You can work inside the fuselage with it laying on the ground, but you risk damaging the belly. I elected to suspend it. I decided to sling it using a "cherry picker" and a 1000 pound ratchet shipping strap through the spar carry through. The tail is held up by inserting the actual tail spring into a typical auto engine stand and strapping it down to keep it inserted. Later on, I simply set the tail on a saw horse on some thick layers of foam. I put the heavy empennage bulkheads right over the sawhorse.

All the foam padding under the engine stand and the empennage is packing from the truck that brought the kit. There's lots of foam, and most of it is under the "canoe" of the fuselage to protect somewhat in case the canoe falls.

Now I'm ready to get in there and work! I'll begin with the baggage area and the battery hold down box.

Fuselage Interior and Floor Panels

What you see above is the fuselage as it came from Team Rocket. It is a quickbuild kit, and most of the fuselage is factory jigged and assembled in the Czeck Republic.

Since I started my build project inside the fuselage, the first thing to do is get the floors ready. It's a great place to practice skills because the pieces are simple, the work is very straight forward, the parts aren't structural, and you can easily hide mistakes under the carpet.

This is where I've learned to buck rivets. I started using a 4x gun, but it's defective and has to be sent back to Taylor. So I'm using a 2x gun. I've learned through trial and lots of error that a quick solid burst on the trigger makes for the best shop head. Trying to ease into it, like when drilling, seems to fold the rivet over more often than not. So a quick BRRRRP! directly down square over the rivet with good pressure works best. It's definitely an art to do them quickly and correctly.

The above pic shows the three baggage floor pieces set in place. I'm not permanently attaching any parts at this point. I have too much work to do under the floor.

Big note: Plans call for riveting nut plates under all the longerons and cross braces to screw down the floor panels. Like many others, I've bought a bunch of the clip on nut plates for #8 screws and will be using them instead. Much faster and more forgiving that way. Just trying to determine if I can countersink the screws to get a nice finish.

This was a fun little project. Many of the floor parts, and control surfaces for that matter, have stiffeners made of formed aluminum angle. You simply cut and trim them to size, spread them out evenly and rivet them to the bottom of the panel. This adds considerable stiffness to the pieces. I did my floors per plans. Lots of builders are making storage spaces under the floor, but I'm planing on carpeting my entire cabin restricting access to the floor panels. I can always go back and add storage lockers if I want. That's part of the beauty of building it yourself. you can do it any way you want! You can barely see the flush rivet heads on the floor panels. I back riveted all of these on the table top on a large piece of flat steel. If you're going to do a project like this, the bigger back riveting plate you can come up with, the better. I have a palm sized one, too, for taking to the plane as needed. But in the bench top, big is good, huge is better.

These panels are the front seat panel and the front floor panels. The longer seat panel is the location of the footwells for the passenger heels and rudder pedals. I will install them later. I have many things to position under the floor that might interfere with the "heel buckets". Also, the plans are not clear on positioning in this area, so I'll need clarification from Mark Frederick at Team Rocket before proceeding. I think many places in the plans are unclear because there are so many different ways of doing things and setting things up, there's too many choices and too many variables to contend with. However, since I'm a rookie builder, I'm going to get help from the "home office". Via the Internet.

The brake pedal parts were match drilled and ready to rivet. I have primed the rudder pedals, which are mostly steel tubing and they are ready to paint. I need clarification from Mark on dimensions of the hing points before installation. And oh yes, I'm thinking of having the text on the paper above the parts cut into the brake pedals instead of just drilling lightning holes. I'll price that out and see if it's in the budget and time frame.

I finally got the floor panel stiffeners and the heel buckets in place and ready to go. I made a mistake on cutting open the hole for the right heel bucket and wanted to see it in place before riveting it in place. I think I'll have to retrim the part. The "canoe" is starting to shape up. With the panel in place,

and a couple simulated instruments on there, it is starting to feel more like an airplane.

