GP-4 BUILDERS & FLYERS NEWSETTER

March 2005
GP4BFN 46

News for Builders of Fast Wooden Aircraft !

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John Evans Checks in with his Subaru Powered GP-4

HYDRAULIC GEAR PLANS NOW AVAILABLE

As you look through your plans, you will note that the GP-4 has a manual landing gear retraction system. The manual system has worked very well, but I received feed back from builders asking if I would develop an electric hydraulic gear for the GP-4.

I spent about a year of research to design and build a working mock up that I feel has all the amenities to do the job. It has since been flight tested and it works well.

all the push rods, bellcranks, and the air drive uplock system.

The advantages of the hydraulic system are obvious. Flip a switch, and fly the airplane. Less parts to build, and you get the Johnson bar out of the cockpit. Disadvantages? Possible electric hydraulic failure, approximately 5 to 6 more pounds weight, and maybe some more expense. And, the F.A.A. requires a back-up system, even in a homebuilt. This system has

Both systems have advantages and disadvantages. The manual system requires no redundant back up to get the gear down. It is all mechanical, the F.A.A. feels it is fail safe. Its less expensive if you build your own parts. The main disadvantage is muscling the Johnson bar between the seats about 90° to get the gear up right after take off. There are also more parts to build,

an excellent emergency back-up, consisting of a mechanical cable uplock release and nose gear extension. It is both simple and foolproof.

No machine work is required for any of the components. Plans are available for $150.00 from Osprey Aircraft. You can find the address and an order form at www.ospreyaircraft.com.

George

BUILDER'S RESOURCE

BY BOB FOSTER

Many GP4 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 beacoup 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 the present. I have listed all the publications and subject that I have. Perhaps someone else could fill in the blanks.

Kitplanes Magazine

Issue Date / Page / Subject

Jan 97 / pg 87 /Coaxial cable

Mar 97 / pg 69 / Extend landing light life

May 97 / pg 72 / ELT antenna

July 97 / pg 79 / Wire rack

Oct 97 / pg 62 / Radio Connectors

Feb 98 / pg 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 and 2000)

Dec 99 / pg 115 / VHF nav antenna

Oct 2000 / pg 49 / LED position lights

Nov 2000 / pg 65 / GPS

Jan 01 / pg 88 / Dim Bulbs

Feb 01 / pg 85 / Antennas

April 01 / pg 61 / Lamp dimmer

Aug 01 / pg 68 / Aviation software

Feb 02 / pg 43 / Engine monitor

Apr 02 / pg 79 / Battery sulfate buster

GEORGE'S CORNER

BY GEORGE PEREIRA

Fellow GP-4 builders:

Winter time seems to drag on for me. I guess it's because winter slows down good flying days. It has been almost a month since I flew my GP-4.

The valley fog seems to last forever in February. Yesterday the fog burned off by 10 AM. The phone started ringing and the Buzzard flight was on! We had a good turnout for a lunch flight; two Bonanzas, two Tailwinds, a Vari-eze and my GP-4.

When Ralph Hallenborg is up in his Vari-eze he loves to jump me when I throttle back. He sneaks up on my six. Ralph is an ex fighter jock and he knows all the tricks. My four G turns are never enough for his super light plastic toy. My best defense is my climb and speed advantage. It is interesting however, on just how tight the GP-4 gets around. If I am down to 160 to 180 mph, I power up and drop 3 to 5 degrees of flap, and it turns real tight. Not quite tight enough for a breakout from Ralph's plastic demon.

I understand there is some discussion about the landing gear link attachment on the main gear. (See dwg. #33) I rechecked my engineering file and I can't seem to find much wrong with it. The AN 5 stud is retained well aft of the rod end attach point by the 1/8th" rivet. The rivet hole will not weaken the stud that far aft in any shear loads.

If you heat treat the gear truss, you should remove the stud before heat treating. You could also use a close tolerance NAS bolt to make the stud. NAS bolts are stronger than a stock AN bolt. A stock AN 5 bolt is good for 7,000 lbs. in single shear. There is no doubt about loading up this link attach point if you are drifting sideways on a cross wind landing. The stud socket must have a good, sound welding job around this 1/2" X .065, 4130 steel tube, as well as the gusset that backs up the side loads.

While we are on the subject of the main gear, my drawing is a reprint from newsletter #35, page 6. It is a simplified way of fabricating the scissors assembly shown on dwg. #34.

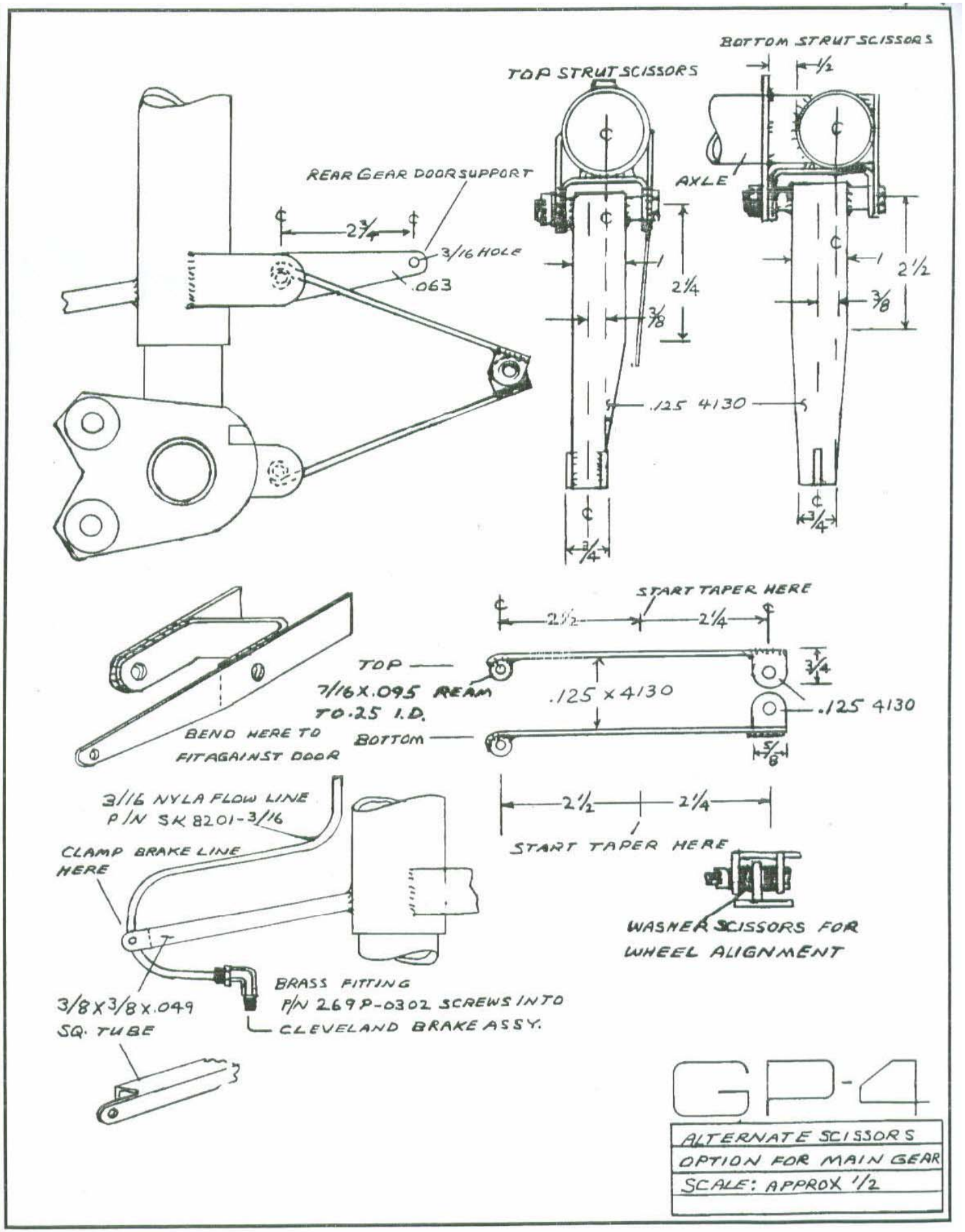
A number of you have complained about how difficult it is to bend the channel to make the original scissors. It is important that you ream 7/16 X .095 to accept the AN 4 bolts which attaches the scissors to the strut. This insures a no-play system that keeps your wheel aligned.

When you align the wheel, using a series of washers, align the wheel for a straight center line. No towe in and out.

Please send Elton photos and progress reports for our news letter.

