Hi! - Hope all is well with you. Sorry I missed you at OSH (only 800,000 people there) - surprised that we didn't see any PL's there, at least not while Anne & I were there. We won't make OSH '93, but planning on '94 -

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Aircraft Designer:
Ladislao Pazmany
P.O. Box 80051
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Editor:
Jack McCombs
2510 Crest Avenue
Cheverly, MD 20785
Phone 301-773-1076

**ON THE FRONT PAGE OF THIS ISSUE YOU'LL FIND PICTURES OF ALL THE PL'S I SAW AT OSHKOSH.** Yes, the turnout was a little thin, at least on the days I was there. I arrived (by car) on Saturday (Aug. 1) afternoon, and stayed through Tuesday (Aug. 4) morning when Anne and I hit the road again for the trip home. Theoretically, those were the big days, as attendance is usually highest on the first weekend and then tapers off from there - both for participants and spectators. Perhaps some of you were able to fly in later in the week; if so, I'm sorry I missed you.

I'm pretty certain that if any of Paz's designs had been there at the times we were there, that we would have seen them. Anne and I walked from one end of the airport to the other, and believe me, it's a lot longer walk than it was just a couple years ago! What with the lengthening of runway 18-36, and the fact that they've pushed the ultralights and rotorcraft even farther south of the runway end, it's a couple miles from one end to the other now. And when you're wandering up and down the rows of aircraft at the same time, it comes out a lot farther. It wasn't that long ago that one could take in the whole convention (less forums and such scheduled activities, of course) in a day, if one worked at it. Now it seems that it takes at least a day to just look at airplanes, what with the new "contemporary" class that now includes almost everything ever produced in the line of airplanes. Then with visits to the commercial exhibits area and fly market (which has also expanded) to try to find the best deal on those goodies you need (I managed to restrain myself - I only picked up a new 2" CHT and a couple cans of zinc chromate primer . . . and a few books, and . . .) and a visit to the EAA Museum, there goes another day at least. Better allow at least three days, if you plan on any forums, airshow watching, etc.

One thing Anne and I both commented on, is that it seems that the attendance might have been down a bit from years past. (Yes, I know EAA reported an increase, but I think we all take those EAA reports with a grain of salt.) Of course, we're not up to date on that, having missed the last couple years. But it seemed that it wasn't as crowded as in times past, and not only due to the much longer flight line of display aircraft which allowed people to spread out more. Even the fly market and commercial exhibit buildings appeared to be less crowded, although living in a major urban area as we do now can cause some distortion of one's perspective in that regard. I mean, around here you're going to stand in line when you go to the store, post office, or virtually anywhere, no matter what time of day it is. Nevertheless, I believe Anne and I have a pretty good feel for

the place, having worked there for several years - and it felt as though there was more elbow room than in the past, even in the most crowded areas of the convention. We ran across an old acquaintance who volunteers in auto parking, and he said that there was still parking available in areas they've filled in the past couple years. Did any of you guys make it this year? How did you feel about this, compared to years past? I'd like to know if it was my imagination or not.

Well, the EAA Convention Report portion of this newsletter is a bit short, since not even Yours Truly had his PL there. (But it's getting closer! - More further below, if there's room) Now we have more room for correspondence, of which I have accumulated sufficient to fill up two or three newsletters, I believe. Last issue, I had (more or less) reported on the doings of your fellow PL enthusiasts from A to G in alphabetical order, with a report that **DEWEY GREENE** had just flown his PL-1. I received a note from Dewey back in April with a copy of his construction and flight video tape, and including a photo of his PL - see below:

This photo was taken at Genneseo, IL, shortly after Dewey completed his PL-1. As you can see, it was still unpainted at the time. (Don't feel bad, Dewey, neither is ours - and I recall that Harold Pio's double grand champion was unpainted, too.) Dewey's PL has a Lycoming O-320 in the nose, and with that he gets a cruise of "about 125 mph at 8 gph." This is with a 70x59 prop. A couple others cruise at about the same speed with the same prop, but cruise speeds on PLs still seem to be all over the place. Empty weight came out to 1003 pounds, which is pretty good considering the almost mandatory nav/com radio and transponder nowadays, plus intercom and loran - and the leather upholstery!

