straightened me out really quickly. But, in self-defense let me state this: you refer to your helicopter as a "ship." All ships I ever heard of have a RUDDER. Sometimes you refer to your "aircraft," a generalized term that includes airplanes. Now, I ask you, what does an airplane have at the back end to steer it? A RUDDER, of course. Also, the RUDDER is used point the vessel in the direction in which forward travel is desired. So, the thingy at rear of the helicopter that you call a ROTOR, rather than a RUDDER does the same thing. I rest my case. O.K., O.K., I know your rudder goes around very fast in order to keep the helicopter from rotating in the opposite direction of the main rotor blades. So, how about calling it the "rotating rudder?"

Now, along with your precious tail ROTOR, controlled via the foot pedals (did I get that term right?), you talk about the response of the ROTOR to the foot pedal as "authority." I don't get it. If you have a good response to the foot pedal depression, why don't you just say so?

Also, the way I grew up, a COLLECTIVE was a farm owned by a socialist or communist government that several families operated; or, very generally, a group of people or things with some sort of commonality to them. So, it seems quite a stretch to me to call a lever at the side of a helicopter pilot that determines the lifting power of the main rotors a collective. HOWJADOTHAT?

I have a joystick on my computer. There's lots of stuff with joysticks - lots of airplanes. So, why do you have to call it a "cyclic?"

Well, I have noticed that most of you do speak English. Whew!

Spousal Support

All guys have got to have their toys. Some get more expensive and time-consuming toys than others. But, I stand in awe of you guys. You have each convinced your significant other that it is perfectly O.K. to spend fifty to a hundred grand on a toy that will consume more than a year's worth of weekends to build. And then, you get in your toy to play and you may kill yourself. I watch these spouses at the shows. They just smile and say you can do whatever you want. Amazing! I just shake my head in wonder.

Enough of this stuff

In conclusion, I really envy your ego, determination, knowledge and the fun you guys have. I wish I could be one of you, but it is not to be. I will always be just on the outside looking in. So, when you see that old guy wandering around with his mouth open and being a pest, just pat me on the head and go on about your business.

Hey, I love you guys! (Now pass me a BUD lite.) ***End***

Building a Tail Boom

By Gary W. Adams

While this was time consuming, I did not feel there was $2,000 worth of labor involved. As of summer 2000, RotorWay's price for a Quick-Kit Tail Boom was about $2,500 plus taxes and shipping. I used about $500 in materials to build it! I got a 14'x4' sheet of (.025") 2024T3 Aluminum from AirParts, Inc. for $188 instead of RotorWay's $388. I think their sheet is 12' x 4'. Of course, I still had to order the bulkheads and stringers from RotorWay.

The first step in building the tail boom is to construct a wooden fixture to hold the four bulkhead castings. This fixture provides the alignment for everything, so be very careful when building it. The fixture is a 12' long sawhorse with four vertical pieces to hold the bulkheads. (See photo 1.) First, go to your local building supply store and find the straightest 12' x 2"x 4" they have and a couple of sawhorse leg brackets. Build your 12' sawhorse and mark the spacing for the bulkhead locations. The marks represent the FRONT EDGES of the bulkheads. The mark for the main bulkhead will be the datum (0") and all others will be measured from this point. The #2 bulkhead is 30-1/2", the #3 bulkhead, 82-5/8" and, the #4 bulkhead, 122-5/8" from the datum.

Now, cut some 2" x 2" or 1" x 2" pieces for the vertical fixture members. Screw these to the side of the 2" x 4" at your bulkhead marks. Cut and install diagonal braces to help steady the vertical members. At this point, checking everything very carefully is extremely important. Take a string and check for the straightness of the 2 x 4's. If there is any bow, use C-clamps and clamp a piece of angle iron or something to the side and shim between them until the 2" x 4" is perfectly straight. Also, your floor may not be exactly level, so level the 2" x 4" and shim under the legs if necessary. All vertical members must be square to the 2" x 4", plumb in all directions and parallel with each other. ***DOUBLE CHECK and even TRIPLE CHECK!!!***