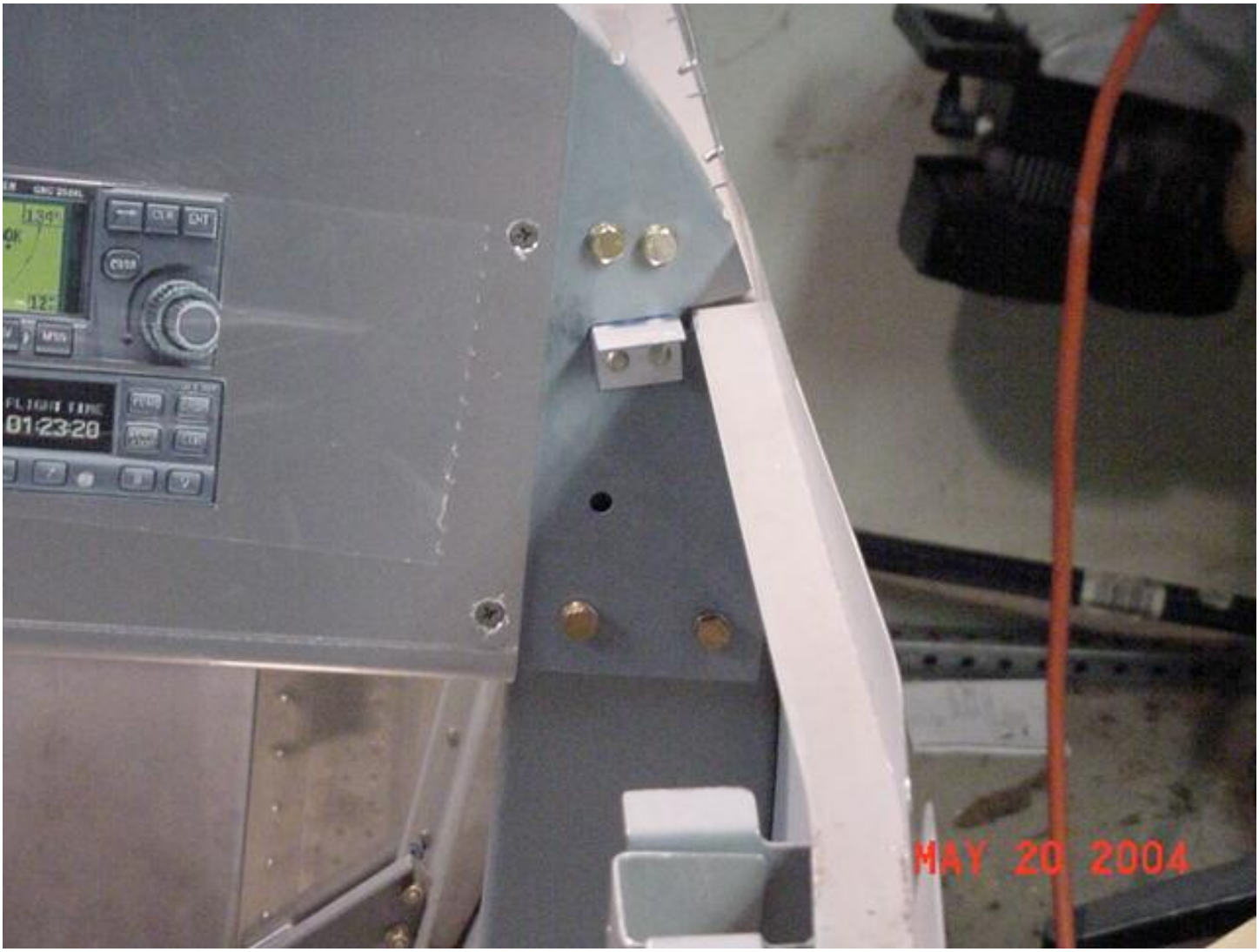
Man, what a chore! I was going to use those removable nutplates for the floor and finally decided to rivet them in. It took me about 9+ hours to get the floors prepped and the nut plates installed. Wow! A LOT of work. I used the #8 screws and the nutplates provided with the kit. I tried to make sure that every "loose" corner was screwed down to keep that "snare drum" effect to a minimum. The toughest place was inbetween the "triple trees", that triangular tripod area amidship. I had a hard time getting a drill and squeezer in there to do all the drilling and countersinking required to install the nutplates. Finally, I used a pair of special Vice Grip squeezers to get on those rivets to put them down. They aren't real pretty, but the nutplates are secure.

Here's the back seat floors temporarily screwed down:

Notice the screw pattern along the right side floor. The only thing I would probably change is the screw between the rearmost "triple tree" supports. Had I to do it over again, I would move that screw as far forward as possible, or just skip it all together. The rear of the floor is not screwed down at all. Since I custom cut the floor and the supports for my rear seat change, there isn't enough meat back there to screw it down. I can add some angle under the floor and change that, if need be, but the center tunnel under the floor is more than enough to support the rear seat pan.

Another note might be to recommend K1000 cs nutplates for the screws in the area just aft of the rear passenger footwells. I think the rear passengers legs won't drag on the screw heads, so I installed normal pan head screws. If I get complaints later (doubtful) I may go back and change a pair of screws just behind the heel wells to countersunk screws.

Instrument Panel Sub frame



The instrument panel has a sub frame assembly that uprights the panel to vertical, perpendicular to the long axis of the plane. The canopy rail comes right up to the panel and is wider than the longeron, so a little brace is necessary to support the rail. I was able to rivet a piece of 3/4 extruded angle on the sub frame, and keep the shop heads out of the way of the doubler on the back side.

