OSHKOSH 1982 and related ramblings and hints...

Both Adventures made it to Oshkosh this year. Johnny Murphy and Paul Charles' Adventure (first plans built Adventure) made it up from Florida, arriving in Fond Du Lac on Sunday and on up to Oshkosh on Tuesday morning. The plane was flown up by Steve Wood and he had good things to say about the handling characteristics. The engine installation was plagued by some cooling difficulties precluding running at normal cruise settings. Prior to returning to Florida they plugged some of the leaks and I understand this helped their problem. The prototype Adventure has an O-200 installed with the same inlet and outlet that the A-80 had. It's my opinion that the inlet and outlet areas are adequate. It's the baffling, cowl/spinner, and cowl/fuselage leaks where problems arise. We literally glued the cowling to the fuselage on N36ME for this year's Oshkosh 500 and the cylinder head temps ran nearly 20°F cooler than normal. The O-200 has an oil cooler installed and that took care of the oil temperature problem we had last year. On the Adventure updraft cooling system you have to remember that nearly the whole cowl is pressurized. This makes the cowl want to lift away from the fuselage and makes the air seal around the spinner more critical. Paul and John installed a baffle on the front of the engine to block the cold air from reaching the spinner area. That's a good idea. The baffle needs to be sealed completely or else the air just goes around the sides. The Varieze has a similar type of cooling philosophy and has similar problem areas. You builders might pick up some hints by looking at some of the Variezes. Most Variezes are not particularly good examples but look anyway so you can avoid doing it wrong. Remember -- every leak has a big influence.

This year's trip to Oshkosh was probably the most enjoyable flight I've made in the Adventure. I had planned on cruising at 9500' but the wind was about 60° off the nose there. At higher altitudes the wind was about 15 knots at 90° to the course so at the last moment I decided to climb to 11,500'. I had set up my checkpoints based on the lower altitude and figured I should average 164 mph from takeoff to the first checkpoint, just 60 miles away. Lo and behold I made exactly 164 mph from throttle application to this checkpoint - and I had climbed 10,000' AGL in the process. I had estimated 200 mph for the next checkpoint (65% cruise at 9500'). Lo and behold I hit exactly 200 mph at 11,500' at 60%. Later on in the flight my speed picked up to 206 mph ground speed and I made the trip, 610 statute miles, in 3 hours and 5 minutes, nonstop, and used 15 gal. of gas. Boy -- how I'd like to run the Oshkosh 500 race at 12,000' of altitude.

The Oshkosh 500 was run in rather poor weather this year. That's good and that's bad. I'll explain.

The prototype Adventure does not have as much basic fuel capacity as shown on the plans so there is a third, auxiliary, tank on the fuselage floor behind the seat. I never use this tank except on the trip to Oshkosh and during the Oshkosh 500 race. The tank was filled just prior to departure for Oshkosh and was used during the trip. On Sunday afternoon the plane was weighed and fueled in preparation for Monday's race. On Monday, just as a last minute check to see that I hadn't left anything on board prior to final weighing and impoundment, I looked behind the seat. Gasoline was everywhere. I could actually submerge my hand in the stuff. We removed the inspection plate from the

rear of the fuselage and a great deal drained onto the pavement. Panic ensued with the race less than an hour from starting. We decided to go ahead and weigh the plane, have it impounded, and make a last minute check before boarding. If there was any evidence of gasoline in the tailcone we'd scratch the race for this year. When I checked, it was wet and I decided it would not be prudent to blow myself to _ _ _ _ by turning on an electric fuel pump half submerged in gasoline sloshing around inside the tailcone. So we pulled out of the race just as the planes were being pushed to the runway. We decided to drain the auxiliary tank immediately since gasoline does bad things to styrofoam airplanes. This we did, even as the race was to begin - but here's where the "good" bad weather came in. It was IFR and Oshkosh would not allow 200+ mph, no radio, special VFR traffic to disrupt their already confused IFR departures. The race was postponed until noon. Now we had a reprieve. The leak was in the windshield washer type pump that was used to transfer the fuel to the main tank. Wayne Lawrence suggested that we saw off the pump (it was Pro-sealed into the tank) and tap the nylon housing for a standard pipe fitting. Johnny Murphy suggested we pressurize the tank and literally blow the fuel into the main tank. So Wayne Lawrence, Bill Parker, Sharon Mead and myself jumped in Bill's car and proceeded to try to find materials for the conversion. We ended up with Bondo, a large red tire pump and a brass fitting. Time was really short now and it looked like I was mostly in the way. Wayne is an old friend of mine from the days when we raced model planes. He's been known to rebuild planes between heats. Knowing that, I figured it'd be better if I got lost. To make the story short- the Bondo was still wet when we pushed the plane onto the scales to load gas. Bondo sets in less than 5 minutes so you can see we didn't make it with time to spare.