You want the centerline, which runs through the center of the tail boom, to be level. So, using a string level or other method, mark where the centerline crosses the four vertical fixture members. Locate the top of each bulkhead casting

(midway between the top recess for the stringers) and drill a 1/16" hole in the front face of the casting. This hole will be used to hang the bulkheads on the fixture. Also, put a line on the outside of the bulkhead casting at both top and bottom. Now check the outside diameter of each bulkhead at the front edge. Divide this number by two to get the radius. Measure up (the length of the radius) from the centerline mark on each vertical fixture member and put a mark representing the **top** of each bulkhead. Locate the center of each vertical member and mark a vertical **line** for where the nail will be located for hanging the bulkheads. Use small finishing nails, not nails with large heads. (When we are finished building the tail boom, we want it to slip it off the nails.) Since we don't want to be driving these nails with a hammer (thereby knocking everything out of alignment) find a drill bit slightly smaller than the nail and, while holding each bulkhead casting, align the top with your **top line**, drill through the bulkhead nail hole and into the fixture. Use a pair of large pliers and squeeze the nail into this hole. Hang all four bulkheads on the fixture. Using welding Vise-grips® or, something similar, clamp the bottom of each bulkhead to the fixture. (Also see photo 1.)

Now, it's time to install the stringers. A box of 1" C-clamps is very helpful with this part. Notice that the stringers have a short lip. This lip points down on the top two stringers (3 & 4) and up on the other stringers. Using the C-clamps, clamp the stringers in place. MORE CHECKING...Just in case your vertical fixture members have any twist to them, double-check the distance to the front edge of each bulkhead from your datum (front of the main bulkhead). Use a marker and number the stringers so you will get them back in the same place. After you are satisfied that everything is right, mark where each stringer crosses a bulkhead. Remove all of the stringers and trim out the short lip of each stringer in this area. Where these notches are cut out of the short lip, use a Dremel Tool® or file to radius the inside corners of each notch. Re-clamp the stringers back to the bulkheads and recheck your distances from the datum. Drill the rivet holes where the stringers cross the bulkheads (one hole per crossing). Remove the stringers again and de-burr all the holes. RotorWay doesn't mention this, but I think it best to attach the stringers with countersunk (flathead) rivets. If you use regular rivets, your finished tail boom skin will have dents protruding outward at each bulkhead rivet! So, countersink your holes. Reinstall the stringers, holding them in place with Clecos®. (See photo 2.) Replace the Clecos® with rivets.

Unless they have changed the manuals, RotorWay recommends building the framework on the wooden fixture, then taking the frame off the fixture and rolling the skin around it on the floor. There have been many cases of frame twisting with this method. Their method of checking for twist is as follows: Tie a string from top to bottom of each bulkhead and, after rolling the skin, sight down through the tail boom. If necessary, twist the frame in the skin until the four strings are in line (parallel) with each other. If the skin is rolled tight, as it should be, slipping the frame is not easy!