I should have waited until the boot cowl and cowl flange were ready to install before finalizing the instrument sub frame and canopy rail. Regrettably, I got the canopy rail bracket a little too high, and that effectively lowers the instrument panel. That resulted in making the aft end of the boot cowl not fit the side skirts correctly. It's only off enough to not let the skin lay flush, just a few thousandths. I'm

going to have to decide whether to relocate the canopy rail/instrument panel bracket to raise the instrument panel back up, or to shave and roll the boot cowl skins to get them back flush. Stay tuned!

The panel sub frame is supposed to be riveted to the top of the doubler. Once that is done, the sub frame cannot be removed without drilling out the rivets. After the canopy rails are riveted in, you can't get the instrument panel sub frame out, anyway, without drilling everything apart. I opted to use bolts instead of rivets at the top of the sub frame. I thought the bolts looked more symmetrical, and since I've been taking the instrument sub panel in and out, it was easier to use bolts.

This should be done with the boot cowl clekoed in place!

Front Seat Back

What's wrong with this picture? Well, the seat is installed backwards. Not to worry, the hinge pin isn't clamped in. I was just getting all the pieces mated and match drilled. The seat is ready for riveting and installation. It will be completely removable, as will the brace under it which is part of the #5 bulkhead. The control (steering) mechanism slides into position under the floor in this location, so if it ever needs service, it's good to be able to just unscrew everything and take it apart. The seat appears to be a bit narrow for my shoulders, but I'm sure I can work the upholstery around that problem.

The front seat and the panel with the rear passenger foot wells are retained by the same screws. All these pieces are just fitted in, but I haven't installed anything to the airframe permanently at this point. So I'm just getting ready to assemble the components, but locating their final positions before finishing the pieces.

The plane essentially needs to be finished front the bottom rear to the top front. Everything in the tail and under the floor has to go in first. Well, it doesn't HAVE to go in first, but it seems more logical to get the main systems and structures in place in the hard to reach areas before building parts on top of them.

Here it is a year and a half later, and I'm back playing with the floors and seats. I actually lost the angle that supports the front seat back under the floor, so I had to cut a new piece of 1x1x.125 angle and match drill and install nut plates for the #8 screws that hold the seat down. I also finally cut the hinge to assist cutting down and bending the hinge pins so they can be screwed down.

One of the other things that you have to do is cut holes for the seat belts to penetrate through the seat back. There's not much to speak of in the plans on that topic, so I guessed! First thing was to mark where those belt supports sticking out from the center of the ship hit the back of the seat. I wrapped them with plastic and then marked directly on the seat back where those supports touched the back.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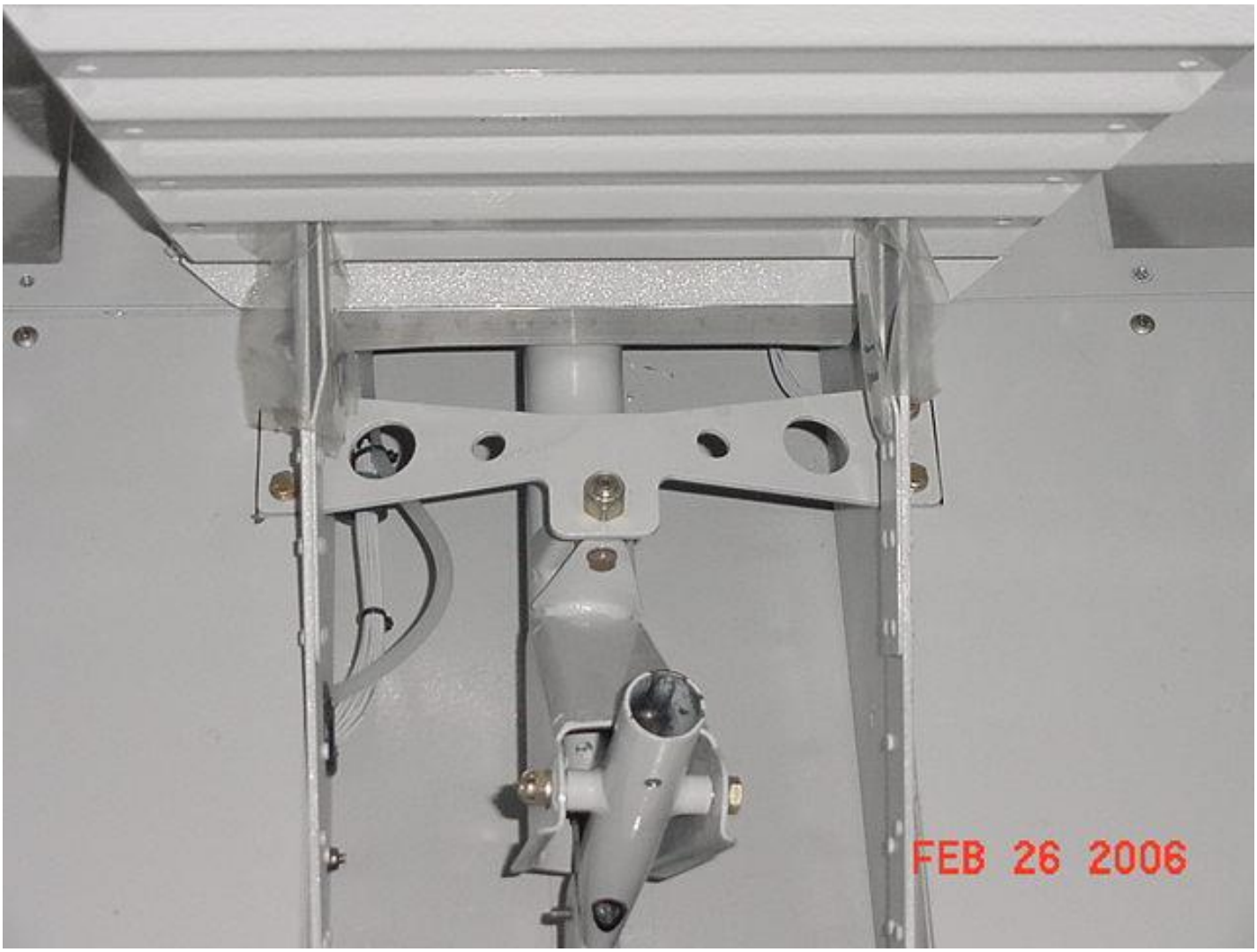
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Seems simple enough so far, eh? Now what to do? Well, I decided to give the belts room to move. I measured my Hooker Harnesses and looked at the corrugated seat back. Based on the location of where the belt supports hit the back, and the width of the actual belt, I settled on centering 1.5 x 2 inch rectangular cut outs. I measured a little inboard from the support marks just to get a little clearance there, but mostly the belts will go outboard through the seat back and then around my big fat gut. The holes ended up just a skosh inboard of the aluminum angle side frame of the seat back, and evenly spaced between the corrugations. I drilled the 4 corners of each hole, then dremeled and filed them open. I kept feeling from the back to the front thinking that the small lip I was leaving was not symmetrical. Then I realized that, yep, I forgot that the seat back tapers outward toward the shoulders.

