

PAZMANY NEWSLETTER
NUMBER 77
SUMMER, 1986
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Rates: \$1.00/Issue
(\$1.50 overseas)
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JUST ABOUT THE TIME you thought you'd never see another newsletter, here it is. They may never be on time, but one thing you must admit: I always have a fresh excuse. This time I was going to hold off even longer, pending a new address to report to you for your editor - but house buying, as in aircraft construction and newsletter writing, always takes longer than you thought it would. Anne and I have started the inevitable paperwork jungle growing toward the purchase of another home, and I was hoping that by the time this newsletter was due, I would have a new address to report to all of you. But even though we seem to have sorted out the worst of the snags, nothing has been finalized yet, so I hesitate to report the new address to you PLers out there just yet. If all comes out as hoped, we'll be making a move to a place just north of town - well, since we still aren't positive it will all work out, I hesitate to say any more. But I'll throw in one hint: Anyone out there want to engineer float fittings for a PL-2? In any case, whether we make the move or not, your mail to me will still get through at the address at 656 Grand, fear not. I'll give you a further update next newsletter.

Meanwhile, onward to PL news. As usual, I have a stack of 3+ months of news and correspondence to relay to you, not necessarily in any particular order. I was happy to see a couple of you during the EAA Convention. Always seems there's never enough time to really get together during Convention, what with my working for EAA and you folks trying to see everything there is to see. But CECIL MICK of Paducah, KY and D.J. SCHNEIDER of Ishpeming, MI stopped by to say hello. By the way, D.J: I've been working for EAA for three years now, and I still don't get to drive around in one of those snazzy little cutoff VWs. How do you rate? Seriously, folks, D.J. earned the right to run around in an EAA vehicle: He worked as security on the grounds out there for the week. I'll tell you, it was most reassuring to know that our PLs were being guarded by a fellow PL enthusiast.

PAZ was there also, and was probably even busier than the rest of us, what with his forums on landing gear design. I sneaked a peak at Vol. I when it arrived at EAA HQ, and I'll tell you, it is comprehensive. It could have been titled *EVERYTHING YOU ALWAYS WANTED TO KNOW ABOUT LANDING GEAR BUT DIDN'T KNOW ENOUGH TO ASK*. I'm looking forward to ordering my own copy - once we figure out what our return address will be. Paz also reports that we have yet another PL flying - JIM LACINA of Chicago recently completed his PL-1 and brought it to OSH for Convention. "Beautiful", according to Paz. But I hardly ever got out of the EAA Museum during daylight, so I didn't get onto the field at all this year. How about a report on PL-1s and -2s in attendance from some of you out there for the next newsletter?

Dear Paz,

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Sorry about not getting a couple pages in here in your new book + other items - out of room this time. Looks like next issue might be an "advertising special," with your items, Pete K's gear Fairings, etc. Seems 22¢ is marginal on 6 sheets, so I cut back to 5 to make things go farther - I'm sure you know all about postage costs!! - Jack M.

And I have a note to myself that there is yet another completed PL-1 out there, from the shop of **BILL RAKSANYI** of 7510 McCook Ave., Hammond, IN 46423 - if any of you are in the area. Neither Bill nor Jim Lacina are on my newsletter list, however, so this is all the info I have, second hand. This has been a real banner year for PL-1's, what with the two noted above and also subscriber **BOB BRADLEY's** aircraft. Sure would be nice to fill up our own row with PL-1's and -2's at Oshkosh someday!

A couple more items on the agenda here, and then we'll get down to business with some tech. stuff, as promised last issue. For those of you who wish to keep your list of fellow newsletter subscribers updated as published in the last newsletter, I have a couple of new names and addresses for you to add: **PHILIP MORRIS**, Morris Aviation Ltd., PO Box 718 (Statesboro Airport), Statesboro, GA 30458. Phil is president of Morris Aviation and new owner of PL-1 serial #302, N319HS - originally built by Harold Sponaugle, an early PL newsletter editor. Also **DONALD R. SWENSON**, 1681 W. Belleview, Porterville, CA 93527. I have no info on Don's aircraft or project. Nice to have a couple new subscribers for a veteran aircraft newsletter!

