no further engine testing by Velocity will be conducted unless conditions change.

#### **IVO Prop Update**

We continue to put time on the IVO electric prop on the Franklin engine and presently have perhaps 50 or 60 hours. The primary problem with the stock IVO blades was that I

was not able to get a satisfactory lower RPM when flying at 75% power at altitude. On climb at 120 kts. full throttle, I could get 3000 RPM, much higher than I needed. I spoke to IVO about this and he agreed to make a special set of blades for me that have more pitch. I have now installed these new blades and find the RPM ranges are just about perfect. Climb at 120 kts. and full throttle is 2800 RPM. Cruise at 7500 feet, full throttle (75% power) I can set the RPM down to 2300. At 13000 density altitude, 21" manifold pressure (wide open) I can run the prop down to 2100 RPM for a VERY quiet, VERY economical cruise of about 160 kts true on 6 GPH fuel flow.

We have also installed the IVO electric prop on three Lycoming powered Velocity airplanes and are starting these tests now. The information gained with the Franklin will be used on the Lycomings and we expect the IVO/Lycoming to be available soon. Some of the differences incorporated by IVO for us for production propellers will be: 1) knurled 7" backplates (so we can use our present spinner) 2) higher pitched blades for better RPM ranges. (the Lycoming blades can be reduced to 66" for higher cruise speeds) 3) greater reinforcement in the blade attach area. 4) all blades to be gel coated in white. 5) molded-in stainless or urethane leading edge protection instead of the stainless tape now used.

We expect to have most all of the above changes completed and on display at Sun-N-Fun in April in the Franklin Velocity.

## **Short Circuit**



*by Martin Hadley*

Short Circuit will return next issue! This is my goof. Martin keeps a supply of articles on hand for my use. By the time I realized I had used all his material, it was too late to have Martin write a new article! Sorry... Rick



# Safety Corner

Accident & Incident Reports,  
Maintenance & Service Difficulties

## Service Caution

### Franklin Engine Installation

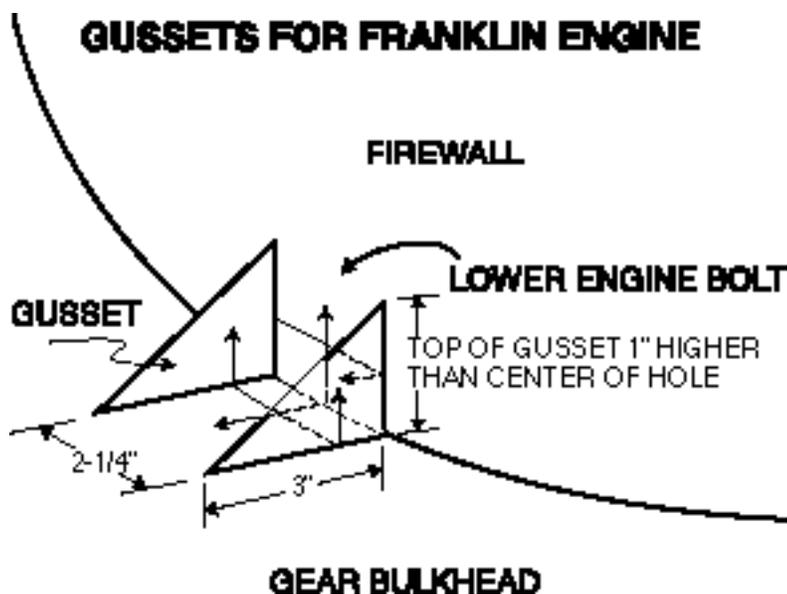
We are recommending that you strengthen your lower firewall by adding gussets from the firewall to the fuselage floor. This should be done on each side of both the lower engine mount holes. The gussets can be made of marine plywood or 1/8" fiberglass laminate. Using the locations and measurements shown below, sand the area thoroughly. Bondo or hot glue (sparingly) the gussets in place. Use micro glass or floc as a fillet material then glass in place as illustrated below.

#### Inside lay-up:

- Floor to firewall & gusset to firewall to gussets - 5 BID (orientation 45° to intersections) or 2 Triax (orientation with arrows)
- Gusset to floor to gusset - 2 BID (orientation 45° to intersection)

#### Outside lay-up:

- Gusset to floor and firewall - 2 BID (orientation 45° to intersections)



## Engine Installation Caution:

Homebuilts seem to have a much higher percentage of accidents related to engines or their installation. The airplanes are relatively simple when compared to the wiring and plumbing that goes into them. We have seen engine installations and wiring that just amazes us. We realize that the manual doesn't cover this a whole lot but with such a diverse amount of goodies going in, you just can't cover every situation.

This is the area where a builder should seek help during the building process. Wiring from Home Depot or Radio Shack is not exactly what you want. Plumbing for your engine from "Plumbing- R- Us" is not where we would get it. Sure there are things from these places that you may use in your airplane, but be careful. There aren't very many of you doing this out there but for those of you who have or are thinking about it please do not.

## Seat back Caution:

Even though it may seem convenient to keep the pilot side seat back loose or unattached for easy entry into the back, make sure you attach it so that if you have an emergency, it doesn't get in the way.

## A Letter from Bill Richards

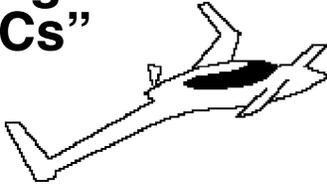
A brief description of my air crash. I departed MLB (Melbourne FL International) runway 27R at approximately 1200 on 2-1-97 and was vectored SW toward the Fellsmere area as requested. After a short time in the practice area, I turned east toward the ocean, passing just south of the Valkaria airport. Then I turned north over the Indian River at 1800 MSL and called MLB control tower, announcing I was inbound with information Bravo. They acknowledged and almost immediately my engine stopped dead. No sputtering or misfire. I turned back toward Valkaria airport, hoping to make a dead stick landing, but came up about 1/2 mile short of runway 14 threshold, crashing into pines and palmettos. Perhaps I would have been able to hold altitude a little longer if I hadn't extended my retractable landing gear a bit too early. But in a tight situation such as this, it is much easier said than done.

After stating the nature of my accident, I want everyone who either owns, is building, or is considering building a Velocity, to know that my accident has nothing to do with the integrity of the airplane. If I had not been in a Velocity, I probably would not be here today. The engine's abrupt stoppage is the sole reason for this incident. I can't overstate the Velocity design, materials, and the way it protected me from much more serious injuries.

We must now find out why the engine stopped so abruptly and then help others to avoid a similar situation.

*Bill Richards, N525V  
February 19, 1997*

# 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 Standard Wing Velocitys  
Manual Section: 3.2.1  
Date of Change: 18 Feb, 1997

Change the dimension in the first paragraph regarding placement of the incidence jig to 105” inboard of the trailing edge wingtip.

## KPC 054

Affects: All Velocitys  
Manual Section: 5.1.3  
Date of Change: 18 Feb, 1997

After the ducts and bulkheads are permanently installed, cut the ducts off flush with the front of the canard bulkhead and flush with the aft face of the firewall.

## KPC 055

Affects: All Fixed Gear Velocitys  
Manual Section: Figure 9-9  
Date of Change: 18 Feb, 1997

The figure incorrectly shows a space between the gear strut and the shock. The strut should be against the shock.

## KPC 056

Affects: All Fixed Gear Velocitys  
Manual Section: Figure 14-25(Elite), or Figure 14-27(non-Elite)  
Date of Change: 18 Feb, 1997

The fittings that thread into the main tank fuel line hardpoint on the sump tank should be 1/8” NPT x 3/8” barb 90 degree fittings.

## KPC 057

Affects: All RG’s  
Manual Section: Pulley Cutout

## Template

Standard RG: Figure 9-31  
173 RG: Figure 9-32  
Standard RG Elite: Figure 9-44  
173 RG Elite: Figure 9-45  
Date of Change: 18 Feb, 1997

The two center holes for the pulley pivots should be centered 7/8” apart. The figure incorrectly shows them uncentered.

## KPC 058

Affects: All Fixed Gear Velocitys  
Manual Section: page 10-5  
Date of Change: 18 Feb, 1997

This KPC concerns the plywood piece that is added to the outside of the keel to stiffen the upper attachment of the nose gear. 1” has been added to the height, making the new dimensions 3” x 4” x 6.75”. This will ensure there is enough hardpoint around the gear attachment location.

## KPC 059

Affects: All Elites  
Manual Section: 10.6.2  
Date of Change: 18 Feb, 1997

The method of installing the instrument panel has been changed to read as follows:  
Duct tape the sides and middle post on the aft side of the panel and hot glue in position.  
Lay up a five-BID flange, lapping 1” onto the fuselage, keel, and duct tape. After cure, remove panel and trim flange. Secure panel to flange with four MS24693C-272 screws and

nutplates on each side and one on each side of the middle post.”