The start of the race was almost anti climactic except I forgot to tell anybody that I planned on accelerating in ground effect after clearing the string. So all Sharon Mead saw was the airplane suddenly nosing over and disappearing behind the crowd. Sorry about that.

Part of the race preparation included removing the carb air box to run with a "bare" carburetor. This is good for .3" of manifold pressure at a given rpm. Good idea - but here's where the "bad" bad weather came in. The race was run in low ceilings and visibilities, a prime ice condition. Sure enough I picked up carb ice on the first lap. There's not much you can do without carb heat. Fortunately this condition did not worsen and I really didn't notice anything from the 2nd to the 6th lap.

My plan was to run the front tank low, then empty the back tank and finally pressurize the auxiliary tank with my big red tire pump. This would give the Bondo sealant a little cure time. A fine plan. On the next to last lap I put a few strokes on the big red tire pump and watched with satisfaction as the fuel filled the transfer line and presumably went into the main tanks. But what's this?? The fuel quantity guage on the front tank continued to decline. Now it doesn't take much education to figure out that I wasn't transfering as fast as the engine was burning. Now I had a problem - there was not nearly enough gas in the front tank to finish the race and have an adequate reserve yet I didn't want to over pressure the auxiliary tank and risk blowing a seam. I watched, pumped, watched, pumped and tried to figure out who would finish first, the gas or the plane. The plane won.

So there you have it. I had more fun than I've had in years.

There's a $1,000 prize for innovation in the Oshkosh 500. Our big red tire pump didn't even get honorable mention. I'm going to have to talk to Nick Jones about that.

The Adventure placed 4th in the Lowers at 189.7 mph, 6th in the Baker at 203.3 mph, and 5th in the Falck with a 191 mph fastest lap. The Baker results are within 1 mph of my prerace estimate. The Baker is the only real indicator of improvement, since for the stock O-200 all speeds from 185 to 205 in the Lowers result in only a 1 mph change in the Baker. The Adventure improved by 2.9 mph in the Baker over last year. About 1.5 mph was due to a pillow and an oil catch can. The pillow was weighed as permanent equipment and was used to absorb body sweat. Therefore the increased weight of the pillow subtracted from the fuel burn. The oil catch can caught the condensate and oil from the breather and stored it until I drained it later. These devices are legal but obviously not real performance improvements. The new tailwheel fairing was probably worth 1.4 mph.

The rest of the flyin was typical Oshkosh - great. Next year we'll try to park away from those blasted public address speakers so we can hear ourselves think.

The first half of the trip home was not such good weather - I got caught in Iowa City by low visibilities and had a wonderful stay with Tom Kennedy and his wife. The next day was nice and after flying with Jim Miller (Taylor Titch) to Ottumwa to check the weather I came on home. The Adventure averaged only 198 mph from Ottumwa to Newton, including the climb to 10,500'.

Come on builders - you can't believe what fun it is to go out and out run all the "fast" store boughts and homebuilts and then fuel up on a couple of gallons of $1.20/gallon Quick Trip auto gas.

CAFE 400...

In case anyone is curious as to why we don't enter the CAFE 400, I'll explain it briefly. The CAFE 400 is best run at low speeds and places extreme emphasis on number of seats (payload). I figure the best result for the Adventure would mean running at 30% power and the engine would be terribly inefficient at that setting. The best the Adventure could have finished was about 19th out of 47 this year. The CAFE 400 is certainly not a race and efficiency means different things to different people. To me efficiency means going as fast as possible on an acceptable amount of gas, say five gallons per hour. Since most four place airplanes are flown solo I would argue with formulas that give them four times the score of a single place airplane. So the CAFE 400 formula is not the Adventure's "bag" and it would be difficult to justify a trip to California for the contest.

PLANS CHANGES...