Speaking of the newsletter, one of our fellow PL enthusiasts, **BOB CONKLIN**, called recently (OK, so it was way back in April, according to my notes) and among other things mentioned that when he received his newsletter # 75 he found TWO page 6's and NO page 5. I meant to mention this in the last newsletter and neglected to - but did anyone else have a problem with any of the newsletters? If so, let me know, and I'll correct it. Generally, the place that duplicates the newsletter for me also collates and staples them, so all I have to do is pick up the finished product. (An exception was the last issue, #76, in which I inserted a couple extras, like the calendar picture.) Anyway, I looked through the few extras I always allow for after mailing, and I found no other problems. I hope it was a one time glitch from the printer, but as I say, if there are problems, please just drop me a card/letter/phone call and I'll correct it if possible. There are some things that I can't do much about, like the way some pictures come out when reproduced inexpensively. They try to adjust the density of the copies, but it doesn't always work out that well. Bob also had another comment, which I'll get to in just a bit in the tech section; but one more comment I wish to make for you overseas subscribers: Seems that every time I go to the post office to mail the newsletters, I find there is some additional restriction I have to put up with. Seems that for overseas mail, all letters & etc. must be sealed all the way around. That's why a couple issues ago you had to struggle with about a foot and a half (pardon me; for you folks, let's call it 45 centimeters) of tape all around the edge of your newsletter. At any rate, from here on out, you'll be receiving them in standard envelopes, which should prove a bit easier to open. For the rest of you on the North American continent, I'm still getting away with a couple small pieces of tape to seal your newsletters, which also helps to keep costs down - until they change the rules again.

But I mentioned above that Bob Conklin had another thought for me which I'll bring up now, under the heading of -

TECHNICAL SECTION

Bob's other question/comment was that from time to time when seeing another PL-2, he has occasionally noticed a problem with "oil canning" or slight ripples in the rear fuselage sides. This problem hits close to home with me, since I have exactly this problem in my N75PL. On my own aircraft, it is worst in the bay immediately behind the baggage compartment, with some ripples showing in the next bay back also. It seems to be a problem of a relatively wide radius of curvature on the skins in those locations (almost flat), along with a minimum thickness of skin to save weight - which is as it should be. Some builders seem to be able to get away with no problems in this area, while others run into problems. I suspect that a lot of it is luck in how the tolerances stack up when assembling the fuselage, and also I've noticed on my own fuselage (N75PL's, that is) that the wrinkles seem to vary somewhat in severity and location depending on the temperature (come to think of it, that applies to my fuselage, also). I tried to come up with a cure for this problem a few years ago, by installing some additional light stringers inside the fuselage in the area of the wrinkles, but the improvement was only marginal at best. I did not rivet through the skin; I merely riveted the additional stringers at each end to the appropriate fuselage formers and worked some padding between the stringer and the inside of the skin to apply pressure to the skin to keep it bowed out. As I say, this was not one of my more successful ideas. The only other idea I've heard for correcting the problem came from another aircraft builder, who suggested using a leather mallet and/or padded object and lightly but continually tapping around the perimeter of the appropriate panel from the inside to install a slightly greater convex shape - even a slight compound curve - to the outside. I haven't tried this yet, but it seems that it should work, even with 2024 T3 since there would need to be only a very slight reforming of the panel. Anyone else have any thoughts on this problem? This is about all some of us need to do with our PLs to transform them into perfect aircraft.