As of the time Dewey provided this information (April of '92), he had 67 hours on N22LG, with no problems other than - as he put it - "bad vapor lock in 80 degree + weather, even with a cooler (blast tube?) on the gascolator." From this, and my experiences, it appears that at least some PL fuel systems may not be compatible with some of the characteristics of auto fuel. Those of you who have been following my own saga on this may recall some similar problems, but mine appear to be primarily due to the carburetor. I'm still not going to write up the final word on this yet, but I believe we have the problems (yes, there was more than one - aren't there always?) solved. Bottom line: Always remember that you're flying an experimental aircraft, and no matter how hard you try, it's never going to come out exactly according to Paz's original concept and plans. (Example in the fuel system: The electric pumps called out have been superseded by a newer model. With very minor modifications the newer ones fit just fine - but are they more, or less, susceptible to vapor lock problems?) This is the nature of the game with homebuilts, and to be fair, even production aircraft go through this when they use components from another source. Anyway, y'all be careful out there.

Dewey also incorporated an aileron trim system, per Bill Raksanyi (I don't recall any details on this), and epoxied some foam sheet into the fuselage sides aft of the baggage compartment to cut down on the "oil canning" in that area. N75PL has had a problem with this, and one of these days I'll tackle that project. It worked great for Dewey, so he says.

And we have a (relatively) new PL enthusiast in our group - I received a note a while back (OK, a couple years ago) from **MICHAEL FISH** of Northamptonshire, England. He's building a PL-2, and as of a couple years back, he was gathering materials, planning to build/buy jigs/fixtures, etc. Mike raised some good questions relating to initial startup, parts and materials suppliers, etc., and this might be a good spot to address some of those basics.

First of all, as all of you are aware there are a lot of jigs, fixtures, form blocks, etc. which one needs in order to make up all the metal parts and assemblies for a PL. It has been said that in order to build a metal airplane, you must first build a wooden one, and then build the metal one around it. I don't know if I'd go quite that far, but it's amazing how much wood work there is in building a metal airplane, at least if you do so from scratch. What about you guys who have completed your PL-2s (at least partially) and have no need for (at least some of) the fixtures and etc. you've built? Mike was wondering about purchasing these fixtures from some source. This might be a good way to go, but I can think of a couple of "excepts" here. First of all, Mike, you have a special situation in that I know of no other current PL-2 builders in England, or the remainder of the British Isles, for that matter. I fear that the cost of shipping all that wood would be prohibitive, for the relatively simple structures that they are. (Crating alone would be a logistical

challenge!) Secondly, while the vast majority of builders take great pains to do everything right with their PLs (there are exceptions to every rule, of course, but I believe PL people tend to be more perfection oriented than most aircraft homebuilders), it's difficult to tell what you're getting if you purchase something sight unseen. If you can find another builder whose jigs and fixtures you can check out, great. Meanwhile, if any of you out there have a set of good jigs and fixtures you don't need any more, pass the word to me and I'll note it in a forthcoming newsletter. (Be prepared for the usual few months delay.) Let me know if you wish to sell them, give them away, ship c.o.d., or whatever.

What does one do regarding materials (and for that matter, tool) purchases? Well, this probably depends as much on individual philosophy and time, money and space available, as much as anything. In other words, I imagine everyone has their own answer on this! For the sort of person who tends to stick with a major project, and who has sufficient building space available (and money!) early on, you'll come out ahead to purchase everything you think you'll need at once (at least everything in a given area, such as sheet metal, etc.). There are several advantages to this: (1) you can likely get a better deal by buying everything at once than by picking up one or two sheets of aluminum here and there, (2) while the shipping costs will be substantial for such a big order, they will still total less than they would if you were to purchase the same amount in several orders over a long period of time, (3) you'll have everything you need and won't have to wait for shipment of this, that or the other, and (4) if you think all this material is expensive now, think about what the prices will be like in a few years! In other words, in the long run, you'll likely be better off financially to buy everything at once at the beginning of the project.

The above includes a few suppositions, however - such as, that you will stick to it on the project and complete it, at least eventually. Remember, it's very unlikely that you'll get anywhere near your cost for those materials, if you sell them later. Another major "if" here, is the assumption that you can provide proper storage for all those materials and tools. If you have a damp basement, for example, you may see much of your investment corrode away before you can use it. Make sure you store it properly. Generally, if you have a good workshop, then you also have a good storage area - but the two don't always go hand in hand, and some magnificent airplanes have been built in some dismal shops.