If anything, I might have to trim the belt holes a little more inboard. It doesn't look like it in the pic, but there is enough room for a bolt head and them some on the inboard side of the holes. However, it that area gets banged around in service, I could easily open the hole another 1/2 inch toward the middle. I thought about going back and putting lightning holes in the seat back, but decided I liked having the seat back full strength.

Cabin Rails

This is the canopy rail and F-017 gusset trial fitted in place. It sure is easier to put the gusset on the rail, then install it as a unit. I had to take the gusset through the roller on my brake several times to flatten it out. The bends from the factory are about twice what they needed to be. My brake rolled them right out. It also broke the primer,too, so I had to sand and repaint prior to riveting. The rails are ready for drilling and final fitting to the airframe.

Am I ham handed or what! If you look at the pic above, you'll notice a few "smileys" at the bottom edges of the universal head rivets. I was not as careful while bucking these as I should have been. The rivet set was not well centered, and hammered little half moons around the edges of some of the rivets. If the rail was not such a long, difficult (and pricey) part to mess with, I'd just replace it and do it over. But I'm going to first try to use filler and see if I can dress them up. The dents aren't deep, but they are noticeable. The problem is more cosmetic than structural.

The canopy rails have taken hours to trim and fit. The left rail is clekoed in place and ready to final drill, debur, dimple, prime, and then permanently install. The instrument panel sub frame has to be installed first. Once the instrument panel frame is in place, you'd have to remove the canopy rail to get it back out. So the canopy frame will be the first part to be irrevocably installed. The part fits well and is all ready to go mechanically. The only problem is that I was going to try to paint it before installing it. And I don't like the color I used. So I'm going to sand it down, re-prime it, and paint it later. This is not that big an issue since I have to paint the canopy rail that butts against it anyway.

Another note: Had I to do this again, once I had the rail set in place, before drilling, I would mark all the obstacles that would not allow bucking rivets. I also would probably just delete a few rivets, too. I was able to buck the rivets in between the "triple tree" on the sidewalls above. I can guarantee that they are not up to specs. There are a couple places where I put rivets in that are just for cosmetics and symmetry. I wish I would have just skipped them.

Control Stick Steering Mechanism

A couple things are apparent in the pic above. The top longeron is machine countersunk and ready to accept the canopy frame rail. That is the part that appears to be date stamped. Also you can see a wood spacer that is in the wing spar carry through. That keeps the carry through dimensionally stable while you bolt up the stick control system.

