

January 2008

GP4BFN53

News for builders of fast wooden aircraft!

Builder Tore Jostein Lie checking in from Norway, with completion just around the corner.



HYDRAULIC GEAR PLANS NOW AVAILABLE

The prototype GP-4 uses a manual landing gear retraction system. After numerous repeated requests from builders, George developed an electric hydraulic gear for the GP-4.

The advantages of the

hydraulic system are obvious, flip a switch and fly the airplane. The disadvantages include extra weight, possible electric/hydraulic failure, a back-up system, and maybe some more expense.

No machine work is required for any of the components. Plans are available for \$150 from Osprey Aircraft. You can find the address and an order form on the website and on the last page of this newsletter.



GEORGE'S CORNER

BY GEORGE PEREIRA



Fellow GP-4 Builders,

Back in 2001 I answered a builder about seat belt and shoulder harness installation. At that time the hydraulic gear was not available, which caused a problem with a fixed shoulder harness. The harness, if fixed, would not allow the pilot to lean forward in order to easily unlatch the landing gear lever and retract the gear. I solved the problem in the prototype by using automotive inertia reels. Two Honda reels were mounted on the aft side of the canopy base on each side. One reel for pilot and one for passenger. I used only a single strap

...this seat belt and shoulder harness is not designed for any negative aerobatics, nor is the airframe for that matter.

over the shoulder into the metal to metal seat belt attachment buckle. My 1 7/8" seat belts were new aircraft grade, with

provision for a metal attachment of a shoulder harness. Both spruce and Wicks have these available.

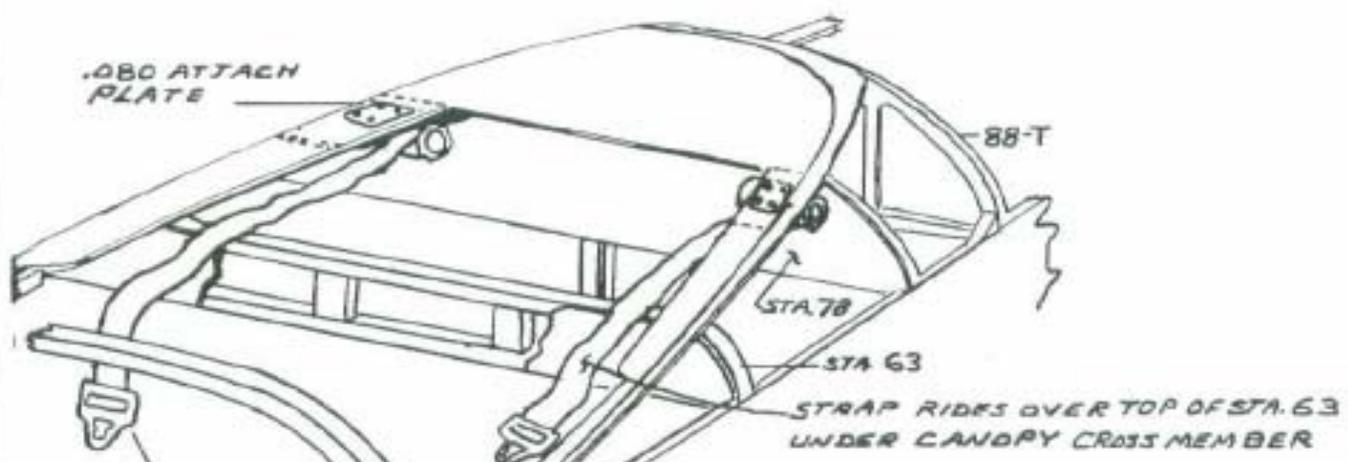
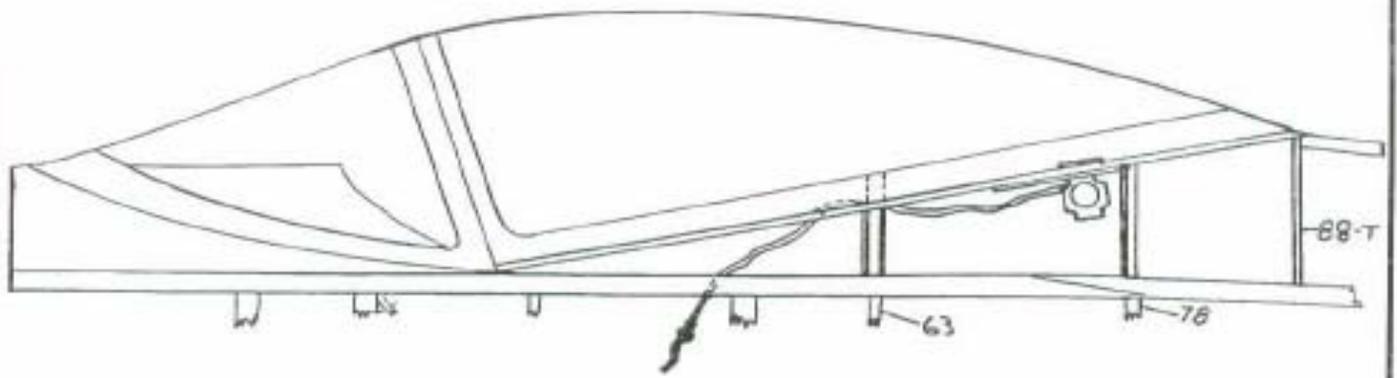
The Honda reels had black straps which I pulled out of the reel, and machine sewed the matching shoulder belt to the Honda strap. This sewn section was then reeled back into the reel and does not show. Not having a sewing machine, I had a shoe shop do the job for me. You may have to drill new mount holes into the reel base to mount the 1 1/2" ply canopy base. The base should be re-inforced as shown in my drawing. The seat belts are easily bolted into the aft end of the four seat rails. Some of you may want to use an adjustable shoulder harness—rather than the inertia reel if you have the hydraulic gear.