## KPC060

Affects: All Velocitys  
Manual Section: Chapter 14, “Fuel System Venting”  
Date of Change: 18 Feb, 1997

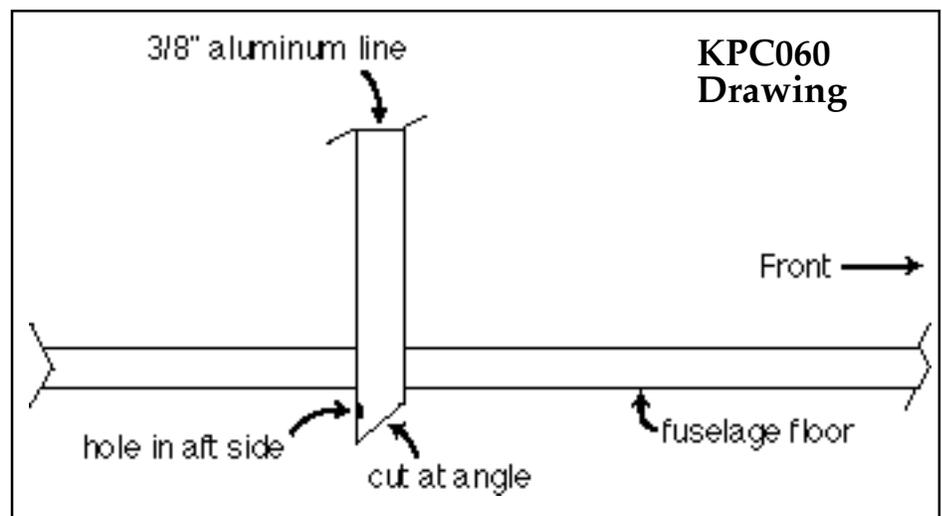
The plans incorrectly show a NACA vent for the fuel vent out the bottom of the airplane. There is no foam core in that area behind the gear bulkhead. Use the following method:  
Route the 3/8” aluminum line from the vent manifold to a hole in the bottom of the fuselage. Let the line protrude approximately 3/8” out of the fuselage bottom. Cut off the end at an angle as shown below. For extra insurance against blockage, drill a 1/8” hole in the aft side of the vent tube. See the diagram below.

## KPC 061

Affects: All RG’s  
Manual Section: 14.5.2 “Install Sump Mounting Tabs”  
Date of Change: 18 Feb, 1997

The mounting tabs should be made from two plies of 3” x 4” BID applied to the back of the tank and two plies of 3” x 4” TRIAX applied to the sides of the tank.

The tank should be mounted to the firewall with two AN 3-10A bolts on each side.





# Views from the West

By Mark & Nancy Machado

Having just returned from Sebastian and been given the opportunity to look the new "XL" prototype over thoroughly, I must admit, this is "One Big Bird"! By the time you read this, I'm quite confident, the factory will be flying this new entry in the Velocity lineup; once again making big waves in the aviation community like Velocity has been known to do so many times in the past.

One thing that struck me while looking at the "XL" was the overall quality of the workmanship. There is a reason why people build experimental class, homebuilt airplanes and enjoy them safely for many, many years into the future. I truly believe it all centers around a sense of quality. I have always been real proud when I have built an RG in the past of how well the "retracting" mechanisms have moved, free of any binding, confident if I ever had to rely on gravity for the gear to be in the right place at the right time, it would be there. In watching Scott work on the same area of the XL, I realized I was watching someone who has known this a lot longer than I. The point here is: if something doesn't look, feel or act right, with regard to your Velocity, FIX IT NOW! Guaranteed, if it was something that wasn't working right on the ground, it won't fix itself in the air! It's the attitude they all have in Sebastian, one we mirror here at Velocity West and one all you builders need to emulate in the field.

The other exiting thing that happened at Sebastian (at least for me!) occurred when I asked Duane if we could go for a ride in the Franklin/IVO. Since we talk about it so much out here in the West, I knew that some first-hand experience with the engine/prop combo would go a long way in making my comments more meaningful. What I didn't expect was Duane to say "Here's the keys.....spend as much time as you need"! After a three-minute familiar-

ization on where all the switches were for this particular RG, I was gone. And, do I mean gone! Have any of you seen the commercial on TV where the frog gets on the controls of the Budweiser Hydroplane? Well.....that's how I felt! Honest! If this combo continues to prove satisfactory, you can put the old myth that "canards are runway hogs" right in the dumpster. Needless to say, it was impressive. For those of you who will be operating out of high-density altitudes, help is on the way. Since that is many of us out here in the West, Duane and Scott decided that the Velocity West company plane, N94VA, should be fitted with an IVO prop to accelerate the testing of the propeller with Lycomings. They twisted my arm until I said OK.....it didn't take very long!

Speaking of N94VA (hopefully with an IVO prop), the company's 173 FG ELITE based here at Velocity West, with Nancy and I in tow, hopefully will be attending the fly-ins listed below, this upcoming flying season. Naturally the schedule is tentative, so give us a call if you're "counting on us being there."

## Major Events

*(attendance fully expected)*

Sun N Fun Fly-In, Lakeland, FL  
4/6 - 4/12

Rocky Mountain Regional EAA Fly-In, Longmont, CO  
6/27 - 6/29

Northwest EAA Fly-In, Arlington Municipal Airport, WA  
7/9 - 7/13

EAA Oshkosh '97, WI  
7/30 - 8/3

Copperstate Regional EAA Fly-In, Mesa, AZ  
10/9 - 10/12

## Minor Events

*(attendance dependent upon time and weather)*

Great Valley Fly-In, Watts-Woodland Airport, CA  
5/3 - 5/4

2nd Annual Southern California Fly-In, Chino, CA  
5/10 - 5/11

Northern California EAA Fly-In, Corning, CA  
5/16 - 5/17

West Coast Antique Fly-In and Airshow, Watsonville Airport, CA  
5/23 - 5/25

Air Fair and Open House, Ramona Airport, San Diego, CA  
6/7

Father's Day Fly-In and Airshow, Camarillo Airport, CA  
6/14 - 6/15

Reno National Championship Air Races, Reno-Stead Airport, NV  
9/11 - 9/14

Edwards AFB Open House and Airshow, "50th Anniversary of USAF," Edwards AFB CA  
10/18 - 10/19

Naturally Duane/Scott/Bonnie and Company will be at the "big ones", in full regalia, trying to keep the drool-damage over the XL in check, but we also hope they will be able to hit some of the West Coast events we have listed. Nancy has assigned herself the task of convincing Scott and Duane that visits to the Chino and Arlington fly-ins, with the new XL, would pay off big! She needs your help! Get those cards and letters off to Sebastian telling them this is an outstanding idea!

Regardless, if we are at a fly-in near you, we would really like to see you. Give us a call and we'll keep you posted on any schedule changes.

## NEW PRODUCTS:

**Lycoming cooling plenums** - Development work continues on the cooling plenums for the Lycoming 360 series engines. Actually, at this point, we are pretty much in the fine-tuning stage, with several currently operating in the field. By the time you read this, plenums should be available for all of those who wish to go that route. Just to clarify, the plenum cooling concept is a replacement for the traditional sheet metal/cowl seal baffling system.

Contact either Sebastian or us for price and delivery details.

**Standard Elite Front Seats:** We have helped Sebastian in the development of slightly narrower front seat pans for the standard ELITE. The seats are approximately 1" narrower on the bottom, approximately the same at the base of the seat back, but from "mid-back" up, the profile has not changed. Using this concept allows for the use of the wider seats in the back and the narrower seats in the front, with the "look" not changing. For details on exchanging your front seats if you wish to, contact Jeff at Sebastian.

**Video Tapes** - Recently, the final editing of Video Tape #3 (Fuselage), primarily focusing on the ELITE construction was completed and is now available. Again, contact Jeff for price and delivery information and updated information on the availability of Tapes 4, 5 & 6.

#### **SERVICE CENTER:**

This is our regular quarterly reminder to everyone that Velocity West IS Velocity's West Coast Service Center. Room is available at this facility for individuals to bring their Velocity projects in and work on them full-time in our shop. The only requirement is that the builder be there full-time. We aren't going to build your project for you, just give you the best darnn environment West of the Mississippi to work in. If you need help, we're a shout away! For details on fees and availability, contact either Nancy or myself at Velocity West.

Considering my earlier comments on quality and realizing that more and more builders are starting to complete their projects out here in the West, Nancy felt it was important for me to remind you of what we left you with last time. When building your Velocity, from the unloading of the container to the first flight, "BE PRECISE, NOT PERFECT, JUST PRECISE".

## Flying Velocity Fleet Expands

*Photos & text by Nancy Machado*



**N94VA** is the current flying factory demo plane being used at Velocity West. The Velocity 173 FG ELITE was started in November of 1996 and completed in October of '97. First flight was on October 3rd. Mark Machado, co-manager of Velocity West, was at the controls. After approximately 20 hours of flying, the engine was removed and completely rebuilt by personnel at Velocity West. With the now stronger engine, the propeller rpm has increased almost 250 rpm and the airplane has become a delight to fly! A new generation of wheel pants will be fitted soon.



**N32BSJ** was completed by its owner, Joe Merola, at the Velocity West Service Center. First flight of the Velocity was on November 30, 1996, performed by Mark Machado. The airplane is a STD RG featuring a dual throttle arrangement, Vision MicroSystems engine monitoring display, HSI and a Lycoming L10-360-CIE6 200 HP engine. The engine turns a Performance Propeller 3-bladed prop. The airplane is currently being kept in New York while Joe does a tour of duty for the Navy aboard an aircraft carrier stationed in Japan.