You can see the stick control system in it's final position mounted in place. It's a clever piece of engineering. The sticks pivot on delrin bushings for forward and back stick (nose up and down). The entire control system "tunnel" is hung by two control rod ends and that allows the whole thing to swing left to right. That gives you aileron movement and banks you left and right. I had a heck of a time getting the system set up for free movement. I assembled it on the bench and it worked beautifully. Once in the airframe and tightened down, I found that the alignment was off. Probably due to where I drilled in the rear hangar. Fortunately, I had some washers in around the rod ends and I was able to reconfigure them to get a free swing yet not have any slop in the movement.

In front of the stick at the firewall, there are a couple angle braces that I installed per plans that reinforce the brake/firewall area. I found that drilling through the stainless firewall is not easy. Even though I used cobalt bits, my cordless drill "punched" through instead of drilled through the metal. Next time, I'll use the air drill and crank up the air pressure. I had to clean up some ugly burs on the backside of the firewall where the drill punched out considerable burs on the metal. My electric debur tool worked well for this, cleaned up the holes nicely.

This is another pic of the control system. You can see two very large nuts, one left of the wood spar spacer, and one to the right on the yoke just under the "seat belt appendages" (sticking up at an angle). The bolts hold rod ends attached to the control tunnel that allows the entire mechanism to swing side to side. Also note the seat belt bracket just right of the wood spacer in the spar carry through. Not per plans, I made that out of 1.5x1.5x.125 angle. Now that I've made a couple of these, it only took about 45 minutes, not the 4 hours it took the first time. Power tools are wonderful time and energy and hair savers!

I have assembled and constructed several smaller assemblies on the F1 so far, but really haven't "permanently" installed anything. So many structures are interdependent and literally interconnected that you have to be careful what you install, and when. I still have plenty of little "chores" to do with what I already have "completed". Before long, though, I'll have to start "committing" and get some things installed. Another consideration is that the more parts that you have installed, the more cramped it is, and the harder it is to work on subsequent components. And I'm trying not to damage or scuff up the parts I already have. So a lot of things are going to come together in groups, and some won't be fixed in place until close to the end of the project.

TruTrak Aileron "Roll" Servo

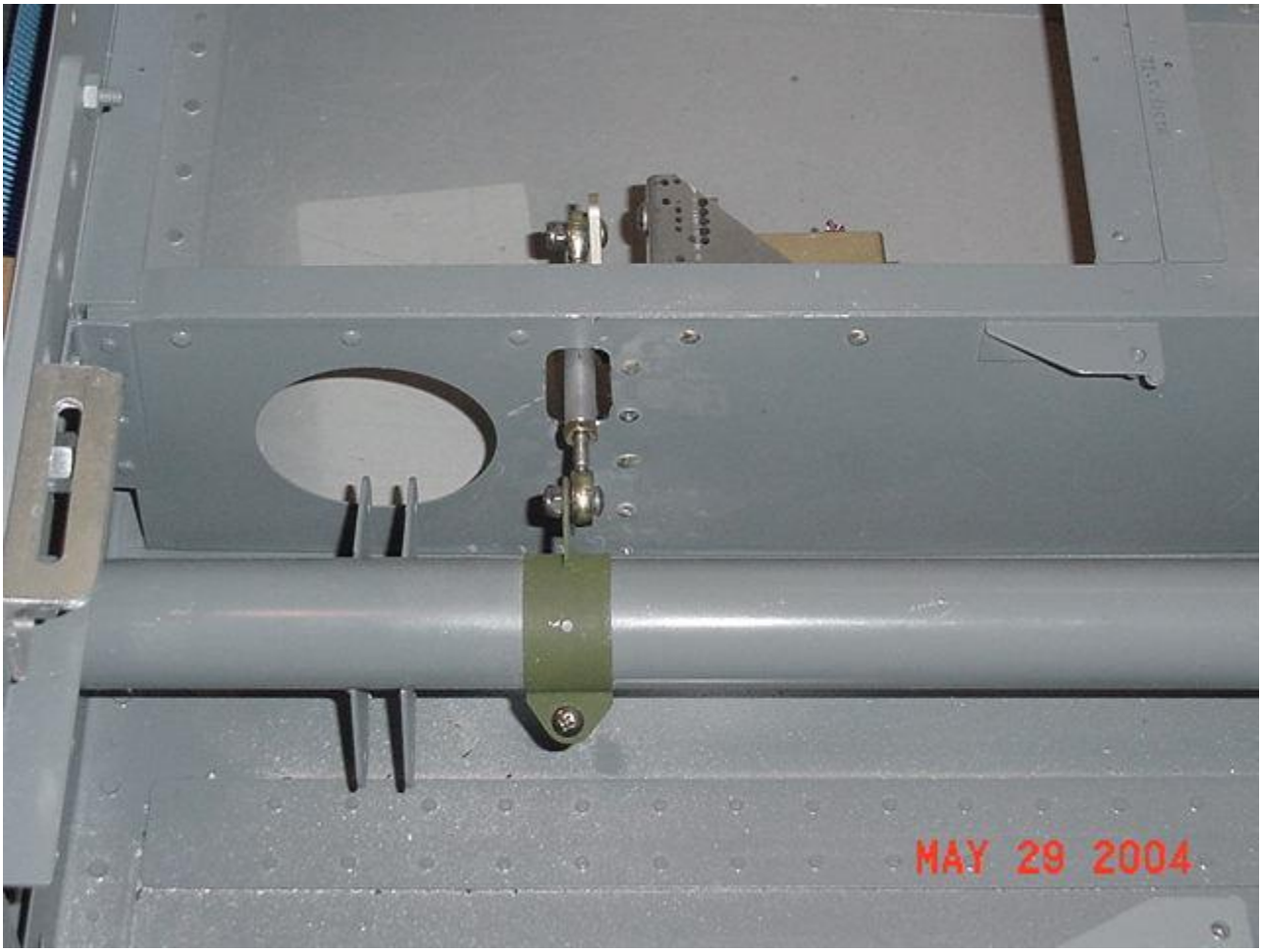
Note: The TruTrak roll servo for the EVO wing should probably be the "C" model, not the "B" model that was originally provided for the standard F1. Also, there is much debate whether or not the "Torque Enhancer" feature should also be purchased for an extra $100. TruTrak still feels that the "C" servo for the ailerons is OK, but they are happy to sell you the torque enhancer "just in case". I went for it. I thought in this case an ounce of prevention was a good 'belts and suspenders" remedy for a potential problem with a servo being too weak for the EVO wing.