You will still need to lean forward from time to time so the slack that the reel gives you is still a nice feature. I would like to point out that this seat belt and shoulder harness is not designed for any negative aerobatics, nor is the airframe for that matter. If you turn your GP-4

upside down, try to keep yourself and your GP-4 positive. I know some of you will question why no negative or inverted flight since the airframe is stressed for a positive 8 and a negative 6. It's the flaps! The flaps are designed to be pulled down by cable and back up by spring tension. In flight, the aerodynamic load is up plus the spring tension. If you go inverted, the flaps will want to rise and would overpower the spring tension. You could possibly overstress the flap attachment due to excessive speed while inverted. I used to do rolls, loops etc. in my GP-4, but these are positive aerobatics. I have also replaced two sets of gyros, so I am now content to just enjoy an occasional rat race with Ralph Hallenborg in his Easy, or some tight formation work on our way to Willows for lunch. It's all pretty much positive no matter how you look at it.

Regards to all.

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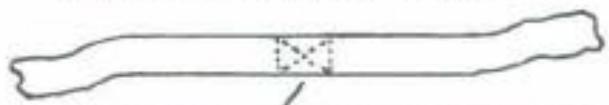


TYPICAL METAL STRAP FITTING BUCKLE SLIPS OVER KNOB ON SEAT BELT BUCKLE

080 4130 ATTACH PLATE



4 EA. 1032 FLUSH MACHINE SCREWS REQ. EA. SIDE



SEWING PATTERN TO JOIN STRAPS

GP-4

INERTIA REEL
INSTALLATION
NO SCALE
DESIGN: OSAREY AIRCRAFT
REEL (HONDA) USED.

FLYING THE GP-4

Emergency Procedures in the GP-4

The past three articles on the subject of the GP-4 have dealt with specifics relating to flying the aircraft, normal procedures and practices which are relevant to this high performance aircraft. In this article, we will discuss abnormal and emergency procedures which are pertinent to the GP-4 and those which apply to all aircraft.

Having flown the GP-4 for several hundred hours, I have seen a few things happen which might get your attention. In any emergency situation, pilot preparedness is paramount to the successful outcome of such events. Aircraft familiarization, knowledge of systems, performance characteristics and overall operational experience will greatly enhance your ability to handle abnormal or emergency situa-

tions. Common sense, use of checklists and maintaining a cool, organized demeanor will contribute significantly to the safe and successful outcome of any emergency event.