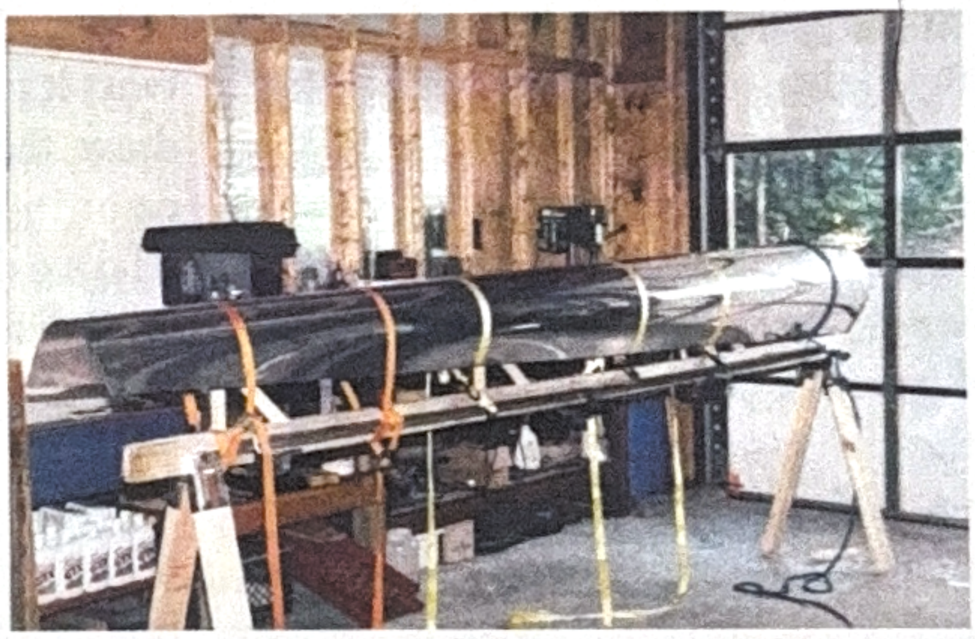

Photo 3

A better method, which eliminates any possibility of twists, is this: While the frame is still on the fixture (stringers 1 & 6 on bottom), lay the skin on top and start to roll the skin downward onto the frame. (See photo 3.) You will have to trim the skin width so that it does not hit the vertical fixture pieces that hold the

