VELOCITY VIEWS

Volume 23

Sun N' Fun 2000

Velocity had three aircraft on display at their Sun N' Fun booth.

At least fifteen Velocitys flew into Sun N' Fun 2000

In this issue

FACTORY NEWS

by Duane Swing

WHAT'S GOING ON HERE?

I have had several present and potential Velocity customers ask me about the financial strength of Velocity in light of the recent developments at Stoddard-Hamilton (Glasair). In case you are not aware, Stoddard-Hamilton closed their doors a couple weeks ago with their future in doubt. What we have now is a closed plant with thousands of customers without any builder support, builders who purchased split kits with the possibility of never getting the rest of their kit and many who have placed deposits on a kit who may never receive anything for their money. Could the same thing happen to Velocity? To answer this, let's look at the track record of the experimental kit aircraft industry and see where Velocity fits in.

Dave and Ruthanne Lincoln take a break from answering questions at Sun N' Fun about their beautiful Velocity. Dave has many innovative ideas throughout his project.

This is Mark and Nancy Riley's first time flying their brand new Velocity to Sun N' Fun. Prior to flying home to Pennsylvania, the couple took a flying adventure to Key West!

Most of the kit airplane manufacturers started with a design that was thought to be a marketable airplane, usually dreamed up by one individual with a limited budget and no experience in either manufacturing or marketing. From this design a prototype was built and, in most cases, the prototype was used as the marketing tool to sell kits. The money generated by the kit sales would provide enough cash to build the necessary tooling to produce the kits that had been sold and would be sold in the future. This is almost like perpetual motion. Sounds good on paper but never works in the real world. Others might have a great design with the money needed to get things started and simply overestimate the market. In time, the demand fails to materialize, the bottom drops out financially, and investors are then required to prevent total collapse. In other cases, a company might be sold and the financial burden of paying off a large bank loan is more than the sales will support. Just what happened to Stoddard-Hamilton is not known by me, nor is it important. The bottom line is that they are financially in a world of hurt without the income to pay the bills. Once the doors were closed, sales go to zero and the only way to survive is to look for investors or sell the company and let someone else pay the bills. The value of Stoddard-Hamilton was seriously decreased by the need to close the doors and recovery might be impossible. How then, can you be sure that Velocity has the financial strength to overcome some of the obstacles that have led to the failure of so many in this industry?

First of all, one sure way of knowing the financial strength of a Stoddard-Hamilton, SQ-2000,

Thunder Mustang, or Velocity Inc., is to look at a Dunn and Bradstreet or TRW business credit report on how we pay our bills. Are we on time, 30 days late, 60 days late or not paying at all? Are there major suppliers who have placed the company on a cash only basis? This is usually the first indication that cash flow has become a problem. The reasons for a cash flow crunch can vary a lot from manufacturer to manufacturer, but the net result is that someone is not being paid when the bills are due. As far as Velocity is concerned, (and you can check this out with any credit rating system) we pay our bills on time and with all the early discounts we can get. We have no long term debt and own everything used in the manufacturing of our kit aircraft with no borrowed money.

Is it possible that even with our positive cash flow and no debt, that Velocity could go under? Anything is possible. As I view our future, I can see only a couple of ways this could happen. One would be if our sales were to drop off drastically. If it were to drop to zero, we could probably survive until another design were up and running. Sales drop to zero usually because of a catastrophic failure of something in the design of the airplane. I just don't see this happening but, again, anything is possible. I could also envision the insurance industry totally dropping ALL high performance experimental aircraft due to the high risk this presents. If insurance was not available, many of our potential customers simply could not justify the risk involved in flying our airplane. I could also see the potential of a frivolous law suit sucking all the money from Velocity to defend ourselves and even by winning, creating a cash flow that would not allow us to continue. Most of you know that we carry no liability insurance. Why? Because it is just not available at an affordable price. This is true of all kit aircraft manufacturers to my knowledge. Most of you also know that, in America, you are free to sue anyone even without apparent cause. To defend ourselves could cost hundreds of thousands of dollars. This is something none of us have a plan to prepare for.

Will Velocity be around for you tomorrow? I wouldn't be sending this out to you if I had any doubt about it. I believe that we have the best team in the industry to run this company for now and for the future.

SERVICE CENTER

The Service Center continues to be an important part of the Velocity future and it has already expanded beyond where we can control it with our present employees. It is, therefore, with great pleasure I announce the new director of our Service Center, Scott Baker. Scott worked with Mark and Nancy in the Velocity West Service Center and has agreed to join us here in Sebastian starting in early August. Scott brings to us his knowledge in the Velocity building program along with his ability to assist us in demo flights and in flight instruction. (He is a CFI) We look forward to his arrival.

In the last *Views* I announced the beginning of a trial program called the "Helping Hand". This program results from our claim that a Velocity can be built to first flight in 800 hours using all the fast build options. Dick Affenit is our first trial customer for this program we will help Dick build his XL RG in a total of 800 hours. This is broken down into a total of 50 working days(8 hours a day x 2 people x 50 days = 800 hours). We actually have extended this to 60 working days to have a little buffer. This time period does not include the instrument panel work, the interior, or the final painting. These are being sub-contracted out. We are now 35 working days into the program and have completed all the glass work including the installation of the fuel strakes, all the landing gear installation, engine installation and are now working on the balance of the systems installation. Can we be finished in 25 more

Scott Baker, Velocity's new Service Center Director

working days? Don't know for sure, but it looks promising. As I said before, if we know it can be done, our advertisement will stay. If it can't be done, we will change our advertisement to whatever it takes. Once the airplane is completed and we can assess the time and conditions necessary, we will publish the results here and on our web page. It will then become a factory option for anyone willing to spend the necessary time (and money) to get his airplane in the air in the absolute minimum time needed.

NACA COOLING DUCTS FOR XL

I just received a call from our super builder Wes Rose. Wes started his XL RG just after Oshkosh last year and reported to me that the first flight has gone without a hitch. Wes purchased none of our fast build wing or fuselage options and it has taken him about 10 months of construction to first flight. Most of his construction was done after normal working hours, weekends and some of his vacation time. Wes is the first to fly the XL with the NACA cooling ducts and he reports cylinder temperatures in the 375 degree range. Wes has the IO540K 300 horse engine. This is certainly good news for those of you who are planning on using this method of cooling your engine. Wes has agreed to have his airplane on display at our booth at Oshkosh. I can't wait to see what a

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Factory News

Continued from previous page

paint job using $400/quart looks like. Must have gold leaf in it.

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Production News

By Mark Machado

Overview

In the past, many of you may remember I wrote a column entitled "Views from the West" for this publication. Since my wife Nancy and I have relocated to Florida and the old Velocity West business is now only a memory, I was hoping my writing career was over. Unfortunately, this was not to be the case! Since most of my activity here at the factory centers around production activity, guess who got elected to write a column call "Production News"? I'll get right into it!

Daren Johnson

As some of you may remember, it was reported in a past *Velocity Views* that our Parts and Inventory Manager, Daren Johnson, was in need of a heart transplant. For most of us this is more than we can even comprehend, but for Daren it was quite real! It was so real that Daren ended up on an operating table, with a replacement heart literally a few feet away before the doctors discovered his heart had improve sufficiently that such drastic surgery would not be necessary. Boy, can you imagine going to sleep thinking your heart was going to be replaced and then waking up to learn they changed their minds?!

Surviving that experience, Daren learned he wasn't completely out of the woods, but rather would require heart by-pass surgery in the very near future. That "future" date is June 20th! Daren has been advised he will be out-of-action for a time period of 4-6 weeks. During that time, yours truly will be trying to fill-in for his duties, as well as taking care of my own, sooooo....please be patient with those orders! We'll definitely get them out, but it may take a few more days than normal. I don't want to get too good at his job!

Of course, we all wish Daren a speedy recover and hope he gets anxious to get back to work real quick!

