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# GP-4 Builders & Flyers Newsletter

May 2007
GP4BFN52

## Congratulations to Don Austin 2007 Sun-n-Fun Best All Wood Homebuilt Aircraft


## 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**

**Installing wing tanks and nose ribs:**

Drawing 23 shows the wing tank mold using 1/8" masonite and 3/4" thick lumber to build the male mold. Since the tanks are airfoil in shape, you need a left and right mold. I found the tempered masonite the easiest way to go. You may have to drill the Masonic if you nail your mold together. The mold ribs 1 through 9, have to be 11/16" smaller than the finished nose ribs. This allows the finished tank to be 3/8" to 7/16" under the surface of the wing skins. (See drawing 23).

*...this contour should be done before any ribs are installed.*

My wing tanks ended up with 18.5 gallons on each side. If you can calculate the tank interior in cubic inches, there are 231 cubic inches to the gallon.

Keeping the mold airfoil shaped pays off when you cut the solid nose rib centers out to fit them over the tank and attach them to the spar. Lets run through this nose rib attachment sequence.

Your wing is setting on the table, structure complete, except the tank and nose ribs are not installed.. Your spar has been contoured on top and bottom to be flush with all of the ribs as they meet chord line to chord line. Your spar will now have a slight radius on the top and bottom to maintain the airfoil shape across the width of the spar. <u>This contour should be done before any ribs are installed.</u>

You block the wing so that the aft ribs are at -0- degrees at their chord lines. The tip rib #11 is also at -0- degrees. The tanks have been pressure tested and are ready to be glued to the spar. The landing gear assembly is removed to save weight in handling. Chord lines have been drawn on the spars as well as on all of the nose ribs. You now can attach rib #1 nose rib, setting the chord line at -0- degrees. You stretch a string from the leading edge of rib #11 at the chord line to the leading edge of rib #1 at its chord line. You now have a reference line to align all of the nose ribs #2 through #10.

When you butt a nose rib up to the spar face, chord line to chord line, the chord line at the rib leading edge should intersect the string. Sand the butt end of the nose ribs until you get this alignment. Now mark the spar exactly where the rib sets until all of the nose ribs are fitted. You are now ready to cut the centers out of the nose ribs, #2 through #8 after you glue the tank to the spar.

To glue the tank to the spar I used a mixture of epoxy resin and micro, thick enough so it wouldn't run, and spread it on the back side of the tank. I painted the spar face with epoxy after masking off 3/8" area above and below where the tank sets. You can now press the tank up against the spar with blocks to hold it into position. The string will give you a good idea if the tank leading edge is close to the correct alignment. If the tank leading edge is too high or too low, you can shim the back side with micro to align the tank. You now can clean off the excess micro

# GEORGE'S CORNER

and pull the tapes prior to the epoxy setting up.

When you cut the centers out of the solid nose ribs, #2 through #8, be sure the tank doesn't distort the shape if it rests on a high spot of the tank. Remove enough material so they slip easily over the tank and butt up to the marks on the spar. Once the nose ribs are in place, I secured them to the tank by laminating 2 ply of 4 ounce glass, L shaped on each side of the rib with strips about 1 1/2" wide. These ribs have to be solid to the tank when you use a long sanding board to fair in the ribs. (See page #16 builders manual.)

Drawing #23 shows a way to adapt a Ford fuel cap to your tank. Most builders are using the available flush caps from Aircraft Spruce or Wicks. They are easy to install in the pine filler blocks shown on drawing 23.

The polyurethane two part foam requires a warm environment to insure a solid cure. I warmed part A and B in buckets of warm water, heated in my shop, about 80 degrees. I was sure the tank surface was not cold prior to pouring the foam over the tank. Mix the two parts well before pouring. Start at the wing tip and let it run towards the leading edge. You can tape on a cardboard dam if the foam starts over boarding onto the table. Try to pour just before it kicks off. Photos in the back pages of the manual show the expanded foam contouring to shape. The manual pages 15, 16, and 17 covers much of the article as well.

If you have questions, give me a call.