I don't know how many of you receive EAA's Technical Counselor News, but I found a couple tips from the April/May '86 issue which I thought might be helpful to you: First of all, a tip from Anders Ljungberg of Sweden (who, back in 1960, flew EAA's Pober Sport on a 48 state tour of the USA) mentioned a nifty way of checking your aircraft tachometer accuracy. I can verify that this really works, because some years ago when N75PL was parked outside instead of in a hangar, I recall running it up in place one night. If you have some sort of light source other than incandescent - something which registers the standard 60 cycle (Hz.) AC current (as used here in the US, anyway) like mercury vapor, fluorescent, etc. - then this will work. Just aim the airplane so that you are looking through the propeller arc at the light source (it will also work fine with the light source behind the aircraft, reflecting off the back of the prop) and run the engine. Since the light source is operating on 60 Hz., it will be "flickering" (much too fast for the eye to see, of course) at 3600 cycles per minute. (Again, these are the stan-

dards here in the US; you overseas folks operating on 50 Hz. or whatever will have some different numbers to contend with. But the principle remains the same, of course.) Now, I can imagine what you're all thinking: No, you don't have to run your engine up to 3600 RPM to use this principle. All that is necessary is some fraction of the basic 3600 to give you a "harmonic" number of some sort - like 1800 RPM, 900 RPM, maybe even 2700 for those of you with variable pitch props who can get that kind of RPM on static runup. Once you hit the proper RPM, the prop will appear to be stopped in front of you (or in back, if you're modifying your PL to a pusher configuration.) Glance at the tach to see how you're doing so far as tach accuracy goes. It's as simple as that! I found that my tach seems to be pretty accurate (or was at the time, at least; they can drift off of accurate readings over a period of time, whether mechanical or electric), except down toward idle. My engine always seemed to idle a little roughly, and after trying this, I found out why: An indicated 800 - 900 RPM on the tach is actually only about 550 - 600 RPM! The error seemed to disappear above around 1200 RPM, though. Give this a try sometime when you're out around dusk or dawn; it really works slick.

Another, from our own favorite designer, is a tip on the use of foam materials in fuel tanks. Paz heard from another home-builder that the open cell foam material he used in the PL-4 prototype (probably Safoam, but at this time it's unclear) **DISINTEGRATES IN WATER**. The problem is that if you happen to get a small amount of water in your tank(s) with this material, which is used to prevent hazardous fuel spray in the case of an accident and ruptured fuel tank, the plastic foam will disintegrate and clog the filters and/or lines! Great stuff, so long as you can keep all water out of it - which as we all know is impossible. In the note I have, as reprinted in the local EAA chapter newsletter, Paz was unsure of the exact material, except that it was an open cell plastic foam material, and that it was orange in color. Don't confuse this with Explosafe, which is, as I understand, more like a metal mesh material. I've had experience with a material like this in small fuel tanks (operating some of EAA's obstinate weed trimmers), and on a few occasions have had a leaky carb/overprime/etc. start a fire while attempting to start the small two stroke engine. I've had these fires actually ignite the fuel in the tank, whereupon I have attempted to set a new world record for the 50 yard dash. With this material in the tank, however, the gasoline in the tank does no more than burn with a small flame at the neck of the tank; it did NOT burn down into the tank at all. It behaved much like the action of a kerosene lamp with wick, alleviating the hazard normally associated with a burning fuel tank. Unfortunately, no one seemed to know exactly what this material was - I believe it was Explosafe, but I'm still not certain. It definitely was a metal mesh material of some sort, and NOT the plastic material mentioned by Paz with the water absorption problem. So if any of you are using an open foam plastic in your tanks, check it to see how it behaves with other substances than gasoline.

While you're at it, you might also check compatibility with alcohol, for those of you who are using autogas. Careful about

your autogas, since a lot of stations are adding alcohol, and this can prove hard on fuel system components. I understand that the FAA and EAA both have had some complaints about fuel system problems supposedly caused by autogas that when investigated were found to be caused by alcohol added to the fuel. Of course, those of us with experimental aircraft can use anything we want for fuel, but the EAA autogas STC for factory built aircraft requires the fuel to meet certain standards - and gasoline with alcohol additives does not meet those standards. So, how do you know? Ask the dealer, or buy from one who claims not to add alcohol. I've asked at the stations where I normally buy autogas for my PL. Actually, it seems that fewer stations are adding alcohol any more, since a lot of newer cars (particularly with injection systems) are having problems with components damaged by alcohol, so this problem may be fixing itself. I hope.