*First Flights continued on next page*

# Timothy England First Flight!



I made my first flight on November 30, 1996. It was "as they say" uneventful, which is great. I want to write a letter for our newsletter; I say "ours" because it is everyone's response that makes the newsletter what it is.

The day I did my first flight, I arrived at the airport at 7 am, checked FSS and there was a front moving in from the south west. I had a number of people coming to the airport to confirm and check things again. This had already been done a number of times. I was really blessed with some very knowledgeable people around me, so I tapped into their abilities. By the time it came to do my flight test, the ceiling was down to 2000 AGL and raining a little. I went up to the control tower and talked to the good folks there and told them my intentions. I hopped in my Velocity RG [non-elite] and taxied out to the active. ATC gave me clearance for take off. I advanced the throttle and, at 70-75 KIAS, I was off. The rain was going right over the top and off the windshield. True to the Velocity aircraft, it climbed like a homesick angel. On the downwind leg, the visitors said that I disappeared and that they could only see the strobes flashing. I had the airport in sight at all times, but the aircraft is painted in primer and blends in with the mist. I checked the oil temp and pressure; it was good. Coolant temp and pressure were good also. I didn't put the speed brake down until final, because it covers up the rad intake and causes turbulence. The weather was getting bad at this point and it would really be difficult to go around a number of times, so this landing had to be a good one. Going through

the checklist again, I turned on final about 1 mile out. I was a little high – we have glide slope lights which is nice. Throttle back just a little, don't move the stick, you're right on the center line, throttle up some, good...right on the proper glide slope. The wind was 5 kts right down the runway, 1/2 mile to go and steady, speed brake down, 90 KIAS, ATC gave clearance to land, engine is working well, 1/4 mile to go, I am a little low, I check airspeed 85 KIAS, throttle up just a little, don't pull back on the stick. The aircraft comes up a little, ah...just right, over the fence 85 KIAS, keep on center line, throttle back a little, 10 feet off, 5 feet off, throttle right back, hold it steady and level 4-3-2-1 touch down, brake straight forward. Speed brake up and called ground for clearance back to the hangar. It was raining more now than before. What a great flight!! What a great experience!!

I want to thank Scott Swing for convincing me to go to the factory and get checked out in one of their machines. The first 2 or 3 circuits I did with Scott were, to say the least, not good. I was leafing all over the place on final because I was used to flying a Cessna type aircraft. Scott said "Tim, I will do a circuit and you just watch the throttle and control stick wrist actions." The fourth, fifth and sixth circuits got better and, finally, I was doing some good landings. We went out later and did some more circuits. When I left the factory, I knew I could handle my machine. By the way, for the benefit of those who don't know me, I have installed a GM 4.3 V6 220 HP racing engine in my standard RG. So I had an airframe and an engine to deal with, plus the weather.

After my flight with Scott, Duane Swing treated me to lunch and we talked about a number of things. On our way back from lunch, Duane asked me a question that really hit home in my heart. He asked "Tim, if you did your first flight without coming down here and getting proper training, how well do you think you would have done?" I thought for a few seconds and responded "Not

very good." You see, folks, it's nice to build an aircraft, but there comes a day when you want to fly it, right?? Please, please, listen to me. If you are getting to the stage of flight testing, go to the factory and get the proper training. Yes, I know it costs. But it is worth every penny you spend, believe me. I have been there, building my own machine and taking on the roll of test pilot. One thing for sure is you don't want to be on short final doing 90 KIAS wishing that you had factory training. My first few circuits with Scott proved that.

At this point I want to say a few words about the Swings and the Velocity employees. As I was building my RG I ran into some areas where I was unsure of the drawings, etc. I would call the factory and they would help me through the problem I was having. Yes, I know some of the drawings weren't great, but the Swings have gone to the time and expense to update and refine the drawings. I have ordered and received the complete new version for the RG and they are great. Let me say this, as a businessman for the last 15 years in the construction and insurance restoration industry, with all of the lying, cheating, stealing going on, it is a real pleasure to deal with honest, hard working and thoughtful people. Going down to the factory for flight training costs, so does building an aircraft. Keep in mind that this is one of the best kit aircraft in the world. We as builders need to support the Swings and the employees as much as they have supported us. Remember they need to make money to stay in business and be there tomorrow for our fellow builders with a passion like ours and for the opportunity to fill that dream. Again, thank you all at Velocity for your great building support and flight training.

It has been a pleasure doing business with all of you and I look forward to continued friendship.

A happy builder and delighted flyer,

*Timothy England  
North York, Ontario, Canada*

# Duane's Dream Trip

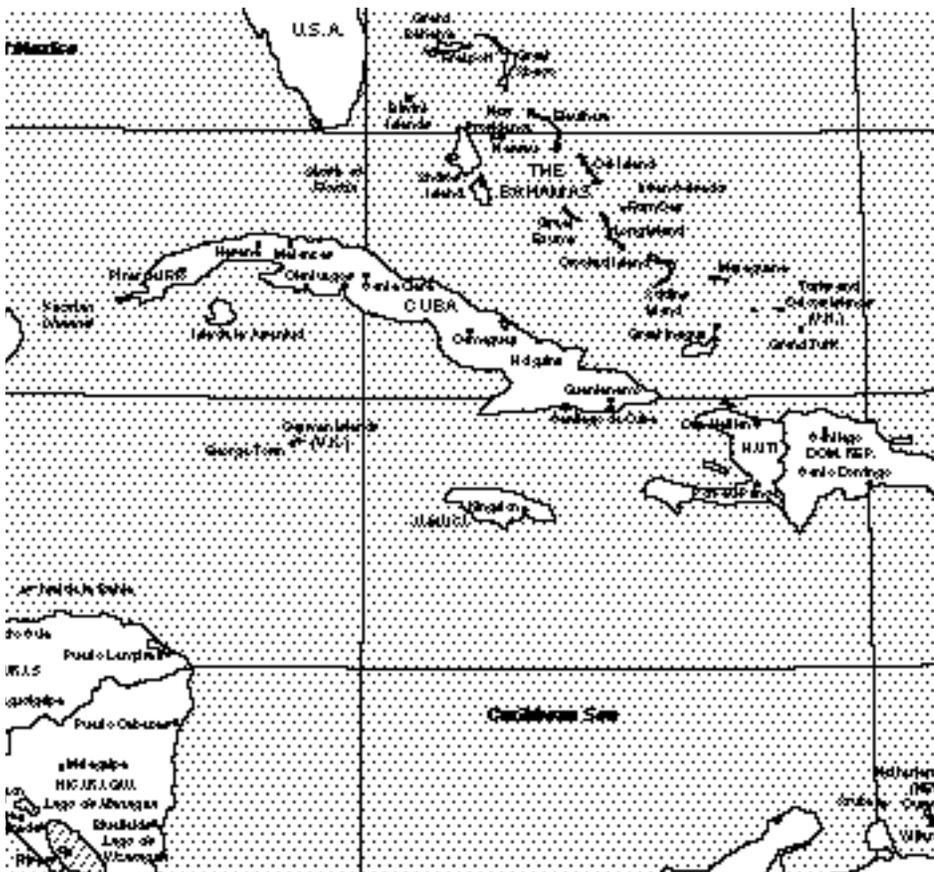
Clive Cussler, one of my favorite fiction authors, whose credits include the book *Raising of the Titanic*, said, "The bottom line is that when the final curtain drops the only things we truly regret are the things we didn't do." I think this statement pretty well sums it up for me.

The year was 1974. I had just purchased a used (1969) Piper Twin Comanche and began dreaming of a trip that would start in Dayton, Ohio, and proceed to south Florida, then on through the chain of islands including San Juan, Puerto Rico, St. Maarten, Martinique, and on to Caracas, Venezuela, in northern South America. From there to Panama, Belize, Cancun, and up the Mexico coast to Brownsville, Texas, and finally back to Dayton, Ohio. This trip festered in my brain for years until it finally faded into oblivion. It's now 1997 and time to revisit a portion of my dream trip. I (we) plan to leave our Florida home some time later this year and my (our)

route of flight will take me (us) on to one of our favorite island stops, Coconut Cove, on the island of Great Exuma. We will spend a couple of days here visiting with Velocity builder Tom Chimento. Then on to San Juan, Puerto Rico, to visit our Velocity builder (now flying) Hector Roman. A couple of days here is certainly in order. Next stop will be Montego Bay or Kingston, Jamaica, for a couple more days of relaxation and sun. From here on to Grand Cayman for a few days of whatever one does in the Caymans. A final flight to Key West for custom clearance and a day of snorkeling or sightseeing before returning to good old Sebastian.

I'm looking for a few good men (and women) to accompany me (us) on this trip. Got your Velocity flying? Want to do something unique? Ever been to any one of these spots and want to go again or suggest an even better place? Let me know and we'll plan from there. Flight time from Sebastian should be around 17 hours, and we will be away from home for, perhaps, 14 days.