Regards to all,

George

** Note - Gayle reports that they are having a lot of difficulty with the Juno e-mail account getting flooded with "Spam" mail. Please be patient if you are trying to e-mail George, or better yet, call him on the phone, fax him, or just send him a regular land letter. All his contact information appears on the last page of the newsletter, and is reprinted here now for easy access.

Thank you !

George Pereira

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## BUILDER'S RESOURCE

BY BOB FOSTER

Many GP-4 builders who have completed their fuselage have installed Jim Weir's antenna kit. Jim has many more "can't live without" electronic designs that will save you beaucoup bucks or as he says, "A champagne panel on a beer budget." He has published a full panels' worth of designs in Kitplanes for several years, from about 1996 to present. I have listed all the publications and subject that I have, perhaps someone else could fill in the blanks

### Kitplanes Magazine

Jan 97, pg 87, Coaxial cable

Mar 97, pg 69, Extending landing light life

May 97, pg 72, ELT antenna

July 97, pg 79, Wire rack

Oct 97, pg 62, Radio Connectors

Feb 98, g 86, Radio "stuff"

Apr 98, pg 20, Altitude chamber

June 98, pg 86, Auto Am FM Radio

Oct 98, pg 60, Inexpensive intercom

(I missed most of 1999 & 2000)

Dec 99, pg 115, VHF nav antenna

Oct 00, pg 49, LED position lights

Nov 00, pg 65, GPS

Jan 01, pg 88, Dim Bulbs

Feb 01, pg 61, Antennas

Apr 01, pg 61, lamp dimmer

Aug 01, pg 68, Aviation software

Feb 02, pg 43, Engine monitor

Apr 02, pg 79, Battery sulfate buster

# BUILDER REPORTING IN

Builder Ray Call Reporting -

First some background. I made all the metal parts up through the aileron hinges last winter. This winter I did some welding on those parts and installed them in my fuselage and stab/ elevator. I purchased some of the control system hardware last week and when I tried to bolt the pulleys onto the rudder cable pulley brackets I found a problem.

The rudder cable pulley brackets laid out on DWG 9 indicate they are to be made of aluminum angle with a minimum of 1 1/2 inch legs which are 3/16 inch thick. The pulleys are AN 219-2 of 1 3/4 inch diameter. The plans show the pulley mount hole to be sized for an AN 4 bolt and centered 1 1/8 inch from the outside corner of the angle stock. A quick math check highlights a problem. Pulley radius is 7/8 inch. Angle thickness is 3/16. That makes a total of 1 1/16 inch. If the mount hole is 1 1/8 from the outside corner that leaves 1/16 inch clearance, which works great except for the bolt head. To get clearance for the bolt head the 1 1/8 dimension needs to be increased. I measured my AN 3 bolt heads at about .120, or just shy of 1/8 inch. I added 3/32 to the major dimension and made new brackets with an outside-corner to hole-center dimension of 1 7/32 inch. Now the pulleys bolt into place with a 1/32 inch gap between the outer edge of the pulley and the face of the AN 3 bolt that serves double duty as a cable guide as per the plans. One more note—the plans call for AN3-14A bolts to mount the brackets onto the 3/4 inch spruce cross-brace, but I found AN3-13A bolts to fit better. The -14s required a washer on the back side on top of the .080 aluminum backing plate to allow the nut to tighten before bottoming out.

On that same page George calls for AN4 stock to hook up the elevator push-pull tube with the rod ends. I coudn't find any but Jerry Peck sent me an internet site USE-ENCO.com that he used to get some. I haven't checked there yet...

Build fun

Ray

Call

## SECURITY MATTERS

At London Heathrow Airport today an individual, later discovered to be a public school teacher, was arrested trying to board a flight while in possession of a compass, a protractor and a graphical computer. Authorities believe he is a member of the notorious Al-Gebra movement.

He is being charged with carrying weapons of “Math instruction”

# FLYING THE GP-4

**GP-4 Flight Operations**

**Part Three**

**Landing the GP-4**

This is the third part in a series on flying the GP-4. Part One dealt with what it is like to be at altitude and fly the GP-4 with some heat on (in flight maneuvers, cruise flight, etc.). Part Two discussed the departure phase (start up, taxi, takeoff). In this Part, we will cover what it takes to get the machine back on the ground. We start at altitude and initiate the let down phase of flight.