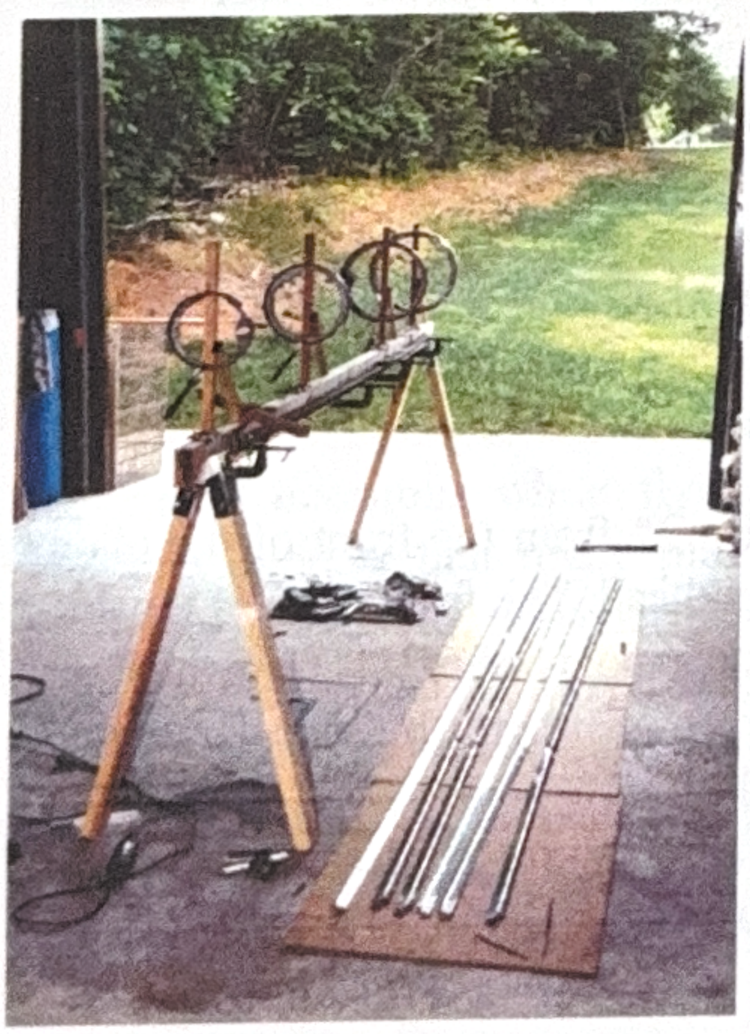

Photo 1

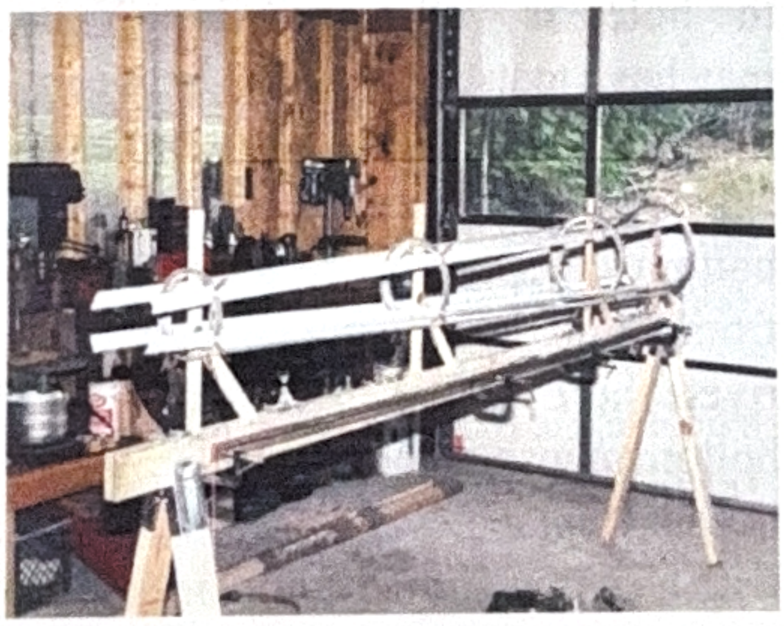

Photo 2

bulkhead castings, while being careful not to cut off too much. Using several ratchet straps (put cardboard under the buckles), tighten the skin onto the frame. Be sure to put a strap near each bulkhead.

Now, go ahead and chalk the lines for your stringer rivets, lay out the spacing, drill the holes and Cleco® the holes on stringers 2, 3, 4 & 5 only. (See photo 4.) RotorWay suggests a spacing of 5-1/2". I would say this is a *maximum* distance. You will have to do some planning here. Remember, you don't want one of these rivets to hit a bulkhead! I ended up with a rivet spacing of 4". Now that everything is lined up, without any possibility of twisting in the frame, remove the skin and de-burr all the holes in the skin and stringers. Reinstall the skin (frame still on the fixture), tighten with the straps, align the rivet holes and reinstall the Clecos®. Now, go ahead and buck the rivets into the bulkheads and stringers 3 & 4. Replace every other Cleco® with a rivet and then come back and do the other half of them.