As with any procedure, normal, abnormal or emergency, the use of checklists will keep the identification (trouble shooting) and solution of the problem properly sequenced and "in check". Because the GP-4 is certified in the Experimental Category, you may not have a list of procedures for emergency situations. Such a list can be developed from existing checklists and modified to meet the characteristics of the GP-4. However, careful attention must be paid to ensure all aspects of the problem are taken into account in the checklist, other wise certain steps may not be included which could, in effect, not solve the problem. As you get used to flying the

GP-4, think about how you would incorporate an emergency checklist into your normal procedures checklist (if you have not already done so).

The following are some examples of abnormal and emergency events which could occur in a GP-4.

Canopy not latched

This would most definitely be an emergency situation. This has occurred in the GP-4 with (sadly) fatal results. Properly built, the GP-4 has a 50 thousands 6061-T6 aluminum strap over the canopy bow which extends aft of the bow about ¼ inch. This strap, properly fabricated, keeps the canopy aligned with the windshield bow and provides sheer strength for the canopy when closed. In flight at high speeds, the canopy on the GP-4 produces up to 400 pounds of lifting force. That is significant and requires a snug fit to keep closed and in place on the fuselage. If your canopy becomes unlatched in flight, the strap should keep the canopy from sliding back (due to the lifting force). However, it depends on the speed and the fit of the canopy. The first thing you may notice during an unlatched canopy event is an increase in noise. Specifically, wind noise due to the gap between the windshield and canopy bows. If you are moving fast, you will, most likely, not be able to close



FLYING THE GP-4

the canopy and latch it properly. Trying to close the canopy may prove difficult to begin with because you have to fly the aircraft, while simultaneously attempting to shove the canopy closed. (An autopilot is a very useful piece of equipment in this situation.) Serious caution is advised if this should occur and judgment is paramount in how to remedy the problem. Trying to close the canopy in flight may result in movement of the canopy such that it could open further and slide aft of the strap (very bad). Trying to close the canopy in flight without an autopilot may result in unstable flight which now adds an additional problem to the original problem. If the canopy cannot be latched in flight, slow down and land at the nearest suitable airport.

How can this problem be avoided? First, double check the canopy is closed and properly latched prior to takeoff. This is a significant checklist item on the 'before takeoff' checklist. Second, make sure the canopy latch functions properly, had no excessive play in the mechanism and is fabricated according to the plans. Remember, modifications to the original design, while very cool, may not be very safe. The "canopy closes and latched" checklist item is like the landing gear: It never hurts to check it multiple times to ensure it is in the proper position.

Landing Gear and Brake problems

Several GP-4's have had landing incidents and accidents where damage was sustained to the aircraft, specifically the landing gear. Regardless of the gear installation you have on your aircraft (i.e. mechanical or hydraulic), proper procedure must be followed for takeoffs and landing the aircraft. Most anomalies have resulted from poor crosswind landing technique. This imposes significant stress on gear components such as walking beams, over center struts, torque tubes and gear attach points. Typically, in high side-load situations on the GP-4, the gear may collapse (fail) on one side causing the associated wing to dip and now you have airframe and control surfaces contacting the ground (source planet) resulting in damage. Bummer. The solution to this problem is to align the longitudinal axis (the fuselage) with the runway upon landing using the rudder. Clearly, the subject of crosswind landings can be and will be debated at length. There

more than one technique and many pilots have relaxed into their own method of dealing with this common type of landing. The important item to remember here is minimizing side-loads during landing. Not doing so may possibly result in damage to your GP-4. Common sense dictates that if the airport you are attempting to land has a stiff crosswind, you may consider utilizing less flaps to minimize the surface area the wind has to push against, or selecting an alternate field with better alignment into the wind.