Descent Phase

It is difficult to have a nice day flying the GP-4 if you can't get it safely on the ground and back in the hangar. That being said, lets start at altitude and go through the process of descending the GP-4. Particular thought must be given to your altitude and distance out when determining when to initiate the descent phase. Procedurally, you must also be aware of engine temperatures (i.e. thermal shocking) on descent and your speed. (Several "techniques" exist on the method of engine cooling during descent. One that comes to mind is reducing power one inch of manifold pressure per thousand feet of altitude loss.) Whatever technique you employ, be sure you are not cold shocking on descent. Engine life can be significantly compromised if this occurs. And don't think you can just push the nose over in the GP-4 to loose altitude. Bad idea because before you know it, you'll be in deep yellow on the airspeed indicator heading right for the red radial line (Vne). There are several stories out there of this very thing occurring in a GP-4. (Of course, I have personally never seen this. Hmmm. ) Your cruise altitude will dictate the distance out that you start the descent. If you are at 8000 feet MSL and landing at an airport that has a field elevation of 1000 feet MSL, you'll (obviously) need to loose 7000 feet on the descent. Lets say you are doing 200 knots in the descent and descending at 500 fpm (to keep this bugger from slipping past Vne and to keep engine temps up). So, how far out must you start the descent? Well, it'll take you 14 minutes to make the 7000 foot altitude change. So, how far do you travel in 14 minutes doing 200 knots? One way to look at it is in terms of percentage: 14 minutes is 23% of one hour. OK, if you are doing 200 knots per hour and it's going to take 14 minutes to make the descent which is 23% of the rate you are travelling (knots/hour), well, it takes just over 46 (nautical) miles distance to get the GP-4 down. Of course, this solution does not consider traffic pattern altitudes and any maneuvering you'll need to perform once in the terminal environment. Looking at this particular problem from a conservative angle suggests you'd start the descent at 50 miles from the destination airport. (Being conservative will allow for any contingencies you may encounter during this phase of flight.) As with most any element in flight operations, the above discussion is only one of several "practices" which are effective in achieving the same result. The important things to remember with the GP-4 are engine

# FLYING THE GP-4

temps and airspeed when descending.

Descent Checklist

Throttle – Reduce power as required (monitor engine temperatures)

Mixture – Enrich as altitude decreases for smooth operation (monitor CHT; keep in green arc)

Propeller – Avoid continuous operation between 2100 and 2350 RPM (this is engine dependent)

Alternate Air Door – Open within 1500 AGL to avoid dirt or dust

Airspeed – Maintain at or below 180 knots.

Approaching the Terminal Area

It is one thing to fly into the airport traffic pattern in a Cessna 182 at 120 knots and all together another in the GP-4 at 180 knots. As stated in the above paragraph, you have to get the GP-4 slowed down in sufficient time to safely fly into traffic pattern. Before we get into setting up for the approach and landing in the traffic pattern, lets review some Aeronautical Information Manual (AIM) details on airport traffic patterns.

In the past few years there has been a number of mid air collisions which have occurred in general aviation flight operations. When you look at each of these events (most of which had fatal results), they all have one thing in common: The collisions occurred in and around the airport traffic pattern – at controlled and uncontrolled airports. The Aeronautical Information Manual states (Section 3. Airport Operations): *Increased traffic congestion, aircraft in climb and descent attitudes, and pilot preoccupation with cockpit duties are some factors that increase the hazardous accident potential near the airport. This situation is compounded when the weather is marginal, that is, just meeting VFR requirements. Pilots must be particularly alert when operating in the vicinity of an airport.*

At a recent presentation on mid air collisions, a noted aviation accident consultant shed light on why these collision occur. Surprisingly, all occurred during the day, in VFR conditions and when local traffic was not congested. Here are some factors to consider:

Communications frequency. Using the correct frequency for ATC (Tower, CTAF, Approach/ Departure). If you are on the wrong frequency, you aren't being heard. Big problem.