Production Organization

Since Nancy and I have joined the staff here at Velocity Inc., there have been some changes in the company organization. Specifically, Production is now comprised of four departments; Fiberglass Manufacturing, Metal Shop, Parts, and Fast-Builds. Fiberglass Manufacturing is supervised by Lambert Kneifel, the Metal Shop is headed-up by Frank Ware, Daren Johnson handles the Parts Department, while Chad Holland runs our Fast-Build Department. Most of these employees have been with Velocity for sometime, with the exception of Frank. They are all good people who are working together to make sure your Velocity kit components are the best quality possible. We meet as a group weekly and discuss those issues that make us all work better as a team. It's that team effort that hopefully will make your kit purchase and/or option part order flow smoother with minimal complication. We all hope you notice this, but of course we are always open to suggestions. It's our goal to be as efficient as possible, where you place an order, it arrives on-time, it's exactly what you wanted, the billing is correct and you are simply amazed at the level of professionalism exhibited! Hey, it's a goal!!

Fast-Build Wings

As many of you know, we have been somewhat delayed in receiving production levels of Fast-Build wings from our Brazilian partner in Southern Brazil. Scott Swing and I have just returned from another visit to the manufacturing plant in Brazil with somewhat mixed feelings. Quite frankly, what we see is great, but the rate of production is very slow. Quality is very important in our business and the Brazilians are certainly paying close attention here, but we need to work with them very closely to significantly increase the rate of production, while at the same time not violate our standards of quality. Doing this long-distance has been time-consuming at best.

Several proposals or rearrangements are being actively investigated. For one, Duane, Scott and I have decided we need to take a more active roll in the actual manufacturing of these wings. How that might ultimately play out we don't exactly know today. We do know that we have started manufacturing Fast-Build wings, using the foam-core technology, right here in Sebastian, as a means of supplementing the wings from Brazil. In addition, we are negotiating with our Brazilian partner to allow at least part of the Brazilian wing components to be manufactured here locally as well. In addition, we have recently completed a centersection spar mold that produces centersection spars that work equally well on both Brazilian wings or foam-cored wings. We call it a "universal" spar. Matched drilling of centersection spars and wing spars are a thing of the past. With the new arrangement, drilling jigs make the "match-up" automatic, regardless of when or where the individual components are manufactured.

Those spars are currently being produced and being shipped to those individuals who are awaiting Fast-Build wings, so that they can continue uninterrupted work on the airplane. If we have missed communicating with anyone about this new technology, and you have a need, give me a call and we'll get it fixed.

Please rest assured, we are working on and fully expect this significant "hick-up" with our wings to be resolved in as short a time as possible. Whatever we can do to help your particular situation, we will do.

Don't hesitate to give me a call personally to discuss the situation. Our objective here is to provide you with the necessary components in a timely fashion such that the progress of your construction will not in anyway be significantly delayed.

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Events & Sales Scoop

by Nancy Machado

Events

The last Open House on May 6th appeared to be enjoyed by all. Many thanks to Don George for delivering an IO-540, followed by Duane and Scott demonstrating its installation onto an XL fuselage. Mark Machado gave an afternoon presentation on how to perform the weight & balance on your Velocity. And in between those speakers we gave 15 demo rides at a reduced cost!

The next **Open House** is set for August 12th and will feature Johnny Murphy, a well-known figure in canard circles. He is an A&P mechanic and DAR for the FAA based out of Cape Canaveral. Johnny graduated from Georgia Tech with a degree in Mechanical Engineering. He retired from NASA in 1981 and has built four canard aircraft, three Glasairs and a few "other" aircraft he's sure not many of you would recognize.

Johnny has been a DAR for 15 years: He simply could not get an appointment with the FAA to come out and certify his homebuilt airworthy in time for Oshkosh one year so he decided to fill out the paperwork and do it himself! He flies a 1951 Bonanza "C" model (V-tail) and just recently sold his Glasair III he flew for the last three years for 1,100 hours. He is currently building a four-passenger Cirrus VK-30 powered with a turbo prop (600 hp) – not down-rated! Says he can never go too fast... my kind of guy!

His presentation at the Open House will discuss problems he's encountered with various aircraft in getting them certified for airworthiness, engine installations and filling out the proper paperwork.

This promises to be an Open House well worth attending!

August 12th Factory Open House Workshop Schedule

Saturday August 12, 2000 - Factory's quarterly open house in Sebastian Florida (X26)

9:00am	Coffee and donuts
10:00am	Workshop: Johnny Murphy on FAA certification, and a review of problems he has encountered.
Noon	Lunch
1:00pm	Workshop: Building Q&A
3:00pm	Demo rides in the XL

Please be sure to call the factory and RSVP! Friday arrivals can book a room at the Key West Inn at Captain Hiram's here in Sebastian. Call 800-833-0555 and mention Velocity to get a corporate rate. When you call the factory to RSVP, let us know when you plan on arriving so we can make arrangements for transportation, etc.

Fly-Ins to Catch Us At

By the time you get this we will have already have gone to the Velocity West Coast Fly-In in Ramona, CA, June 10th. From the response we've gotten so far, this appears to be a Big Event! I'll be sure to give a detailed report of that fly-in in the next *Views* if you couldn't attend.

June 24th is the Rocky Mt EAA Regional Fly-In in Longmont, CO. Velocity builder and pilot, Butch Hernandez, is attending this event for us in his beautiful Velocity RG. We are very proud to have him represent us at this important fly-in.

The next fly-in we'll be attending is July 5 – 7 in Arlington, WA. This is the NW EAA Regional Fly-In (third largest fly-in of the year). If you're in the area, please stop by and say, "Hi." And put your aircraft on the flightline display!

Tim Crawford and his Velocity RG-E will represent us on July 22 at the Twin Falls, ID, show. This is close to where he now lives and he's built a beautiful Velocity! Stop by and meet Tim if you're able to attend this fly-in.

And, of course, we'll be at Oshkosh again July 26 – Aug 1st.

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Events & Sales

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Our Velocity dinner is happening Friday night, July 28th, 6 p.m. at the Park Plaza Hotel (same place as last year). Please make your reservations ahead of time; cost is $20 per person for a buffet dinner.

Kitplanes

Kitplanes Magazine wants to hear about your newly completed Velocity! They will be featuring a column in October entitled "Completions" that gives brief comments and photos of your recently completed homebuilt. They publish all entries they receive. Simply send a short description of the completed and flying Velocity plus a single photo (print or slide; no digital) for them to keep to: Kitplanes "Completions," 8745 Aero Drive, Suite 105, San Diego, CA 92123. The deadline for the October issue is June 26th but if you miss that date, the column appears in each issue, only with fewer entries. The October issue will include at least 100 entries! Let's make Velocity a big hit with this October's issue!

SALES

The following new Velocity kits might soon be in your neighborhood:
John Cervini, Davie, FL, XLRG
Ulrich Christen, Switzerland, XLRG
Ted Cox, Jacksonville, FL, Std/RG
Aycan Gencoglu, Quincy, MA, XLRG
Rich Guerra, Iowa City, IA, XLRG
Mark Lunsford, Covington, GA, SUV
Dave Marier, Lawrenceville, GA, XLRG
Ken Mishler, Vero Beach, FL, SUV
Roy Paschal, Cartersville, GA, XLRG
Robin Ream, Blue Springs, MO, SUV
David Riley, Laconia, NH, XLRG
Allen Schenholm, Davie, FL, XLRG
Harold Swarthout, Daytona Beach, FL, XLRG
Bruce Topp, Eagan, MN, XLFG
Robert Wood, Sebring, FL, XLFG

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About 45 Velocitites attended the Third Annual West Coast Fly-in, held this year in Ramona California. The event included a BBQ picnic and was held in conjunction with the EZ Squadron's annual weigh-in.

Is that Velocity's Mark Machado manning the BBQ grill?