Duane



## Last Call for Bahamas '97

May 16th (Friday) through May 20th (Tuesday) are the dates for the '97 Velocity Bahamas Fly-in. Feel free to alter your arrival or departure date to your needs. All Velocity pilots, builders & wannabees are welcome!

### Be sure to do 3 things right now:

- 1) Call Coconut Cove to book your lodging Phone # 242-336-2659. Be sure to identify yourself as part of the Velocity Fly-in. All the rooms are blocked off for us and Velocitites get a 20% discount! Tom's nephew Russ & his wife Paule have leased Coconut Cove and have re-opened the restaurant. Tom and Pam will be free to have fun with us!
- 2) Call (Rick -home# 904-461-6912) or e-mail (lavoie@aug.com) me to get on my list of people going. This is *a must* for me to coordinate things.
- 3) Fax your letter to the Bahamas Civil Aviation Dept for Experimental aircraft approval (see sample fax on the bottom of the next page).

You will need to have your IFR / VFR charts, plus a coast guard approved life vest per person, and big numbers on your plane (temporary tape is ok).

The main group will be departing Sebastian FL (X26) Friday at 7:30 am, and meeting Tom and Pam Chimento for lunch in George Town, Exuma, Bahamas! For Velocitites in Southern Florida, Mark and Nancy Ewart will lead a second group, joining up with us over the Exuma Island chain.

### Route of Flight:

Sebastian	X26
Intersection	ANGEE
Freeport	ZFP
Nassau	ZQA
Mosstown	ZEM

- Rick Lavoie

# Visiting Atlas Motors

by Rick Lavoie

Recently, Ginger (my English Springer Spaniel) and I took a drive to Winchester Virginia. The purpose of this trip was to pick up my new Franklin engine and learn as much as time allowed from Pat Goodman and Ira Himelright of Atlas Motors. Velocity builders Dave Black and

Leroy Roger met us at Atlas. Leroy was the first Velocite to buy a Franklin.

## Why on earth did you buy a Franklin?

Franklin has a bad reputation

with most IAs & A&Ps. Why is this? I asked Pat and Ira this question and here is what I learned.

Franklin was based in Syracuse New York selling 80% of its engines to the military. Remember all those Bell helicopters in "MASH". Well they were powered by Franklin 4 & 6 cylinder engines. Pat said everything was just fine until the military went to turbine engines. Franklin ended up bankrupt in 1972. So how did they get a bad rap? Well here is what went wrong. In the 40's, Franklin received a huge military contract to make an engine to power a drone. These drones would be used against Japan. The engine only needed to run for 25 hours. Thus Franklin used scrap metal to make these parts. The U.S. later used the atomic bomb, thus ending the war with Japan, and negating the need for the "drone" Franklin engines. These engines and parts were simply stored, until they were later sold as government surplus. Thus these surplus "drone" parts made it into the general aviation market. Wow, no wonder Franklin has had a bad name!

In 1974, Poland purchased Franklin. They made some improvements, but basically are using the same sound and simple engine design used with success in the Bell helicopters for years.

## What did it cost you?

Here is a breakdown of my cost with Atlas Motors Inc:

Franklin engine	\$12,744
Marvel Schehler Carb	1,470
Slick mag & harness	625
Gear reduction starter	350
Alternator (12V 45 amp) w/ regulator	170
Engine driven fuel pump (4.5 lbs)	150
Vacuum (dry) air pump	311
Labor to install Electroaire ignition, install Velocity mount, test run	250
Total paid to Atlas Motors	\$16,070
Electroaire ignition	865
Total	\$16,935

Once I get my Velocity flying, I plan on taking many long cross country trips. The starter, alternator, engine driven fuel pump and gaskets

## Sample Fax to Obtain Bahamian Approval for Experimental

Fax To: 242-377-2040

Voice: 242-377-7281

10 April 1997

Bahamian Civil Aviation Authority  
Nassau International Airport  
Nassau, Bahamas

I am writing to obtain permission to fly an experimental certified aircraft to the Bahamas on 16 May 1997. I plan on staying at the Coconut Cove Hotel, George Town, Great Exuma and flying in to Moss Town International Airport for about a one week vacation.

Purpose of Flight: Pleasure  
Date of Proposed Entry: 16 May 1997  
Port of Entry: Moss Town International Airport, Great Exuma  
Manufacturer: Lee David  
Model: Velocity  
Serial #: DMO043  
Registration Marks: N81VA  
Equipment: Full Engine, Flight, & Navigation Instruments (COM, VOR, Loran, GPS)  
Engine: Lycoming IO 360 (200 hp)  
Last Annual Inspection: 1 February 1997

Attached are copies of my pilot and aircraft documents:

- Pilot's license
- Medical certificate
- Airworthiness Certificate & Statement of Limiting Conditions
- Aircraft Radio Station License
- Aircraft Registration
- Aircraft Log book entry to verify the last annual inspection
- Insurance Certificate (shows coverage is good in the Bahamas)
- A&P Mechanics Certificate (limited to Velocity)

Two contacts in the event of an emergency are:

Name, address, phone numbers

Please contact me as soon as possible if you require anything else. I look forward to receiving your approval. If possible, please fax my written approval to 904-xxx-xxxx

Signature, Name, Address, Phone, & Fax #

are not parts that you can buy from your local FBO or NAPA shop, thus I purchased a spare of each. When I buy my IVO prop, I will also purchase a spare blade.

The engine installation kit that I purchased from Velocity Inc. comes with instructions. I paid \$1449 for mine, but check the options catalog for the current price. The package comes with the cooling plenum (instead of baffling), mounts, flex oil & fuel lines, fittings, nuts, bolts, throttle & mixture lines and controls, supplemental oil cooler kit.

The IVO 3-bladed adjustable prop costs \$1960 plus \$350 for the constant speed controller. Order your IVO stuff from Velocity Inc. That brings my cost for a brand new 6 cyl engine, complete with constant speed prop to \$20,694! Not bad at all!

I decided to order the Franklin based on Duane's recommendation. During the summer of 1996 on one of my many visits to the factory, Duane took me for a test ride in the Franklin Velocity. I had already ordered my Franklin with Pat, but after this ride, I was convinced I made a good choice. The acceleration, short take off, and rate of climb were all impressive. This engine combined with the newly improved IVO prop are a great package! The new IVO prop is now white jell coated with the leading edge protection built in, a new pitch (more bite) for 2800 rpm max, and a knurled hub.

## Tips from the Pros

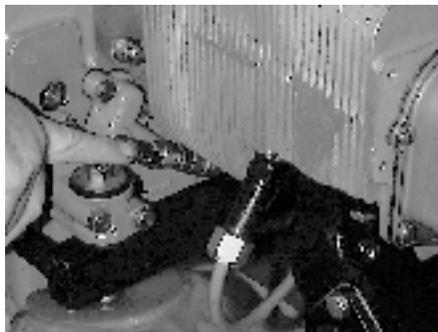
Ok, what did you learn from Pat & Ira about the Franklin and installation tips?

The Franklin has a 10 1/2 to 1 compression ratio. It was designed for the Bell helicopter and has a 4000 RPM do not exceed! Maximum horsepower at 3200 RPM is 235. With a metal prop, recommended maximum RPM is estimated at 2800 RPM (extended higher rpm will "sling" the prop). Pat said that with the composite props, 3200 RPM is an ok maximum. He also said that the Metal prop manufacturers would never agree with this.

Know your right from left engine side? Sitting in pilot seat of a Piper,

the engine is in front of you (tractor engine). Seated in the pilot seat of the Piper you are facing fore (toward the direction of flight). The firewall is between you and the engine. Looking at this engine while seated, the left mag is to your left, and the right mag is to your right. Easy? Well how about my canard pusher? You can look at it the same way, only get in your back seat facing aft (away from the direction of flight). Once again the firewall is between you and your engine. Facing aft, your left mag is left, your right mag is to your right.

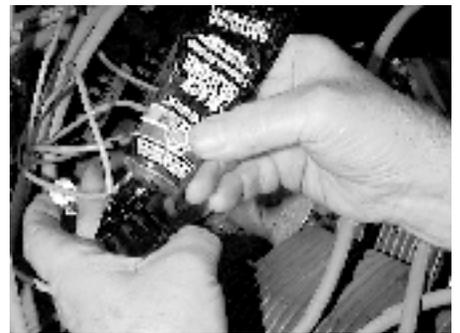
Since we are mounting our engines as pushers, I'll refer to fore as closest to the firewall, and aft as closer to the prop. This of course is backwards, but what the heck!



**Oil pressure line** - use the aft (nearer the prop) tap to tee. In the Franklin installation manual, connection drawings, refer to 7.3 This outlet already had a tee (refer to drawing 8), one end with a hose that feeds oil to lubricate the fuel pump, with the other end of the tee available for you to attach your oil pressure line. Also on drawing 7, Duane told me that he removed the plug (about a little less than 1" bolt head) and drilled and tapped for his oil temp probe. Drawing 7 also shows the inlet (7.2) and outlet (7.1) for the oil cooler lines. Pat recommends placing a remote in-line oil filter from this outlet (7.1). He said to buy an automotive racing type "remote in-line oil filter", mounted to the firewall, then feed to the oil coolers. So the oil flow will start from the engine outlet (7.1), then feed to the remote oil filter, then to the main oil cooler (in nose), then to the aux oil cooler (in wing root), then back to the engine inlet (7.2). Air Wolf and other companies also make aviation oil filter remotes.