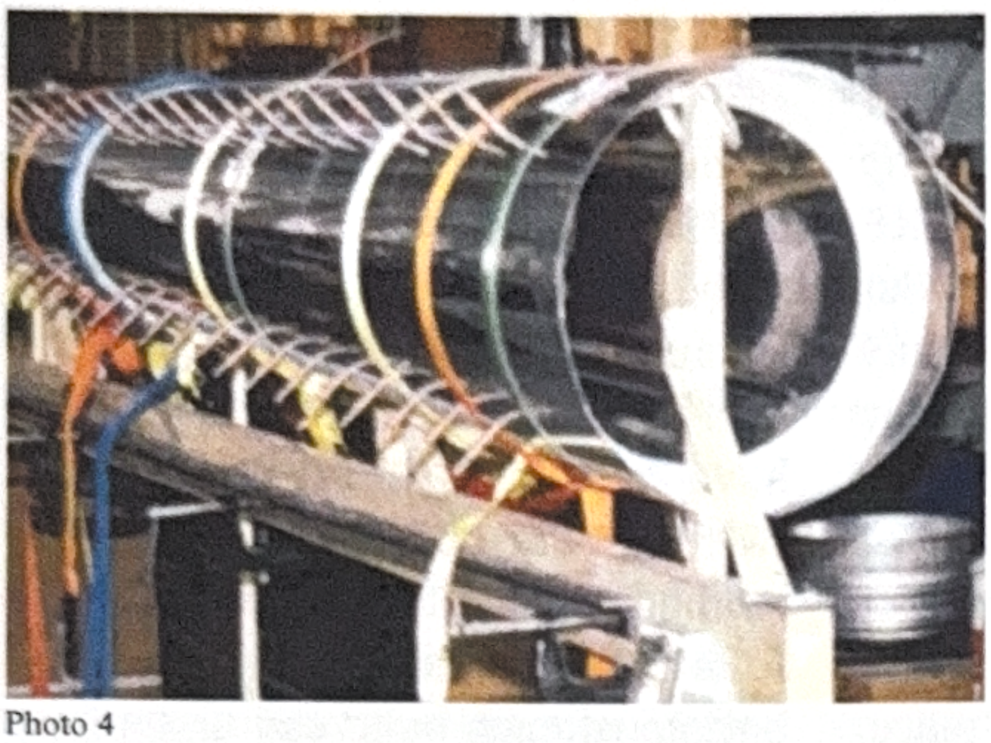

Photo 4

Turn the tail boom upside down on the floor, laying it on carpet or something to prevent scratching. The bottom tunnel opening *should be* 3-1/2" between stringers 1 & 6, but you will notice that the skin bulges between the bulkheads, making the distance too wide. At this point, trim the skin at the opening, leaving it about 1/4" past the stringers. About every 6" to 8", drill a small hole in this overlapping skin on each side of the tunnel opening. Now, thread safety wire through these holes and twist it to draw the opening closed until distance between stringers 1 & 6 is 3-1/2". (See photo 5.) Now, chalk the lines for the #1 & 6 stringer rivets, lay out the spacing, drill the holes and install Clecos® in the holes. (See Photo 6.) RotorWay suggests a rivet spacing of 2-1/4" for these two stringers. Do a little planning here. Remember that the bottom skin rivets need to hit **between** the stringer rivets, so plan the bottom skin rivet spacing at the same time. I used a rivet spacing of 2". Remove the Clecos® and de-burr the holes as well as possible (You may have to use a small file between the stringer and skin.) Blow out any shavings with an air hose. Since the bottom skins have a break line 7/16" from their edges, using countersunk rivets here is not necessary. The bottom skins will cover regular rivet heads. Replace every other Cleco® with a rivet and then come back and do the other half of them.

Photo 5

If you didn't buy the three bottom skins ready-made from RotorWay, you need to fabricate your own. The flat skins (before bending on the break line) should be 5-3/8" wide. The lengths are 23-3/8", 39" and 44". They should have a break line or 'lip' at 7/16" from each long edge turned up 15°. Lay out and drill the rivet holes in your skins, just outside the break lines. Now, with the consistent tunnel openings, you can lay the covers over the openings and drill through the holes and stringers. Remember, these holes need to hit **between** the original stringer rivets. The 23-3/8" skin lines up with the front edge of the main bulkhead. The front edge of the 39" skin should be 35-1/2" from the front of the main bulkhead. The front edge of the 44" skin should be 86-3/4" from the front of the main bulkhead. Install Clecos® to hold them in place. After all holes are drilled, remove the covers and debur all the holes.