On one occasion, I landed a GP-4 without braking capability. This happened because the brake pedal stays were butt welded into the rudder pedal torque tubes and broke at the weld joint. (Darry Capps solved this problem by inserting the brake pedal stays through the torque tube and welding at two places instead of one.) Landing without brakes is a normal land-



Another picture of Tore Jostein Lie's GP-4 in Norway

FLYING THE GP-4

ing with emphasis on useable runway length, touchdown location and aircraft control during rollout. Normal approach speeds are utilized with a touchdown location closer to the approach end than the usual 1000 feet (i.e. fixed distance marker on a precision runway – the big white paint). Full flaps are required for the slowest speed, however, flap position may be dictated by the amount of crosswind during landing. (Remember, the greater flap extension during crosswind landings [see above], the more surface area the wind has to push against increasing the difficulty to keep the aircraft straight.) Touchdown and rollout normally. A decision may be required whether or not to shut down the engine or keep it running (idle) – this is a function of runway length and control during the rollout procedure. If you control your approach speed and touchdown point, the GP-4 will slow nicely and very likely not roll off the departure end of the runway. Of course, you should thoroughly brief yourself as the procedure you will utilize in this event so that no surprises occur.

On the prototype GP-4, there have been instances where the (mechanical) gear was “jammed” during retraction. This was the result of certain components of the system (i.e. walking beams or torque tubes) wearing or bending as a result of normal use or stress due to insufficient strength of material used (i.e. tubing wall thickness insufficient for the desired strength of the

component). These situations happen over time and typically cannot be accounted for in the original design. Should you encounter a jammed gear situation during retraction, re-extend the gear and land as soon as practicable and then trouble shoot the problem. Do not attempt to force the gear up. If you find that you cannot re-extend the gear, then you now have to land the aircraft with an unsafe gear condition.

Other gear situations may arise due to improper fabrication and welding technique. In one instance, the builder did not properly weld a rod end bearing into an over center bracket. This subsequently failed on landing resulting in a gear collapse. Following the plans and implementing proper fabrication techniques will ensure structural integrity of the associated system and minimize failure.

Flap System Failure

The GP-4 is designed with a single slot, fowler type flap system, actuated by an electric motor. (The venerable Cessna 150 flap motor is the motor of choice.) On one occasion, this motor failed during flap extension resulting in the flaps not being able to retract. Since the aircraft was not at its home base and no maintenance facility was available, it required that the flaps be disconnected from the motor. The flap design is such that they are spring loaded to the up position. Disconnecting the flaps from the motor assembly and associated linkage will allow the flaps to retract; however, if you have to fly the aircraft after disconnecting, a no-flap approach and landing will be required. Not a serious problem except in the GP-4 a no-flap landing will increase your landing speed and distance considerably. Common sense dictates you have ade-



George and Pat Salamone

FLYING THE GP-4

quate runway available for this and know the differences in landing distances (with various flap settings include up).

Propeller Overspeed

The GP-4 is equipped with a two blade metal Hartzell propeller. This propeller has been optimized specifically for the GP-4 by Hartzell and George Pereira. While other propellers have been installed, GP-4 performance typically has not improved outside of that with the designed propeller. On one occasion while flying a GP-4 with a three bladed composite propeller, an overspeed situation occurred. The blade went to low pitch (flat) and the engine RPM increased to well over 3000 before power could be reduced, decreasing RPM. It was thought at the time that cutting the mixture may be required to reduce RPM to acceptable levels, however this was not the case and a normal landing was made at a nearby airport. It appeared that the problem was associated with the propeller governor. The important thing to remember about propeller overspeed situations is recognizing the problem quickly and reducing the engine RPM prior to sustaining engine damage. Retarding the throttle is a good first step, however, that may not solve the problem. Cutting the fuel mixture may be the only realistic option available. In some cases, the mixture control may be modulated to generate some power in order to facilitate a safe landing (hopefully at

a satisfactory landing site or field). Keep in mind that in an overspeed situation, the propeller is in flat or low pitch configuration which produces a serious amount of drag (i.e. windmilling). Careful attention to airspeed must be maintained or you will introduce another problem: Airframe stall and departure from controlled flight. Maintain sufficient airspeed during the entire procedure and keep enough energy for flare and touchdown. You can simulate this in your GP-4 by retarding the throttle to idle, setting the propeller to high RPM (low pitch) and maintaining a safe airspeed while descending (however, be mindful thermal shock to your engine). This will give you a fairly good idea of the rate of descent you will encounter during a propeller overspeed situation.