**Oil screen and drain** - The oil drain has a magnetic pick up (See drawing 11). Pat said to break in your engine with the oil you plan to use (not mineral oil). He said to never add anything to the oil (like Bon Ami) to speed up the break in. This will destroy the engine. Engine holds 8.8 qts max, and 5 qts min. Pat says to change the oil every 25 hours



**RTV Electrical joints** - Pat recommends that you buy Permatex Black Silicone Adhesive to RTV your electrical wiring joints. This prevents the wire and contacts from breaking due to vibration. The next photo shows where Pat applied RTV to the ignition wire holder and anti-chaff.

When you get your engine, the

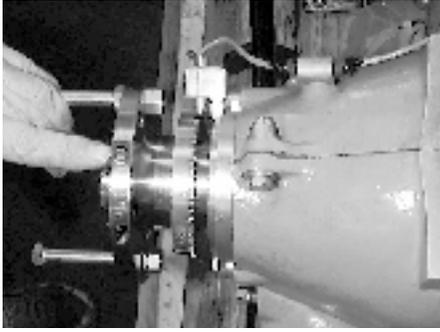


log book is stamped with a 600 TBO from Poland. Be sure that Pat includes the amendment certificate which raises the TBO to either 1200, 1400, or 1600 hours. Pat said that the factory is trying to get the TBO raised to 2000 hours with the FAA

*Continued on next page*

## Atlas Motors / Franklin

*Continued from previous page*



**Timing Marks** - The Slick mag setting is 32° TDC. The above photo (top view) shows the 32° mark lined up with the split on top of the engine. A word of caution from Pat - do not stick your finger in the spark plug hole when finding Top Dead Center "TDC". You will be minus one finger if you do!

If you go with electronic ignition, move it to a cool spot away from the engine. Jeff Rose supplies instructions for fine tuning the timing.

Both Pat Goodman and Jeff Rose recommended to start the engine with both the Slick mag & Electroaire ignition on.

When buying spark plugs (or other engine parts), say the engine is out of a "Maule Lunar Rocket M4". This will help identify the engine for your supplier.

Be sure that you verify everything in this article with your Franklin manuals, as I am a novice when it comes to understanding engines.

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*I sent Pat a proof of my article, and he responded with a fax letter loaded with info. Here it is... - Rick*

The Franklin engine saga started many years ago, beginning with small air-cooled farm engines, then progressing through the Franklin automobiles, branching off along the way to power such diverse things as motor launches and the famous 'Tucker' automobile.

Franklin (actually there were many offshoot companies, and several names) was always the patron

saint of odd engines, powering such things as the 'Culver' drones mentioned, where they were chosen because the original 4 cylinder vibrated so badly that the tube type radio control units were unreliable!

The engines ranged from 2 cylinders to 12, and, except for the two cylinder (they shake like a Harley), all were known for their smoothness and high power-to-weight ratio. In addition to helicopters, they were used in such diverse aircraft as the 'Cheap Champ' of the '50's, (2 cylinder) J-3's, Bellanca's, Stinson, Cessna 170 through 177, Maule Lunar Rocket (the airplane used in Smokey and the Bandit that is seen leaving the hangar at a 45° angle), Waco, Republic Sea Bee (not their best engine, by the way), Siai Marchetti, S.C.O.T.A. Rallye, Swift, the Republic RB-Y47 flying wing (flat 12 cylinder engines, buried in the wings, with 9 foot prop shaft extensions), and in many conversions, such as the Reed conversion for the Piper Apache (replacing the 165's with 220 HP gave take off of 300 feet, at gross, from dirt runways).

Of course, the PZL Franklin is rapidly becoming the engine of choice in 120-220 HP range for home-built aircraft. They are now in: Ercoupe, Tailwind, Velocity, Co-Z, Breezy, Aero Comp and Compmonster, Kit Fox Series 5, Coot, Great Lakes, Baby Lake, BD-4, Starduster...and we were just given an order for the RV-8 by the factory.

When they lost the military helicopter business, they sold their STC's and even offered engines as kits in an attempt to continue. These attempts failed, and they were bought by the PZL company in Poland. (PZL stands for many-lettered words meaning Polish Transport Workers). A large company, PZL has made aircraft engines from 1917, through two world wars and many revolutions. They are currently making the P&W PT6-A, the R-985, as well as round motors from 265 HP to the 1,000 HP Dromadier used in AG planes and the famous AN-2 Biplane, as well as turbine engines and gearboxes for most of the MIG's and the old Soviet Bloc helicopters. In addition, they



*L to R: Velocitite Dave Black looks on as Atlas Motors' Ira Himelright and Pat Goodman test run the Franklin 6 cylinder. Note that there is only an automotive fan on the prop hub. Dave and I marveled at the lack of vibration.*

make many sub assemblies for other companies, including their famous silicone-filled harmonic dampers (used on all the current opposed cylinder airplane engines) for Mercedes Diesels, impellers for Jacuzzi pumps, and turbochargers for Mann diesel locomotive and ship motors. (When we were at the factory, I thought the turbo impellers were just very well made and finished irrigations pumps; some of them were 4 feet in diameter).

Poland, just emerging from the breakup of the Soviet bloc, has always been known as the industrial country of Europe. They have a strong work ethic and the actual workers have a fierce sense of pride in their work, and take great pains to show how well each of them do their job. The future production looks secure. Poland as a nation needs hard currency and export products and wants to put its labor force to work. Building small aircraft engines is the perfect product; they are labor intensive, have a high 'value density', a well-defined market, and an existing factory and production lines. Barring some political upheaval it seems safe to plan our aviation engine needs around these engines.

We now have delivered about 180 engines, and run tested perhaps 3/4ths of them per customer requests, in addition to just general R&D. One of the more frightening things in the world is a 220 HP blender. Joke: what is messy and red

and dead? Ans: Anyone near a whirling prop that gets caught in it, or someone who just 'adjusts the blade positioning' on a prop without checking that the magnetos are grounded, the carburetor/fuel system dry of even fumes, etc.

As a result, we often (obviously) test engines with just an after-market style heavy-duty automotive fan. (The one we use is a LEFT hand fan, so it blows toward the motor). Obviously, it only requires a few HP (about 20 @ 4,000 RPM, perhaps more than one would have thought) at the speeds we run the engines. Since all the engines are dyno tested at the factory, there is no doubt that they will produce HP, we usually only need to verify the action of the impulse couplings, ignition timing, oil pressure, look for oil leaks, etc., so a small fan just for cooling is adequate, and a damn sight safer. We have a video, taken by none other than Roy Rodgers, depicting some exhaust pipe tests of over 5,600 lbs with engine stand and 'crew' and the Franklin with the IVO prop will accelerate it to over 40 MPH in 800 feet! The same combination in the back of a Ranger 2000 pickup, with the rear wheels locked, will 'ooch' along the asphalt. DO NOT TRIFLE WITH 220 HP AND PROPELLERS!

Every A & P, airplane mechanic and self-styled engine builder will blanch at the thought of running an aircraft engine 'in neutral' so to speak. Before they all start mailing us dead fish, let me point out that, with the exception of aircraft, almost all engines start in neutral. You were there, and you, Mr. Black, and every other person who has witnessed this demonstration, have marveled at the smoothness, and how cool these engines run under these conditions. If you recall, even after several minutes at 1,500 RPM, the cylinders were still comfortable to the touch. These engines, even the smaller four cylinder ones, are remarkably smooth. Obviously, even a small amount of throttle will quickly overspeed the engine, and care must be taken not to do so.

HOWEVER: Do not try this with a Cont or Lycoming. Franklin is the

ONLY aircraft engine I know of with a full range viscous damper/fly-wheel, and – as you can tell from the propeller sheet – these engines have no known adverse prop/crank/RPM harmonics.

GENERAL INFO: Upon receiving your PZL/Franklin, the first thing I suggest is that you and all your friends, especially engine-type friends, walk around the engine and search for any evidence that it might be a Cont or Lycoming. You will find none, so immediately dispense with all the preconceived information applicable to either of these engines, and most others.

The Franklin is a high compression, high RPM (by comparison) engine, and, as such, it has unique differences.

Do not turn the engine with the moisture absorbing plugs in place, lest you become adept at blowing out the residue. The pistons come almost halfway past the sparkplug hole. If the desiccant plugs are in place, the ends will be broken off, and little blue and pink crystals will be inside. If your finger is inside, you may have to learn to pick your nose with a shorter finger. If you attempt to 'find' (as if it were lost, it is marked on the crankshaft flange) top dead center with a Lycoming tool, it will ruin the tool, the cylinder, the piston, the rings, and your day – especially if you use the starter to turn the engine. Not to laugh, in the last year, all of the above have happened...sometimes more than once!