Regards to all,

George


BOTTOM STRUT SCISSORS
TOP STRUT SCISSORS
1/2
REAR GEAR DOOR SUPPORT
AXLE
2 3/4
3/16 HOLE
.063
2 1/4
3/8
2 1/2
.125 4130
3/4
START TAPER HERE
2 1/2
2 1/4
TOP
7/16 X .095 REAM
TO .25 I.D.
BOTTOM
.125 X 4130
.125 4130
3/4
5/8
BEND HERE TO
FIT AGAINST DOOR
3/16 NYLA FLOW LINE
P/N SK 8201-3/16
CLAMP BRAKE LINE
HERE
BRASS FITTING
P/N 269P-0302 SCREWS INTO
CLEVELAND BRAKE ASSY.
3/8 X 3/8 X .049
SQ. TUBE
WASHER SCISSORS FOR
WHEEL ALIGNMENT
GP-4
ALTERNATE SCISSORS
OPTION FOR MAIN GEAR
SCALE: APPROX 1/2

BUILDER'S UPDATE

STEC-30 AUTOPILOT UPDATE

JIM SIMMONS, CHESHIRE, CT

I have written a previous article (GP-4 Newsletter, February, 2004) concerning the successful installation of the STEC System 30 autopilot in my GP-4. I have been requested to provide the specific information regarding exactly what to order to duplicate the installation.

In the table to the right are the exact part numbers and descriptions to assist you in ordering correctly:

STEC PART NUMBER	DESCRIPTION OF COMPONENT
ST-XXX30	Describes system being ordered
01260 - 11 - 0 -14	Turn Coordinator / Auto pilot
01261 - 36 - 14	Pitch Computer
0105 - 4 - R4	Roll Servo, 14 volt
0107 - 2 - P7	Pitch Servo, 14 volt
0111	Pressure Transducer
6030	Bracket, Stop, Roll servo
0345-5	Assy, Control Rod
39106-144	Assy, Cable Extension (Servo)
3306	Rectangular Plug 9 CT
6103	Connector 9 Pin
5508	Cover 9 Pin

As mentioned in the previous article, STEC will fabricate each of the necessary electrical cables to the builders specifications.

In addition to the avove STEC items, I also ordered ST4000C19 Directional Gyro with Heading Bug, for coupling to the Autopilot.

After using this system for over a year, including coast to coast travel, I believe it is an excellent choice for the GP-4.

Jim Simmons

BUILDER'S UPDATE

PLANNING EQUIPMENT LOCATION & ROUTING

JIM SIMMONS, CHESHIRE, CT

Our GP-4 is an excellent high performance airplane. To accomplish this level of performance the design was kept very "compact". Since I planned to use my Gp-4 for some extensive cross country travel, I chose to equip my GP-4 with full IFR capabilities. Additionally, I opted for the VM1000 engine monitoring system and a two axis autopilot system.

Note: GP-4 builder and flyer Jake Jackson installed the VM1000 in his GP-4. I had the opportunity to fly with Jake and he very convincingly sold me on the features and benefits of this system. Once those decisions are made, the next task is finding locations for all the indicators and the ancillary equipment necessary to support those systems.

The first task is to design your instrument panel and plan for the physical locations of all the indicators and switches to accomplish your goal. Our "compact" design significantly limits us to the size and shape of this panel. I opted for a software package called PanelPlanner to assist me in this design. The software contains the GP-4 panel (to scale) as well as all the instrumentation and avionics you may care to configure in your installation.

The software permits you to move the various components around, at your discretion, while maintaining the exact scale to illustrate whether it will actually fit, or not. The software package also provides the dimensions for the depth of the components. If you are planning a complex or crowded panel, I highly recommend this software package. The real benefit of this package is that you can do much of your planning prior to actually purchasing anything. Information concerning this package can be found at:

www.PanelPlanner.com. *Note: It originally sold for $100.*

Once the various indicators and switch locations are selected, you will now need to research each system and find a location for the various support devices for these systems. There are not many places within the GP-4 that will provide suitable locations for these devices.

I detemined that the best location would be under the seats of both the pilot and the co-pilot. Our plans indicated the desired locations of the flap motor, the dump valve, and the landing gear hydraulic pump. After that, you're on your own. Figure 1 illustrates the general layout of the support equipment for my GP-4.

Once the above decisions concerning the physical locations of all the devices are made, you will now need to determine the best routing of wiring, brake lines, hydraulic lines, pitot lines, static lines, vacuum lines, antenna cables, etc.. Once again, this is no small task in our "compact" design.

In general, I opted to route high current or voltage wiring down

BUILDER'S UPDATE

PLANNING EQUIPMENT LOCATION & ROUTING

JIM SIMMONS, CHESHIRE, CT

the right side of the fuselage. This included the #4 gauge battery and ground cabling, hydraulic pump relays and wiring, and the position and strobe light wiring. I selected the left side of the fuselage for the low voltage or signal wiring. This consisted of antenna cabling and all necessary electronic signal cables. I believed that this would minimize or reduce any possible electrical interference between these wire bundles.

The next decision was where to locate the holes which pass through the firewall for all of the sensor cabling required to support the VM1000 Engine Monitoring System. Since I opted to install the VM1000 processor under the pilot seat, the main hole through the firewall for cabling is below the engine mount, on the pilot side of the firewall.

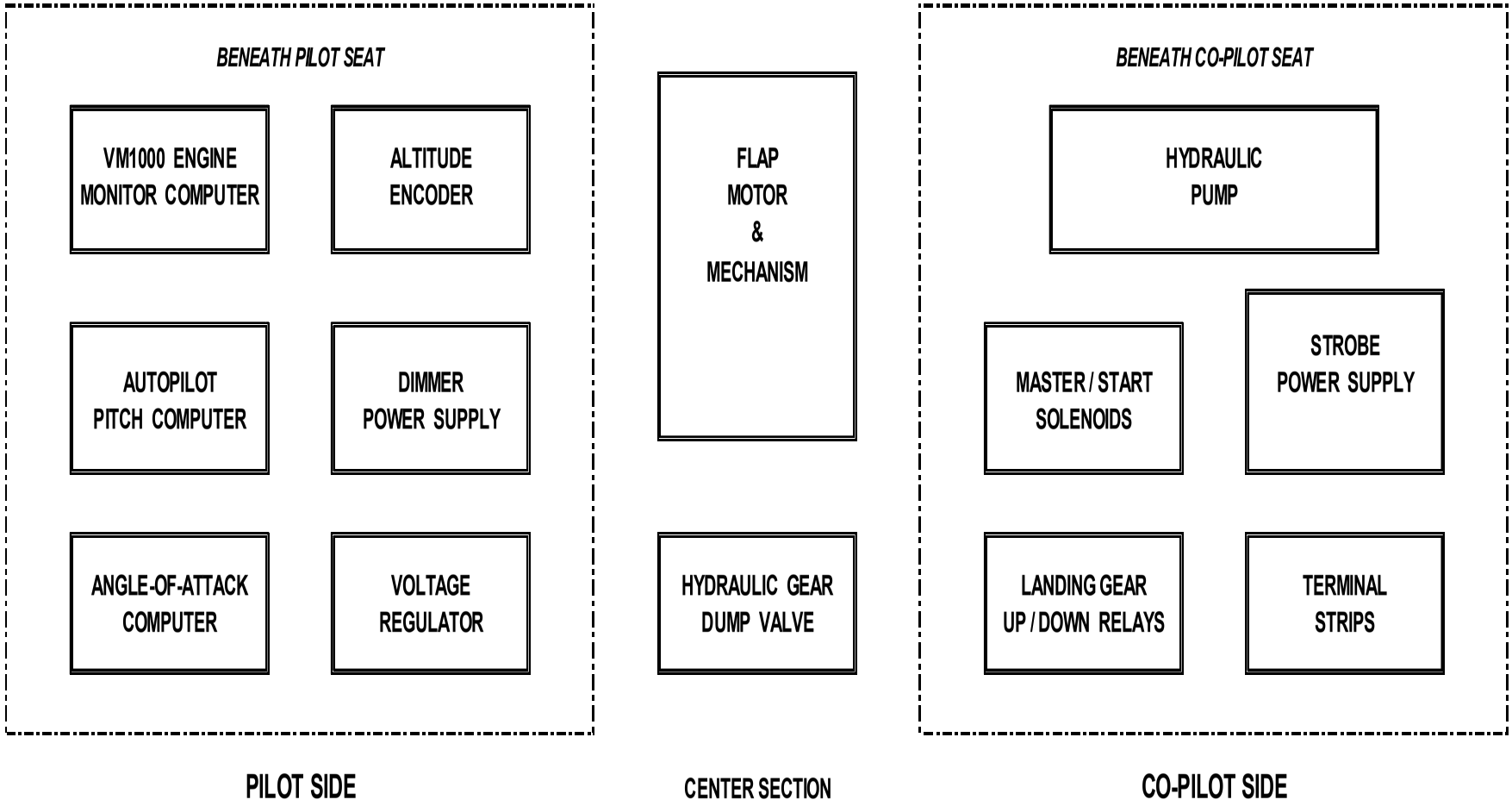
This permits the cabling to run from the engine compartment, under the floor on the pilot's side, under the main wing spar and into the area under the pilot seat. I should also point out that due to the significant amount of wiring necessary to interconnect from the equipment under the seats, to up behind the instrument panel, I needed to create a major route for the cabling from under the floor on the pilot side, up the side of the nose gear tunnel (inside the cockpit) and then behind the instrument panel. This was necessary because the area through the center console will be filled with rudder cabling, throttle, mixture and prop control cables, as well as any wiring necessary to support indicators and switches within the center console area. Additionally your aviation stack in the center console will also serve as a major restriction in the routing or wiring up through this area.