Velocity Views Newsletter
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If I already have your correct information (address, etc.) in my data base, then you can simply mail me a check. See the last page of any issue for details.
Payment is **due no later than December 15th**. Renewals received after December 31st will be assessed a **$5 late charge fee**.
Thank you for your support!
Rick Lavoie

Safety Corner

Accident & Incident Reports, Maintenance & Service Difficulties

By Duane Swing

Ken Swertfenger Accident

In the last issue I reported about the accident that took the life of builder Ken Swertfenger. To Ken's family and friends, I apologize if what I said made Ken look like he was irresponsible. Ken was a very thorough and careful builder who would not let anything stand in the way of a safe airplane. There are times in our lives when, in spite of how careful we may be, an accident will happen, and Ken was the victim of just such an accident. What I was trying to say was to be used as a warning to all our Velocity builders of the necessity to be on guard for anything that would wave a red flag.

Runway Overshoot

Now that the summer heat is upon us, it is important that we look at the performance of our airplanes when higher density conditions exist. We received a report of a Velocity that ran off the end of a runway after aborting the take-off . Details are not clear at this time but it would be important for all of us to review the density altitude conditions and our airplane performance. If you have been flying your airplane up north with a light load and medium fuel for years you may not know how it will perform in the hot weather with a heavy load and especially at a higher elevation. There are a couple of things that we need to consider here. First of all, what kind of static RPM are you getting from your engine? A 200 horse Lycoming gets 200 horsepower at sea level on a 59 degree F day at 2700 RPM. Increase the temperature or decrease the RPM, or use runways that are above sea level or any combination of the three and you are not going to see the 200 horsepower. Add to this the inefficiency of a propeller that is twisted to achieve the maximum cruise speed, and you may have a condition that makes safe take-offs impossible. The solution is to know how your airplane performs at the elevated density altitude, use a propeller pitched for climb instead of cruise, or switch to the expensive M-T constant speed propeller. I know this prop is not cheap, but, then again, neither is your airplane.

NTSB reports

Every so often I will get bombarded with phone calls from our builders who have read on the reflector about a Velocity that has gone down. The initial NTSB reports only gives us sketchy information that often doesn't include what caused the accident or if anyone was hurt. I received several such calls yesterday. I called the airport FBO and he gave me a better look at what had happened and a confirmation that the pilot and passenger were not hurt. In this case, the pilot was making a high speed pass down the runway and either one blade of his two bladed prop broke off and the resulting vibration shook the lower cowling off the airplane or a portion of the lower cowling broke loose and went through the prop. We don't know for sure yet just what happened. My point is this: It would be good if those of you who want the reflector group to know what is happening out there to get a better grasp of what has happened BEFORE jumping onto your computer and repeating an NTSB report. A report that is not only incomplete, but causes trauma to our builders, results in repeated calls to the factory wanting us to comment on what happened.

FINAL NTSB REPORT ON MARLIN HOWE

It has taken the NTSB over two years to determine the probable cause of Marlin's accident. The probable cause was a broken valve in number 3 cylinder that caused the engine to stop. It was reported by the NTSB that inadequate quality control during construction of the exhaust valve was what caused the failure. Marlin had no place to land and the collision with trees and a river bank took his life. We do not know if Cory Howe (Marlin's son) has been in contact with PZL Franklin. If I learn more about this engine condition, I will report it to you.

MORE FRANKLIN STUFF

One of our builders reported a cam gear that destroyed itself in less than 10 hours flight time on the Franklin 220 engine. An analysis of the cam and gear was being made to determine if improper heat treating might have caused the problem. It is important to note that the initial response by Franklin was that the builder had made some changes to the engine that nullified the warranty. The changes may or may not have anything to do with the problem, but it is how Franklin is handling this situation. Again, the final chapter has yet to be written on this problem. As a side note, I called the Lycoming rep and ask him if a new factory engine warranty would be honored if something like a Jeff Rose electronic ignition were installed. His answer was virtually the same as PZL Franklin, in that if Lycoming was aware of any changes that nullify the type certificate, then the warranty would not be honored.

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Notice

Zip Code Change

Velocity View's Postal Zip Code has changed from 32084 to **32080.**

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 126
Affects all XL aircraft
Manual Section 14.2.3
Date of Change 6-07-00
Third paragraph should read "should go about 78" forward from the aft side of the spar."

KPC 127
Affect all aircraft
Manual Section 12.2.1
Date of Change 6-07-00
This has to do with rudder deflection and brake adjustment. The last paragraph should include the removal of the reference to the 30 degree deflection and the addition of " rigged such that the brakes do not start engagement until rudder deflection is approx. 2 1/8" with a total movement of approx. 4 1/2". This is measured at the wing intersection. This may change some based on the size of the rudder. Another thing to remember is to make sure the rudder moves at first movement of the pedal.

KPC 128
Affects XLFG's
Manual Section 10.5.3
Date of Change 6-07-00
Add this paragraph:
Drill #21 pilot holes through the bulkhead using the pedal assembly attach brackets as a guide. Remove the brackets and tap them with a 10-32 tap. Enlarge the holes in the bulkhead to 3/16". Install the assembly with (4) AN#-11A bolts.

KPC 129
Affects all Standard or Small wing aircraft.
Manual Section 3.2.1
Date of Change 6-07-00
The paragraph below Figure 3-7 should read "range of 108" to 109".

KPC 130
Affects all planes
Manual Section 3.2.1
Date of Change 6-07-00
This note should be above Figure 3-7.
Note: The incidence jig is positioned parallel to the leading edge cut line. Also, remove the reference to the 125" as mentioned in the first paragraph.

KPC 131
Affects all Elite, XL and Suv aircraft.
Manual Section 15.2.3
Date of Change 6-07-00
When referencing the seat back plates, this paragraph should read: "When both seat bottom side plates are attached, set the seat backs in place and install with two 10-32 machine screws."
No cutting is need on the hinges.

KPC 132
Affects all RG aircraft
Manual Section 9.4.4
Date of Change 6-07-00
Figure 9-25 shows an AN100-3 Cable Thimble. This is actual an AN111-3 Cable Bushing. Please re-label that in your manual.

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Service and general items

1. In section 10.3.4 there is a hardware list. In this list the Elevator push rod is called out as VEPR-01. Make a note that this is also called VETT on the packing list (Velocity elevator torque tube). We will clean this up on this end so that in the future they will match.
2. We may have shipped some canard bushings that were short. To clarify the sizes of the bushings, the canard bushings should be 1" long and 1" diameter. The nose gear bushings for a fixed gear airplane are only 7/8" long. You would notice that if you tried to mix these two up, the bushings would be too long in one area and too short in another. Let us know if you have a problem here.
3. Section 10.3.3 has a photo (not a good one) of the aileron control bracket. This picture shows spacers behind it. Unless you have an airplane with a seatback bulkhead and clamshell door (non-Elite) there are no spacers needed. The bracket is bolted directly to the fish tale on the keel.

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CFI Notams

by Brendan O'Riordan, CFII, A&P

Transitional Training

"I have been building constantly and I don't have time to fly." This is a phrase we hear way too often. A good majority of first flight accidents happen not because the airplane isn't ready but because the pilot isn't ready. The whole reason you are building an airplane is so you can fly, so go out and do that from time to time as you build. It serves two purposes. One, it keeps you motivated to get your airplane done, and, two, it keeps you current, which is the most important. Flying one hour every 2 years for your biannual flight review and that's it, is not being current. Excuses like " it's too expensive" are just that, excuses. If you can't afford to fly once every month or two then

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CFI Notams

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you can't afford to build an airplane.

You also should prepare yourself to fly a high performance airplane like the Velocity. This means getting a high performance/complex checkout. This will at least get you into something that moves faster than a Cessna 172. I had an opportunity to go fly a Cessna 150 this last weekend. The first time I turned final I checked my watch, looked down at the airspeed indicator, and then checked my watch again. It was a lot slower than what I had gotten used to. It was really easy to see how someone who thought it was a challenge landing a Cessna would have a heck of a time with a Velocity at first. I guess you could compare it to an average driver taking a Volkswagen Beetle around a race track and finding it challenging but being able to control it, and then you toss him the keys to a Ferrari and tell him to do the same with the advice "It's just a little faster." You also don't want to have the first time you work a constant speed prop and retractable landing gear be your first flight.