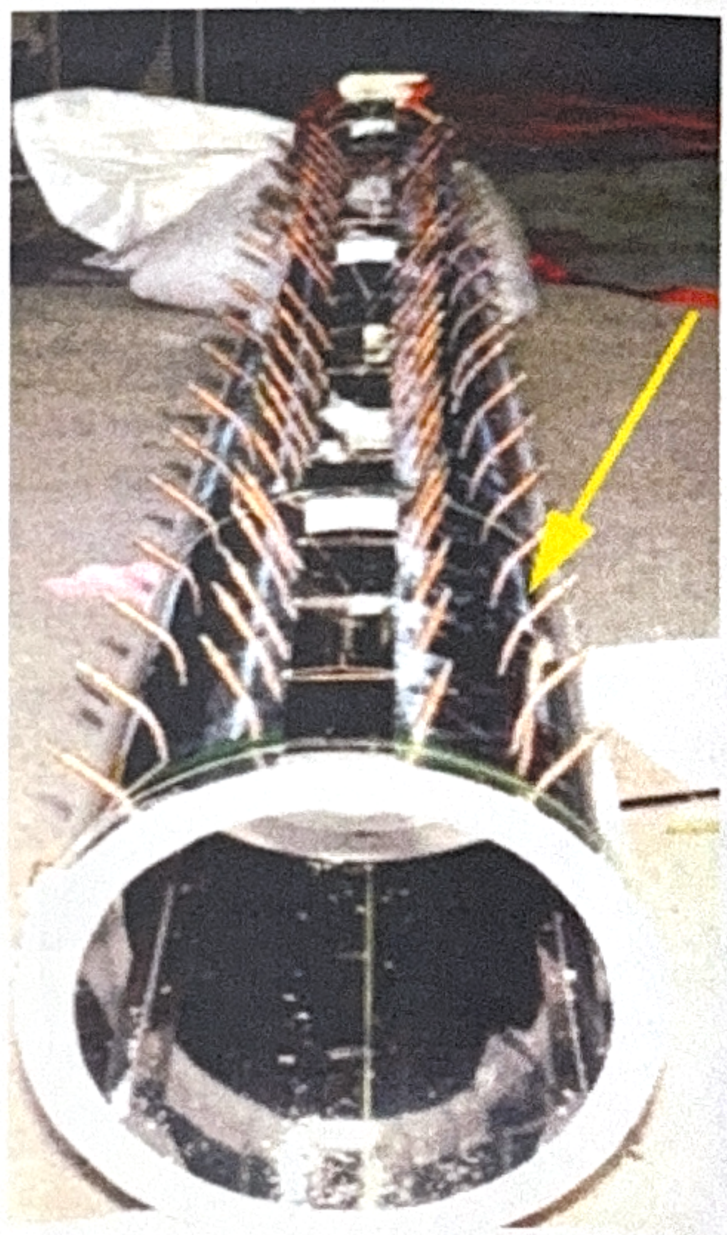

Photo 6

Continued on page 11

Continued from page 6

Once the holes are drilled, you can cut the safety wires and trim the skin even with the stringers. When you install the bottom skins for the final time, you can pull the upper skin together by hand and install Clecos®. Now, go back and replace every other Cleco® with a rivet, then go back and do the other half of them.

Trim the tail boom skin even with the front edge of the main bulkhead. The skin will extend past the #4 bulkhead. Mark and trim this skin at a distance of 130-1/2" from the datum.

