

Instructions for Assembling
“Dragonfly Surprise” MechaniCard™

Thank you very much for purchasing the “Dragonfly Surprise” MechaniCard™ kit! This is the very first in my series of mailable kinetic sculptures. The parts in this kit are identical to those which I put together, for sale as completed works. Everything you need is included, except glue and tools. Please, follow these instructions, and study the accompanying diagrams, carefully, to successfully complete your working, MechaniCard™ model.

Note: These directions are very much a work in progress, at the moment. If you have any questions, comments, or suggestions, please feel free to email me - blit@bradlitwin.com

Gather the tools and materials you will need:

High Viscosity Type Cyanoacrylate Glue (Gap-filling Super Glue for wood/paper)

The quick-setting type is not recommended. **WARNING!** Cyanoacrylate glue aggressively bonds skin. Exercise caution when applying, or when handling freshly glued assemblies. **WEAR SAFETY GLASSES!**

Small Forceps (tweezers)

Magnifier

Toothpicks

Small wire cutter

Razor Blade/Hobby Knife

Wax paper

Familiarize yourself with all the parts of the kit, shown on the next page. Open the bag under good lighting, onto a well constrained work area, as some pieces are very small.

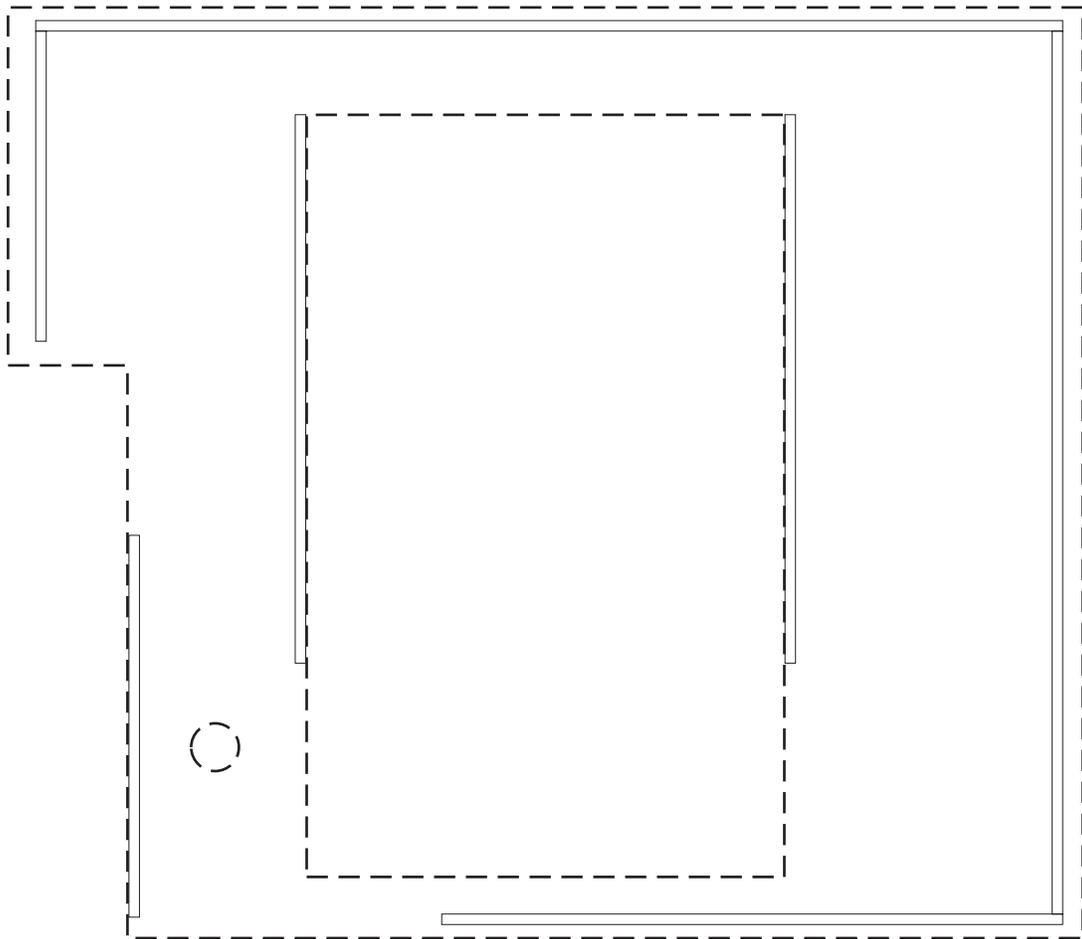