So I know some of you are thinking "Well, I'll just go to Velocity and get 20 hours of dual in their airplane." I will let you know right now that this is not going to happen. I happen to be the only instructor here to do checkouts and sometimes I wish all I did all day was sit around and wait for you guys to call to get checked out, but that doesn't happen. Instructing is one of the ten or so jobs I do around here. If I never checked anyone out I would still be busy all day long. So this means that I only do "transitional training." Before you come and see me there are a list of things that you must have done:

1. Have a current Biannual signoff
2. Flown 10 hours in the last 3 months (preferably in a high-performance airplane)
3. Must have a complex endorsement signoff (I will waive this if your airplane is both fixed gear and has a fixed pitch propeller)
4. Minimum Private Pilot certificate

These four little rules are non-negotiable. You will need to bring your logbook with you so you can show me that these requirements have been met. I have seen too many pilots get discouraged and think they will never be able to fly their airplane, only to find out that the last time they flew anything was years before. You will have a much easier time transitioning into a Velocity if you have met these requirements.

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Maintenance Notes

by Michael J. Snyder
Private Pilot, A&P, IA

I would like to start off by introducing myself to all of the Velocity builders. My name is Mike Snyder. I have been interested in airplanes and aviation since I was a young boy, wanting to follow in the footsteps of my Dad (who has recently retired from Raytheon Aircraft).

Starting with stick & tissue models through radio control airplanes and finally getting my hands on the real thing by soloing a Piper Cherokee in January of 1974, I realized that I loved to work with my hands and started my career in aircraft maintenance in South Florida (1976).

I was very fortunate to be surrounded by some "real" airplane men who took the time to teach me the many skills involved in aircraft fabrication and maintenance. My past experienced is primarily wood, tube & fabric and aluminum construction.

In December of 1999 the shop I was associated with (on Sebastian Airport) closed. As luck would have it, Duane and Mark approached me and we discussed the possibility of me coming to work with them in the new service/maintenance center. After being neighbors to Velocity at the Sebastian Airport for many years, I knew this would be a great opportunity to further my aviation experiences by working for a fine company who produces a great composite design.

Most of my flight experience is in conventional tail wheel airplanes (primarily my Piper Pacer) but I am looking forward to Brendan teaching me the skills of flying a canard type aircraft. Scott mentioned that they would silicone my shoes to the carpet of the Velocity (whatever he means by that).

I would like to share with you some tips that I have learned along the way. First of all I'm sure you have the various EAA publications "Firewall Forward", etc. I would also like to recommend that you obtain a copy of AC43.131B "Acceptable Methods, Techniques, and Practices". Not mentioning the little bit they provide on composite techniques but, more importantly, the proper identification and uses of aircraft hardware, a very thorough chapter on weight and balance computing..and electrical system component use and wire size requirements.

Another important point is when approaching the final assembly of your flying machine, that you finish each item. For instance if you install a nut..tighten it. If a cotter pin or saftying is required..do it. You would be surprised what a phone call, lunch break, etc., can do to one's concentration! If there is an item that you can't complete, simply tag it so

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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.

CHECK YOUR PROPELLER!

From Kirk Lindberg

After two years and only 150 hours, my three-blade Performance Propeller has developed a crack. Fortunately, I caught it while doing a routine prop-bolt torquing and inspection. I sent it to Clark Lydick and he said he is seeing this in less than 5% of the pusher aircraft, and only one other Velocity. Performance Propellers has a 30-month pro-rated warranty, where 20% of the value is deducted every six months. So I have only 20% or about $350 dollars remaining on the warranty. Clark provided three options: 1. Attempt a repair by filling the crack with flox and wrapping all three blades with glass (which Duane Swing did not think would be a good idea, and neither do I), 2. Refund my pro-rated warranty, or 3. Put the remaining warranty towards a new prop.

I talked to Duane about other propellers available, and the Performance Propeller still seems to be the best cost/value/performance option. In further conversation with Clark Lydick, he agreed that repairing the propeller would not be a good idea. So I guess I'll plop some more money down (that plopping sound is a familiar one with airplanes) and hope the next one lasts longer. Clark is also going to try wrapping some glass around the blades from the hub to about half way towards the tip on my new propeller. On the positive side, I'm finding more of my flying is local and shorter trips, so now I'll have the opportunity to trade a little speed for take-off performance when Clark makes my new propeller.

The moral of this story is to check your propeller carefully before and after every flight. And here's a tip I picked up from an A&P - before shutting down your engine, check the mags (you can do it at idle). It's better to know they're bad at the end of a flight, rather than find out just before you're ready to take off on your next flight. At least that way you've got a chance to get them looked at before the next flight.

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Maintenance Notes

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that it won't be forgotten.

One more item I see too often is when installing the plumbing of aircraft systems, you need to blow clear with compressed air and keep clean..seal each end until final assembly can be made.

I have had the great pleasure of meeting some of you at the February and April Sebastian open houses, and am looking forward to meeting and talking with all of you in the future.

Careful building and safe flying

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First Flight Report XL RG

From Wes and Becky Rose, Zeeland, MI

I thought I'd give a report on the first flight of our new XLRG along with a few pictures. The first flight was on 5-26-00. I actually made three flights that day about 20 minutes long. There were many runs down the runway, first at low speeds to set wheel alignment then faster runs to check controls and see how the engine was running. Before this, I had made a check list of everything I felt had to be done before the Big Event down to how much wind I would allow for the first flight. I had another list of all the things I wanted to verify on the first flight which I took up with me. I also had a check ride with Brendan in January when we were in Sebastian to get the feel of the Velocity again since it had been 8 months since I had flown one. I guess the point is to get your plane and yourself prepared for that first flight. Know ahead of time what you want to accomplish, at what point you are going to abort take off if things don't "feel right", and where you are going to go if things do go wrong once you are off the ground.

Enough said about that. The feeling you get the first time that plane leaves the ground can't be put into words. My first flight in the XL couldn't have gone better. It was off the ground in 1000 feet. The plane handled great and cylinder and oil temps were real good. At full rich I was at 1500 on exhaust gas temp, but

Wes and Becky Rose's second Velocity, an XL RG, just after first flight at the Rose's airpark home!

throttled back to 120 knots, it was all ok. I circled the airport for 15 minutes and the plane would fly hands off, so I decided to retract the gear. I brought it up and back down then came in for a near perfect landing. It was great. I pulled the cowlings and did a complete inspection, replaced the fuel filter (this is the third one so far!), then went back up for another 20 minute run with the gear up. By the end of the day, I had the speed worked up to 165 knots at 2400 RPM and 20 inches of manifold pressure. By the time we get to Oshkosh, we will have speeds and temps with the NASA scoops. I want to thank all of our good friends at Velocity for their help over the past 11 months while we put this plane together.

Hope to see you at Oshkosh!

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V-8 in my Velocity 173E RG

From Bill Mulrooney,
West Bloomfield, Mi.

After my last Builders Forum article I received a lot of calls and e-mails about it. Well, many questions were about my engine mount, PSRU (prop speed reduction unit), and the engine itself. At that time it was not finished but now it is and I like it A LOT. Needless to say I think it turned out well.

1. First the engine. Here is a parts list:
-Dart aluminum sm.block chevy V-8 rocket block
-Eagle 4340 forged steel crank internally balanced
-Trick Flow"Midweight" 6" rods
-Ross custom made forged pistons 22cc dish
-Crane Hydraulic roller cam lift:.539 In .558 Ex Duration@.050 236 In 244 Ex
-Edelbrock Performer RPM cylinder heads(small ports will make great torque)
-Crane Gold 1.5 roller rockers
-Fluidampr-harmonic damper
-Edelbrock Pro-Flo fuel injection
-MSD Pro Billet dual pickup distributor
-Hooker Street rod headers, Ceramic coated to help keep engine comp.cool
-Flowmaster 3" SUV muffler to keep it to a roar.
As you can see, the only thing about this engine that is GM is the initial design.