Airframe Icing

We are getting into winter flying

which introduces a different set of decision making criteria not typically seen during fair weather flying (experienced during the summer months). As we all know, not a winter goes by without an accident occurring as a result of an encounter with weather and icing is a big part of winter weather. The GP-4 is not designed, built or meant in any way to fly in conditions that are conducive to ice formation or encounters. The solution: Get a thorough weather briefing and just say no to flying if there is any indication that weather (icing) will be a factor in your planned flight. An icing encounter in the GP-4 will negatively compromise the performance of the wing and really make a bad day. If you notice ice accreting on the wing, a decision must be made quickly as to whether a climb or descent will mitigate the problem. Typically a descent will produce warmer temperatures, however, you may not be in a situation where a descent is safe due to terrain. It is vitally impor-



Always draws a crowd

FLYING THE GP-4

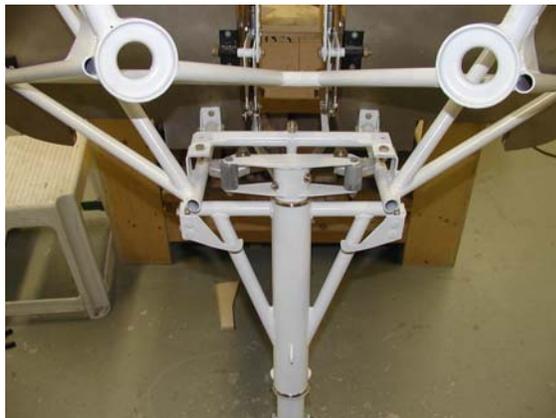
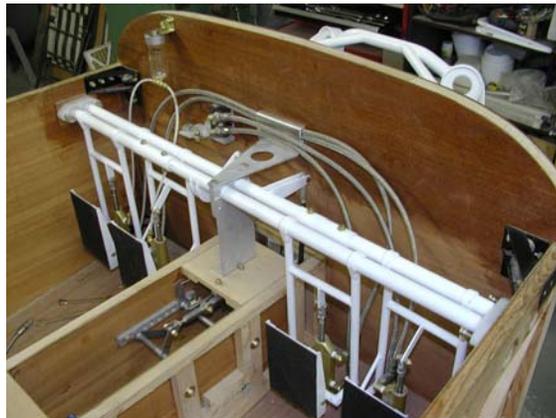
BOB RINGER CHECKING IN

tant to understand the freezing level for your route of flight. In some instances, a climb will get you out of weather that is causal to ice accretion but you must have the performance to climb out of the weather – ice on the wing may preclude this from happening. It is important to consider that stalling speed goes up substantially with any kind of contamination on the wing. So if you initiate a climb, particular attention to airspeed is necessary to avoid a stalled condition. An angle of attack indicator can be of paramount significance in this situation.

Stay on top of weather and ensure proper pre-flight planning is performed prior to departing.

The above are a few abnormal and emergencies that may be encountered in a GP-4. But many other situations may be encountered as well. Having proper checklists, flight planning, judgment, safety awareness and common sense will certainly contribute to the safe outcome of any flight.

Mike Traud
Gold River Facility



BUILDING THE ENGINE MOUNT

Building the Engine Mount without the Engine

By Jerry Peck

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Paola, Kansas 66071

913-557-5009

I am not nearly ready to invest in an engine, but because I have been working on the fuselage and wanted to build and install the Nose Wheel Strut, it was also necessary to build the engine mount. (Please note that I have nothing against Ray Beasley's work. It has just been my personal goal of building, as much of the airplane as I possibly can, by myself.)

To do this, I borrowed a jig fixture (orange color) from a local friend. An old accessory case for the your engine choice would probably work, as well. (I plan to use the IO-360 A1A or the new IO-390. They are the same weight and fit the same engine mount.) This fixture was set up, as shown in the photos, with a 3/4" piece of MDF and a firewall duplicate of 1/2" MDF, braced with 2x4s on edge.