If you have opted not to have Atlas test run your engine, you will also find the meaning of preservative oil. The engines are drenched inside and out with a slimy anti-corrosion muck, including a great quantity in the intake system. We drain as much as possible, and even then sometimes have the residue foul the sparkplugs just a few seconds into the startup. Not to worry; you can either remove the plugs and clean with carb cleaner, or spray a bit of starting fluid into the carburetor, and, after a minute of so of belching smoke reminiscent of a P-47 radial coming to life, the engine will settle down. DO NOT try to start

the engine with 'carb cleaner'! Starting fluid, at least all that we have ever seen, has lubricant. Carb cleaner is a cleaner and vile degreaser. A few shots of carb cleaner into the engine will cause the rings to 'squeak' as the engine is turned over, and there is little or no compression. The brighter of you will not have to ask how we know the above. We drove a long way to find out.

Also, because the engines are high performance, and have a lot of camshaft and compression, etc., the mag check will reveal some strange mag drops at different RPM's, the manifold pressure gauge reads like no other, and the idle is, shall we say, not like a farm tractor, more like a P-51 Merlin or six cylinder BMW rally car. Don't worry, under load it smoothes out, and, while the engine is willing at low RPM, it comes alive at about 2,500 RPM. As a result, a prop that works will with a competitor's engine may not work at all with our engines. On the other hand, for canards and pushers, which are usually diameter limited, these engines really perform at speeds other engines cannot be safely run.

As noted above, they require very little in the way of cooling the cylinders, requiring no inner cylinder baffles, just air over them, either from the top or bottom, and adequate sealing. Most importantly, because they are very efficient at giving up heat, the outlet area must be larger than normal because the cooling air leaves the cylinders at a higher temp and the air is larger in volume. (Air grows 1/272nd in volume per degree C). A check to see that all are cooling equally, and the judicious use of screen or air guiding vanes, will usually set things right. Do check!

Oil cooling usually requires a bit bigger oil cooler than equal HP Lycomings. Most Lyc's run the inlet manifold through the oil pan, which does several things: cools the engine, heats the inlet charge, lowers the HP, increases the octane requirements. Obviously, by not doing the above, the Franklin can use higher compression

# 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 Simon Aegerter, Tampa, Florida*

### Learn From My Blunders

Most of what I have left to do is the fun stuff: putting life in that empty hull (OK, s-o-m-e filling and sanding, but so what). So I figured it is time to look back at the REAL building phase and try to remember what went wrong and why. And time to say "caveat" to those who are yet to fall for the traps and get caught in the snares. This is the first of a series (of at least two) and it is the saga of my fuel tanks. About a year ago, when I was building these fuel baffles and fuel bulkheads - not to forget the wheel well - I had heard it all: how hard it was to get them sealed, how meticulous you had to be about painting the insides of the strakes and all that - you know. So, I WAS meticulous and took everything VERY serious and I decided to do more: before I installed the bulkheads and wheel well to the lower strake, I fixed everything on the duct taped UPPER strake and built lips (or flanges if you will) of fine bid all around the inner side. I even managed to make a flange along that part of the fuselage that would become part of the fuel tank. All the tubings and fittings that go through that wall got my special attention: I removed lots of foam and filled with lots of microglass/alphapoxy putty. For the main fuel lines I used finger strainers and had my buddy Jim Agnew (who has an affair with a lathe) machine bushings in the shape of a top hat that could not possibly ever leak. When it came time to put the upper strakes on, I cleaned the tanks from every speck of dust (oh - had I only known) and put what seemed a whole lot of microglass on these lips, edges and overlaps. On they went. Looked real good. The first sign of disaster blinked ominously when I turned the hull upside down to do

that impossible layup behind the rear fuel bulkhead. The plane had been sitting idly all summer in the Florida heat and humidity. When I looked in that narrow space guess what - water had seeped out from under that bulkhead. That told me two things: The tanks that I had sealed all openings to prevent ants from building a nest in there had breathed and condensation had formed. And that condensation was now LEAKING out. So obviously there was just one spot where the amount of microglass had not been quite sufficient. Yeah, sure. The impossible layup had gone in reasonably neatly taking care of that obvious leak. Pressure testing the tanks seemed to be a good start of the finishing process. So out of the panel came the altimeter and it got hooked up to the vent line of one tank, a blow line was put on the main fuel line and a few lungs full took it to -500 ft. — shshshshshshshsh! Good thing the VSI wasn't hooked up too. It would certainly have pegged. The leak was so obvious, it was hard to miss: the wheel well. It was totally porous. I hadn't paid much attention to it before closing. It looked so compact out of that mold. Well I had painted it once on the inside. Considered it overkill. It was definitely underkill. But easy enough to fix. Put some vacuum (300 ft or so) in the tank and let progressively thicker cabo ooze in while slowly reducing the vacuum. Finally paint with paintable cabo on the outside (where else!?). Let cure. Ought to be OK now. Well - better. Now the thing climbs like a 172. Not very obvious this time. A long Al tube attached to a stethoscope didn't reveal anything behind the aft fuel bulkhead. Lots of listening and soap water finally revealed a leak at the outboard end of the leading edge. The overlap! Fix that. Let cure. Now it climbs like a 152. Another hour or

two reveal a leak each at both ends of the strake near the join line to the fuselage - fore and aft. Both are seemingly far from the tank. Where could that come from? We found no other way than through the lip at the hull and then along the edge of the upper strake and through the foam. Now I was so mad that I decided on a radical solution: would the surgeons call it a straketomy? Anyway, I cut the joint of the strake to the fuselage open all the way from the end of the baggage compartment to the end of the tank. Sure enough: There were voids where microglass was supposed to be. I did what I should have done last spring: FILL the sucker. And the other tank? Sure enough, the wheel well - and the strake to hull joint! Another straketomy! That did it. It was so sealed, that we could measure the temperature change inside the tank. By comparison, the first tank didn't look that good. But after hours of leak hunting by myself, Jim and my son Chris (who had come over from Switzerland to have some fun) we declared our utter inability to locate a leak. Remembering how easy it was to flip the airplane over and since the turn jig was still on, we stood it on its tail and simply and brutally poured water in the tank. Now picture this: the water went into the RIGHT tank, but the first indication of leaking water was at the LEFT end of the spar! Tracing that back we found the real leak inside the cabin, at the join line of the slanted part of the gear bulkhead and the spar cap - at the INBOARD end. Now - what the heck does THAT mean?! You have to know the layup structure of that part of the aircraft pretty well to come up with the solution: the feed through for the vent line. By default. Now I became a dentist. Using my Dremel tool (and thinking all the time of Bob

Ginsberg, who, years ago it seems, had told me to get one of those) I neatly drilled a cavity around the vent line, thereby dusting up the tank probably more than I care to think of. Believe it or not, I used real dentist's instruments to get stuff from under the tube. (Jim has dentist's tools. Jim has every tool you think you would never use). Fill the cavity ("sister, two squirts of alpha") let cure and lo and behold: a sealed tank! - well, almost. The other one was still more sealed. Continue hunting. Go home and "celebrate" Xmas. Merry whatever. Yeah, thanks for the sweater. Nothing that I wanted more. Back at the hangar. I'm in that "let's get radical" mood again. We roll the poor thing within reach of neighbor's garden hose and fill the tanks to the brim. There it is: the "fixed" leading edge. 'T was almost fixed. The remaining leak was so tiny that it couldn't be heard and soap water probably plugged it. Drain the tanks (while doing so measure the capacity: exactly 30 gal each), dry, fix the leak and that is the end of the saga. What can you learn from all this? When you are about to close the tanks, put plenty of micro *everywhere* you expect a seal. And I mean PLENTY. Then, when you think you have enough, slap on again as much. Then go ahead and mix another batch and find a way to put THAT in place. Think that's too much? There ain't no such thing!

There you have it for what it's worth. Sorry, if my foreign accent is showing. Hope you get the gist of it.

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*From Dale Alexander, San Bruno, CA*  
**Enjoying Building My RG 173 Elite**

Finally got all the X-mas boxes put away. It's hard to work on these things with a one car garage. As I tell everyone, all pieces 17' and less get built here at home. The bigger pieces are down at the shop.

I've only got about 80-90 hours in so far, so excuse my enthusiasm. It may change as I get up around 500-1000. But I gotta tell you, I'm doing the final sanding on the canard and elevators and I am REALLY enjoying

watching the parts take shape. I stand back and look things over and say to myself that this seems to look as good as many I have seen...and then it hits me that I'm at a place that many of you have been in the past and now your birds are flying. Hey...I am getting there!

I've done big projects before. I used to race motorcycles professionally and all-nighters get kinda common. But this is a real pleasure. Here we all are, building Velocities, solving problems, interpreting manuals, and gaining experience in working with materials.

If you are having a hard time telling...I'm having a blast! Here's to all of us who are building and to those of us flying. It's good to have sanding dust in my hair again.