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|---------------------------|-----------------------------|-----------------------------|
| 1. Door | 19. Crank Arm Hub | 37. Crank Sleeve |
| 2. Top Board | 20. Control Rod Mount (2) | 38. Door Stop |
| 3. Back Wall | 21. Door Crank Handle | 39. Upper Mech Spacer |
| 4. Left Wall | 22. Door Crank Axle | 40. Right Side Wall |
| 5. Front Wall | 23. 1/16" x 1/18" Rivet (2) | 41. Crank Stave (2) |
| 6. Right Inside Wall | 24. Cam Follower Axle | 42. 1/16" x 3/16" Rivet (2) |
| 7. Right Side Crank Wall | 25. 1/16" Spacer | 43. Crank Strip |
| 8. Left Inside Wall | 26. Door Strut | 44. Mailer Box (not shown) |
| 9. Mechanism Plate | 27. Door Hinges | |
| 10. Mech Spacer Plate (2) | 28. Cam | |
| 11. Dragonfly Body | 29. Cam Follower | |
| 12. Wing Assembly | 30. Lower Mech Spacer | |
| 13. Nylon String | 31. Door Raiser Spacer | |
| 14. Dragonfly Eyes | 32. Cam Spacer | |
| 15. Door Strut Mount | 33. Wing Crank Hub | |
| 16. Dragonfly Legs (2) | 34. Crank Handle Spindle | |
| 17. Control Rod | 35. Square Crank Peg | |
| 18. Crank Arm | 36. Door Raiser | |

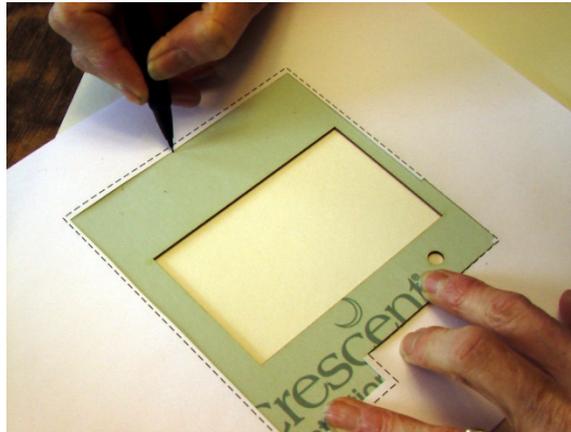
Note: Only a few kits shipped with the inside door graphic not attached. See instructions for placement details.

“Dragonfly Surprise”