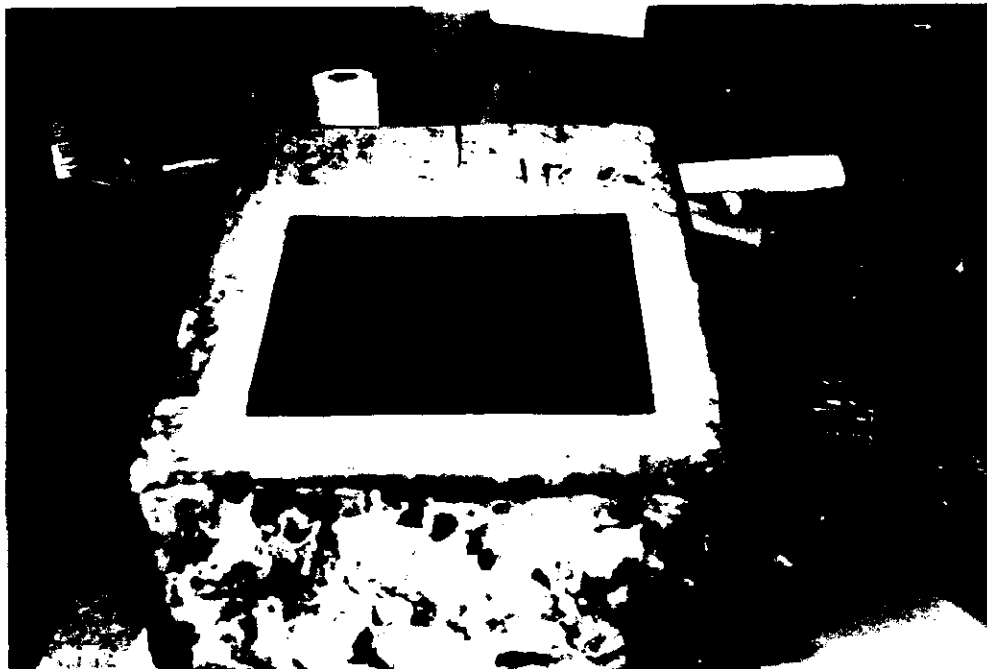
And while we're on the subject, have any of you had occasion to purchase autogas for your aircraft at an aviation FBO? I haven't heard of any problems with this, but one thing to keep in mind is that the autogas STC (SUPPLEMENTAL Type Certificate) is for those aircraft and engines with Type Certificates in the first place - in other words, factory built production aircraft. (You actually receive two STCs for autogas - one for the airframe and one for the engine.) Naturally, these folks want to keep their liability to a minimum, and often (and rightly so) will refuse to sell autogas for an aircraft and engine which do not have an autogas STC. So, here you come in your PL, taxi up to the pumps, and they refuse to sell you autogas since you have no STC. And you'll never get one either, since homebuilts are not type certificated aircraft in the first place, and you can't get one for the engine alone, since it's dependent on the aircraft's fuel system.

So, what's a PL pilot to do? Well, I contacted EAA's experts on the subject, **Harry Zeisloft** and **Dick Roemer**, and they pointed out that once an engine is installed in an aircraft it becomes an accessory of that aircraft, and therefore since a homebuilder can put pretty much whatever he wants into his fuel tanks since it's a homebuilt, the same applies to the engine also. (This engine - as - an - accessory - of - the - airframe idea is why engine operating limitations and instructions in the aircraft operating manual / pilots operating handbook / airplane flight manual always take precedence over instructions or limitations established by the engine manufacturer.) So if you ever run across a problem like this, now you know the answer. And if you want the word straight from the Feds themselves, contact **Mr. Ron Wojnar** of the Chicago Engineering and Manufacturing District Office (just use "EMDO"), 2300 E. DeVon Ave., Des Plaines, IL 60018. He'll tell you essentially the same thing. And don't worry about an additional flight test period if you want to use autogas. The word from the Feds now is that if the engine is one which is approved in some factory built aircraft for the autogas STC, then no additional flight test period is required for using autogas in this engine in a homebuilt - and that's almost every 80 octane engine out there.