Correct and accurate reporting of your position, altitude and speed. Many controlling facilities do not have radar, or their radar (is a feed from the local terminal facility and) is not as detailed as on-site ASR (airport surveillance radar). As such, these controllers depend on pilots' ability to provide accurate reporting. Controllers will sequence other aircraft based on your reported position, altitude and speed. If you provide erroneous information, you put yourself and others in jeopardy. Big problem.

Airport traffic patterns are set up in such a way as to allow the flow of traffic to and from the airport. This applies to controlled and uncontrolled airports. The AIM clearly spells out this standard (*reference: AIM Section 3, paragraph 4-3-2 through 4-3-5)*.

3 headed for Oshkosh

# Flying the GP-4

Where problems occur is pilots deviating from this standard and even worse, performing *unexpected maneuvers in the traffic pattern.* Big problem.

I would encourage each of you to review the AIM on this topic and see where you can enhance your flying in terms of safely getting into and out of the traffic pattern. While simple in design, this process is not often followed (especially at uncontrolled fields). During the conduct of pilot examinations, I am amazed to see pilots' lack of understanding and implementation of this important procedure. Of note: The information detailed in the AIM is not regulatory (in fact there is little or no regulatory guidance when it comes to traffic patterns), rather, this information is provide as a standard or method to utilize for the safe conduct of airport traffic pattern operations.

It was a bit of a wake up call to study these mid air collisions, all of which resulted in fatalities and all of which could have been easily avoided.

Getting back in the GP-4….If you have implemented a power reduction process on your descent, you will be at a reduced power setting when entering the traffic pattern (assuming the descent was timed properly and there weren't any deviations in getting to the airport). As such, you should be at reduced power when in the terminal area. At this point if your GP-4 has the manual gear system, you can further reduce your speed by letting the gear "free fall" into the slipstream by releasing the gear handle. George Pereira recommends free falling the manual gear no faster than 120 knots IAS. This procedure will significantly help in slowing the aircraft in the pattern to the desired speed of 100 knots IAS which are your flap and gear extension speeds. In GP-4 aircraft with the hydraulic gear system, you will have to reduce power further to slow to 100 knots IAS in order to get the flaps and gear extended. Keep in mind that this "slowing down" problem is common to many aircraft and simply requires a bit of planning ahead to achieve the desired results without compromising engine cooling. It will take practice and time to get used to the speed and manner that the GP-4 lets down and enters the traffic pattern.

Before Landing Checklist

Seat Belt and Harness – Secure

Strobes and Nav Lights – ON as required

Mixture – RICH

Propeller – FORWARD (high RPM)

Aux Fuel Pump – ON

Fuel Selector – Fullest Tank (center tank if enough fuel exists due to gravity feed characteristics)

Landing Gear – Out of detent at or below 120 knots (manual gear)

Trim – SET

Landing Gear – Extend at or below 100 knots (manual or hydraulic)

Check Gear Down – Green light (s)

Flaps – Extend at or below 100 knots

Downwind – flaps 10 degrees

Base – flaps 20 degrees

Final – flaps 20 degrees

George and Pat Salamone

# Flying the GP-4

Short final – flaps 38 degrees

Trim – Adjust as necessary

Alternate Air Door – Open

Traffic Pattern

Now that we are in the pattern with the airspeed at or below 100 knots IAS, you can extend the gear and set the flaps to ten degrees. You want to watch your airspeed very carefully when on downwind so as to not get too slow (opposite problem). Extending the flaps too early in the pattern will slow you down to speeds below 80 knots IAS (which is your desired approach speed). Here are some guidelines on speeds in the pattern:

Entry: 110 – 100 knots (clean configuration; gear in free fall on GP-4's with manual gear)

Downwind: 100 knots (clean configuration; gear in free fall in GP-4's with manual gear)

Downwind (abeam intended touchdown zone): 90 knots (gear extended; flaps 10 – 20 degrees)

Base: 85 knots (gear extended; flaps 20 - 30 degrees)

Final: 80 knots (gear extended; flaps 30 – 38 degrees)

Fence: 75 knots (slow deceleration)

Touchdown: 65 knots

Having landed several GP-4's (and even the GP-5), there are many ways to accomplish this and they all vary on technique. Airspeed management is critical and you can get into serious trouble if you get slow. The method I use which works quit well is the slow deceleration method combined with a graceful turn from downwind to base to final. As you initiate the turn from downwind to base, reduce power slightly (at or around 15 IMP – this is dependent on configuration and speed at this point) and extend the flaps an additional 10 degrees. You are looking for a descent rate of approximately 700 – 900 FPM and planning to roll out of the turn at 300 feet AGL which puts you just outside the fence and set for final flap configuration followed by flare and touchdown. This method varies from the rectangular pattern slightly by keeping the turn constant from downwind to final.