In other words, the short answer to the above is, "it depends." I wish I could provide an absolute answer for some of these questions, but these questions are somewhat like considering whether it's better to rent or buy your home - it depends. I will point out, though, that even if you do choose to purchase everything all at once, there will still be little things you'll need from time to time that, for whatever reasons, you didn't get the first time. (Example: You wait until the air frame is well

along before purchasing an engine, and upon finding a real deal on that engine, you also find that you need various accessories for it, or have to modify something for this particular engine.) Count on this occurring from time to time; it can't be helped. That's why aircraft companies have full time people on their staffs in purchasing and shipping, in order to sort out this sort of thing and keep the production lines moving.

Way back shortly after George Bush was inaugurated, **JIM LACINA** wrote with a few words on his PL-1, N85VB (ask him about his old squadron markings!). Question: Is anyone using synthetic engine oil in their PL? Personally, we're using a multigrade (Phillips X/C, currently) since we've been flying so little lately and have no occasion to change the oil seasonally due to hours on it. The Phillips multigrade is a bit cheaper than Aeroshell multigrade, which was my sole purchasing decision. All right, so I'm cheap. Actually, I don't mind paying more for something, if I can see an advantage to the more expensive product or service. I know of none to speak of between these oils; perhaps one of you can educate me. Anyway, no, I don't know of anyone using a pure synthetic in their PL, and considering the cost of synthetics, I can understand. (Although I understand that the Aeroshell multigrade is a semisynthetic. Please correct me if I,m not correct on this.) They are marketed as providing longer intervals between changes, etc., but for peace of mind I'd just as soon change the oil at least at annual time. Even in the last year, when N75PL only got about 2 hours running (and most of that was on the ground), we're still going to change the oil and clean the screen. Oil will oxidize over a period of time, and in addition the additives will dissipate. Since those additives provide much in the way of internal cleaning of the engine, as well as the multigrade viscosity, I'd just as soon spend $15 a year or so and change the oil, whether it needs it or not, just on general principles.

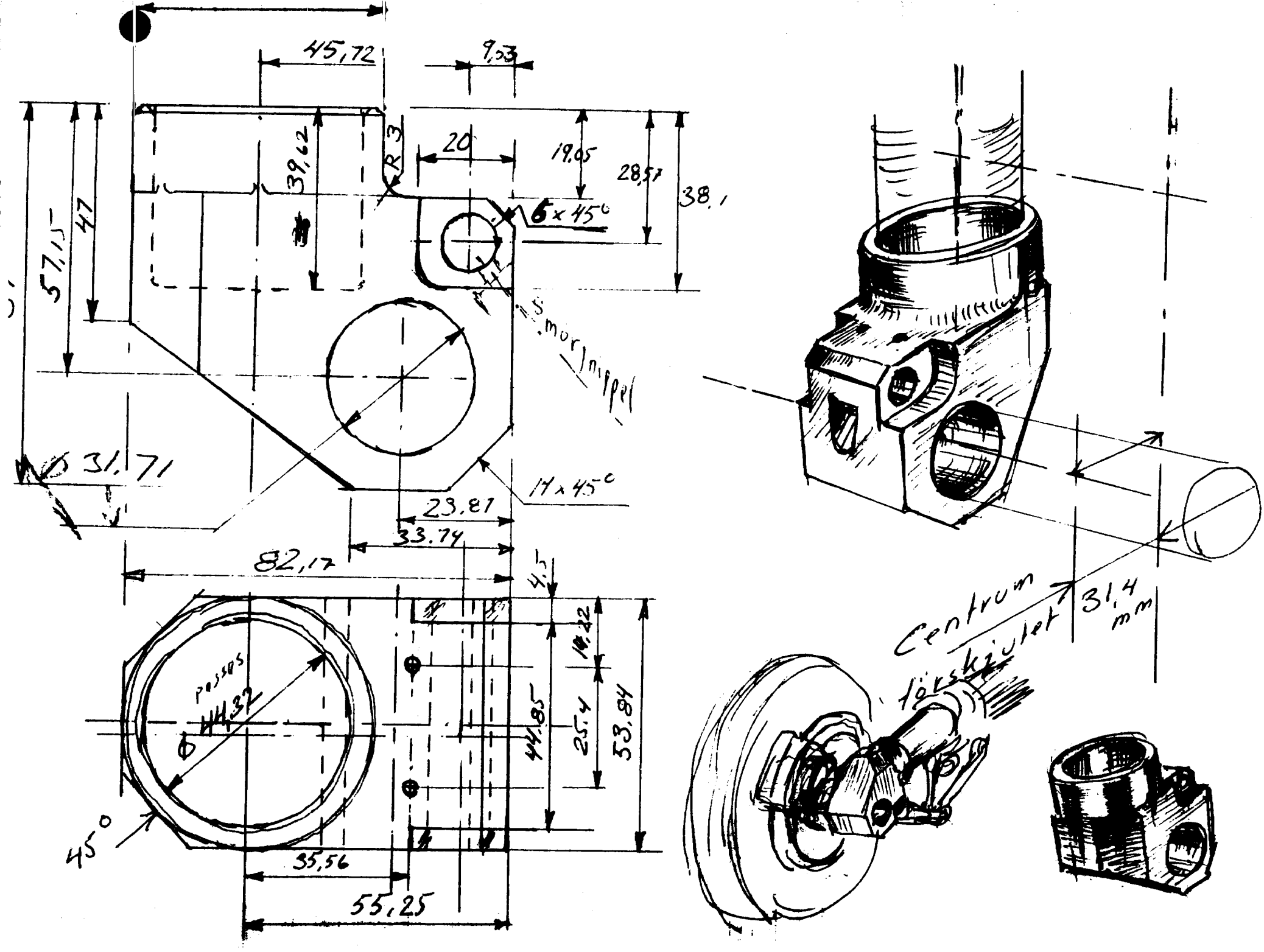
Anyway, whatever oil Jim is using in N85VB, it seems to be working - since that letter, he has been flying N85VB regularly, as evidenced by his July '92 letter in which he reports on several annual trips to the Glenview NAS open house. (I thought about that once, Jim, but they required us to carry some Godawful excessive amount of insurance - I couldn't see spending another $75 - or whatever the difference was - just for the extra insurance to go to one show. Sure would be fun to fly into a military field with a PL, though!)