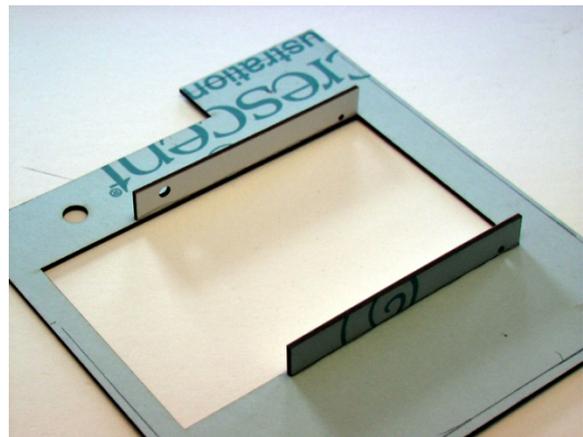
Wall Installation Template



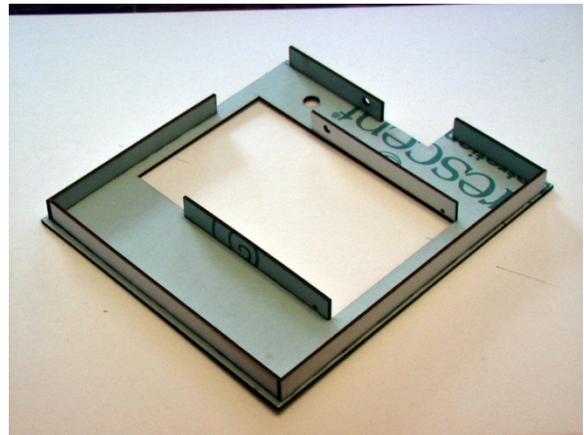
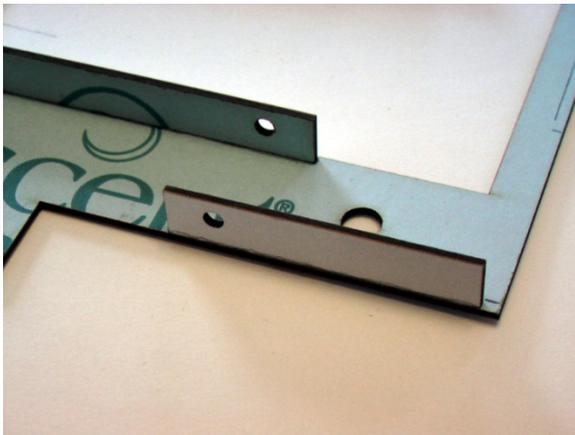
Print out the template on the previous page, and transfer the positions of the five walls to the underside of the Top Board (2). The template also indicates the walls overlaps at their respective corners.



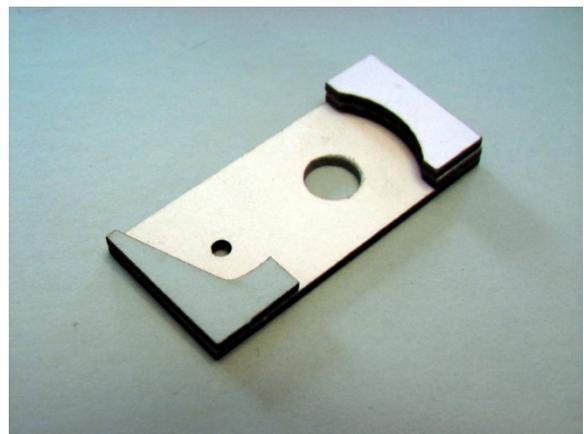
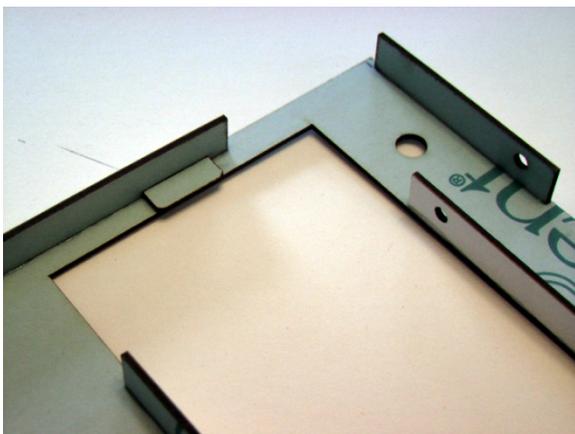
Apply glue to the joining edge of each wall, and hold in place for about 15 seconds. Note that the two free-standing, inside walls (7 & 8), either side of the door opening, must meet the edge of the opening, exactly, and not overhang the opening at all. Note that the inside walls are not the same. Their white sides face into the opening, with the small hinge holes next to the joining edge, as shown.



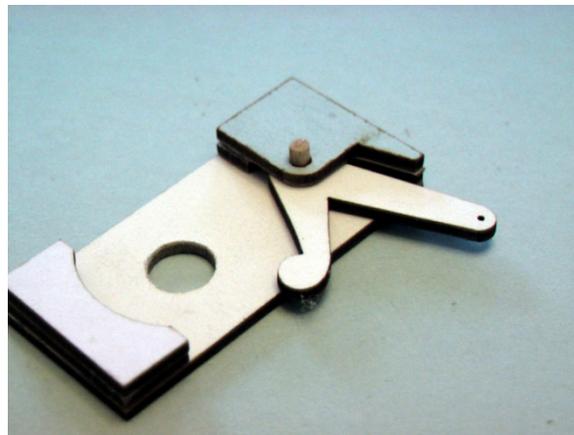
When joining the Right Side Crank Wall (7), make sure the white side faces out, as shown. When all the walls are in place, allow to cure for at least 15 minutes.