For my installation, I opted to use the aluminum tube ducts which George Pereira illustrates beneath the left and right sides of the main fuel tank for the routing for my vacuum lines to the rear of the instrument panel. For my installation, very few wire actually pass through these tubes.

I fully realize that everyone's installation will be different, depending on the level and complexity of the equipment selected for your GP-4. I only offer this summary of my systems to illustrate the thought process which I used to get to my final configuration. It has served me well and I continue to enjoy my Gp-4.

Jim Simmons

FIGURE 1



EQUIPMENT LOCATIONS AS VIEWED FROM ABOVE THE GP-4 COCKPIT

(NO SCALE)

BUILDER'S UPDATE

ABOUT THE LANDING GEAR

BOB RINGER, HUBLEY, NOVA SCOTIA, CANADA

Hi Everyone,

I have been trying to sort out what I perceived to be a problem with my set of plans for the hydraulic gear.

My plans on page M-6 show the main gear being held in proper alignment with a scissors arrangement the same as the manual gear. I talked to Jim Simmons who plans were dated 1996 (my M-6 is 1999) and his plans call for the slot and hard bronze key. I call George and he stated he went back to the scissors arrangement due to inherent problems with the key system, ie. wearing of the key, spreading of the outer sleeve of the main gear requiring a clamp, positioning of the key and slot very critical to ensure proper wheel alignment, machining required to fabricate, etc.

The scissors is virtually maintenance free, is easier to fabricate, wheel alignment can be adjusted by shimming the scissors and the scissors are better able to handle the torsional effect of the wheel being off set from the gear leg. This applies to the main gear only as the nose wheel is mounted directly below the nose gear leg and and therefore is not subjected to torsion. George recommends using the scissors for the main gear and retain the key and slot for the nose wheel.

With respect to heat treating the gear, both George and Jim Simmons did not have theirs heat treated. George does not think it is necessary. Jim was told by the shop who does that type of work it would change the dimensions of the gear leg and they doubted it would still fit. The proper way to get the heat treated value called for is to heat to 1600 degrees F, quench with oil, reheat to 600 degrees and immerse in lime. This is according to reference charts. I am not going to heat treat mine.

I also discussed with Jim and George (you should see my telephone bill!) the problem with the trunion link arm pivot on the gear leg. George is of the opinion it is okay. I share Jim's opinion that a bit of reinforcement and moving up to a 1/2 inch bolt from a 3/8 is certainly not going to do any harm. The arrangement Jim published in the News Bulletin with a set bolt holding the pin in place instead of drilling for two 1/8 rivets seems like a real good idea. George calculates the present setup as called out in the plans should handle a shear force of 7000 lbs.

Happy Building

Bob Ringer

BUILDER'S UPDATE

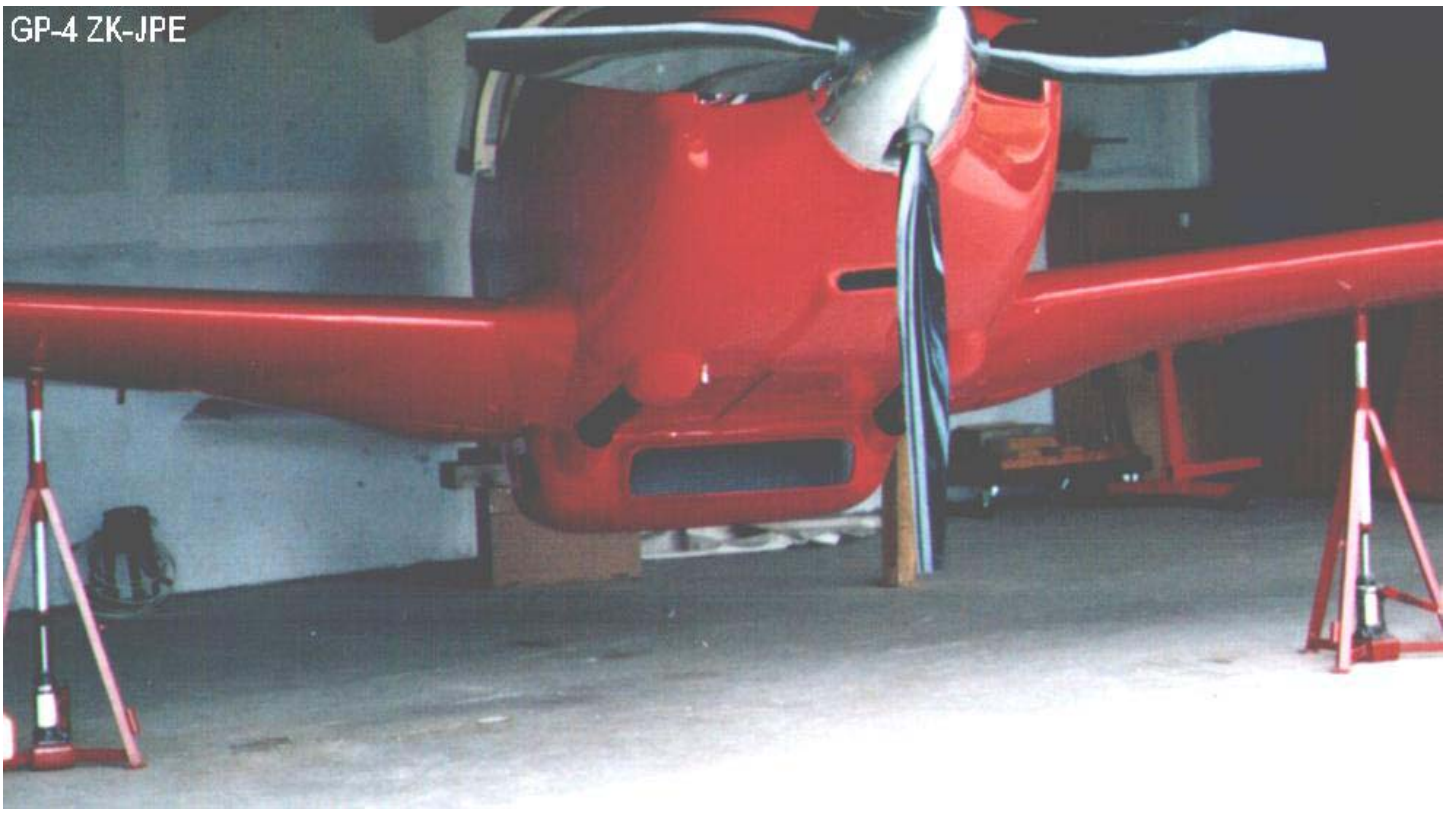
BUILDER/PILOT JOHN EVANS CHECKING IN NEW ZEALAND

John's GP-4 is currently down while he overhauls his Subaru engine (hopes to be back in the air by end of the month).

John has sent us the following drawings and photos of his gear modifications.

WoW !