When we got ready to return the plane from Fond Du Lac to Oshkosh I put several gallons in both the main tank and the aft tank. I left the fuel transfer valve open since the aft tank had more gas and I wanted to move some of it forward. On takeoff the engine coughed at about 20 to 30 feet of altitude. I immediately pushed over and was able to land with ample room to spare on

the remaining runway. Thank goodness for a good wing. The problem is the decrease in line pressure caused by fuel movement in and toward the aft tank due to the very rapid acceleration of the Adventure. If the valve would have been OFF there would have been plenty of gas in the front tank for a safe takeoff. So put this in your plane:

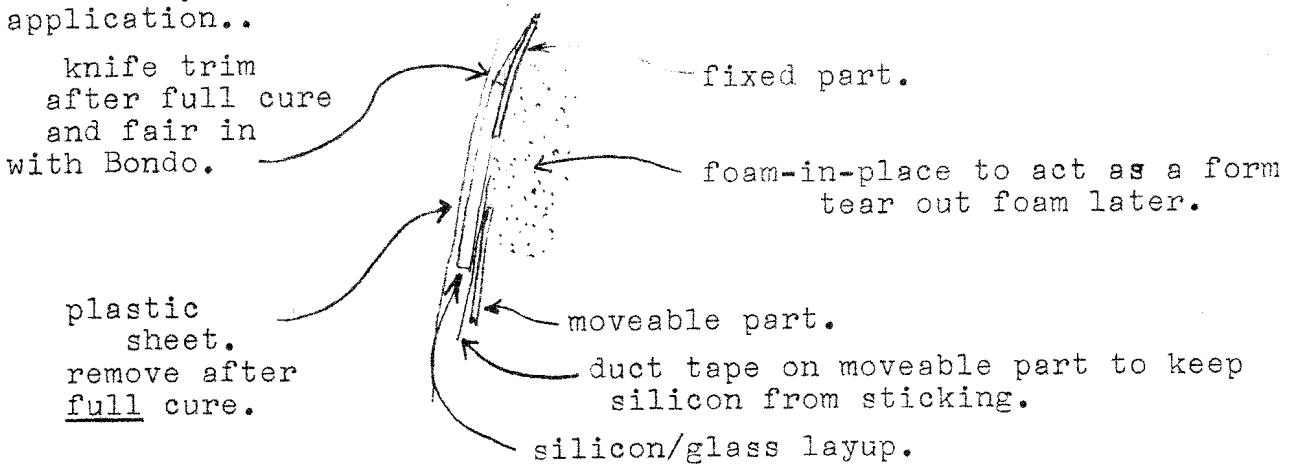
NO TAKEOFF WITH TRANSFER VALVE ON .

Make sure you also mark a "NO TAKEOFF" line on your fuel guage based on the quantity of gas necessary to produce 10 gal./hr. flow at the carburetor in climb attitude (20° nose up).

HELPFUL HINTS...

The tailwheel fairing on the prototype uses a silicon seal/fiberglass fairing idea that some of you might use. The geometry of the tailwheel spring results in an aft-upward movement under load. A silicon impregnated fiberglass fairing allows movement diring swiveling and flexing but flops back in place when the tailwheel is centered and there is no load.

The silicon fairing is made by smearing silicon seal on a piece of sheet plastic like Saran Wrap, then placing a layer of BID on the silicon and squeeging the cloth to bring the silicon up through the cloth. Apply more silicon, another layer of BID and more silicon. Each time use a squeegee to smooth an spread the silicon out. Now pick up the plastic and smooth it in place on the fairing and form (silicon side down so it'll stick). When it has fully cured you can peel off the plastic and you'll have a reasonably smooth surface. Here's a cross section of a typical application..

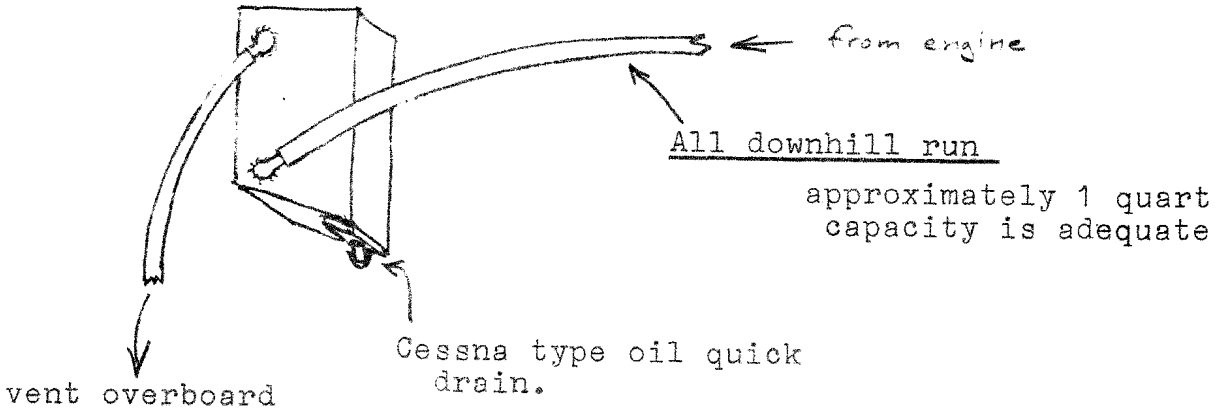


You might use this technique to build baffling seals that really fit the engine cowl.