The GP-4 does not require any special technique or procedure to land successfully. However, it is faster in the pattern and on approach which is something transitioning pilots may not be used to. There have been accidents in the traffic pattern (final approach) where in the aircraft was too slow and departed from controlled flight (i.e. stalled condition). Particular attention must be paid to airspeed during this phase of flight. (Much like the takeoff phase when retracting the gear on manual gear configured GP-4's.)

Landing Checklist

Approach speed – 85 to 80 knots (depends on flap configuration)

Landing gear – Check down and locked – green light(s)

Propeller – FORWARD (High RPM)

Flare – Technique to establish touch down at 65 knots

Touchdown – Main gear first

Landing roll – Lower nose gently

Brakes – Apply as necessary

Flare and Touchdown

Because of the low seat and cockpit design of the GP-4, you

Always draws a crowd

# Flying the GP-4

will notice that during the flare you will have to use peripheral vision to judge your altitude. This is not a difficult technique – you are looking straight down the runway with your peripheral vision giving you indications or height above the runway. The GP-4 settles in very nicely and touches down in a manner consistent with aircraft of this design (high performance, low wing). The key to smooth touchdowns is judging your height above the runway during the flare. Judge too high and you will drop it in. This has occurred many times with damaged or broken landing gear. If you don't flare, you'll land hard with similar results. Practicing landings on larger runways will allow time to feel out the process without getting jammed up on narrow, shorter runways.

Touchdown and rollout are conventional with good directional control from the rudder initially during rollout and then with nose wheel steering. Be very careful not to skid the tires with heavy braking as this will compromise your ability to keep the aircraft on the runway.

Crosswind Landings in the GP-4

Several GP-4's have experienced broken landing gear components due to excessive side loads impose during crosswind landings. This occurs when, during the touchdown phase, the aircraft is not aligned with the centerline of the runway (using the rudder). Crosswind technique is the same in the GP-4 as with any aircraft and simply requires you point the nose of the aircraft down the runway centerline with the rudder and keep your track down the runway with the ailerons. (Be careful not to drag a wing tip here.) One technique for crosswind landings is simply to fly the final approach phase with the aircraft crabbed into the wind, tracking the centerline of the runway. Fly in this manner all the way to the flare wherein you apply rudder pressure to align with the runway centerline and opposite aileron to maintain the proper track down the runway. Several crosswind techniques are in use and can be utilized with the GP-4 - the objective here is to land the aircraft without side loads on the gear. If during the final approach phase you determine that the crosswind is a little stronger than you thought, execute a go-around procedure and fly to another airport and solve the problem of getting back to home base another day.

Go-Around Checklist

Power – Advance smoothly to full throttle and 2700 RPM (this is engine dependent)

Airspeed – Accelerate to 100 knots

Flaps – Retract to 10 degrees

Landing Gear – Retract before reaching 100knots

Flaps – Up

When executing a go-around procedure, be careful not to exceed the airspeeds for flap and gear retraction. Retracting the flaps initially to 10 degrees will assist in getting the GP-4 up and climbing, however, you will accelerate quickly and could exceed the limitations for gear and flap retraction. In some cases, you may have to reduce power momentarily to keep the airspeed below 100 knots for gear and flap retraction. (Refer to Part 2 of this series for a review of procedures for retracting the gear after takeoff.)

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After Landing Checklist

Throttle – Reduce and maintain at or below 1000 RPM

Flaps – RETRACT

Aux Fuel Pump – OFF

Transponder – OFF

Strobes – OFF

Be sure to taxi clear of the run-way before initiating the After Landing Checklist.