Gear Up

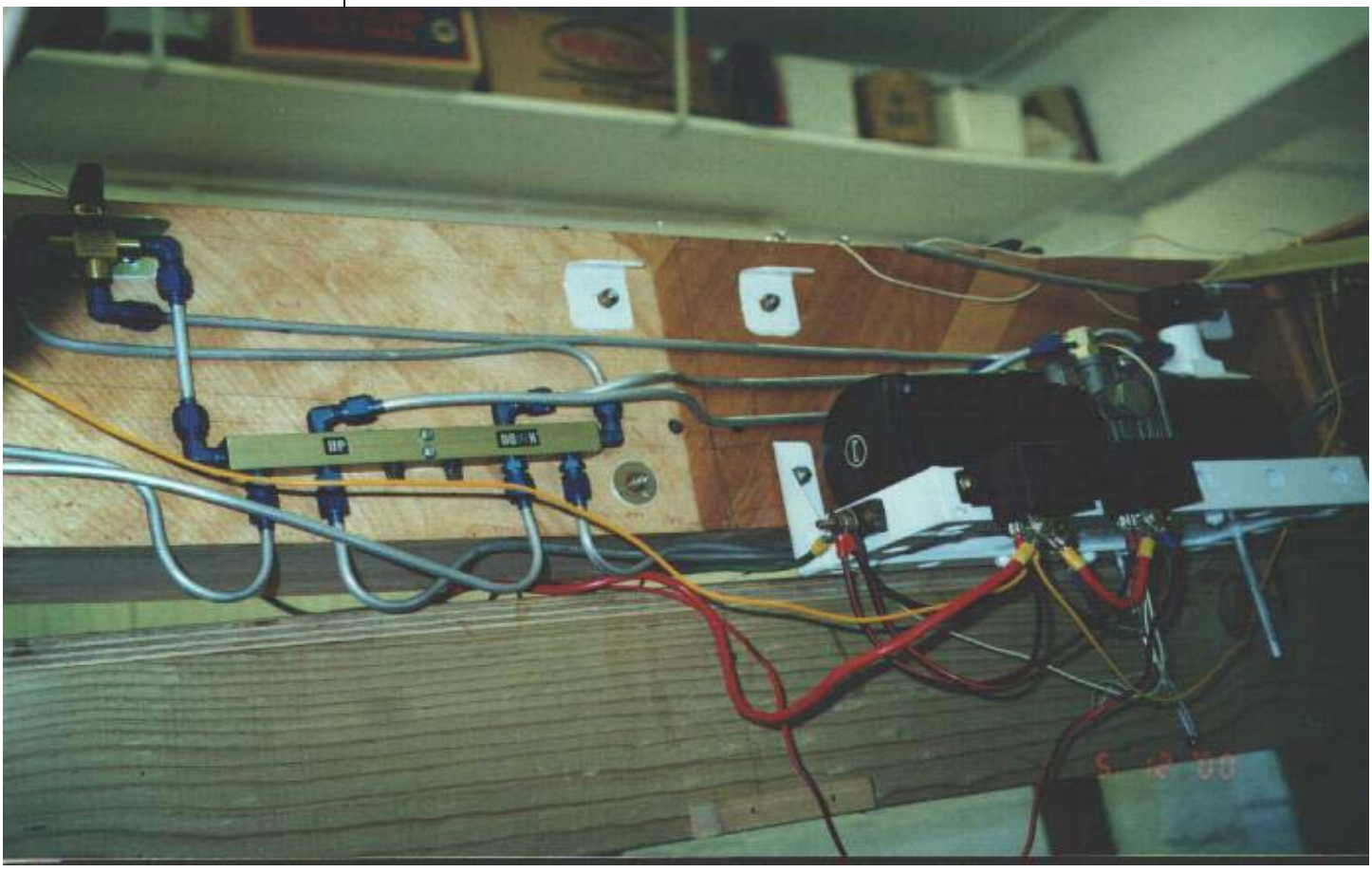


Radiator ↑ Radiator Scoop ↓

Subaru Engine

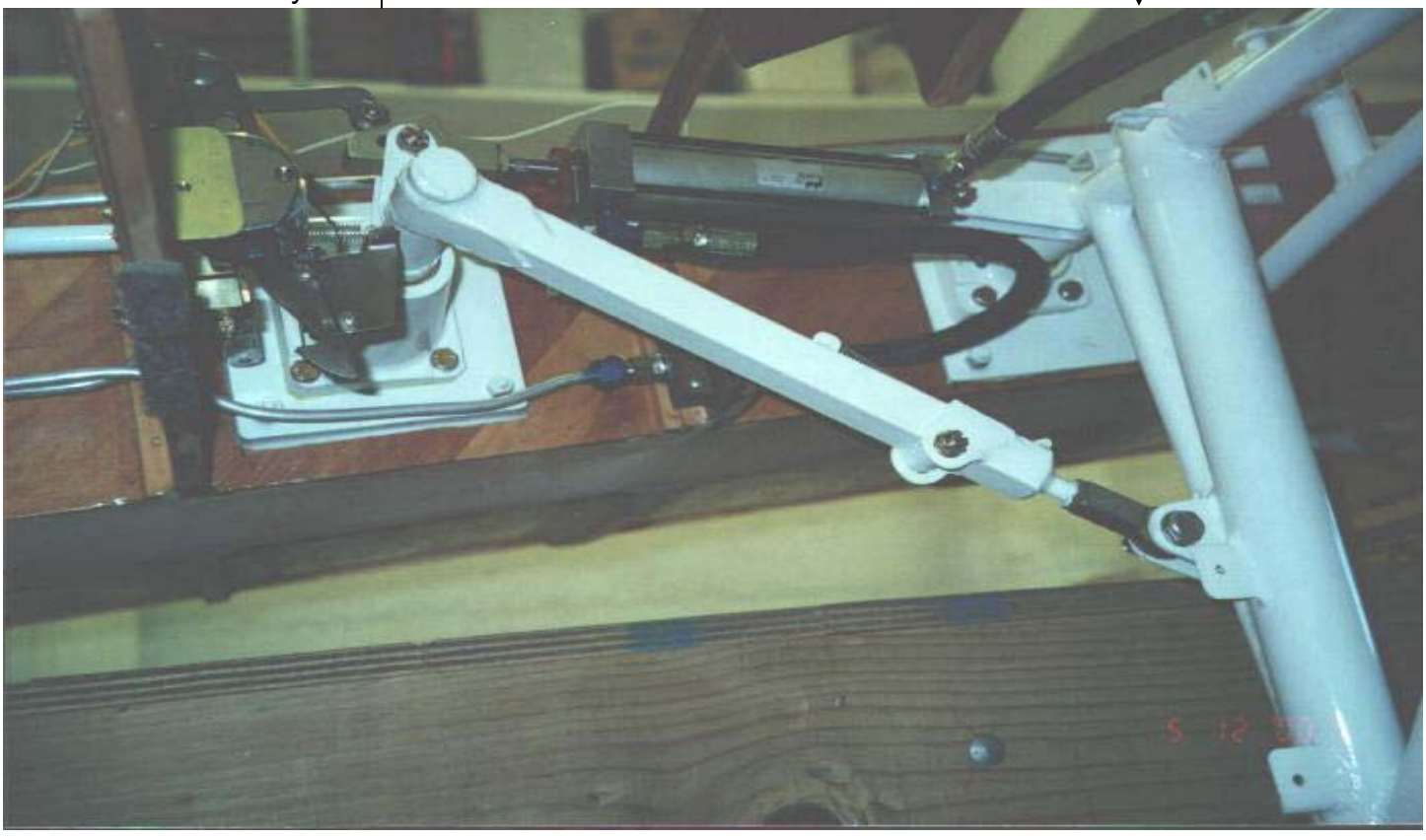
Subaru Engine

Hydraulic Pump Mount



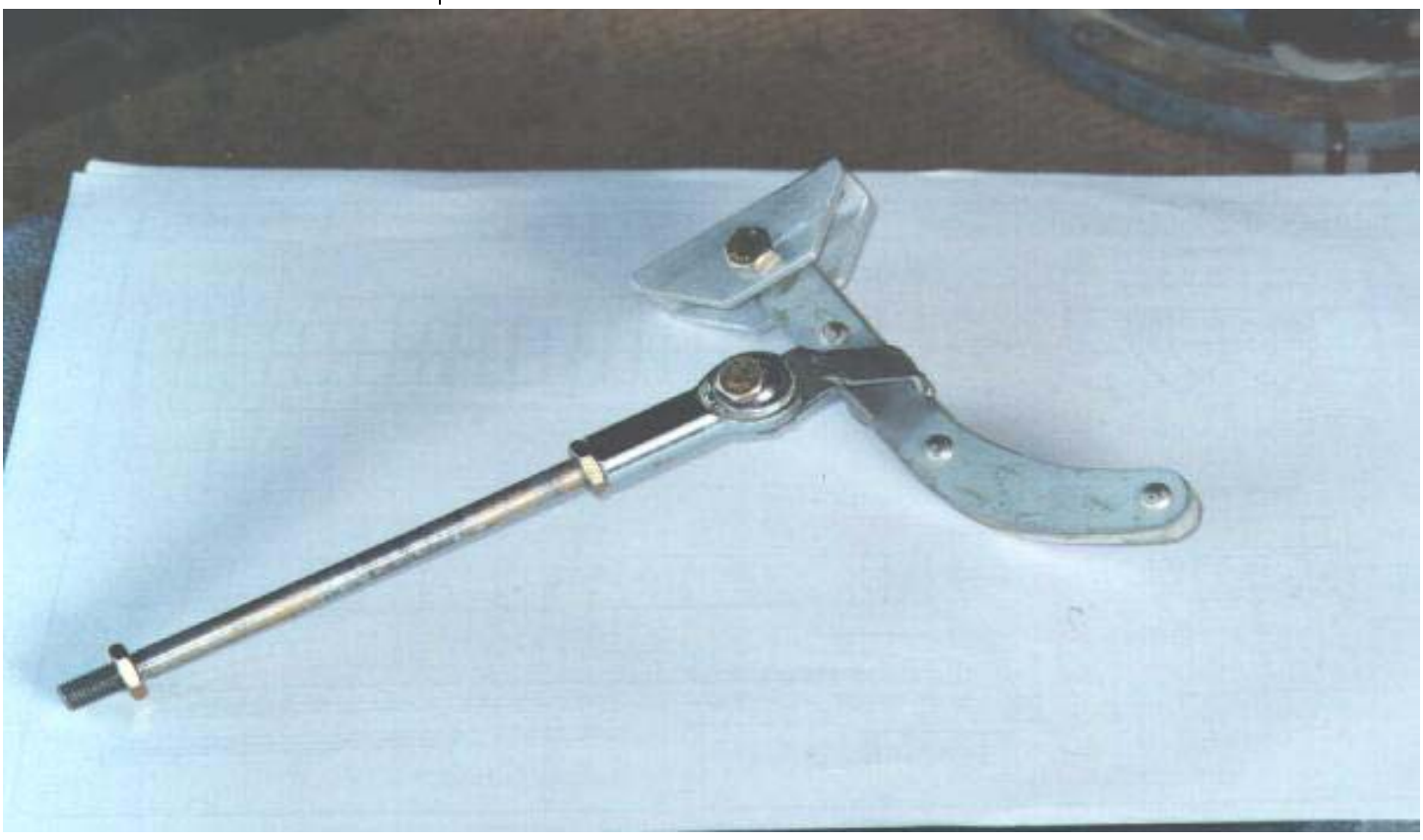
Gear Layout

Main Gear Down

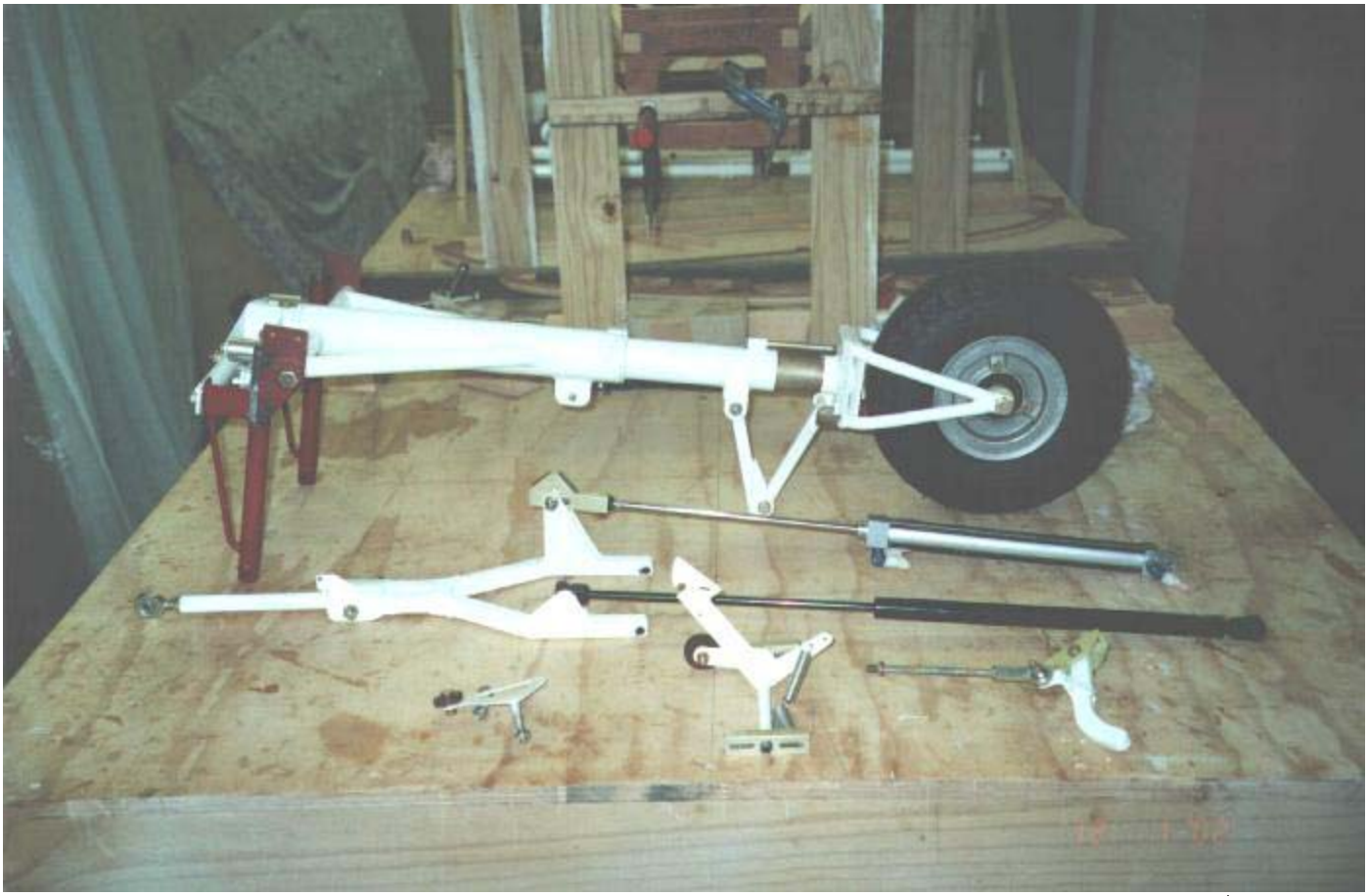


Main Gear Up

Nose Gear Door Actuator

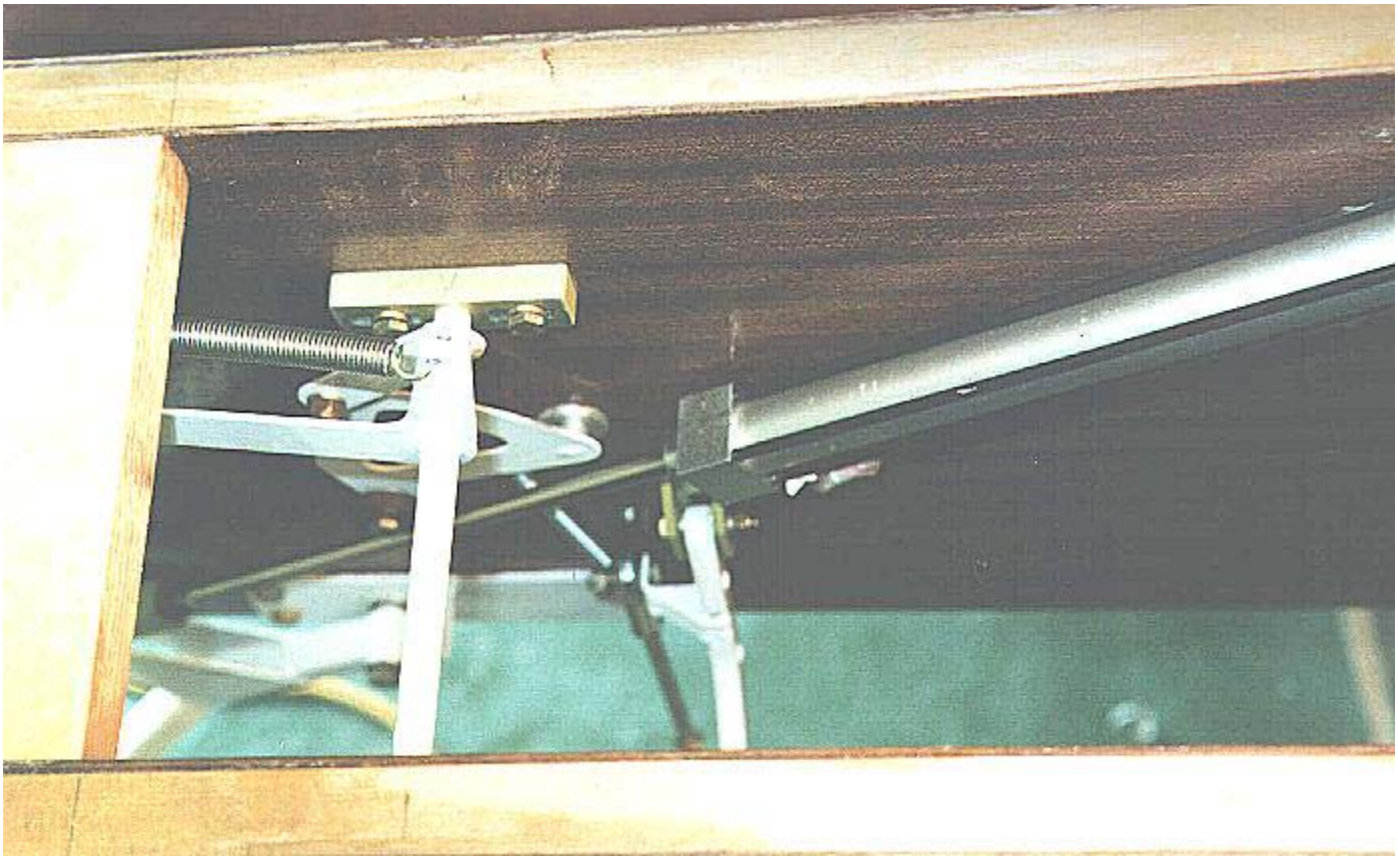


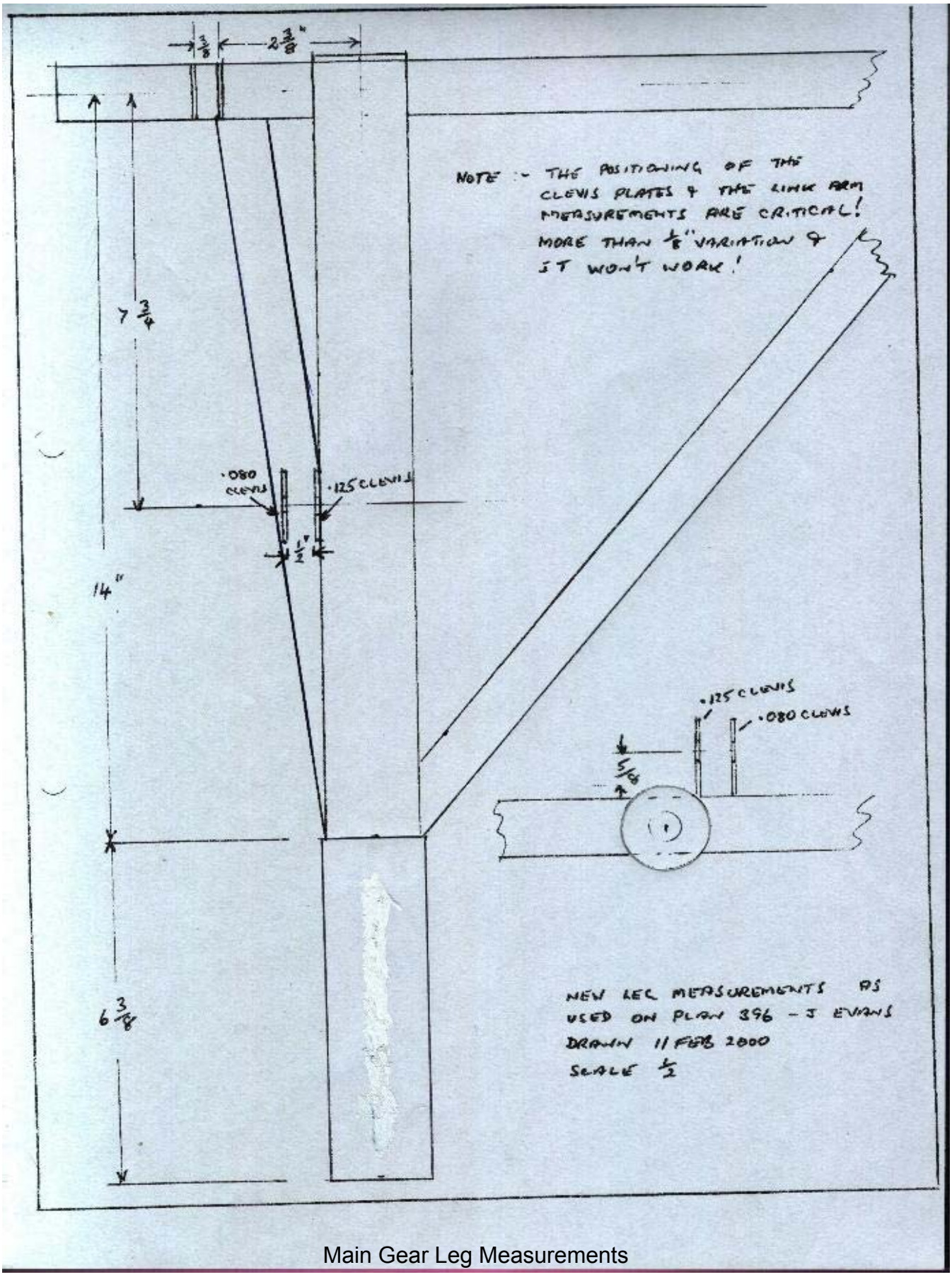
Main Gear Link



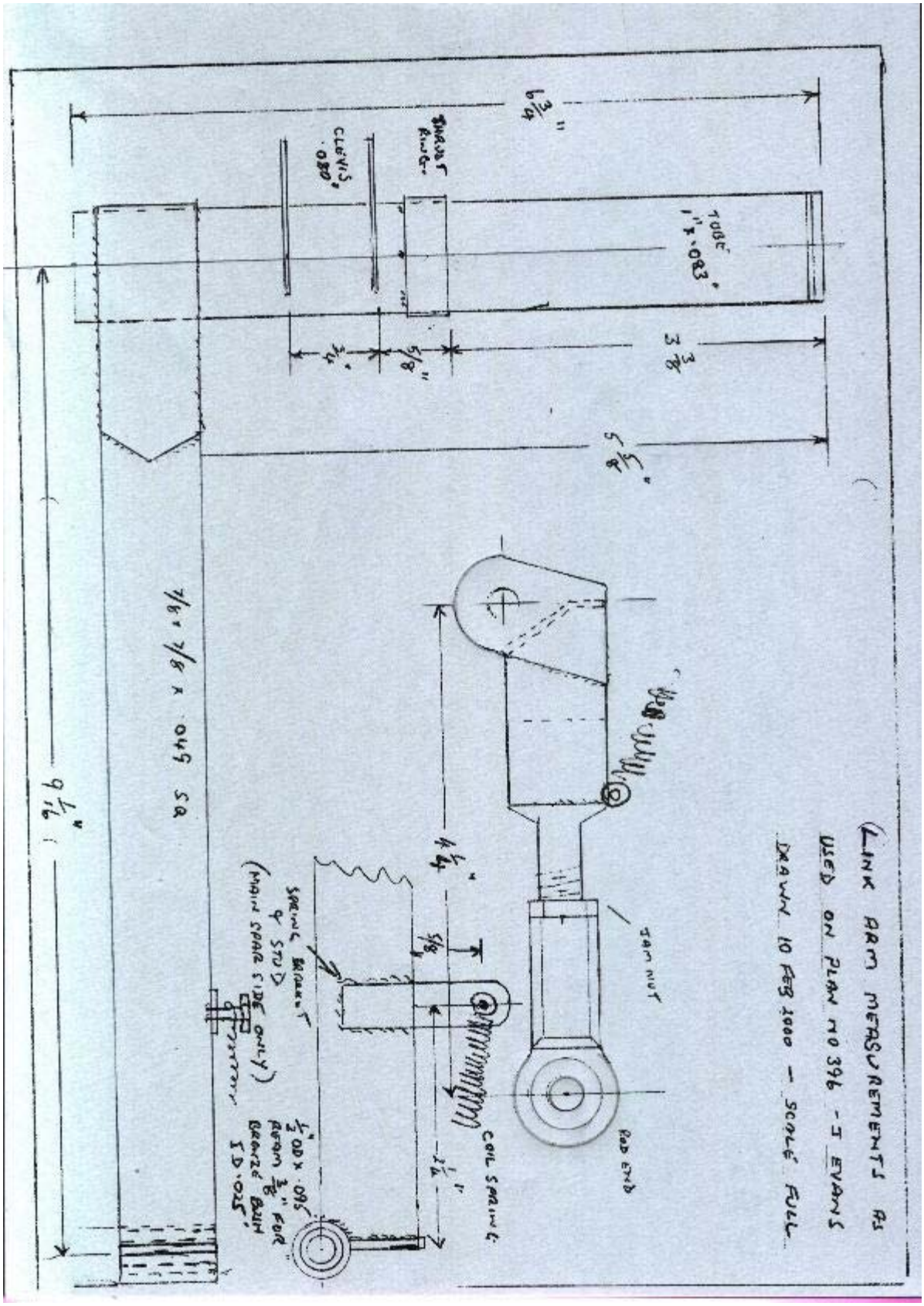
Nose Gear Parts ↑

Nose Gear Uplock Cam ↓

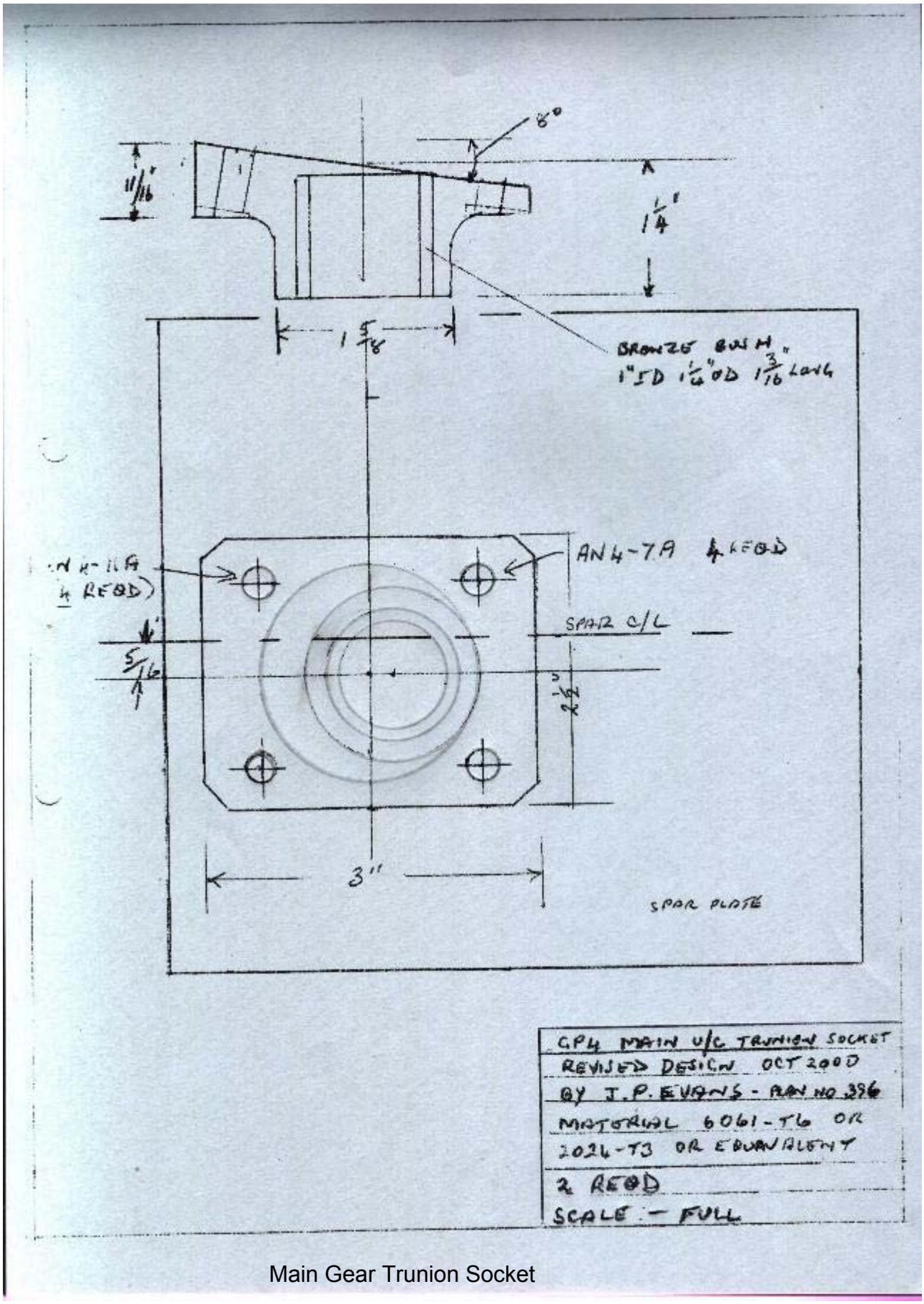




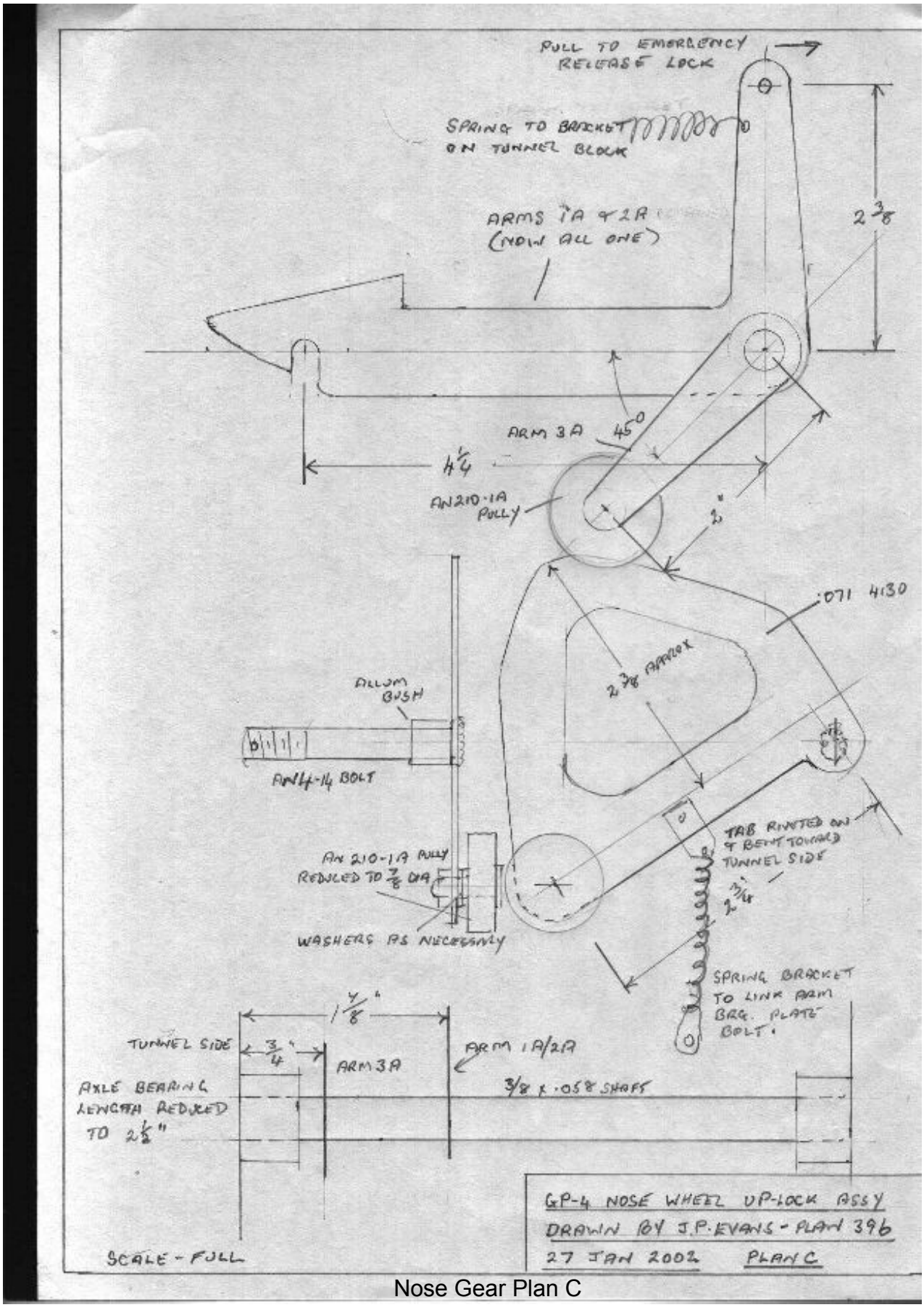
Main Gear Leg Measurements



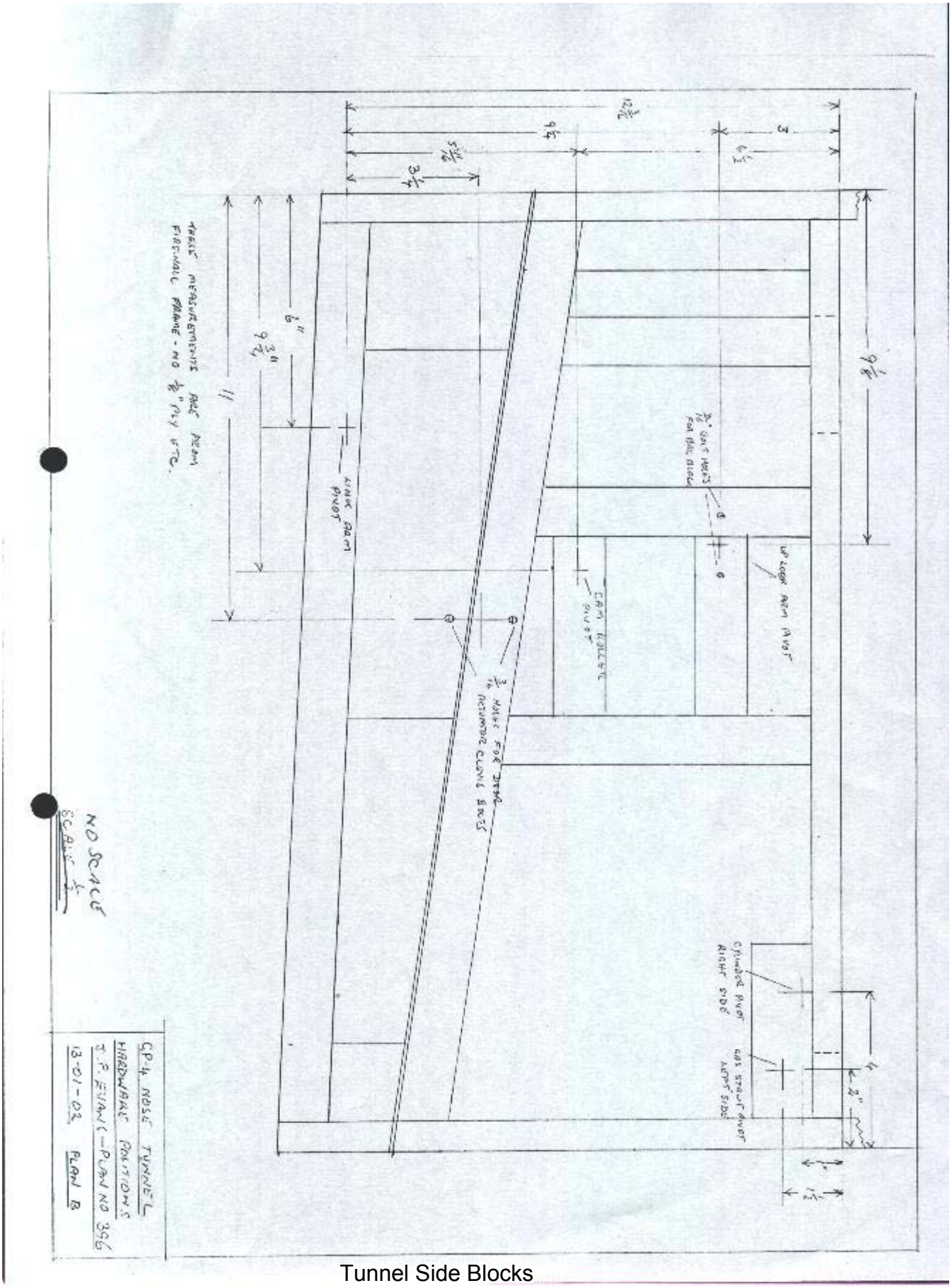
Main Gear Link Plan



Main Gear Trunion Socket



Nose Gear Plan C



Tunnel Side Blocks

BUILDER'S UPDATE

BUILDER BOB LOCKMILLER CHECKING IN

My project started way back in '91 and had moved along pretty well until I moved in '94.

That left me with most of a fuselage and completed tail feathers. After that, I made some fits and starts but nothing substantial.

Well, after a way too long lay off, I got back to working on my project last spring. Made good progress from scratch to finish of the main and aft wing spars and aft ribs. As I started to install the nose ribs, I realized that decisions needed to be made regarding how and when to approach the fuel tank fabrication and installation. This led to considerations of the landing gear installation.