Here's the standard setup:

I received my TruTrak autopilot servos. You can buy the servos for a reduced price and install them

early (when it's easier). Then, later on you can choose which "brain" unit you want. I bought two servos, one for each pitch and roll.

I went ahead and installed the roll servo since I have been working in that area. The "kit" comes F1 specific (well, RV4 modified specific), and has a mounting bracket that fits very well in the rear passenger footwell area. The bracket required a little filing to get it to position. I drilled out two factory rivets and mounted the bracket in the factory rivet holes along the top. There were also 5 or 6 predrilled holes along the side of the bracket that holds the servo. It was a little difficult to get to the rivets, so I used a blind rivet in one area. Had I to do it over again, I would use the two factory holes along the top and squeeze the rivets, but along the side, I would just use pull/blind rivets.



This shows the rivet location where the TruTrak mounting bracket is located. Also, you can see the hole I had to create with a dremel type tool in order to get the control rod of the AP to the torque tube bracket. This hole was tricky, and still needs dressing, but the servo and rod have a clear path with the full swing of the control system. The drawing from the factory showing the hole is very conservative at best. My actual hole was not in the same location, and appears to be almost twice as large as the factory drawing.

Roll Servo Upgrade

I called TruTrack and arranged to pay the extra $100 and shipping to return my "B" model autopilot servo for the stronger "C" servo WITH the torque enhancer already installed. Word from Zack at TTFS is that the servo needs the torque arm extended with some rod (provided) in order to reach the steering mechanism torque tube. I got an RMA number and now need to remove the aileron roll servo

and return it to TruTrak in Arkansas. Then I'll reinstall the servo and continue with final wing setup.

My new "C" servo came back with the torque enhancer already installed. Regrettably, they omitted the extension rod. So there will be another slight delay in the re-installation of the roll servo upgrade. Or I could remove the torque enhancer and shelve it. When I returned the "B" servo, I kept the arm used for hooking up the standard push rod. Maybe I'll just do that for now. Still, so many other things to do, have plenty of time to wait for TT to send the parts.