He also reports that he has been using auto fuel on one tank, since 80 octane is difficult to find. No problems (This is per your letter of '89, Jim - still true?) - which brings up another variable in the auto fuel thing. Operational conditions obviously have a great bearing upon the results of the experiment in this situation. I will assume that Jim is using the auto fuel only at cruise, since he mentioned using it in only one tank - and that he is switching tanks to burn avgas for takeoffs and landings. Insofar as actual running of the aircraft is concerned, this should accentuate any vapor lock problems, since

obviously one will be at a higher altitude at cruise where atmospheric pressure will be lower (and fuel vapor pressure will therefore be a higher percentage of atmospheric pressure). Granted, the temperature (usually) drops with altitude, but it takes a while for that volume of fuel in the tank to cool significantly. On the other hand, the worst possible case for startup will be after landing and parking for 1/2 hour to an hour, when everything under the cowl gets heat soaked. If one is going to have a problem with autogas, it should show up here. (That's where I first started seeing symptoms.)

Jim also reports an alternator and battery change from the original - B&C Specialty alternator and 32 amp gel cell battery, rather than the older Delco generator and lead - acid battery. This is definitely the way to go; alternators are superior to generators, efficiency - wise, and many years ago we bought a gel cell battery for N75PL. That battery has been horribly abused, what with sitting for long periods of time and a lot of starting current drain lately without extensive engine running to recharge it. I believe it's around 6+ years old now (without looking it up in the logbook), and it's still going strong. The only problem with gel cells is that they recharge very slowly. You can attempt to dump more amps into them, but they just won't accept more than about 5 amps, probably more like 2 or 3 amps. In other words, if you have run your gel cell down and plan on recharging it in the air from the alternator, even if your alternator can put out 30 amps or more, the battery will only accept about one tenth of that. This can be deceptive when you glance at the ammeter and note the relatively low rate of charge. One's first thought is that the battery is back up to nearly full charge, which is why the charging rate is relatively low, but in reality the battery may still have a quite low state of charge and just be recharging slowly. There's nothing wrong with a gel cell which does this; it's normal for them. Just be aware that if you must rely on your battery in flight (such as for the dual electric fuel pump system in N75PL) if the alternator goes out, make sure your gel cell is in a good state of charge. Best way to accomplish this is to fly it regularly and for at least an hour a flight. It's also the most fun way to recharge your battery! Otherwise, you don't need a very expensive battery charger; the gel cell won't take all those extra amps anyway. A 3 to 5 amp charger is plenty, but plan on leaving it on the battery at least overnight if you run the battery down.