2. The motor mount. I called Velocity to pick their brains and Duane recommended that I call Mike Snow at Snowline Welding in Oregon (541-617-1107) they make the mounts for Lancair and the mount for the Tigress which was similar to how I wanted to build my mount and Mike was a wealth of knowledge and friendly. He recommended 1" .049 wall tubing for the lower tubes and 1" .058 for the upper tube and of course all chrome moly tubing. For simplicity I used all .058 wall tubing, the wt. savings was only a 1/4 lbs his way. All the tubing at the front of the engine and the tubing used for cross bracing is 3/4" .058 wall. The tubing the 7/16" engine mount bolts go threw is 5/8" .095 wall that is welded to 1.5" dia. 1/8" thick washers that I made out of 1/8" chrome moly plate. Snowline Welding supplied the chrome moly cups that the tubing gets welded to, and I bought the Dynafocal sandwich mounts from Aircraft Spruce P/N 08-03500 $168.00. I used a tubing notcher to cut all the tubing and that chrome moly is very hard on hole saws. Expect to destroy at least 3-4 of them.

First jig the engine in place, raising the engine 3" made my lower cowl clear the engines oil pump and flywheel. Later I welded the oil pan to also clear the cowling. The engine was placed as far forward as possible leaving about a 1/2" between the water pump and the firewall and I am using a Elelbrock Nascar pump with larger bearings and the short mounting legs. Next I made all the mounting points for the Dynafocal mount to mount to the engine. On the front of the engine I used 3/8" aluminum plate 2"X 5" one on each side (see photo). These mounts are horizontal to take the thrust loads and the mounts in the rear by the prop are on a 45 degree angle to handle the torsional or rotational loads. The rear mounts bolt threw a 2" dia. piece of alum. that I cut on a 45 and then welded to the spacer blocks for the PSRU then the blocks were drilled threw for the mounting bolts. Now I made wooden spacer blocks to simulate the rubber engine mounts. You don't want to destroy your $168.00 mounts by welding next to them. Then decide where your mounting bolts will go. I spoke to Scott Swing to get his thoughts and

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Builders Forum

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basically up top the closer to the fuselage the better, and below the lower and closer to the transverse bulkhead the better. And Let It Be Done, that's where I put them. I welded the 5/8" tubing to the washers I made and bolted them to the firewall with 7/16" threaded rod. Do not use good bolts because they will loose their strength when you weld by them. The last step is fitting the tubing between the two mounting points. I did the rear first because once tacked into place the engine could not move at all. The last point is triangulation is good, and the greater the angle the better(closer to 45 degrees, not 10-15degrees). Have Fun, it feels great when its done.

3. Cooling system. I have spoke with Tim England about his cooling system for his V-6 and he has had good results with a 25"wide X 6"high X 3.5"deep aluminum Griffin radiator and no separate oil cooler. I am using the standard oil cooler in the nose and thanks to the new NACA roof cooling inlets a single 25" X 8" X 3.5" aluminum Griffin radiator. My first idea was to use two, one in each wing root, but this is far simpler and lighter. If this turns out to be to much radiator, it is easier to make it smaller than larger. I planned on having the cooling system tested by now but there was a screw up and somehow our prop order for an MT from Velocity was not placed 2.5 months ago and I found this out when I called to tell them where I would like it shipped a month ago. Well, another year flying to Oshkosh falls at the waist side. From the pictures you can see how much room their is on the sides and how much tighter we will be able to cowl it in an effort to clean up air flow to the prop. Hopefully the back will look almost as clean as the nose. We will finish the cooling and cowling when the prop comes. For now we will move onto paint and interior. Good Luck and if anyone has a cooling thought or experience please E-mail me at majomlry@aol.com or call me at home at (248)366-7951 Just don't wake the baby, it's the only time I can work on the plane. Thanks, Bill

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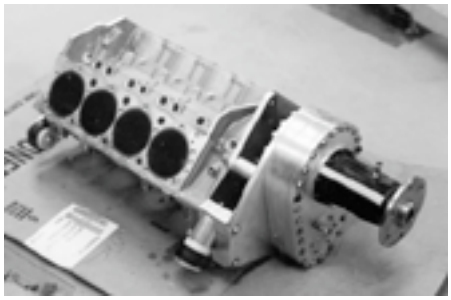
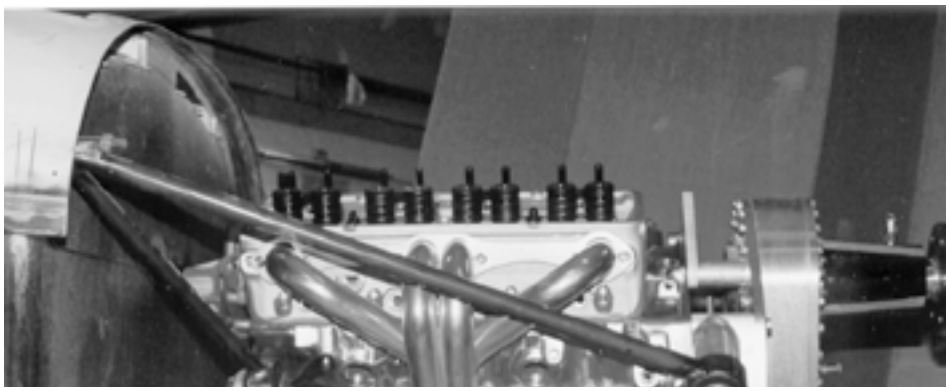
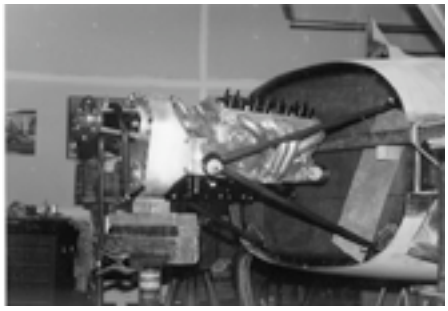
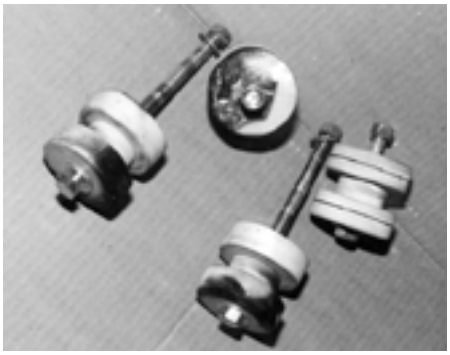
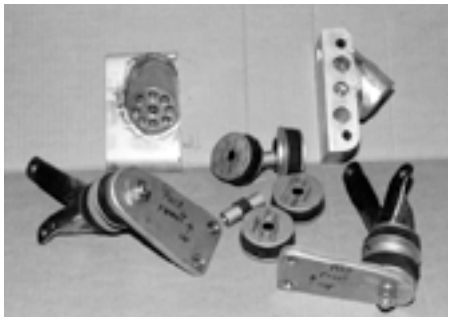
See Photos from Bill's project below:

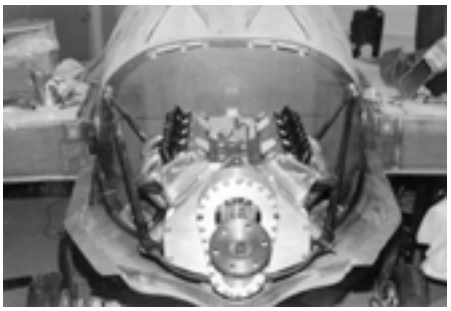












What I learned at Lycoming school.