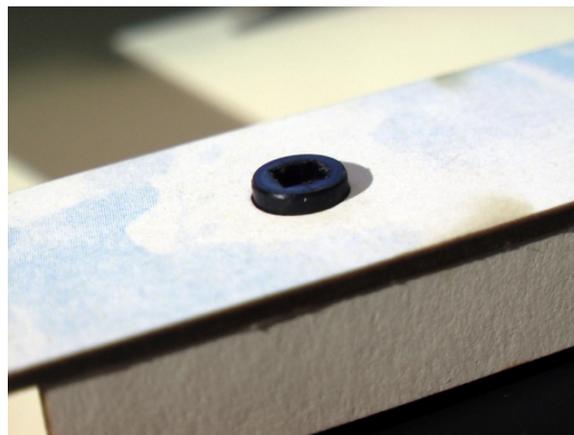
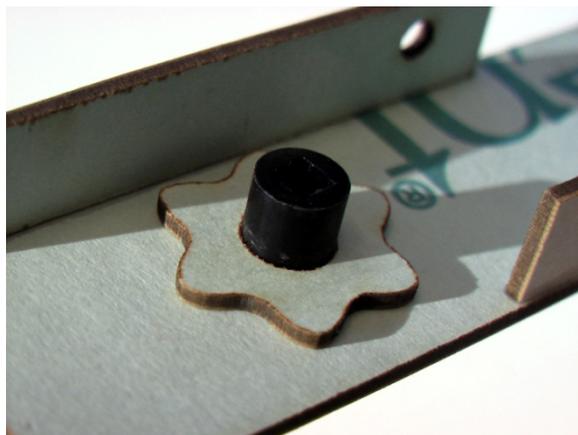
Install the Door Stop (38) in the middle of the door opening. Glue both Mech Spacers (10) and (30), as shown, on the white side of the Mechanism Plate (9)



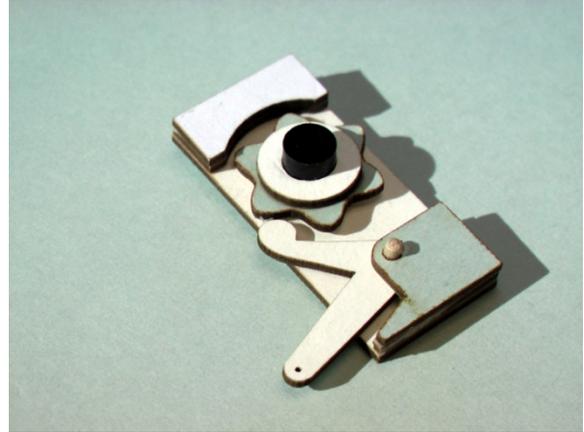
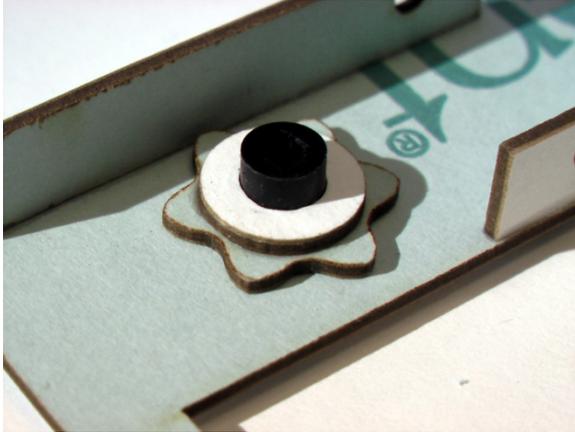
Glue the Upper Mech Spacer (39) as shown, being certain that its peg hole lines up with the hole in the Mechanism Plate, below. The Cam Follower (29) must rock freely when installed.



Slide the Cam (28) over the Wing Crank Hub (33) and Insert in its hole, from the underside of the Top Board. It should extend through the other side between 1/16 – 3/32 inches.