**HANS NIELSEN** of Sweden sent a nice letter back at the end of 1989, with sketches of a few modifications to his PL-2, SE-XCU (great registration!). Hans has been flying SE-XCU pretty regularly; he had about a thousand hours on it as of three years ago, and of course had made (or was planning to make) a few modifications here and there. One which I found interesting was that Hans felt that the nose wheel was a little too light. There are two ways to fix this: (1) install an IO-720 in the nose, or (2) increase the arm between the main and nose wheels. Hans chose the latter, by making up some offsets which install in place of the standard main gear strut to axle adapter. See the next page:


45,72
9,53
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6 x 45°
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M5 smörjnippel
Ø 31,71
17 x 45°
23,81
33,74
82,17
4,1
10,32
25,4
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passas
Ø 44,32
45°
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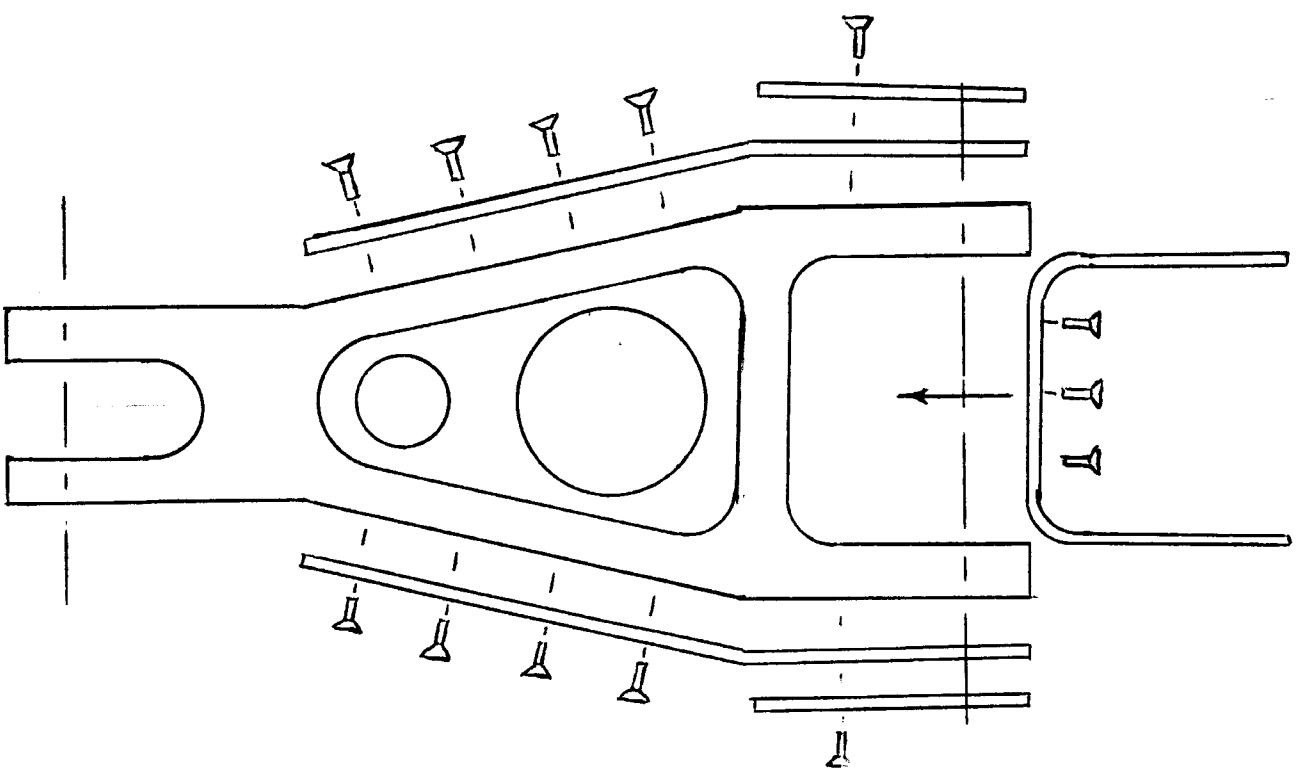
55,25
Centrum
lärskruvar
31,4
mm