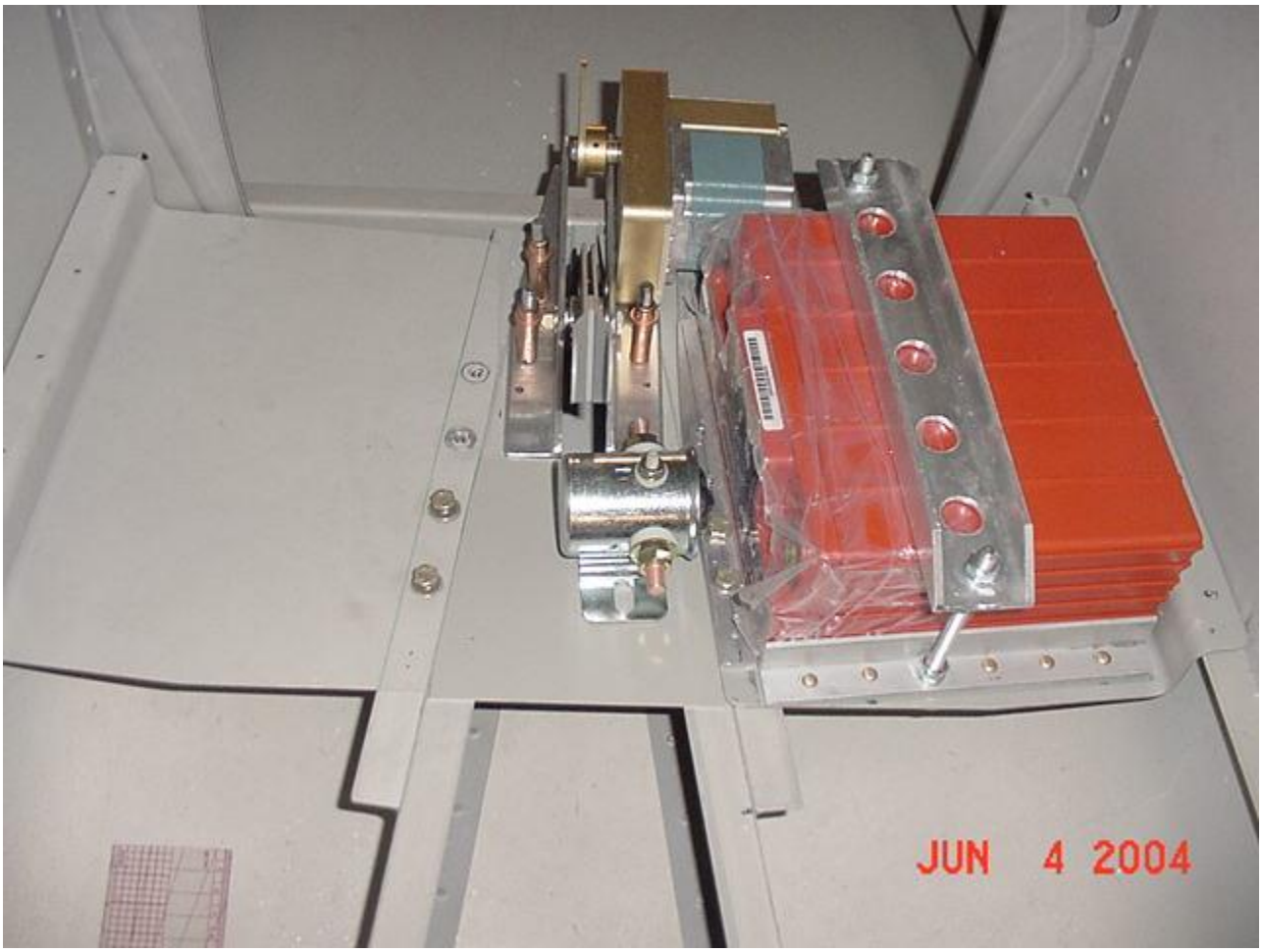
Seat Back Brace

The steel tubing that supports the front seat is not a roll bar. There is not enough strength in the structure to support the airframe in a roll over.

Once the canopy frame rails were riveted in place, I mounted the uprights and marked approximately where the crossbar would go. I took a digital level and marked for approximately 30 degree bevel on each tube to get the parts to lay nice and flat. I ended up eyeballing it, using a 4 inch grinder, then finishing with a hand file. It was kinda fun shooting sparks all over my house at night. Now I have to convince my friend Bruce Dallman, RV6 builder, to show me how to MIG the parts together.

Battery Tray and Elevator Pitch Servo

<>With the EVO edition of the F1, this battery configuration is not appropriate. After having gone through the motions to install the battery, tray and the elt and tray, Team Rocket has since determined that for W&B, the battery should be moved up front. Consequently, the battery tray on the left side of the ship isn't installed. I have also cut down the ELT tray on the right side, and moved the ELT back flush with the bell crank. That gives me 4 more inches of baggage space behind the seat. But that did require remaking the baggage floor and the "hat rack" "battery cover".



Note: If you have the EVO edition, you may not want to bother making the battery tray or mount the ELT in the factory location. Of course the ELT is very light (until you put batteries in it), but all these items are best put as far forward in the EVO edition of the F1 as possible due to the change in the CG and loading envelope. I'll probably relocate my battery, ELT and anything else I can fit in, under the floor in front of the spar. Another thing location change would allow: You could lower the aft baggage floor. If you scrap the factory pieces and make your own, you can drop the floor to the very top of the bell crank, which would give you an additional 3 - 5 inches of height. You may not be able to put any more weight back there, but you sure could get in more bulk. When I get to the point that I'm finalizing the interior, I will probably cut down the "hat rack" area and drop the baggage floor.

I drilled my ELT and Battery trays for bolts on the center longerons and for screws on the outer longerons. I made the hold down bracket for my Odyssey P-680 battery. The "dry cell" battery is not recommended for inverted use, but otherwise supposedly will work on it's side. So I mounted it with the terminals facing the middle and laying on it's side. I hope that this will allow me to remake the

baggage compartment panels and lower the baggage floor about 4 inches. That will mean a LOT more storage space.