Shutdown Checklist

Throttle - 800 – 900 RPM

Radio – Check frequency 121.5 for ELT

Flaps - UP

Avionics Master – OFF

Electrical Equipment (lights) – OFF

Mixture – IDLE CUTOFF

Throttle – RETARD as engine stops

Magnetos – OFF

Parking Brake – Set

Master Switch – OFF

Securing Checklist

Control Stick – Secure

Electrical Equipment Switches – OFF

Master Switch – OFF

Parking Brake – SET

Canopy – Locked

Chocks – In place

Gust Locks – Install

Tie Downs – In place

If you use common sense, take your time and get appropriate training, you can fly the GP-4 safely and have a good time doing it. However, situations do come up where it can go south on you. In Part 4 of this series, we will discuss emergency procedures which are typical in an aircraft of this type.

As with any aspect of the GP-4, please feel free to email me with questions or comments. The information presented herein is general in detail and not meant to be the definitive answer or procedure in the operation of this very cool design.

Mike Traud

Rio Linda Facility

traud@hotmail.com

Adrian's Test Piece—story next page

# BUILDER ADRIAN MCCLELLAND CHECKING IN

I was talking to Bob Ringer the other day….what am I saying, we talk everyday….and I was telling him about the legal requirements for building an aeroplane in Australia prior to the introduction of our "Experimental Category" in the late 1990s.

One of the requirements was that, if you were intending to build a wood aircraft, you had to construct a wood test piece.

The Dept of Aviation would supply the plans for the test piece. This test piece had to be constructed exactly as per the plans, dimensions, size, number of laminations, etc. It included all the types of joints that you would encounter building this type of aircraft...scarf joints, laminations, corner blocks and gussets / skinning.

Once completed, you would contact the Department of Aviation and an inspector would come (for a fee, of course), inspect your workshop (yes, there was a list of requirements for this too), check for test piece for size, construction technique, grain direction (particularly in corner blocks), scarf angles, and then smash it up in front of you to check glue joint integrity.

Thankfully, we now have an experimental category based on the United States system, and I dare say, even more user friendly. I will give you a complete rundown of our current system next time.

Since I ordered and received my plans prior to the new experimental system I had to build a test piece. The new system came in, and I didn't need to have my handwork destroyed, as there are no checks or inspections required prior to starting building.

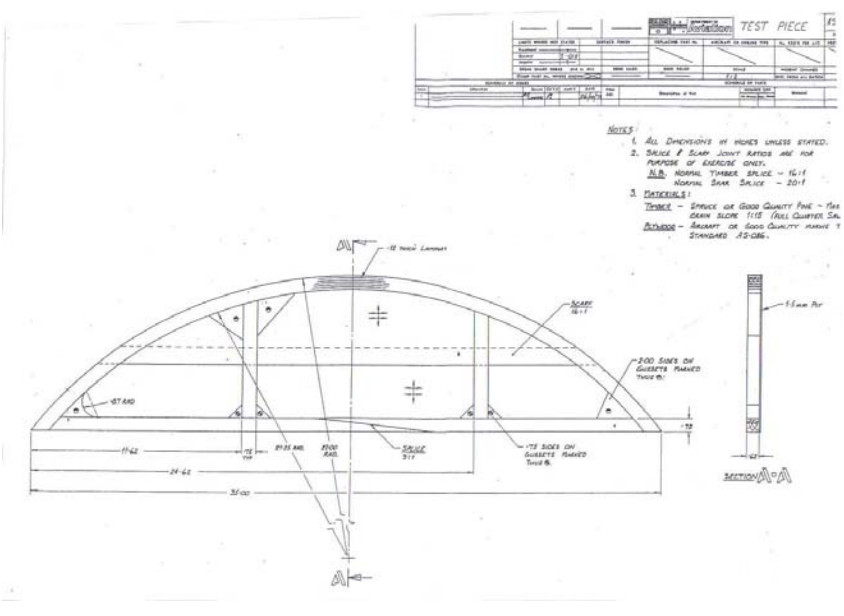
I would say though that anyone thinking of building a wooden aircraft and new to the techniques involved, this test piece would give some knowledge of what is involved.

Cheers for now

Adrian

McClelland

Australia





Adrian's Test Piece

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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

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- order by the piece, sub assy or pkg
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