Bob Ringer graciously provided me with the following measurements in order to assure that the engine mount would be appropriately spaced from the firewall. Bob, I believe, purchased his engine mount from Ray Beasley, so they should be accurate measurements.

Firewall to front of Top Left Ring 13 5/16"

Firewall to front of Bottom Left Ring 13 9/16"

Firewall to front of Top Right Ring 13"

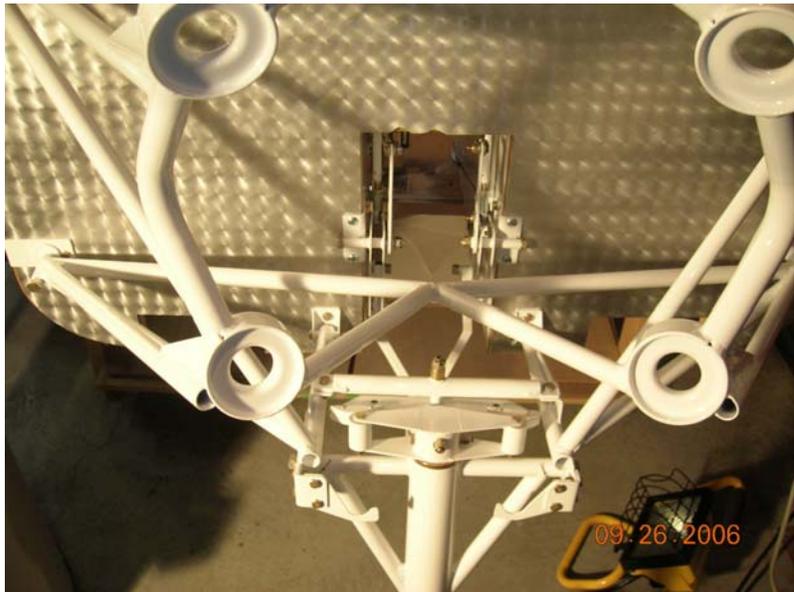
Firewall to front of Bottom Right Ring 13 5/16"

These measurements were taken by placing a piece of flat aluminum plate across the front of the engine mount against Lord mount ring ar-

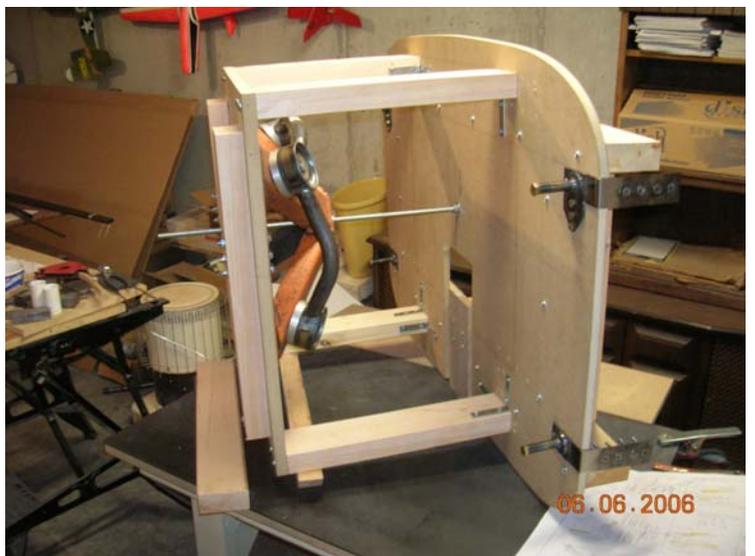
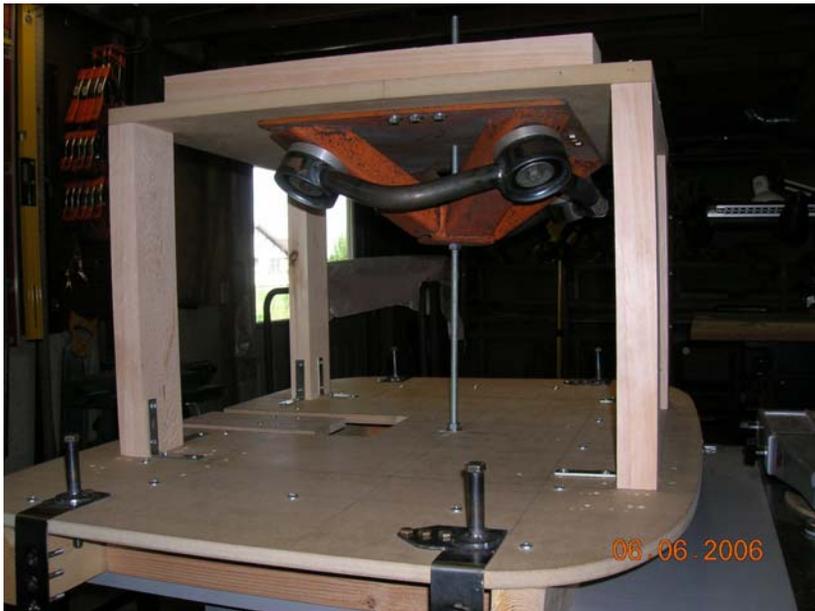
eas, and them measuring from the back of this plate from all four Lord mount areas directly to the firewall. These measurement essentially provide the further most forward points of the dynafocal mount from the firewall.