From Dale Alexander,
Daly City, CA

Last September, many of you may remember that I had placed a request for questions regarding Lycoming engines as I had enrolled in their engine Inspection/Repair class. I answered all that had specific questions and promised a follow up with all additional information that I gleaned from the class.

What I have assembled here comes more or less straight from my class notebook and from what I remember. Rather than try and make complete sense of 18 pages of notes and write a smoothly flowing masterpiece, I will keep them in the order that the material was presented to me. Even so, the material is organized in a logical order and builds on itself. As this material was presented to me by their representative instructor, I would ask you to direct any questions about info here to them directly. Lycoming's tech phone number as of the time of my instruction was 717-323-6181 ext. 1.

The Lycoming class itself is held at the University of Pennsylvania at the Williamsport Airport. The classes are comprised of a 4-day theory and information and a 3-day disassembly/inspection/re-assembly class. Prices for the classes were $500 for the 4-day class and $400 for the 3-day class. Included in the price is shuttle to and from the hotel and a complete set of service letters, service bulletins and service instructions along with a free one-year update subscription. This was a pleasant surprise as at the time of enrollment, I was not made aware of this. If anyone has bothered to price out a complete set, they know how much this is worth.

Instruction began with an explanation of various materials available to the owner/repair facility.

Service Letter: Lycoming' way of announcing policy changes or new product changes.
Service Bulletins: Are red in color. Lycomings way of telling of a problem and need to correct condition. Not mandatory unless FAA issues an "AD".
Service Instruction: Set of instructions on how to perform a task, such as valve adjustment, replacing rings.

As many of us know, a new engine has all new parts in it and is zero timed. The FAA defines a "Reman" as an engine that has a mixture of new parts in it and used parts that measure at new specifications. Only an OEM can zero time a rebuilt engine. A properly overhauled engine has a mixture of new parts and used parts that measure at the "service limit" or better and no one can zero time a used engine. Lycoming has a recent Service Bulletin, SB 240R, Mandatory Parts Replacement at Normal Overhaul and During Repair or Normal Maintenance.

Service Instruction 1059C outlines what Lycoming requires for an assembly lube and where the use of the lube is required to insure against damage during first start. Several different lubes are suggested, but the instructors favorite was a mixture of 85% SAE 50 wt and 15% STP.

Crankshafts
Steel forgings that have been nitrided in the high wear areas for durability. Copper plating is used in areas not to be nitrided and this copper is the main source of copper found in an oil analysis during the first 150 hours. It will taper off after that point. Latest style prop seals are one piece with a raised rib, eliminating a plate in the old assembly. The prop seals can be replaced without engine dis-assembly. The proper technique requires that the seal be sufficiently warm to allow stretching over the prop flange. The internal bore of the case where the seal seats must be clean. A sealer, either Dow Corning Silastic 140, Goodyear Plybond 20 or W.J. Ruscoe "Pliobond" is required. The sealer should only be applied to the outside of the seal, not the case as it will be squeezed into internal oil passages and the prop bearing.

Service Bulletin 1098F deals with the correct location of the prop index bushings. The bushing used to locate/index a prop can either be all the same, one larger than the rest or two different than the rest. Some time was spent on this subject. In the course of his career with Lycoming, our instructor had seen several cases of unexplained failures of avionics, lamps and brackets, alternator problems and belt tossing. Many were traced to a prop that was not indexed correctly. Some owners had repositioned the prop to allow for easier hand cranking and this threw off the balance enough to cause a high frequency vibration that may or may not have been noticed by the pilot. This would seem to be an excellent place to look if these problems are found in your aircraft. On the IO-360 CIC engine that is recommended for the 200hp installation, this may not be as great a problem as the engine does not have dynamic counterweights on the crank. But any other 360 or 540 may have a number of counterweights attached to balance out 2nd, 3rd, 4th and 6th order vibrations depending on what the OEM installation required due to what prop was mounted. The order and placement of these weights will affect the engine and airframe differently. So check if whatever prop you are installing matches what was originally called out for in whatever application the engine was used in.

Prop mounting flange run-out: new spec is .000" to .005"
.005" to .018" run-out can be repaired and anything over .018" is considered no good.

If a constant speed prop goes to the feather position when stored, it is very likely that the seal plug inside the crankshaft is leaking. This is nothing more than a conventional automotive style freeze plug. The leak occurs around the outside of the plug where it seals against the internal crank bore. Just because you may have a fixed prop, you don't get off so easily. Service Bulletin 505B outlines how to inspect and treat your crank if internal pitting is found on engines shipped before February 15, 1997. Cranks with internal bores larger than 1.910" in the area of the prop flange to about 3.5" back

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should be considered scrap as far as Lycoming is concerned. Service Bulletin 530A deals with this issue in engines shipped after February 15, 1997.

Further information was given regarding crankshaft counterweights and engine overspeed. Service Bulletin 369H defines momentary overspeed as an increase of no more than 10% of rated engine rpm for a period not exceeding 3 seconds as is most likely caused by a slow prop governor failing to keep up with a "go around" type of condition. For example, an IO-360 has a continuous rating of 2700 rpm, a 5% overspeed will be 2835 rpm and a 10% overspeed will be 2970 rpm. When the condition for 10% overspeed exists to the point of damage (beyond 3 seconds in duration), the counterweights have experienced over 90 tons of force on the bushing and rollers, producing flat spots that will not allow the counterweights to slide freely. At this point, the engine is in a state of "detune" permanently until the next engine overhaul.

As long as we're on the subject of vibration, Lycoming recommends replacement of the engine mounts every 500 hours.

Camshaft

Steel forgings hardened much like the crankshafts with copper used in areas where hardening is not required. The copper will show up in oil analysis until about 150 hours at which it will taper off. Copper plating can also come from accessory dive gear copper coating. Main thing to remember is that copper will be found in oil until about 150 hours.

Lobe height is measured from the CENTER of the cam to the top of the lobe. Properly functioning cam lobe/follower should have a series of concentric circles reflecting that the follower is rotating in the bore. When follower stops turning, patter will become a series of radial lines from center of follower to edge. In extreme cases of follower failure, spalling will occur. This takes on the appearance of pitting and wear on cam lobe.

Causes of cam/follower failure are corrosion due to engine inactivity, high rpm starts, cold starts without engine pre-heat (rec pre-heat at below 0 deg F, valve adjustment too loose or too tight, sticking valves, overspeed of engine. Service Instruction 1011H outlines inspection procedures for hydraulic lifters (followers).

In 4 & 6 cylinder engines, groove on the 1st & 2nd cam journals indicates a cam used in a left hand turning engine. A light colored coating on the cam indicates a tin plating that is used to help with start up lube. This coating wears away as the engine is broken in. If the cam goes to TBO without significant wear, it can be reground once while maintaining lift/duration.

Cases

Serial number is located on flat boss on left-hand upper case. Many cases are held together with through bolts that can be removed without taking the cases apart. Engine bearings are made of a compound containing lead babbit, steel, silver, gold and aluminum.

Oil inlet to case is located on right rear of case. Diagnosis of oil pressure system can be performed by checking pressure at this point and then again at the plug at left front (near the prop). Look for a pressure drop of no more than 10-12 psi. If more, suspect a possible cracked case, bearing clearance or case opening up in center main area (fretting). If pressure drop is less than spec, suspect possible restriction from bearing flaking, etc. Pressure drop may be higher if a multi-viscosity oil is used. Switch to 50 wt. Mineral oil to recheck.

When the cases are re-assembled after repair, oat both halves of case with POB #4 (avail at FBO's), let get tacky and then install two lengths of #00 silk thread to case halves making sure to run thread on inside of case bolt holes. Make sure that no gasket sealer gets on main bearing webs as this can act to reduce case torque later as sealer is pushed out during normal engine operation. The case torquing procedure is too complex to outline here and varies by engine model. Service Instruction 1029 is HIGHLY recommended for accurate information regarding specific engines. When I was inspecting used engines for my project, I brought a torque wrench with me to check the tightness of the through bolts. I figured that if they were tight, it would be less likely that the case would suffer from case shuffle.