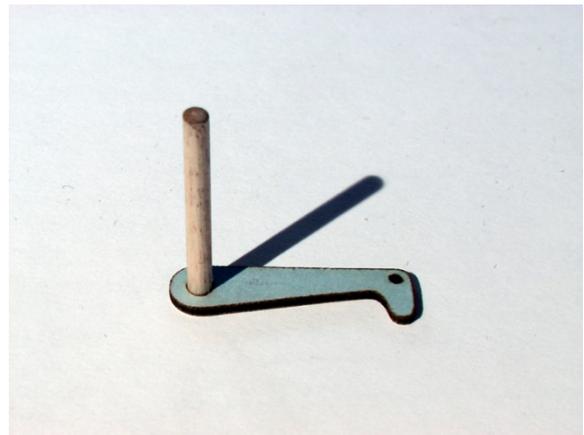


Turn the cam with your finger, noting that the hub should **not** rock from side to side, as you do this. Correct as necessary. Then, apply glue to the mating faces of the hub and cam, followed by the Cam Spacer (32). Install the finished cam assembly, cam follower, and Axle (24) as shown. Do not glue the axle until the next step.

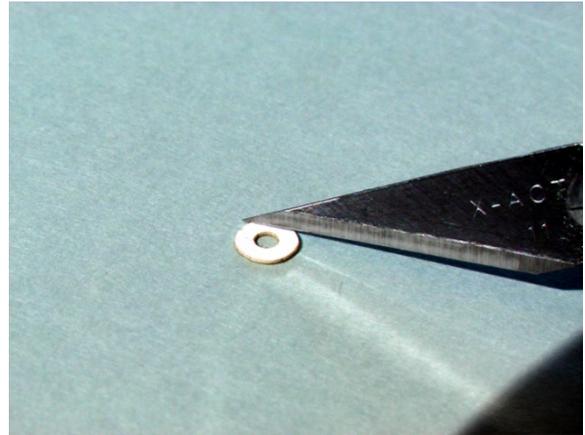


Glue the crank mechanism into place under the Top Board, as shown. Glue the extending axle, in place

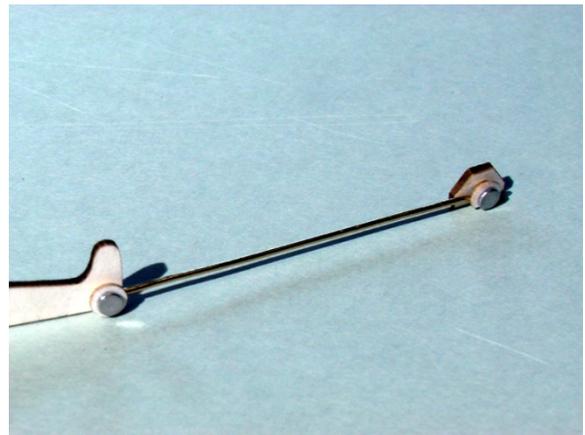
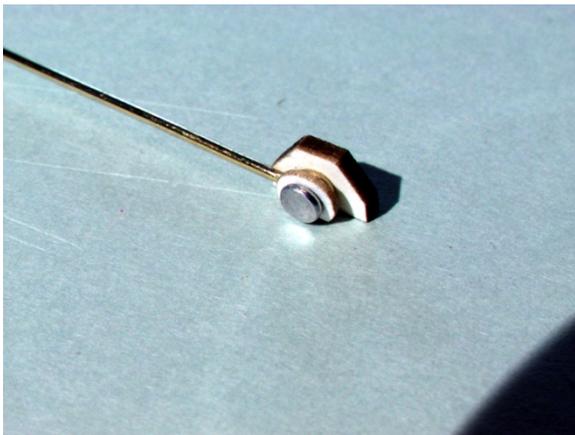
Glue the Door Crank Axle (22) into the Door Raiser (31). The axle must protrude at 90°.



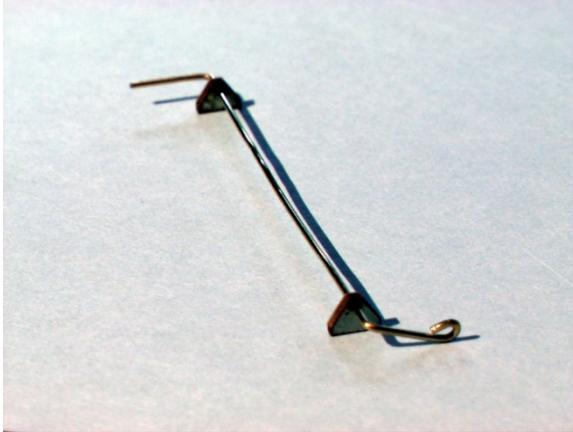
From the white side of the Door Raiser, install a 1/16" x 1/8" Rivet (23) through a 1/16" Spacer (25) and one end of the Door Strut (26), applying glue to the inside of the hole, just as the rivet is pushed home. The strut must rotate freely.



