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Cermark F16P Landing Gear Reinforcement

Introduction

Many people have purchased the Cermark F16P propjet and found a great flying airplane that goes like a rocket with a 2 stroke .90 sport or high performance engine. There is no perfect RC kit. This one is no exception. After reading a number of overall positive Internet blog posts about the plane, I decided to buy one. I also joined the Yahoo! Groups rcpropjets group, moderated by Jim Stratton, (Yahoo! user sbrackets). Jim also owns one of these planes and experienced one of its very few shortcomings; landing gear mounts. It is the intent of this article to bring to light, the inherent problem associated with the installation and weakness of this part of the aircraft and what can be done to mitigate failure of the main and nose gear mounts. The following article documents how I applied suggestions from Jim and others to fix the problem and to make the aircraft stronger in this area. If you own one of these planes and are considering strengthening the landing gear mounting, please read through the entire article before beginning.

The Problem

Cermark makes the gear mounts with less than the best quality wood parts. This seems to be a common problem in the industry in all but the high-end ARF planes I've built. There are two 1/8" ply plates sandwiched on top of each other and fitted into two fuselage formers. This arrangement makes for a good design, but materials and construction technique lack in the final product. Built per the assembly manual, the landing gear is attached to the mounting plates via 4 sheet metal screws. That's it. Two problems exist here. 1) the ply mounting plates are generally soft, less than best quality wood. 2) they are not glued to each other! Even though they are attached to each other through the use of the gear mounting screws, the screws are short and wimpy – again my opinion.

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Fellow group member Jim had the unfortunate experience of tearing the gear out of his F16 after a less then perfect landing.
He subsequently repaired and reinforced the mounting plates and this is the focus of the article. Jim basically trail blazed this effort and I learned from him, tackling this issue during initial assembly, rather than duplicate his misfortune. I'd like to thank Jim for his support, phone calls on weekends, emails, etc. in his support of not only my questions, but for his support of the Yahoo! rcpropjets group. I hope you find this article useful. Feel free to send email with comments or questions.

The Fix – Part 1
Procedure – Main Gear Reinforcement Blocks

Materials – Main Gear

- ¼" ply to make (4) ¾" X 3 7/16" blocks (rails)
- Phillips screwdriver
- Epoxy – 5 or 30 minute
- Thin CA
- One 2-56 rod x 7 with 1/2 90 bend in one end
- 1/16" drill bit
- 5/64" drill bit
- Servo mounting screws or similar

Main Gear Reinforcement Procedure

1. Make your block tool from a piece of 2-56 push rod. I used a piece about 6" long. Bend a 90 degree "L" in one end about 3/8" long. You will use this to manipulate the block into position. This tool makes the job very easy.

2. Fabricate 4 blocks from ¼" ply that measure ¾" x 3 7/16". These will be used in the main gear reinforcement. Nose gear will be discussed later.

3. Number the blocks 1-4 and assign numbers 1-4 to the landing gear areas where the blocks will be installed. Two blocks are used for each gear mounting plate.

4. Drill a 1/16" hole in the edge of the long side of the block.

5. Push the bent end of the block tool into the hole you just drilled and use this to manipulate the block into place. Make sure the block fits inside and on top of the gear mounting plate.