One more point, while we're on the subject: Some of you might find it advantageous to install a new data plate on your

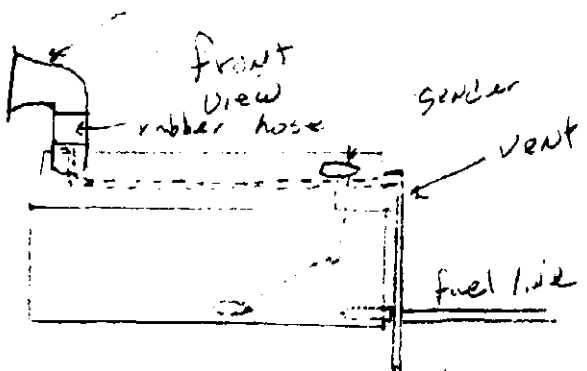
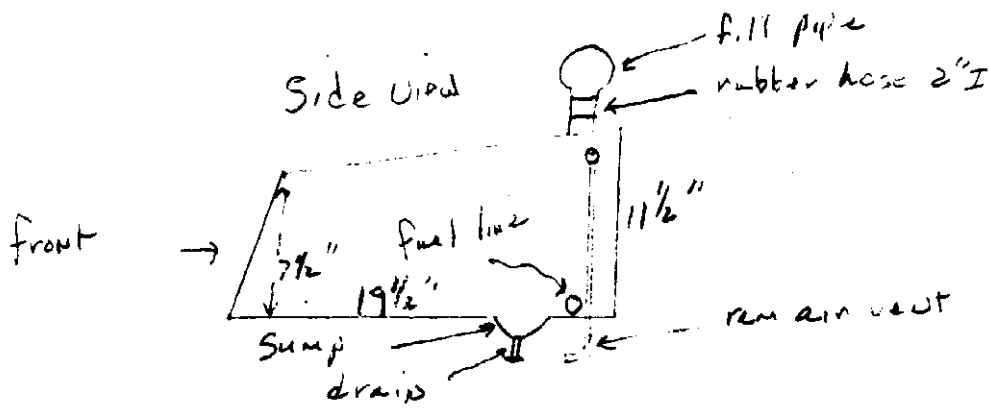
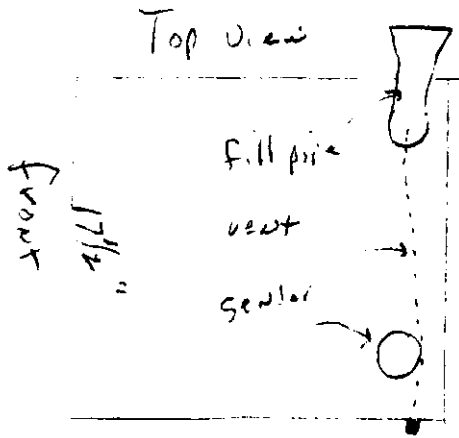
engine and change the paperwork to reflect this, especially if you've modified the engine in any way - say, installed a key start system on your Continental O-200 with the original mechanical solenoid engagement, for example, or modified a Lycoming O-290G to D specs, maybe. This way you no longer have to worry about ADs, since the Feds will have no ADs in the system for your "Stovebolt Special #1" or whatever you choose to call it. However, they may have plenty of ADs on Lycoming O-290Ds, Continental O-200s, etc. that a mechanic would want to see complied with before signing off the annual. For many of you this is academic, since you can perform your own annuals if you built the airplane. But for those of us who purchased our FLs already completed this might be important - and for all of us it could be important insurance-wise: You may not be covered if you don't comply with all applicable ADs on that engine. If there are no ADs on your Stovebolt Special (remember, it's not a Lycontinental any more), no problem. I think I'd still try to keep up with such things, though, just to see if there might be applicable problems I might want to take care of. But at least you wouldn't have to worry about any legally binding expensive problems any more.