Absolutely no sealer should be used at the cylinder to case sealing area as this will lead to leaks as the sealer wears away and the cylinders loose torque. In addition, the machined bevel (used for the O-ring seal in the cylinder base area) in the case must be protected from damage due to the connecting rod striking the groove. If the case is damaged in this area, it will be very difficult to maintain an oil tight engine.

I brought a question from one of our builders to the instructor's attention; what to do about the chronic oil leaks at the various case parting lines i.e. oil pan, accessory drive or case joint. He replied that if recommended sealers are used and the case is retorqued at 50 hours, the chance for oil leaks is greatly reduced.

In severe cases of wear, fretting will be found at the center main bearing area. The case will have a distinct Grey color with wear that is evident. This is due to the case loosing torque and not keeping the bearing under proper crush. The bearing is allowed to walk around in the bore and the cases themselves shuffle around wearing the case. The cases can be repaired by machining up to .007" from each case half and crank and cam bores redefined. This will require that the idler gear pivot bores will have to be remachined and the starter will need to be shimmed as both of these areas will move closer to the centerline of the case. The factory offers these services for case repair.

Connecting Rods

The connecting rods are made in house as steel forgings. After machining, the rods are graded by weight. For example, a Lycoming part number may be 76201 E, where 76201 is the main part number, the "E" is the

weight coding. The significance of the weight code is as follows:

A
B (no longer used)
S Service Rod (intermediate weight)
D (no longer used)
E

When replacement of a rod becomes necessary, weight grouping must be kept in mind to maintain correct balance. Can use an "A" rod with a "S" rod or an "E" rod with a "S" rod, but cannot use an "A" rod with a "E" rod as the difference in weight will be over what is recommended by Lycoming. The "B" and "D" rods are no longer available as service replacements, so one can use the rods on either side of them i.e. "B" rod can be replaced with either an "A" or "S" rod. The instructor didn't make a big deal about the need to balance the engine any more than what Lycoming recommends. He stated that as far as he was concerned, due to the low rpm nature of the engine, anything closer than one ounce was unneeded. He based his statement on the fact that engine balance was not a factor in any engine failures that they saw. I say the closer you want to balance an engine, the better. Oh well…

The factory installs the rods with marked cylinder numbers facing down as a uniform assembly procedure. This also put the bearing locking tangs down as well. When working in this area, review Service Instruction 1106D regarding proper identification and installation cautions for connection rod bolt nut. Service Bulletin 439A concerns inspection of the complete connecting rod, especially in regards to galling in the bearing bore and recommended repair guidelines along with repair limits. This bulletin also lists which rods can be repaired and which cannot. Service Instruction 1059 is once again mentioned as source of information regarding prelube of bearing at time of assembly.

Piston Pins

Piston pins have had a history of breakage due to a change in grinding wheel used by an outside vendor. This has since been corrected.

1st style of pin plugs were aluminum. 2nd style is a piloted type. This style is having current problems. Need to replace plug with new style of aluma-bronze material. Same style as 1st type. Need to make sure that engine has all the same type of pin plug for balance purposes.

Improper honing or wear from rings can cause steps in cylinder that will wear piston pin plugs. Material in oil sample will show "curly" shavings that reflect pin plug being scraped away be steps in cylinder.

Rings

Two different types of rings have been used, one type is a "keystone type" and the other is a full taper type. Install all compression rings with the word "top" (on ring) up. Pistons are installed with the stamped number facing forward toward the prop. This will keep the valve pockets in the proper place as there is no piston pin offset to take into account. It was pointed out that non-OEM rings are very ductile in nature and will wear quickly and loose tension. Lycoming rings are very stiff and cannot be twisted. If the rings can be twisted 180 degrees, they are non-OEM and will not make TBO.

Cylinders

Lycoming cylinders come in two basic types. Narrow deck cylinders have reinforcing plate (AKA the banana plate) and use internal hex type nuts for torquing to case. Wide deck models have regular hex nut.

Cylinders are chrome-moly forgings and are honed to a 60-degree angle. All nitrided cylinders are hone before being assembled to the head. Iron cylinders on the 235 engine are honed after being assembled to the head. If internal bore of cylinder has a black coating on it when new, do not remove it as it has been applied to the cylinder by Lycoming as a preservative and will wear out naturally. Service Instruction 1181 outlines the cylinder color coding as it applies to various types of cylinders whether steel, chrome plated, nitrided and either .010" or .020" oversize.

Cylinder Heads

As per above Service Instruction 1181, if cylinder has blue paint under cylinder head, it will be nitrided chrome moly. No paint applied indicates plain steel type of cylinder. If orange paint is found, cylinder is chrome plated. If yellow paint is found in area of spark plug, proper spark plug length is 13/16""and valve cover will have sticker "Correct Spark Plug Must Be Used". If green band of paint found on bottom of cylinder will indicate a.010" oversize bore, yellow band will indicate .020" oversize. If oversize piston/cylinder assembly is not available from Lycoming, Top of cylinder has a distinct choke (tighter at the top of the cylinder) when cold and assembled correctly.

When performing a cylinder leakdown test, keep in mind that Lycoming recommends a restrictor (id of .040" or #60 drill bit, .250 long) be placed between the regulator and the cylinder gauge. Cylinder must be hot for most accurate test. Lycoming wants all cylinders to be within 5 psi.

An auto compression gauge can be used as a secondary check, but must be used on nearly new cylinders to establish a "new" value. If a cylinder has good differential pressure but burns oil, a compression test will help test the mid cylinder area. This is because the differential test only tests the cylinder top sealing surfaces. A reading of 160 psi will indicate very good sealing, 140 psi is good and a value of 120 psi should be considered as needing further inspection for wear. My personal experience as it applies to auto engines is that you may have good compression readings but be burning oil if the oil control rings are stuck in the grooves due to past overheating of the oil. The oil then carburizes and seizes the oil control ring.

Our instructor outlined the factory assembly of cylinder and head. The cylinder head comes out of an oven and is laid into a cradle. The valve guides are then installed. Next, the valve seats are installed with a weighted mandrel. After a moment, the head is taken over to a cylinder

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that is being held in a fixture. The top threads of the cylinder are coated with an anti-seize compound. The head is placed on top of the cylinder and spun down with a weighted wrench. After a moment, the head/cylinder assembly is removed and sent along to have the valves installed. This whole process takes about 12 seconds and is done completely by hand! It is now easy to see how Lycoming can have a problem with their current engines as per Service Bulletin 540 requiring inspection for mis-matched seats and heads installed at the factory.

Intake Valve

The seating angle of the intake valve is originally 30 degrees. The valve stem is 7/16". In aerobatic engines max cylinder head temp must not exceed 500 deg. F and for maximum service life must be below 435 deg. F during high performance cruise and below 400 deg. F for economy cruise powers. Recommended range for continuous operation in all engines should be between 150-400 deg F.

Exhaust Valve

The seating angle of the exhaust valve is originally 45 degrees. The valve stem is _" . The internal portion of the valve can have either a short or long cavity that is filled with sodium for cooling purposes.

The most common problem in this area is a symptom known as "morning sickness". Symptom include:
1). During first start of the day (or anytime the engine returns to ambient temp), engine will start smooth and then runs rough without lead deposits on the spark plugs,
2). Intermittent miss at cruise or take-off, "bump" in engine power,
3). High mag drop, sometimes smooth, sometimes rough. If high and rough = ignition,
if high and smooth = possibly sticky valve,
4). If rough with carb heat = possibly sticky valve.

Causes include dirty oil, wrong oil (not aviation spec), LL100 used when 80 oct is specified (too much lead), carbon buildup, Silicon (from dirt/sand) due to bad air filter-what ever is in the air will eventually show up in the oil. Paper filters are the best-when dirty just throw away.

Too high cylinder temps, bad baffle fit or missing baffle, improper leaning-too little fuel (high temps), too much fuel (lead problem).