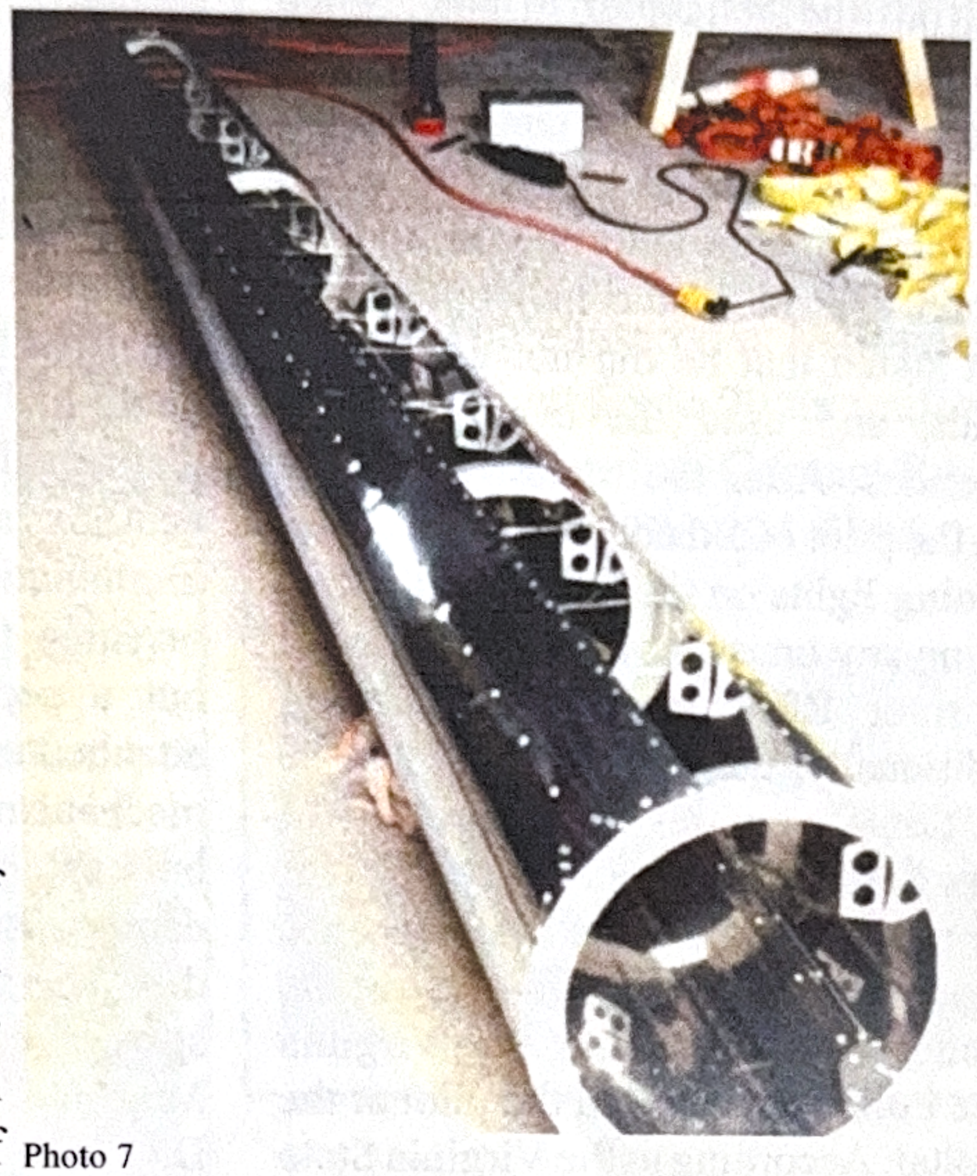

Photo 7

Another little arm saver is this. It is very hard to install your cable and wires in the tail boom after it is installed on the helicopter. My arms are not long enough! I made small aluminum brackets with rubber grommets and riveted them down the inside of the tail boom and installed the cable, wires, pulleys and the rear two belts BEFORE riveting on the bottom skins.

I won't go into every little detail in this article, but it is very important that when you build the tail rotor slider frame, that the slider rails are the correct distance apart and parallel with each other. I fabricated a wooden block around which to build this frame and hold the sliders in their correct positions. With the slider still on the block, I installed the slider and block into the end of the tailboom, leveled it laterally and drilled the bolt and rivet holes, temporarily installing bolts and Clecos® as I went along. (See Photo 7.) When the holes were all drilled, I removed the slider, de-burred the holes, removed the block and reinstalled the slider frame in the tail boom. This eliminates any binding from twisted or unparallel rails.

Rather than clog up everyone's e-mail, you can go to the following link to download the pictures: http://www.rotorway.org/cgi-script/CSFileshare/CSFileshare.cgi.

I hope this helps. If anyone has additional questions, just call or e-mail and I will try to help.

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UNFORTUNATE INCIDENTS

Accident occurred Saturday, August 04, 2001 at CARROLLTON, VA

Aircraft: Delbridge Rotorway EXEC 162F, registration: N113RD Injuries: 2 Serious. Printed as received.

This is preliminary information, subject to change, and may contain errors. Any errors in this report will be corrected when the final report has been completed.

On August 4, 2001, about 1525 eastern daylight time, a home built RotorWay Exec 162F helicopter, N113RD, was substantially damaged when it collided with terrain near Carrollton, Virginia. The certificated private pilot and passenger sustained serious injuries. Visual meteorological conditions prevailed and no flight plan was filed for the personal flight conducted under 14 CFR Part 91.In a telephone interview, a witness, who was employed as a mechanic, was in his home when he heard the sound of a helicopter with an engine that "wasn't sounding right." He then heard three loud "pops" and went outside and observed the helicopter upright about 100 yards away, hit the ground and collapse the skids. When he approached the helicopter he assisted the occupants, and observed gray and white smoke "pouring" from the engine compartment. Another neighbor used a hand held fire extinguisher to suppress the smoke. The witness did not see any flames, and described the odor of the smoke to be similar to an "engine that was really hot."The witness stated that there were three freshly cut tree trunks about 5-inches in diameter located near the wreckage. He stated that the trees were originally 8-10 feet tall. According to the witness, "that popping noise I heard may have been the main rotors blades cutting the trees."The witness attempted to describe the area surrounding the accident site. He reported that the direction he heard the helicopter