6. See photos below for illustration.

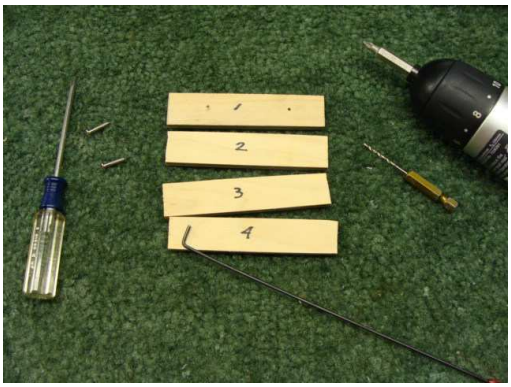

Fig. 1 - Blocks and tools

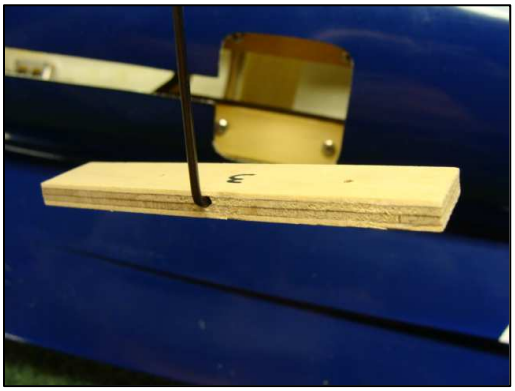

Fig. 2 - Tool installed on block

Fig.3 - Positioning the block

Fig 4. - Final position

7. Before dry fitting the blocks, have a drill with a 5/64" bit ready along with two servo mounting screws and a screwdriver.

8. Using the tool on the block, position the block in place and make sure it fits properly. Cut or sand ends to fit as needed.

9. Once you have the block fitted in place, drill a hole in the plate and through to the block as far left or right as possible that still allows use of a screwdriver to drive a screw that will ultimately pull the block up against the back of the existing plate.

10. Install a screw to hold the block in place.

11. Now, be sure to align the block so it's straight and drill another hole.

12. Drill the second hole. There is no need to install a screw here as you're only ensuring the holes align for the second screw when you actually glue the block into place.

13. To make the gluing process easier, install both screws that will be used to hold the block in place into the plate that will receive the block. Install the screws so that a small part of the screw sticks out through the other side of the plate. This will make alignment easier.

14. Now, mix up some epoxy. I used 5 minute, but 30 minute will work fine as well.

Fig. 5 - I used 5-minute epoxy for the this part

15. Coat the back of the block with epoxy and then position it into place just as you did when you dry fit it. Have screws and screwdriver ready.

16. Tighten the screws to pull the block tight against the plate. Excess epoxy will squeeze out. Wipe excess with a towel.

17. Remove the block tool and wipe off any excess epoxy that may have coated the end.

18. Repeat steps 8 – 17 for the other 3 blocks.

Fig. 6 - Example of block glued in place, screws removed. This area is now a full ½" thick and stronger than factory built.

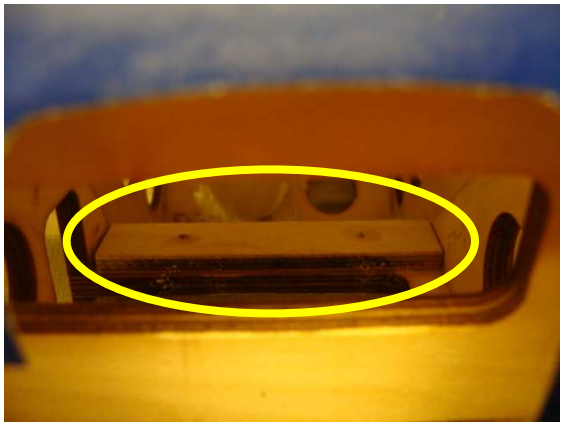

Fig. 7 - View of an installed block from the inside of the fuselage

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The Fix – Part 2

Procedure – Nose Gear Reinforcement Blocks

The reinforcement of the nose gear mounting plate is pretty straightforward. Due to its location and clearance limitations, ¼" sized plywood could not be used. You may want to lay in some fiberglass on top of the installed wood pieces described in the following procedure.

Materials – Nose Gear

- 1/8" ply to make (2) 3/4" 2 1/2" blocks and one filler block

Nose Gear Reinforcement Procedure

1. Cut 2 pieces of 1/8" ply to measure ¾" x 2 ½".

2. Mix up some epoxy and coat one side of the block.

3. Install the block as illustrated in Fig. 8 below. Repeat for the other block.

4. Fill the gap between the two as shown in Fig. 8 with a third piece of ply.

There are only two illustrations for this part of the fix; before and after.