Anyway, getting back to the idea of materials to keep fuel from spraying in the case of tank ruptures, that's one of the reasons Paz put those tanks out on the wingtips on the FL-1 and -2: To keep the fuel away from the people, hot engine exhaust, etc. in case of an accident. For those of you who plan on adding an aux. tank in the fuselage, a material like Explosafe might not be a bad idea in that tank. Personally, though, I wouldn't bother with it in the tip tanks, although it takes practically no tank capacity and weighs next to nothing. This is just my own opinion, but I really don't see much need for such a material way out there in the wingtips away from the cockpit. In fact, we have just such a design for an aux. tank under the baggage compartment floor, as submitted by your fellow subscriber and builder, LEIGH BLAKE. See below:



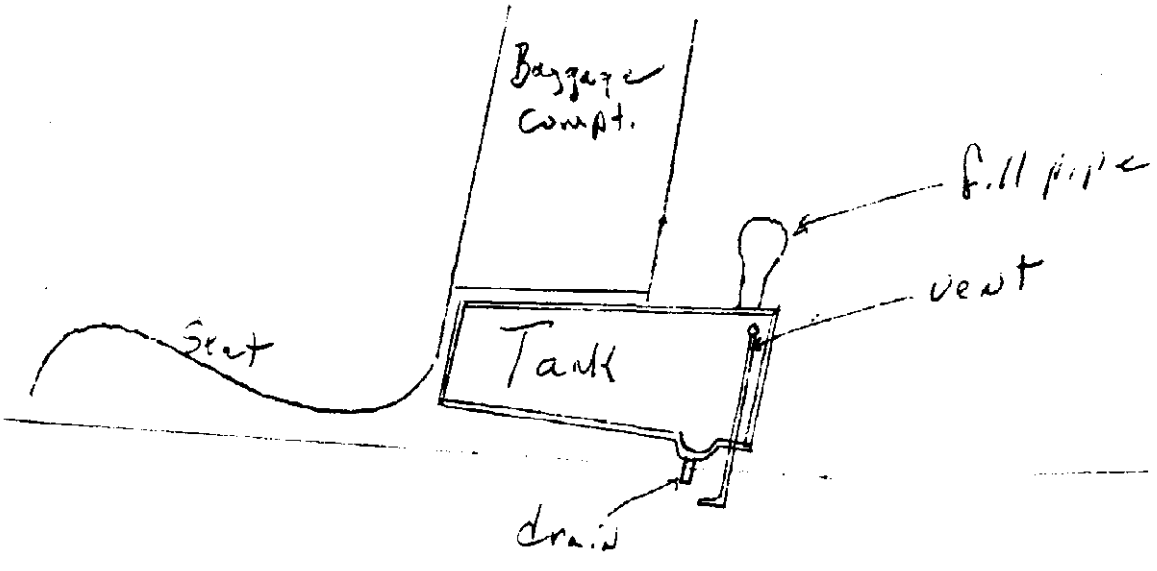
PL 2 Auxiliary Gas Tank

(Capacity \approx 13 gal.)



Note - there was not enough room to take fuel out bottom

Not to scale



Leigh Blake

Rather than making such a tank from fiberglass, I think it might be easier to fabricate it from aluminum, myself. At least, here in Oshkosh that might work out, since INAV (used to be Monnett Aircraft) advertises that they do custom aluminum welding of such projects. No, I don't know how much it would cost to weld one up. After finding out, I might opt for the fiberglass tank instead.

So, what's this do to weight and balance in your PL? Well, I'm glad you asked, since I've wanted to work in a neat little way of working weight and balance into the newsletter for a while now. I picked up this little never fail equation at a weekend ground school for my ATP a few years ago, and it's served me well on several occasions since:

$$\frac{d}{D} = \frac{w}{W}$$

Where d = amount (distance) of CG change, D = arm from weight added / subtracted / moved to current CG, w = weight added or subtracted, and W = new total weight of aircraft. Those of you who subscribe to EAA's *Light Plane World* might recall an equation from the January '86 issue which looked startlingly familiar:

$$x = \frac{S \times D}{W}$$

Where *LPW* used x for distance of CG change I used d , and where they used S for weight change I used w . If you change the letters accordingly and manipulate the equation a bit, it comes out the same, an exercise, as they always used to say in my math textbooks, left to the reader. The neat thing about my equation is that it's so easy to remember: Little d is the shortest distance (the arm change), big D is the longer distance (from current CG to location of weight change), little w is the smaller weight - the amount of the weight change, and big W is the larger weight - the new total weight.