Also, be sure to note that Lycoming literature indicates that a Type 1, 30 degree dynafocal ring should be used for the IO-360 and IO-390 engines.

(additional pictures next page)



BUILDING THE ENGINE MOUNT



GP-4 SERIAL #507



Mike Mahar's GP-4, #507

Mike and Dan Hopkins are busy making final adjustments and preparation for an appointment with a DAR in January 2008 at PCW. After flight testing it will return to live at its home base of Cuyahoga County, Ohio.



NEWS FROM NEW ZEALAND

ZK-JPE

I am having my ups and downs!!

The first “up”. I took my dream machine to our annual Sport Aircraft Association gathering in February and was presented with the trophy for the “Best Wood and Fabric Aircraft”.

Another “up”. In July I made the long journey to Oshkosh and was able to meet briefly with Don Austin and several other builders. It was great to see another GP-4, thanks Don.

Now for a “down.” I have been struggling with a Blue Mountain Avionics EFIS/ One for over three years and have never been able to make it work satisfactorily. In June I decided that enough was enough and took the whole system including Auto Pilot out. At Oshkosh I bought Dynon D-100 and D-120 units and have been working on the installation for the last two months. This has entailed making a complete new panel rearranging other instruments and switches and redoing a lot of wiring, not easy, however the end is in sight and I should be flying again in the next week or so.

I have been installing a new 406 ELT and carrying out my Annual Airworthiness Review at the same time.

One small item that may interest builders.

For the second time I found the nosewheel steering limit plate on the leg cracked at the weld. In my view this needs beefing up a little and you will see in the photo what I have done. You will see that mine is on the front of the leg not the back as shown in the plan, don’t know how that happened!!

The other picture shows the new panel.