After much internal debate (yes, I do talk to myself a lot :-) I decided on the hydraulic system that George designed and after a short conversation with him, I placed my order for the plans. By the way, I must say that it is always a pleasure to talk with George and I always come away from the phone a bit more knowledgeable.

While waiting for the plans, I tended my parents garden and started doing other household chores (bad idea). When the plans arrived, many hours of study and plan comparisons were needed before I had enough understanding of the plans to place an order for steel. While waiting for the steel, more household chores (again, another bad idea).

Well, long story short, the steel arrived but I had fallen into the trap of "household chores". So much to do and so little time. Looks like now I'm building a garage. I'll fill you all in when I escape again (and have more progress to report).

Happy Landings,

Bob Lockmiller, GP4 plans#133

NEED HELP?

Have a question, idea, or is there something you don't fully understand?

There are currently about 525 sets of GP-4 plans in builder's hands. Of course, its impossible to know how many builders are active, but we can hope :)

Help / answers / advice is only a phone call or note away. Please remember to include your plan serial number when you write, it helps to locate your mailing address.

Write or call:

George Pereira

Osprey Aircraft

3741 El Ricon Way

Sacramento, CA 95864

Ph: 916.483.3004

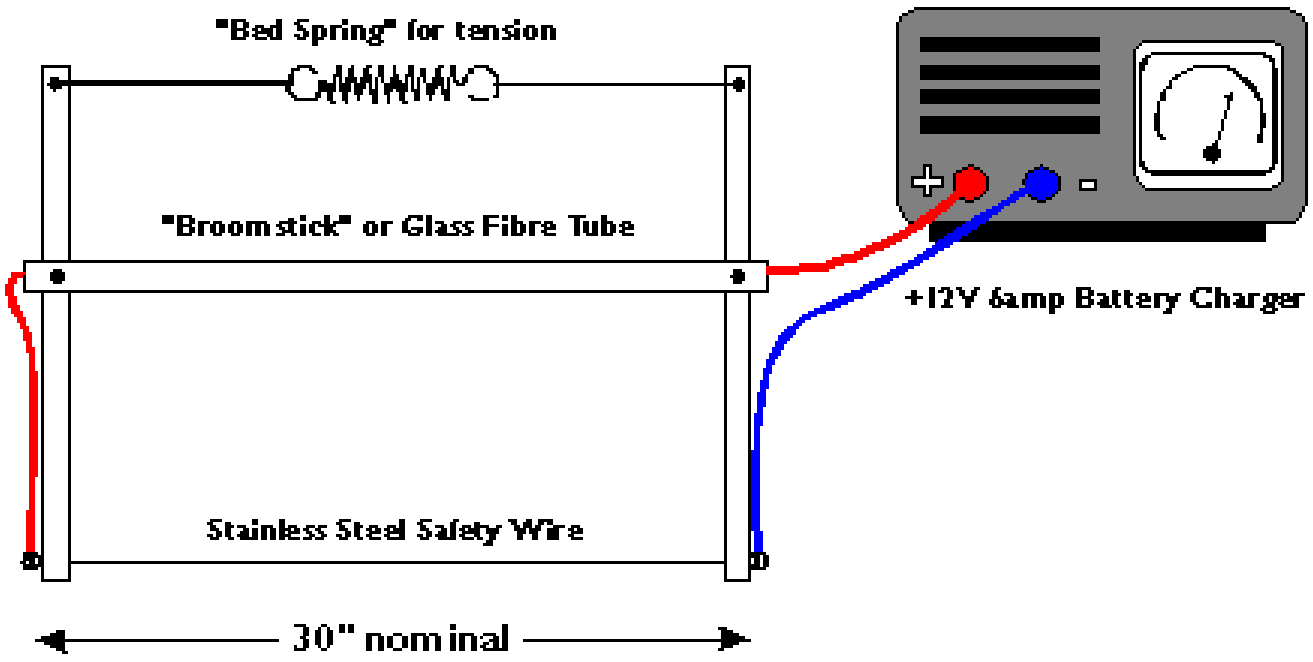
Fax: 916.978.9813

Email: gp-4@juno.com

BUILDER'S UPDATE

Bob Ringer found this on the internet, looks like a good way to shape the foam for the fillets, etc...

Poor man's Hotwire Foam Cutter



A simple freehand hotwire cutter can be fabricated from three lengths of 1" diameter dowel or glass fibre tube pinned with nuts and bolts. Across the top of the bow is a spring tied to each leg with strong wire to maintain tension in the hot wire when it heats up.
Across the business end is stretched a length of stainless steel safety wire or a piece of resistance wire recovered from an old heater element. These pass through a thin slot sawn into the dowel ends.
The ends are simply terminated with screws, nuts and washers to the positive and negative leads from 6-10 amp battery charger. Around 4.5 amps is required for a 30" wire.