Let's see what happens with Leigh Blake's aux. fuel tank. First we have to make a few assumptions (relax, they're not nearly as bad as some of the ones the government makes about the economy, for example). All I mean is that not knowing what our pilot and passenger weights are, I'll use the standard FAA 170 lbs. for each, and I'll use the empty weight and arm for my own N75PL, since I don't know those of Leigh's airplane. I'll also assume the baggage comp. is full (40#) and that the tip tanks are also full - let's call it 25 gal. fuel, since that's what most of you have for capacity, although mine is 30 gal. total for the tips. I'm not going to detail the calculations to this point, since I assume everyone can do a standard weight and balance. Let's just use the final figures resulting from the above assumptions, and then add the aux. tank, and maybe play with some other weight shifts and see what happens. anyway, the result of the above assumptions on N75PL works out to a weight of 1422 lbs. (including oil), and the CG comes out at 70.25", or 27.5% MAC on my airplane. (By the way, I'm sure you all realize how easy it is to determine mean aerodynamic chord - MAC - on a PL. Just find the arm for the leading edge of the wing - LEMAC -

and determine the distance back from there where your CG lies. Since the chord is exactly 50 inches, each inch of chord represents 2% of chord, and the wing is nicely rectangular, so all is very simple to figure out. Did you do this on purpose, Paz?) Anyway, it looks as though this 27.5% MAC might be pushing things a bit. Let's use the equation and see what we come up with when we install a 13 gal. aux. tank under the baggage compt:

$$\frac{d}{91} = \frac{91}{1513}$$

Where d = the distance of the CG shift (unknown yet), D = the arm for the aux. tank, 91 inches, w = the weight to be added, which just by coincidence in this problem happens to come out to the same number as the arm for the tank. I figured 13 gal. fuel x 6 lbs./gal. = 78 lbs, + an allowance for the tank weight of approx. one additional pound per gallon capacity (you didn't tell me what your tank weighs, Leigh!) for a total tank + fuel weight of 91 lbs. And last and also most is W, the new weight of the aircraft with the full aux. tank. When I work all this out, I come up with a CG shift of 5.47 inches rearward (obviously, since the arm of the tank is to the rear of the CG), and multiplying this by 2, we come up with the % MAC change, or a new MAC of 37.45%. Tell you what: **Let's not fly it like this.** This is WAY too far aft, and I'm sure you could see this coming from the number we came up with for MAC even before we figured in the tank. OK, so now what do we do? Well, let's make another assumption and assume that our airplane isn't finished yet and that we can adjust the length of the engine mount (and cowl) to allow for all this. Here goes:

Using my N7SPL again, the weight of the O-235 comes out to 215 lbs. This is W, the biggest weight in this calculation. We want W to balance w, the weight of the full fuel tank, which moved the CG 5.47 inches too far aft. This is D in this equation since this is the larger distance - the 215 lb. engine won't have to be moved nearly as far to balance the 91 lb. fuel tank. And the last figure, d, is the unknown here. It should look like this:

$$\frac{d}{5.47} = \frac{91}{215}$$

Using the old cross - multiply and divide technique, I come up with 2.32 inches additional length needed for that new engine mount to balance that aux. tank. remember to keep in mind which way all this stuff needs to be moved; you'd *really* be in trouble if you went the wrong way on the length of that new engine mount! I didn't get into the left / right - negative / positive convention here; I think all of you can figure out that if you add weight behind the CG, then whatever you move on the other side of the CG has to go *forward* to compensate.

And I haven't even considered engine swaps, constant speed props, etc., etc. Just about out of room for this issue, anyway. In fact, I had in mind a section for you folks trying to sell some goodies, but there's just no room this time around. I will mention, though, that you might contact Paz and Pete Karmouche (see back issues), as well as Leigh Blake, as they still have some goodies available. I'll try to find room next issue for a complete listing of items. Till then, keep 'em flying!

Your last issue is #N/A

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