Lycoming has a great deal of info on this problem including Service Instruction 1200A outlining proper valve guide surface finish, Service Instruction 1425A "Suggested Maintenance Procedures to Reduce the Possibility of Valve Sticking. The inspection can be completed by putting a length of nylon rope into the cylinder, rotating the piston up to hold the valve closed with the rope, remove spring, grab valve with "fingers" tool and lower into cylinder. Then carbon can be reamed from the guide, lube guide with assembly lube and reassemble. Perform to all intake and exhaust valves.

Service Bulletin 388B illustrates the proper procedure to determine exhaust valve and guide condition with a dial indicator and how to make the special tools required. A supplement to SB 388B corrects SB 388B for time of compliance to include helicopter engines to 300 hours OR earlier if sticking is suspected, and all other engines to 400 hours OR earlier if sticking is suspected until guides can be replaced with guides made of improved material. When checking for wear/carbon, if stem play is less than .015", suspect carbon build up in guide. If more than .030" suspect wear in guide or valve. Look in area of oil drain back in head. If installed guide is high chrome material, a "C" inside of a circle will be found in this area. This guide may also have a 5-degree cutback on top of valve guide.

Service Bulletin 301B lists a complete instruction for inspecting the valves for wear. Service Letter L197A list recommendations for avoiding valve sticking.

Service Instruction 1193A lists inspections to be performed in event of a valve failure.

Springs and Seats

When installing new springs, observe that the painted coils are installed toward cylinder head. These are the closer coils of the springs.

Retainers and keepers can be of different designs. Intakes are more likely to have tapered keepers with corresponding taper in retainer. Exhaust valves may have either taper or 1'2 ring type keeper/retainers. Intakes will be 7/16" and exhaust _". Because of this it is difficult to use the incorrect parts on the wrong valves, but it is good service practice to carefully organize the parts upon dis-assembly. Also note that the exhaust may or may not be fitted with a rotor cap. This can be also called lash caps.

Service Instruction 1240C helps identify proper valve springs, lists fact that spring heat treatment has changed and lists paint color codes and physical dimensions of springs for various applications.

Rockers

Exhaust has a hole for pressure lubing valve stem and rocker bushing. These rockers can also be used on the intake valve.

Dry Valve Clearance

On hydraulic models, a dry valve clearance must be performed when the valve train is re-assembled. Different pushrods are used to adjust this clearance. Because of this fact, it is crucial that when performing service on the valve train on an assembled engine i.e. carbon removal, the parts must be kept in their original position.

To adjust the valves, the hydraulic tappet must be removed, disassembled and completely cleaned. Only perform this on one valve at a time as the tappets are fitted assemblies. Reassemble tappet and collapse tappet by using a piece of safety wire inserted inside tappet to bleed air. Install tappet, push rod, and rocker. While holding tappet in

Continued from previous page

collapsed condition, measure clearance between rocker and valve stem. This value should be .028" to .080". (.040" to .105" on the 541 engine. The –76 style engine uses shims under the rocker fulcrum). If not, correct by replacing with pushrods with different length pushrod. A Lycoming parts manual is valuable in finding the correct pushrod. Service Instruction 1060H lists pushrod part numbers and lengths for each Lycoming engine. If the valve clearance cannot be correctly adjusted with any pushrod, valve must be replaced. Do not grind additional material off the stem or sink the valve in the seat.

There are heavy wall pushrods available on the 541 engines that can be used on engines fitted with standard wall pushrods, but standard wall can not be used on the 541 engines.

Service Bulletin 238 warns of the use of magnets to remove hydraulic tappets or the use of magnetic inspection of tappets. Either of these procedures may magnetize the tappet, leading to possible clogging of small passages and failure of tappets ability to adjust valve clearance. Tappets found in this condition cannot be fully de-magnetized and must be replaced.

NOTE: This article will be continued in Volume 24

For Sale: Chevy V-6 4.3 aluminum Block and Heads

Block is 4"bore, 2 piece rear main seal, wet sump, and 78 lbs. compared to Iron at 160 lbs, never been used. V-6 aluminum heads are small port, large valve 2.02 &1.6, part #14044802. great for high torque at low RPM. $2400 Call Bill at (248)366-7951 or E-mail at majomlry@aol . West Bloomfield, Mi.

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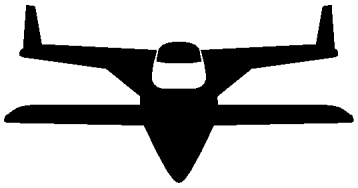

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For Sale Terra Audio Panel

- Terra Audio Panel TMA-340D $250 Have manuals, harness and cage. Recently bench checked at my local avionics shop and found in good working order.

Contact Rick Lavoie, St Augustine FL daytime: 904-461-6912 or e-mail: lavoie@aug.com

For Sale: Monitor & Beacon

RMI Micro Monitor $900
I built this planning on a Diesel and now I have a Lycoming. So I'm going to trade up to a scanning engine monitor. This unit is completely assembled and the preliminary testing is done. It went back to RMI for a bench test and RMI complimented the workmanship.

Bendix King KR-22 Marker Beacon receiver $450. New I adding an audio panel that will have a built in marker beacon, so this one is available.

Contact Bob Trent
Home phone 517-839-0491
E-Mail Bobtrent@aol.com

For Sale; IO-360, 200 HP

Angled valve model. 200 SMOH. Engine removed from crashed Velocity. Lycoming Dealer disassembled, inspected and reassembled engine, completed with blue and chrome finish. Accessories: Lt Wt Starter, Magnetos (2) w/harness, Vacuum Pp, Alternator (Cooling fins are bent but can be fixed) - all low time.
$15,500.00, call Lynn Swann or Bill Borgardt at (909) 592-2700 or email:
bill@borgardt.com Pictures of the engine available upon request.

Also, several Velocity accessories for sale: Propellor extension, Exhaust stacks, Baffling, Spinner, etc.

Congratulations

After only one insertion of my FOR SALE ad in VV, I found a buyer, and my Velocity kit was picked up by its new owners last Sunday. Thanks very much for publishing my ad. The exposure was apparently just right.

CONGRATULATIONS to Dan Fast and Joy Baker of Whitefish, Montana, the new owners of my Velocity Elite RG dream-in-progress! (#DMO-202) I'm very pleased that my "baby" was adopted by great people like Dan and Joy, and wish for them an exciting adventure and successful completion of their new dream. Make it happen! - Gary Clark, Sheridan, Oregon

Notice

Zip Code Change

Velocity View's Postal Zip Code has changed from 32084 to **32080**

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MARKETPLACE

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Factory Information

Velocity Inc.
Factory & Home Office:

200 W Airport Rd
Sebastian FL 32958 USA
Ph: 561-589-1860
Builders Hot Line:
561-589-0309
Fax: 561-589-1893

Builders HOT LINE

Please remember that on weekends, and after hours, we do not answer the 561-589-1860 phone number. Our unlisted builders hot line is 561-589-0309 and if we are here, this is the only number we will answer.

Internet web site:
http://www.velocityaircraft.com

E-mail addresses:

DuaneS@velocityaircraft.com
ScottS@velocityaircraft.com
MarkM@velocityaircraft.com
BonnieS@velocityaircraft.com
NancyM@velocityaircraft.com
BrendanO@velocityaircraft.com
DarenJ@velocityaircraft.com
MikeS@velocityaircraft.com

- Builder assistance: Scott or Mark
- Sales Qs: Duane or Nancy
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- Order parts: Daren
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Velocity Views
is published Quarterly by:
Lavoie Graphics
26 Marshview Dr
St. Augustine, FL 32080-5873
Rick Lavoie,Editor
904-461-3146 (fax)
e-mail: rick@lavoiegraphics.com

Velocity Views newsletter is published by Rick Lavoie / Lavoie Graphics as an agent for Velocity Inc. (the factory). Prior to printing, the factory reviews each volume published for accuracy.

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