Note the TruTrak servo attached to the bell crank brackets. Those are homemade hold down brackets made out of 1 inch T6 extruded aluminum angle.. I installed the factory brackets backwards. It would have worked fine that way, but I wanted to be correct. Besides, mounting them the proper way gets the servo out of the way of the battery. Barely.

BOOT COWL, FLANGE & SHIM

Note: My pictures show SCREWS across the aft edge of the boot cowl. If you are going to put in a SPEED SLOPE WINDSHIELD (SSW), you DO NOT have to use screws under the canopy. Knowing what I know now, I would not bother putting the nutplates in the center 1/2 of the aft edge of the boot cowl. I would recommend only using clekos in this area (probably along the entire aft edge) of the boot cowl until after you have the canopy finalized. You cannot remove this part of the boot cowl with the SSW in place, so there's no sense using screws. Countersunk rivets will look much nicer, and are easier to install. If, however you are using a standard canopy, use nutplates and screws from the beginning.

After our EAA83 chapter meeting today, I came home and started working on the cowl shims and flange. The flange needs to be set back from the outer skin to allow for the thickness of fiberglass, so a thin strip of aluminum is used between the the cowl attach flange and the firewall fingers. I used

several scrap pieces of 1/8 aluminum to use as a spacer on the shim. That sets the shim back from the firewall to give it a little clearance. The cowl shim goes on in 3 pieces and is clekoed under the fingers of the stainless firewall. Weaving it was not necessary, but the factory pieces will not look very good under the firewall fingers. If I didn't plan on having the engine cowl covering this 99% of the time, I'd make wider pieces and work on the shim alignment to make it prettier.

The hardest part is shaping the cowl flange and making it sit parallel to the outer airframe skin and boot cowl. That is critical for keeping a real clean line at the junction of the fiberglass engine cowl and the airframe skins.

So I was working on getting the boot cowl skin and the cowl flange a doubler ready to install, and I had a brain fart. Well, actually, it wasn't my fault, but I wasted several days because I wasn't familiar with aviation hardware. I keep trying to figure how I was going to dimple everything and then put a "k1100" nutplate underneath it to hold a flush #8 screw. I tried one dimple and tried to set a "k1100" under it, and it just wouldn't sit straight. Which means the rivet would be crooked, so then the screw would be crooked. After several emails, I finally figured out (with lots of help) that my initial suspicions were true. I HAD THE WRONG PARTS! The "boot cowl hardware" bag from Team Rocket had K1000 nutplates, not K1100. You can tell by the picture how the fatter K1100 will hold a dimple in the recessed area around the threads. Once I figured out I had the wrong parts (and found a couple other things omitted), I emailed for the correct parts and started borrowing from other hardware bags, and from friends to keep moving on.

Again, if you are going to use the Speed Slope Windshield, you are not going to need screws and K1100's at about 10 or 12 locations in the aft top of the boot cowl.

This screwed down boot cowl and engine cowl flange (with underlying doubler) took a week of very frustrating work. The toughest part was trying to read the plans and read into the plans what I was really supposed to have and what I was really supposed to be doing. Well, it turned out OK. I still have to mount two screws, and two hold down rivets in the corners, then trim/sand/roll/tweak the boot cowl. And then I have to hope that the engine cowl flange is wide enough and parallel enough to the side skins in particular for the fiberglass engine cowl to sit properly against the boot cowl and sides. Time will tell. If the flange isn't parallel enough, I can always flute or shrink it.

Today I finished the boot cowl and some other little projects. The boot cowl has puckers and required some bending and filing to get to fit. All this was because I prematurely attached the instrument panel to the canopy rail, and it effected how the boot cowl skin sat at the rear. It's not too bad for a beginner, but still, I could have done better. Live and learn, on to the next steps.

More Fuselage Interior

I "completed" placing the clear soft plastic tubing from the VAN'S static kit. Several days ago I pop riveted in the static ports and used "Goop" to glue the tubing on (as opposed to RTV). I bought some adhesive pads that are for tie wraps and stuck them in place and carefully tie wrapped the line out of the way of the close out and rudder cables. There is a bit too much tension on the lines, so I will have to reposition the pads, and later epoxy them in place. But for now the static line is out of the way. The "T" in the line is above the ports. Theoretically that should keep moisture from collecting in the lines.

After setting the pads for the soft static lines, I ran a 5/8 poly conduit all the way from the tail bulkhead to the front seat floor. I also drilled holes for the poly tubing that comes from the static ports to the instrument panel. Originally I was going to run the poly tube inside the conduit. There would be plenty of room in the rear conduit because I think only 2 wires for the tail light and the elevator trim cable will be going to the tail. But I decided to leave the conduit exclusively for the wires, and run the static lines independently