When cutting polystyrene foam the correct heat will produce a hissing sound and leave fine "hairs" of styrene in the cut. Wiping the wire helps remove any molten blobs of plastic which will mar the cut.

The trick to good cores is to move the wire across the former guides at an even rate so the start and ends of the cut occur in the same place on each guide. Low tension on the wire will result in undercuts to the form as well pulling the wire through too quickly causing it to bend or sag.
See GUIDES.GIF for hints on making up profile guides

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Thank You!!

CLASSIFIEDS

For Sale:

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

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

I get great discounts on shipping and I pay for the packaging. For current pricing, please call or e-mail: Bob Ringer—Halifax, Canada.

Phone: 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. Available from: Raymond Beazley, Dartmouth, Canada.

Phone: 902-465-6141

Cell: 902-497-4187

E-mail: ray1beazley@accesswave.ca

NOTES—

* You do not have to order the entire package at once. You can order piece by piece, by sub assembly or by complete package.

* All parts are tagged for identification. Dimensions are as per GP4 plans so you must notify me of any deviation from the plans that would effect the size of a particular part.

* The pieces are cleaned by glass beading and then primed with an epoxy primer.

* You can order any part at your convenience. *Note:* I have all the necessary metal (from Wicks) however items such as the dynafocal engine mount ring, landing gear springs and hydraulic rams can be supplied by the builder or I can supply them at an additional cost.

* Small items can be supplied within a week with larger items and complete packages requiring up to six weeks.

Thanks !

Raymond

For Sale:

Back Issues of the GP4BFNewsletters

We have all the back issues available in either electronic (.pdf) or hardcopy.

Hardcopy

Complete set of 1 - 40 = $40.00

Individual Issues 1 & 50 = $1.50 ea

Individual Issues 41— 45 = $3.00 ea

(1 thru 40 were black & white, beginning with GP4BFN41 we switched to full color, hence the pricing difference)

CDs containing electronic files of the same are available

Complete CD of 1—40 = $10.00

Complete CD of 1—45 = $25.00

All are plus shipping.

Please contact me at ecultice@woh.rr.com for a complete price and payment options. We currently accept checks, money orders, and paypal payments from around the world.

Thanks……Elton