Fig. 8 - Looking down on nose gear mounting plate from top of fuselage

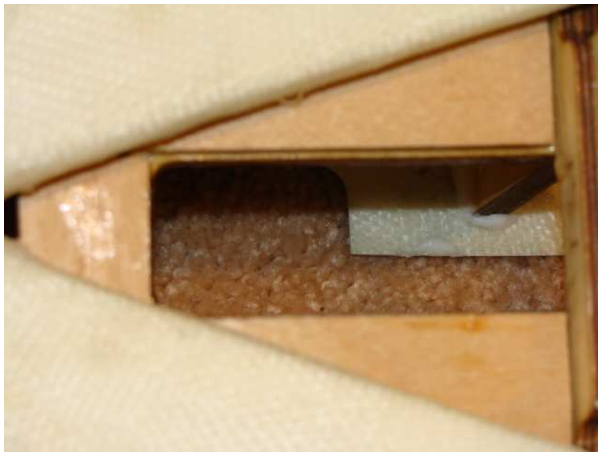

Fig. 9 - Same view now with 1/8" ply pieces in place

The Fix – Part 3
Procedure – Carbon Fiber Cloth Application

Introduction

The third part of the improvements to the landing gear installation relate to improving the structural strength of the areas where the factory installed gear plates are fitted into the fore and aft fuselage formers. Here, two pieces of 2 ounce fiberglass/carbon fiber cloth were sized and cut to fit along the outside of the plate and up against the formers. Two pieces are used for each main gear mounting plate and a total of four pieces were used to reinforce the top and bottom of the nose gear mounting plate. I've included some photos of the installation process.

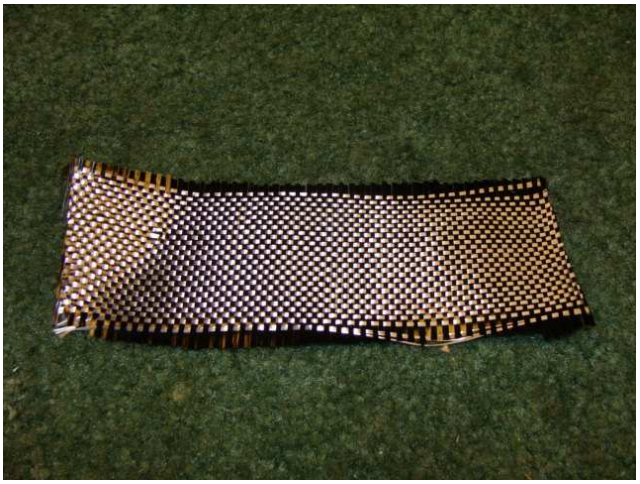

Fig 10 -2 ounce fiberglass/carbon fiber cloth

Materials – Main & Nose Gear Carbon Fiber Cloth Reinforcement

- Piece of 2 ounce carbon fiber/fiberglass cloth. This is what I used, as it was given to me by Mike Barbee. There are smaller sizes available.
- 30 minute epoxy
- Scissors
- Popsicle stick
- Patience
- Paper towels
- Alcohol

This part addresses the installation of the fiber glass cloth to the main gear areas.

1. Cut 6 pieces of cloth to ¾" x 4 ½". Put 2 of these aside, as you will use them for the nose gear part of the reinforcement described later. This size allows for good coverage of the plate and an adequate amount of it to make a 90 degree turn and lay up against the formers.

Fig. 11 – Carbon fiber cloth strips

2. Mix up some 30 minute epoxy; enough to coat the coverage areas for the 4 strips you're going to lay in.

3. Paint the areas with an epoxy brush and let the epoxy begin to get slightly tacky.

4. Lay the carbon fiber cloth on the plates making certain it is centered over the plate with sufficient excess to allow it to make the turn up against the formers. This is where the cloth will help to strengthen the joints.

5. Use a popsicle stick to press the cloth into the corners where the plate and the formers meet. Also press the cloth against the plates themselves to assure good contact and adhesion.

6. Allow the epoxy to become a bit more tacky, and then apply a coat on top of the cloth. Allow this to cure overnight before installing the retracts.