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*From Larry Epstein, New Rochelle, NY*  
**Nose gear 173 FGE**

Well, the measurements in the manual don't add up very well. If you measure the 2 1/4" back from the inside of the keel (as written in the manual) you will end up with a space between the gear and the rubber shock and the gear will cant forward. In order to get the correct spacing, I used the following procedure:

Using a caliper, I measured the thickness of the rubber spacer and fabricated a 3x4" plywood spacer of the

same thickness. I then attached the spacer to the nose gear with the steel strap. I then leveled the fuselage (fore & aft, side-side) on the cradles and ran a string between the tips of the main gear. I ran the straight edge down the centerline with the top even with the string. I placed a 9/16" spacer on top of the straight edge and hot glued the 3x4 spacer to the canard BH with the end centered on the straight edge and on top of the 9/16 spacer. This gave me the location of the bushing holes. I used a temporary bushing (From Denis Miller, actually a plastic piece from a toilet repair kit) to reduce the nose gear bushing size to 1/4". I then drilled thru the keel side, nose gear bushing and other side of keel. The nose gear was removed and the holes enlarged with the hole saw (same technique as main gear, 1/2" first side, all second side and complete first side). The holes were filed, bushings trial fitted, bolt inserted and all measurements re-checked. The assembly removed, cleaned and the bushings microed into place with the spacer in-situ.

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**Encouragement from a 173 Elite Builder**

*From Wes and Becky Rose, Hudsonville, MI*

We just came back from taking our second demo flight in the 173



*Wes & Becky Rose's 173 Elite*

Elite at Velocity. This helps to remind you why you chose a Velocity to build. It also helps to get the motivation going again.

I took our photo album with us to show Duane what could be done in six months, if you stick to it (see the picture of our 173 Elite). There is not much glass work left to go – engine covers, wheel pants, canard tips, and that’s about it. Oh, yes – we did build the wings ourselves, too.

After talking with Duane, I thought it might be a good time to send a letter in to let everyone know how much we enjoy the Newsletter. Being that I just recently got my fixed wing rating and a first time airplane builder (I built a Rotorway helicopter in 1989), I don’t have anything in the form of hints or builder ideas. We just wanted to share our progress and remind everyone that we chose the Velocity to build, and, if by building it by the manual we end up with a plane that flies as well as the factory’s Velocity 173, we will be happy. I guess the point I’m trying to make is that if builders choose to make changes, they usually end up adding to the build time and may or may not improve the plane. That is what the Experimental category is all about, but no one should come down on Velocity because of the amount of time it takes to build. Remember, we need and expect Duane, Velocity, and all the guys to be there when we call. Please give them some encouragement. Our thanks to everyone at Velocity. We had a great time!!

Keep on building!

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*From Steve Swift, Dalton, Georgia*  
**B & C Oil Filter Adapter**

Rick, first an apology for being so long in getting in touch with you since I had the pleasure of meeting you and Judy at the St. Augustine Fly-in. Suzy and I had a wonderful time and learned some very interesting facts about the Velocity aircraft. We were sorry that we arrived so late that we missed most of the day’s events; but, really enjoyed the evening get-together. Sure were glad you guys decided to come back to

the airport and check out the planes late that Saturday afternoon and give us a ride back to the motel.

Since you are always looking for new things for our “toys”, I thought that I would let you know about B & C Specialty Products new Oil Filter Adapter. I saw their new product at Oshkosh last year as it was just being introduced. The unit is small, one piece aluminum, very well made and does not require hoses for connections. The spin-on filter mounts inverted which allows the oil to drain back into the case as you drain the engine. Simply unscrew and throw away. For the Lyc IO-360 in my plane, there were no problems at all. Simply install the thermostatic valve and the oil temperature sensor and install the unit with the new bolts, washers, gasket and even the lub goo they provide.

Bill at B & C told me that Patty Wagstaff has just installed one in her Extra 300 and that Burt Rutan has also used the new unit in one of his ships. There is a picture and small article in the October 1996 issue of IAC’s Sropt Aerobatics magazine page 10 if you have that issue. The people at B & C are easily reached at (316) 283-800; fax (316) 283-7400.

I’ve used B & C’s starter and alternator in my Christen Eagle and have found everything to be of highest quality. Enough of this pat-on-the-back. Sufficient to say, “try’em, you’ll like’em”.

Keep up the wonderful stories and information in *Velocity Views*!!! I look forward to the new issues. And don’t forget to think of maybe using Chattanooga, TN, as one of our future Fly-ins. There are several builders in this area and I think we could get some help on putting something together in this area. The area has Lookout Mountain, Ruby Falls, the Chattanooga Choo Choo, the Tennessee Aquarium, several Civil War battle grounds, etc. that might interest pilots and significant others during their stay here. Let me know if I can help.

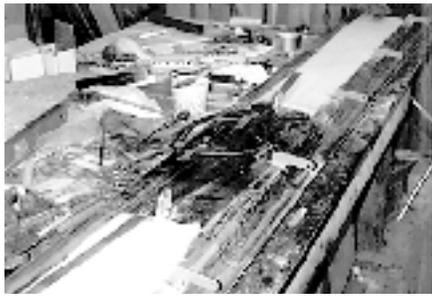
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*From Bill Wade, Unity, Maine*  
**More on Antennas**

Several years ago I read about tuning antennas in The AeroElectric Connection, and more recently there were the excellent articles in Views. Much as I wanted to, I could not find test equipment to check my antennas, however. It was only recently that I got access to an SWR analyzer which Bob Nuckolls [AeroElectric] rents (\$25.00 for two weeks). The results are on the graphs (next page).

The antennas were all constructed according to Velocity plans, using RG58-A/U coax and mil-spec BNC connectors, either soldered or crimped style. I built my own wings and they contain no carbon. Bear in mind that my knowledge is limited to these experiments and my understanding is limited to: “SWR of 1 is perfect, 2 is good, under 3- usable”. I have no idea of what these measurements mean in terms of actual performance, and I am not about to get involved any of that Torrid Balloon stuff. Having installed these antennas I find they’re good enough that I will use them, that’s all. Anyway, I was very interested in both the testing process and the results. The analyzer was an MFJ-259, like that used by Dave Black.

I started with a COM antenna, trimming 1/4” at a time from both ends. Fortunately, all of the antennas are overlength. I marked the original end of the tape and measured from that point for each cut, which helped to keep things even. I originally tuned so that the lowest SWR would be at 127 MHz, the center of the COM band. I then graphed it out and discovered that I had trimmed too much. Trimming has the effect of raising the frequency range, moving the curve to the right on the graph. At Dave Black’s suggestion, I added tape back onto the ends and soldered them together. At 1/2” shorter than the plan length the result was not only better distribution through the range, but a much lower minimum. I tuned the NAV next. I have been told this is not critical for receive antennas, but I agree with those who say it will maximize reception. Otherwise, I’d expect that all the antennas would be constructed identically. Mine is located on the canard



underside, with a 2" forward sweep. It took 1-3/4" of trim (from each end) to achieve the results shown. This time I decided to sweep the frequency range and note the areas where SWR was below 2.0. I trimmed until this range straddled the NAV frequency range. This method was very fast. I started graphing, and was quite pleased with the results. I then put the canard in place with the pitch and autopilot servos in their approximate positions and concentric elevators installed. The other measurements are without any further trimming. As can be seen, there was some degradation with the gear down. However, when the gear was raised the graph improved slightly, and when the master was switched on the results were excellent. Of course the results may change when [install the avionics and battery. My conclusion is that nearby objects may not harm antenna performance and may in fact enhance it. There is also good reason to test the antennas after everything is installed as well as while you are constructing them.

The marker beacon had very narrow sensitivity, and required about 1-114" trim. The second COM was totally unacceptable. There were two SWR ranges less than 2.0, one at around 97 MHz, and a much broader

one around 147 MHz. I was unable to bring either one within the COM range, though I tried using extra long elements and wider strips to both lower and broaden the range. I ended up trimming the elements to 18-1/2" without bringing the lower one into range. Apparently something happened to the coax during construction, though the ohmmeter readings are fine. I will have to replace everything.

A few other very basic lessons learned the hard way: Don't worry too much about the exact length if you build- I suspect it's more important to keep the elements even. Use quality connectors. I originally bought screw-ons at Radio Shack and they were a waste of money because they would not make dependable connections. BNC connectors are also specific for coax type. I forgot what I was using for cable and bought some which turned out to be for RG59. I was able to use them only after drilling out the center contact. Wicks includes a helpful instruction sheet with the BNCs they sell. I also recommend purchasing The AeroElectric Connection. I have learned a lot from it. Whether you believe in tuning or not and whether you build or buy you should check your antennas to ensure that they will operate properly. Without the analyzer I would have found a bad radio on my pre-flight. My first reaction would have been to blame the radio, not the antenna. The end result would have been wasted money, time, and a ruined paint job.