The Adventure originally had a home made oil separator installed. I don't know how George's old A-80 did regarding blow by oil but the O-200 put a real mess on the bottom of the plane with this separator installed. We tried a couple of iterations of vent location and orientation with no success. Later I removed the separator and installed a separator better designed around the principal of centrifugal separation. It didn't work either. I've had personal experience with 3 different oil separator schemes and they had one feature in common. They didn't work. After

seeing the residue that collects in these things I don't think I really want them to work anyway. The primary output of the oil separator is <u>water</u>. Apparently the separator does a good job of condensing the water vapor from the oil breather. This water is corrosive and will become rusty water if the oil separator is made out of steel. The liquid that is returned to the pump is mostly undesirable.

There are three ways to solve the problem of oil on the belly of a plane. The first is to overhaul the engine and keep it in topnotch condition. This is a highly respected and desirable goal which I'll ignore for the sake of discussion. The second solution is to run the breather tube out the tail of the plane or down a gear leg. This is referred to as the "relief tube" approach. If you can imagine the potential problems caused by a plugged relief tube you can also imagine the problems caused by a plugged oil breather line. The third solution is an oil catch can. This device is designed to collect and retain the condensate. You must drain the catch can after each flight just like you drain the fuel sumps. The can should be made out of aluminum or fiberglass to keep it from disintegrating due to rust. Here's a sketch of the oil catch can...



Fill the can with aluminum scouring pads or Explosafe or other material that will breakup the air flow without creating backpressure. A removable lid on the top of the can is desirable.

PLANS CHANGES/COMMENTS...

Builder David Kelm points out that page 5 of the plans shows the position of the wing templates on the foam block and does not show what direction the face of the block "slants". The top of the airfoil slopes toward the foam block. The top of the outboard airfoil slopes away from the foam blocks. The idea is to compensate for the 4° dihedral angle with all templates parallel to each other. David also found that duplicating the templates resulted in a 3% size discrepancy. He didn't realize that's why George printed <u>two</u> of each template, so that you could use one and leave the plans set intact.

SHORT FIELD PERFORMANCE...

I've always maintained that 2500 feet of hard surface was required for the Adventure. It really bugs me that the Q2 lists a 750 foot ground roll and the Glassair lists a 700 foot ground roll and the Varieze, and Longeze, and Midget Mustangs and Cassutts,

ad infinitum all supposedly land in under 1000 feet. Hogwash.. Peter Garrison in his article in Flying magazine says he never once stopped in under 3000 feet in the Q2. The others are equally as guilty of misleading numbers. The Adventure, even at the higher wing loading that it has, can land shorter than most of the high performance homebuilts. The reason that the Adventure is able to do this is the extremely effective slotted flap. The flap raises the airplane lift coefficient about 46%. This makes the landing speed the same as if the plane had about a 13.5 lb/ft^2 wing loading. The Varieze has a 17 lb/ft^2 loading at gross, the Longeze has about 14 lb/ft^2, the Cassutts have about 14 lb/ft^2, the Glassair has about 18 lb/ft^2. Now some of these planes have small flaps, others have no flaps, and still others have relatively inefficient flaps. The point I'm trying to make is that they all have nearly the same touchdown and approach speeds.

The best shortfield technique for the Adventure is over the fence at 75 to 80, power off. Wheel it on and start raising the flaps, applying brakes, and using the elevators simultaneously. As the flaps are gently raised the tail comes down. Counter this with brakes and elevator to keep it up on the wheels. When the flaps are all the way up play the brakes against the elevator. This technique gives maximum braking and is the best way to get stopped quickly.

With this technique it is possible to get into a 2000 foot strip. I'd guess the ground roll to be about 1000 to 1200 feet.

Takeoffs are no problem. The ground roll on a full gross, no wind takeoff is under 1000 feet. If you can get in - you can get out.

The airplane is being brought in this winter for modifications and maintenance. We'll be back in the air next spring if everything works out O.K. Should be able to cruise at 250 mph on about 6.5 gph...!

PLANS CHANGE...

There's a typo error on page 22 that says to cut a 0° UNI piece of 35" length for one wing skin. The 0° UNI ply goes <u>full</u> span and should be 112" in length.