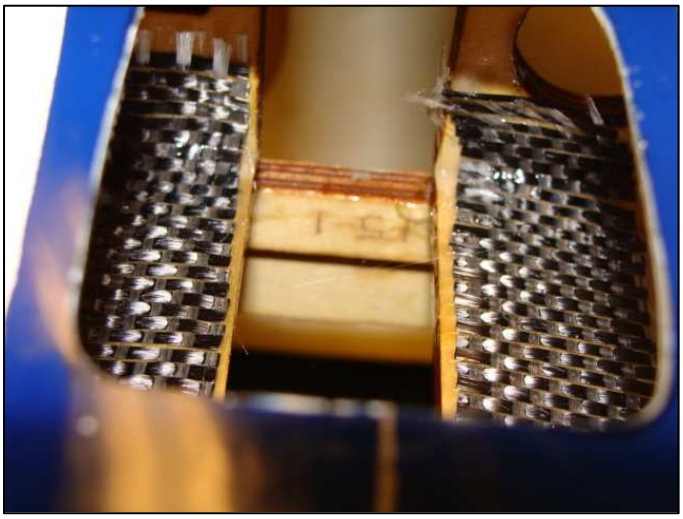

Fig. 12 – Carbon fiber cloth glued in place on the mains

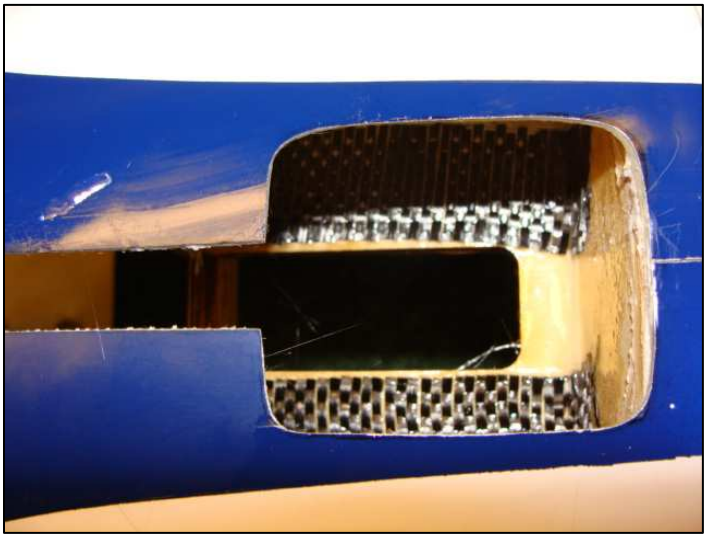

Fig. 13 – Another view. Nose gear looks about the same

This part addresses the installation of the fiber glass cloth to the nose gear areas.

People seem to have as much of a problem tearing out the nose gear as they do with the main gear, so I elected to apply the carbon fiber cloth to both the top and bottom areas of the mount.

1. With the fuselage oriented so you look down on top of the nose gear mount; notice the area inside the fiberglass part of the fuse. This is where the cloth will be applied. See Fig. 10.

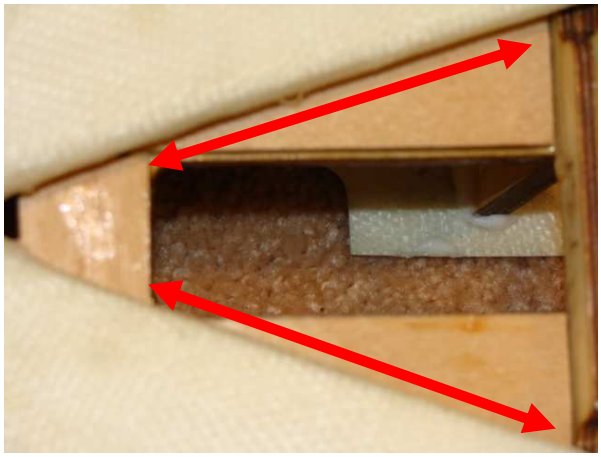

Fig. 14- This area will be strengthened with carbon fiber cloth

2. Cut 2 pieces pf carbon fiber cloth that will fit into this triangular area. Size them such that they will be bonded to the wood, the rear former and the fuselage fiberglass.