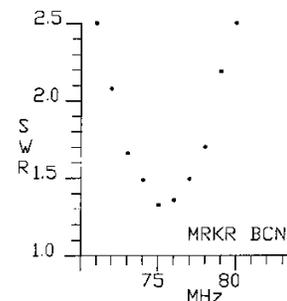
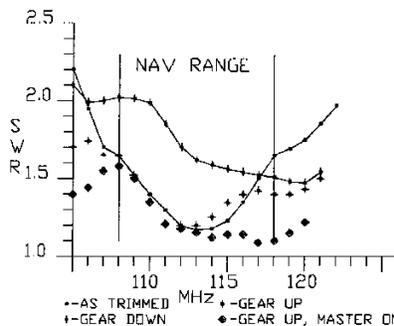
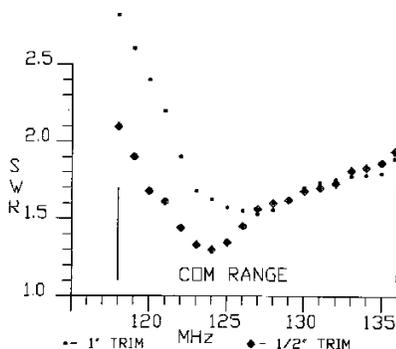


*From Rick Lavoie, St. Augustine Florida*  
**Pin Hole & Primer Tips**

I want to pass on some new tips that I learned the hard way. Not wanting to repeat myself (refer to my article in *Velocity Views* Volume 2 pages 12-14 titled "Finishing Tips") or other finishing articles (refer to Volume 3 pages 21 - 23 and Volume 4 pages 13 - 16 titled "Finishing Your Velocity" by John Harvey), here are some things I have learned.

Once you think you have your fuselage, wings, and parts all perfect, it is time to prime them. As I mention in detail in my previous article, you have contoured your wings with a long sanding board. They look real good ... at least you think so! But wait until you prime them. All those little imperfections and pin holes will jump out at you. After trial and error, I found a few good tips on filling those pin holes and little imperfections:

- First coat of primer - I used a gray primer (Vikron 2 part epoxy primer surfacer), the same stuff I used on my Long EZ. I sprayed it on heavy (if you have no sags, then you did not put it on heavy enough). Once it has flashed off, take some of that same primer you just used and mix in some West 410 (micro) in a cup. Get a paint brush and squeegee out, and yes, go ahead and brush in the stuff to fill those darnn pin holes. After you are done, do it again, until you find no more. Let the primer cure for several days until hard.
- Sand with 150 dry. If you see any imperfections, you can use "Putty-Cote", which is a polyester glazing putty that requires the addition of a peroxide hardener (tube). This stuff



kicks in about 2 minutes, so be ready, fast, and mix only a small amount at a time. You can sand it in just about an hour if it is hot out.

- Prepare your surface for the good primer that the factory uses (U.S. Paint Awlgrip White Primer - also a 2 part epoxy primer). Oh yea, be sure to get the right thinner / reducer for epoxy primers! You need to thin them by about 25% with only an epoxy type thinner. Once you surface is cleaned and tacked, get out your spray gun and prime it again. This time you want to get good coverage with the White Primer.

- How does it look? If it looks good before you sand it, then you are ready to wet sand with 220, then 320, then 600.

- A word about masking tape - buy the good stuff, or you'll be sorry! Scotch 3M and Scotch 3M Blue cost a lot, but work the best. The blue is for extended use. Visit your local auto paint supplier and ask for guidance from a pro when buying. And if you get masking tape wet, take it off right away! If you don't, you will know the misery that Judy and I know about trying to get it off plexiglass.

Well, I have my bird ready for painting. I'm finishing my electrical and engine installation. I sure hope it will be ready for the Bahamas fly-in!

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## Atlas Motors / Frankin

*Continued from page 13*

sion with lower grade fuel, produce more power on less fuel with less displacement. On the other hand, you will have to supply adequate carb heat, and a bit larger oil cooler. A fair trade off, it would appear. Lest you scoff at the power differences, what do you think causes the RPM drop with carb heat?

Because of the comparatively 'stiff' camshaft, the carburetor inlet, air cleaner, etc., is very sensitive to pressure loss; far more so than with engines with lower specific output. Most people do not realize how sensitive engines can be to pressure drop. For instance, the highly touted

'Ram air' amounts to less than 3% at 150 MPH, and that is assuming full pressure recovery. On the other hand, a scat tube, a few fittings and turns, and an air cleaner can quickly drop available manifold pressure by 10%. It takes 750 SCFM to make 500 HP, and, unlike automobiles, aircraft engines usually run close to full throttle, so pay attention to the inlet system, especially turns near the carb entrance. Some carbs are more sensitive than others; the Ellison is among the most sensitive.

Exhaust is another sensitive area. High compression and high performance engines are sensitive to exhaust design. Do not confuse 'design' with the ubiquitous 'back pressure' so often referred to. Any liquid or gas forced through a pipe will have a finite amount of 'back pressure' else there is no movement. (No engine 'requires' back pressure to run, a complicated subject beyond the scope of this paragraph). What we are most concerned about is the pressure AT THE EXHAUST VALVE just before it closes, followed by 'back pressure', than by the effects the dumping of the exhaust into the airstream may have. (A note from the past: we once maintained a very successful Alfa race car, running in the pure stock class. One day it just seemed 'flat', ie. willing, but not strong under load. It turns out that in unloading the car from the transporter, we had folded a lip on the downturned end of the exhaust pipe. The lip, about 1/8" high and 1" long,

was on the outside radius of the exit, and, at high flow, it formed a shock wave that cost 12 HP by restricting high mass flow!) Of course, you may ask what has this to do with airplane exhaust? Simple. We once had a Franklin engine that simply felt 'flat' at full throttle, and the sparkplugs all looked different. The beautifully polished exhaust manifolds looked great, when we cut them apart the joints that were beautiful on the outside were hideously restrictive inside.

The summation of this is: aircraft must be considered as a large package composed of smaller packages, one of which is the powerplant 'package'. This includes everything between the air inlet and the exhaust exit, and the details are important. No single component operates alone; every change affects something both upstream and downstream, and small variations can cause enormous changes in the total results. If at first glance something appears out of the ordinary, look and think carefully for the hidden reason something is done in a particular way (obviously, this does not apply to politics, or the way the local airport is governed) before changing expensive things uselessly. Don't be afraid to ask why something is done in a particular way, and be prepared to learn. Knowledge is not yet taxed!

Questions? Want to ask why? Call anytime.

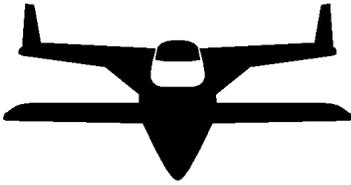
*Pat Goodman, President  
Atlas Motors, Inc.*

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One of the best things that you can do to help me out is to pay by check (instead of credit card). It is very time consuming for me to process credit card subscriptions (not to mention the bank fees too), and saving time is saving money. I originally started accepting credit cards for the international subscribers, as it is the easiest way for them to pay in US dollars. If you have the option, please pay by check. Thanking you in advance! Rick

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## Engine For Sale

Lycoming IO360 engine. 200 hp fuel injected. Set up to run on Velocity, with lightweight starter, lightweight 60A alternator, 8" prop extension, vacuum pump, fabricated intake elbow, engine mounts, various filters, etc. Running perfectly on Velocity prior to accident. Engine has less than 25 hours SMOH and has been checked by AMO. Will include engine gauges (sensors already installed). First \$15,000 (or \$20,000 Canadian). Much more invested. Contact: Al McLean, Box 1799, 248 Emily Street, St. Marys, Ont. Canada N4X 1C1 Business: 519-284-2580 Home: 519-284-3492 Fax: 519-284-3601

## Parts for Sale "Parting out" Velocity

I am parting out my Velocity 173 RG after my accident. This consists of a custom canted control panel with all tubes, brakes, hydraulic pump, cylinders, oil cooler, and breaker panel. Also, cloth-covered seats, seat belts with shoulder harnesses. I also have a Lycoming IO-360 200HP engine, complete with lightweight starter and alternator, control cables and quadrant, and just about anything else needed to complete a Velocity project.

Bill Richards (407) 725-1819

## FOR SALE 1/2 Velocity Kit

Transfer out of Washington State forces the sale of my 1/2 interest in a Velocity Standard RG that is approximately 1/2 complete. Hangered at Payne Field in Everett, WA. This plane will be full IFR and is set for completion by Oshkosh 1998. If interested, please call Mr. Chuck Harbert at 206 885 3226

## FOR SALE Lycoming Engine

I have a zero since major overhaul Lycoming IO-360-CE16 for sale at \$13,500  
Call George Morris of Coconut Grove, Florida 858-4064

## Manuals

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...

## FOR SALE Tipover Cradle

Used to turn your Velocity over during construction of the strakes. I also kept my plane inverted for a number of other things like finish & primer. Yes this is the one built and designed by Dave Black (see Volume 6 page 12 for photos & article on Dave's "TOC"). \$50 plus you need to pick it up in St. Augustine FL (too big to ship). Call Rick Lavoie 904-461-6912 or lavoie@aug.com

## FOR SALE Paint Spray Gun

Two Quart Cup, High Volume Low Pressure (HVLP) Spray Gun, with regulator, two 55" hoses, 1/4" NPT inlet. I used it just twice to prime my Velocity. It is in like-new condition, complete with manual. I recently bought it from Harbor Freight tools for \$130, asking \$70. Call Rick Lavoie at 904-461-6912 or e-mail: lavoie@aug.com

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2) **E-Mail** your text file to me: lavoie@aug.com

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