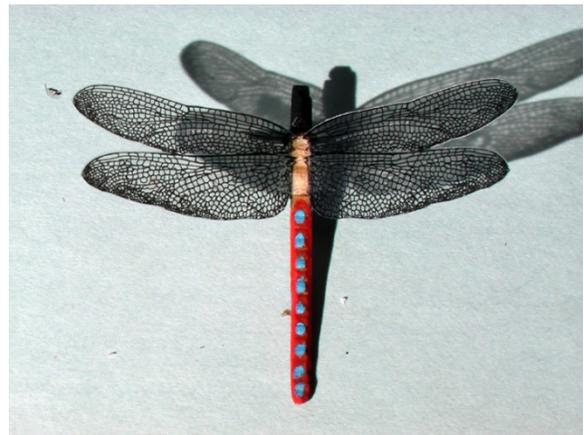
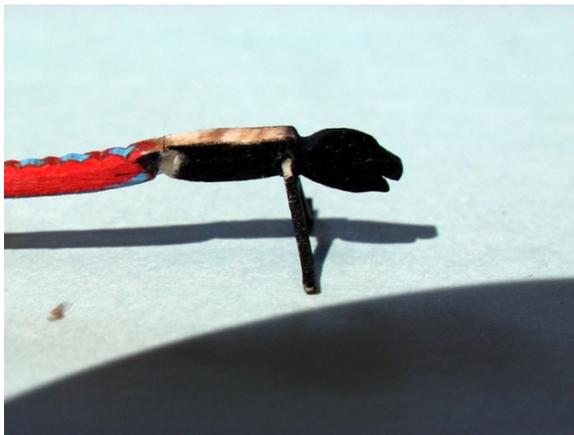
Cut a segment of a Spacer (25) before assembling it to the Door Strut Mount (15), as with the other end of the strut.



Slide both Control Rod Mounts (20) into place on the Control Rod (17) as shown. Make sure the free end (at top) is parallel with the table, when the loop end is resting on it. Adjust if necessary. Glue the assembly into place on the underside of the Door (1). There are cut-outs in the graphic to position the mounts.



Glue the front Legs (16) on the underside of the Dragonfly Body (11). They should be at a slight angle, and support the body upright, as shown. Apply glue to the bare wood portion on top of the body, and slide the Wing Assembly (12) sideways along the tail, taking care to keep the wings clear of the glue, until they are in the correct position.

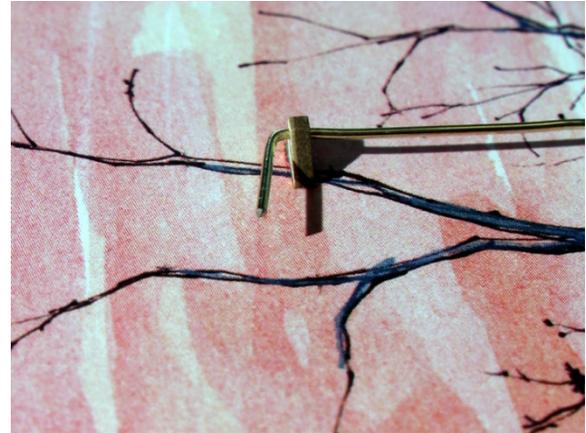


The wing puller should not interfere with the front legs, if properly positioned. Glue the hind Legs (16) and the eyes, as shown.