Basically, what Hans has done is to make his strut-to-axle adapters to include a rearward offset for the axle, thereby moving the main gear axles rearward by 31.4 mm (about 1.25 inches; all dimensions on the previous page drawings supplied by Hans are metric.) In retrospect, Hans says that probably about 20 mm (just shy of 0.8 inch) would have been enough. Hans has a point in that the additional weight on the nosewheel due to this modification makes SE-XCU more stable while taxiing in crosswinds, and I can see his point. Personally, however, I rather like the gear geometry the way it is originally, with no offset. This way I can easily push down on the tailcone to lift the nose wheel off the ground for tight maneuvering, and I haven't found the light weight on the nose wheel to be a real problem in crosswind taxiing myself. Anyway, a competent machinist should be able to make up a couple of these offset adapters, and they're easy enough to install, if you want a bit more weight on the nose wheel. No, Hans didn't say what the difference in weight on the nose wheel was between the standard and offset adapters. But you guys can calculate it using your weight and balance data, and merely working backwards from the calculated CG to determine what the weight would be on the mains at a more rearward location. And by the way, your drawings are <u>beautiful</u>, Hans!

Hans had another problem with his machined aluminum main gear scissor links - the ears or lugs where the scissor links attach to the gear struts were breaking off through the bolt holes. I've never heard of this problem before. The only problem I'm aware of with main gear scissor links, are those that have made them up from welded sheet steel, and as I recall the usual break point on those scissor links was at the link connection end rather than at the strut attach end. Anyway, Hans has more or less combined the machined aluminum links with some .050 4130 steel reinforcement plates; see sketch below:



In Sweden, as with many European countries, noise regulations are relatively strict. Hans has found it necessary to come up with some additional muffling for his engine in order to comply with the standards there. Now, this is one drawing I'm not going to include, because it essentially is a"Glass-Pack" muffler, and I'm sure most of you are familiar with the concept. Besides, I'm not sure I understand the specific flow path Hans is using! Anyway, fortunately most of us don't have to worry about this - yet. If and when the time comes, Hans indicates that he has come up with a system that works, without costing too much in the way of power loss or back pressure and heat.

Hans is also considering going to a wet wing fuel system, a la **Ed Boothe.** It seems that five students from Gottenborg Technical University have been using Hans' PL to consider the retrofit of both wet wing fuel tanks and also retractable landing gear. Those of you who have been reading this rag for several years might recall my thoughts on such a modification. Hans summed it up pretty well: "Retractable landing-gear is nothing for PL2in my opinion." Mine too, Hans. Considering that one would have to use smaller wheels and tires for them to fit within the wing, which would likely rule out the use of unimproved runways, or else the standard wheels and tires would stick out the bottom of the wings as with the Beechcraft Sierra series, not to mention all the other complications - - well, if one of you wants to tackle such a project, good luck, but I believe that (someday) I'll just fair in the standard fixed gear and leave it at that. I ran through some calculations some years back, and concluded that retracting the standard wheels and tires on a PL would increase the cruise speed on the order of three mph over a well faired fixed gear! As an engineering challenge, yes, it would be interesting. But for increased performance? Forget it! And by the way, if you don't believe Hans and me, take a look at Tony Bingelis' Sportplane Builder column in the Sept. '92 issue of Sport Aviation. Tony discusses drag reduction, and points out that a partially retracted gear (as would be the case with standard 5:00x5 wheels and tires in a PL wing) may actually produce more drag than a well streamlined fixed gear!

Well, just about this point in every newsletter I find I'm about out of room, and darned if it hasn't happened again. I've managed to get from the G's through the N's in correspondence in this issue, so we're making progress. Once I get through all the current (and not so current) correspondence, maybe I should start at the back of the alphabet and work forward for a change.

Anyway, quite some time back the previous newsletter editor, **DAVE PANTON,** sent along a full page cutaway CAD drawing of a PL-2, which looks like it will find its way into the next issue. Also some info and pictures from **BILL RAKSANYI, D. J. SCHNEIDER,** and **DUANE SEYMOUR** are forthcoming. And as I keep threatening, if there's room I'll fill you in on the saga of N75PL. The family A&P (Anne), has developed a checklist for the annual on our airplane, as has Duane S. for his PL. We'll discuss those in a future issue too. Till next time - - Jack McCombs, PL N.L. Ed.