3. Apply these triangular pieces using the same technique used on the main gear areas.

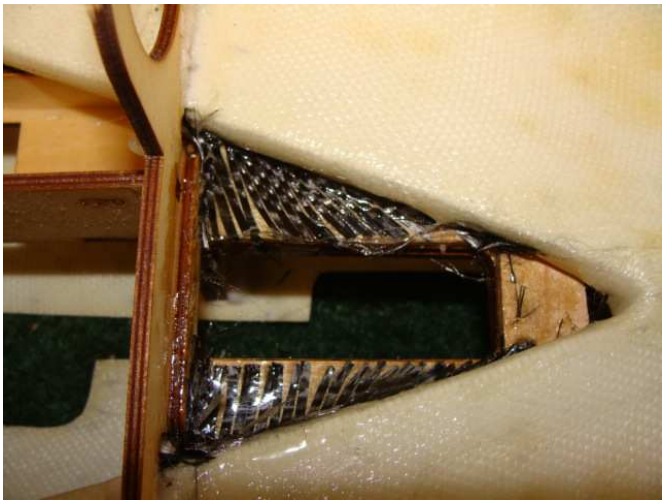

Fig. 15 – Top side nose gear reinforcement completed

4. Locate the 2 pieces you set aside earlier. Install them as you did on the main gear.

Well, that pretty much wraps up what I did to strengthen the landing gear mounting system. I think it will work well. Check my website at www.ricktressler.com for build updates and flight reports. Also be sure to visit the Yahoo rcpropjets group for lots of good information about the Cermark F16P propjet.

Retracts Installation Change Notes

Jim Stratton wrote in a post on the Yahoo! rcpropjet group page, that he replaced the sheet metal screws supplied to mount the retracts with 6/32 machine screws and blind nuts. I agree this is a good idea and it will be implemented on my build. This will make for a stronger gear installation. This can't be done on the nose gear because the fiberglass fuselage is in the way for the *front* attachment screws. As far as I can see, machine screws and blind nuts can be use in the rear area of the nose gear, but the front.

The system arrived packed in the box with the plane and the wheels and axles were already installed. I'm not one to assume too much, so I applied Loctite #242 (blue) to the wheel collar screws as well as the gear wire set screw that holds it into the retract mechanism.

I found the assembly screws on these retracts not to be very tight and some were about ready to fall out. All screws should be removed, one at a time, and a drop of Loctite applied to the screw. This will prevent gear disassembly in flight; a bad way to end a day at the field. ☹

Useful References

- Cermark website - www.cermark.com
- Yahoo! *rcpropjets* group. Free to join! http://groups.yahoo.com/group/rcpropjets/
- RC Universe Group

http://www.rcuniverse.com/forum/m_3077149/mpage_1/key_/tm.htm

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Some Notes on
Spring Air Retracts and Their Operation

Here's a few things on the Spring Air retracts you currently get with the Cermark F16P. Keep in mind that Cermark may change the make and model of the supplied optional gear at anytime, so this information applies only to the retracts I received in July 2008. As far as I know, they're still shipping the same package. Contact Cermark via their website contact link to send them email or to obtain their phone number.

The Spring Air Retract system is a pneumatically operated, all metal retractable landing gear. The gear is retracted by application of air *pressure* from an on-board compressed air tank charged by the user with a small hand pump. Control of all gear is handled by a dedicated servo, which operates a single valve. As long as pressure is maintained on all lines, the gear remains retracted. The gear is lowered when the gear valve is operated in the opposite direction, allowing the stored air charge in the cylinders to escape. So, if the system develops a leak the gear automatically extends. Components are interconnected through the use of plastic tubing and tee fittings. A restrictor valve is installed in the pressure lines to regulate retraction and extension speed. The system is initially charged through the use of a small hand pump connected to a one-way valve installed in the aircraft fuselage. The Spring Air system I received with the Cermark F16P included everything but the pump. It costs about $30 and is available from a number of suppliers such as Tower Hobbies. Below are some shots of my retracts and the pump.