John Evans



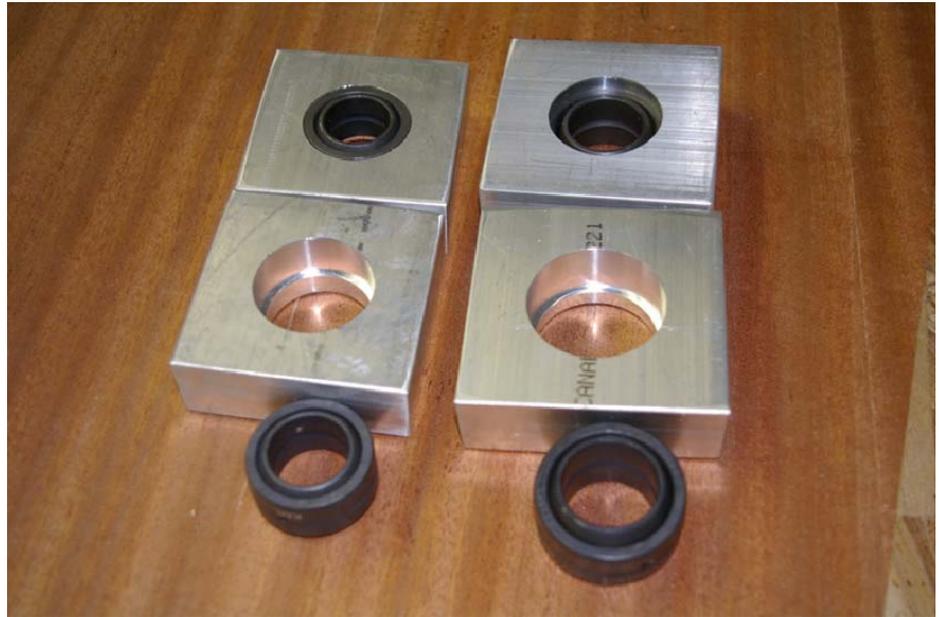
MAIN GEAR TRUNION BEARINGS

By Bob Ringer

The main gear strut and link arm trunions are attached to the front spar with aluminum blocks drilled at an angle of 82 degrees and to the rear spar with aluminum blocks drilled at an angle of 86 degrees. The holes are one inch in diameter for the main gear trunion and 7/8 inch for the link arm trunion. This system works quite well but alignment must be precise to avoid the trunion arms binding in the bearing blocks. This system does have a problem in that even when well greased it is metal to metal and when pressure is applied to the gear in the form of air loads it will cause the system to move with more resistance as pressure increases. A lack of grease in this area would compound the problem. Wayne Tomkins, Australia and I visited Ernie Holmes, Orange, Mass. two summers ago and during the discussions on gear fabrication, Ernie suggested an eyeball type of bearing and showed us an example. Further investigation by Wayne and I located a suitable bearing sold by KML that seem ideally suited to our needs. The bearing numbers are KML GEZ25ES and KML 6206-2RS and retail for just under \$10.00 each. These bearings have a groove completely around the outer case which makes an ideal grease path when a grease fitting is installed in the aluminum carrier block. The bearings pivot sufficiently in all directions to allow for a wide range of installation angles. We had our bearing blocks drilled at exactly 90 degrees and left a shoulder (or seat) on the inner portion of the hole to seat the bearing in place. A small collar is welded around the trunion arms which bear against the center portion of the bearing and prevents the trunion from moving forward or back. Wayne has completed fabrication and installation of his main gear including hydraulic and

electrical systems and using the KML bearings. He reports the system was not difficult to align and works very smoothly with no obvious friction problems. The gear photos with this article are clearly indicative of Wayne's outstanding workmanship. This system should

fail the trunion should remain functional. Bearing replacement would be simple compared to milling a new bearing block at the correct angle. I have discussed this design change with George and he indicated he could not see any reason the bearing system could not be



also greatly enhance the ability of the gear to free fall into a locked down position should the hydraulic or electrical system fail. Normal maintenance should give years of service and in the event a bearing

used in the GP-4

(additional pictures next page)





Important Note—

Gayle has created a new e-mail account for builders to contact George. The address is ospreyairgp4@aol.com

There is a lot less unwanted spam and trash traffic on AOL.

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CLASSIFIEDS

For Sale:

Pre-Fabricated composite components for the GP-4. Cowling, Exhaust Blisters, Inlet Ramps, and Tailcones. Individual parts or complete packages available.

Cowls are constructed with West System ProSet 125 Resin and 225 Hardener. They are hand lay-ups of 4 layers of 6 oz cloth, and 2 layers of 10 oz cloth.

I get great discounts on shipping and I pay for the packaging. For current pricing, please call or send me an e-mail.

Bob Ringer

Halifax, Canada

Ph: 902-876-2871

Cell: 902-483-4611

E-mail: bobringer@eastlink.ca

For Sale:

Quality Custom fabricated metal components for the GP-4. State of the art equipment used by a certified welder to construct parts on the jigs obtained

from Darry Capps.

Raymond Beazley

Dartmouth, Canada

Ph: 902-465-6141

Cell: 902-497-4187

E-mail: ray1beazley@accesswave.ca

- order by the piece, sub assy or pkg
- Parts tagged for identification
- All parts are cleaned and primed
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