Fig. 16 - Robart retract pump available at Tower Hobbies

Fig. 17 – Spring Air retract kit that ships with the plane (July 2008)

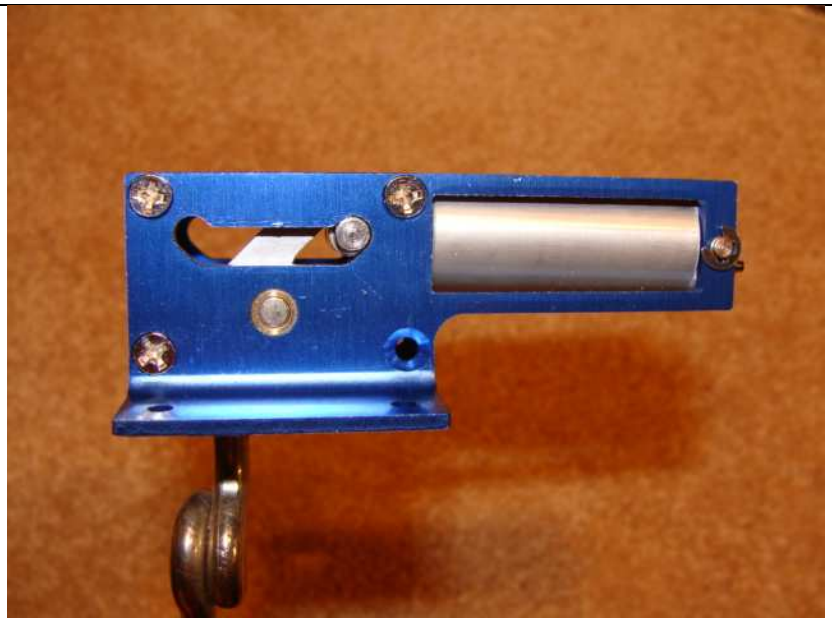

Fig. 18 – Side view of main gear cylinder and housing

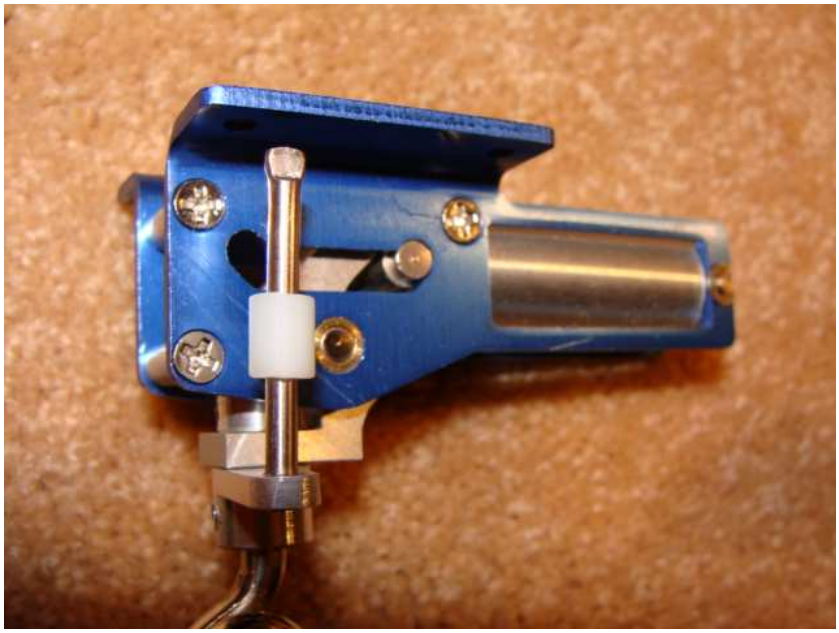

Fig. 19 – Nose gear retract showing steering arm assembly

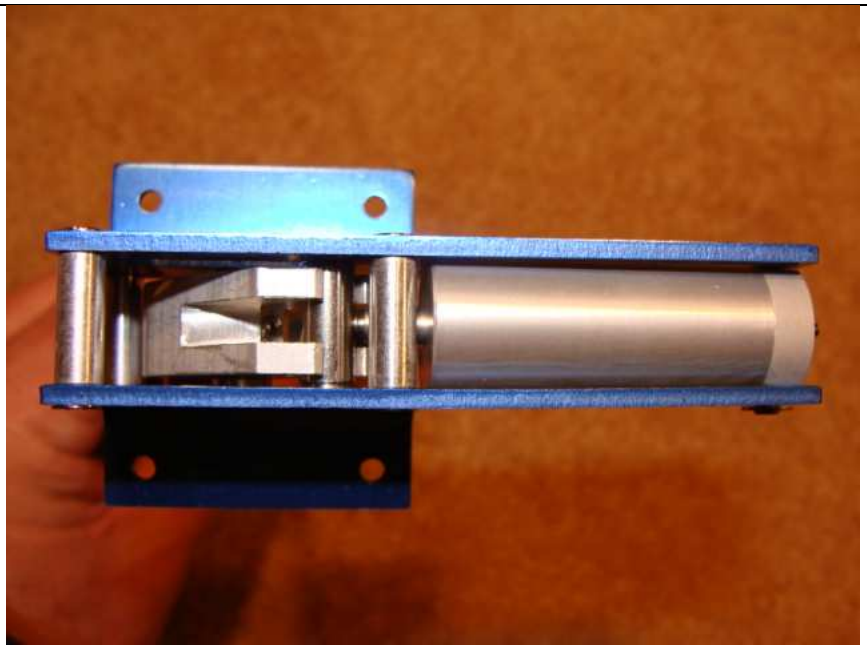

Fig. 20 – Top view of main gear retract

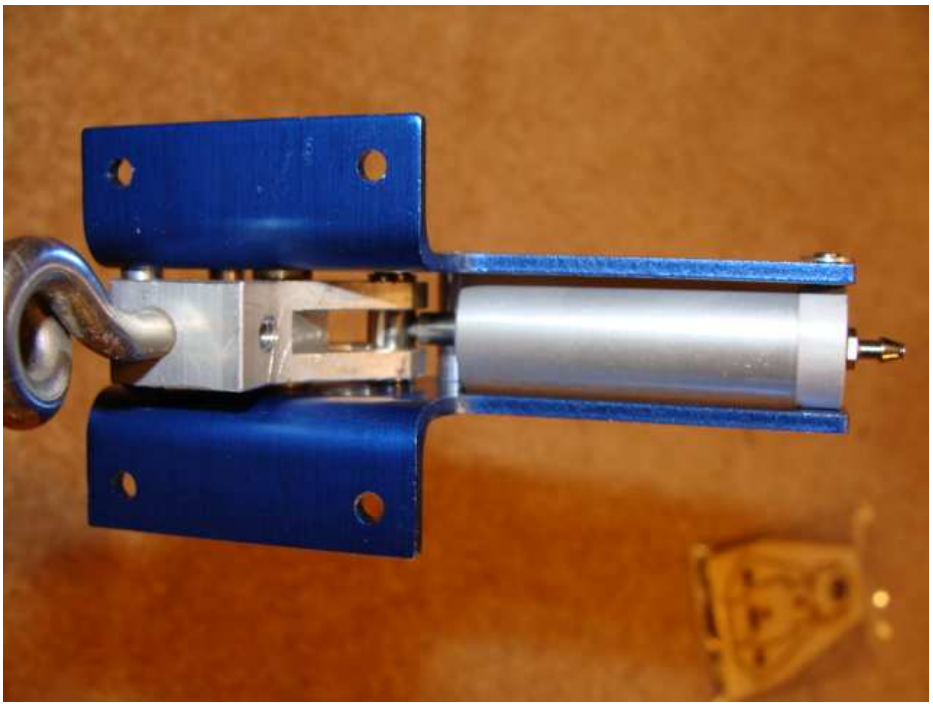

Fig. 21 – Bottom view of main gear retract. Note airline attach point on right.

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Want to learn more retractable landing gear? There's more to it than pneumatics. Check out these websites below:

LADO Technologies
Robart
Dave Brown Mechanical Retracts
Hobbico Retracts

Please feel free to contact me with any questions. Thanks for reading the article.

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