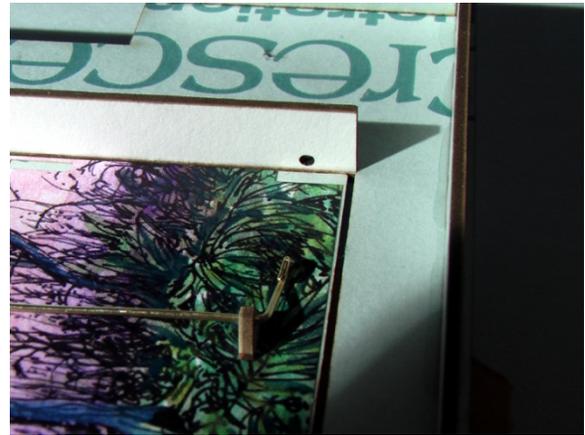


The eyes should nearly meet, at the top of head.

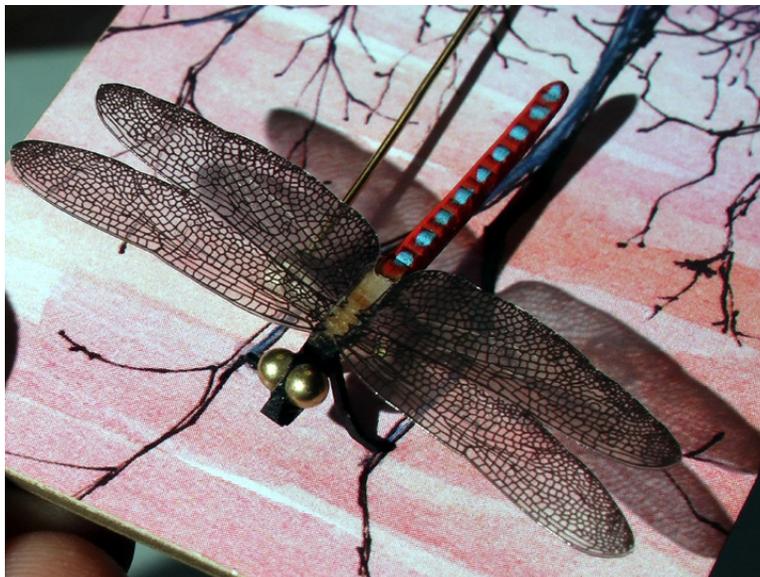
Check that the control rod end protrudes at a slight angle, so that it is perpendicular to the branch, in the door graphic.



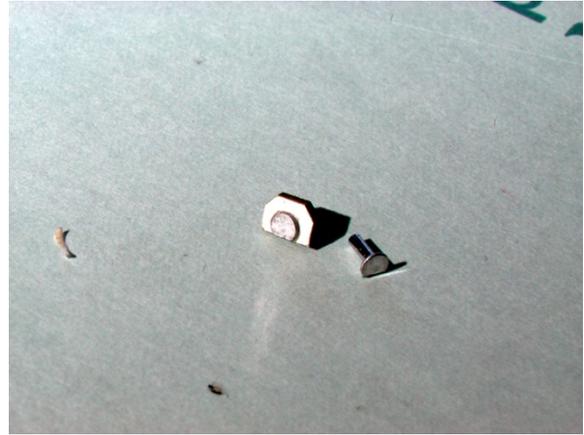
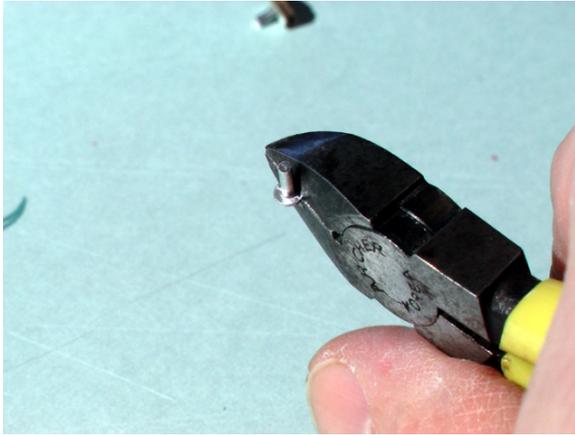
Place the Dragonfly on the door, and slide into place, fishing the control rod end through the holes in the wing-puller. The final position of the dragonfly is determined by the control rod. It should be adjusted in the mounts such that the loop, at the bottom, lines up with the hinge holes, when the door is properly aligned, within its frame. This is determined by pushing the door up against the top edge of the frame, leaving a gap, at the end, as shown.



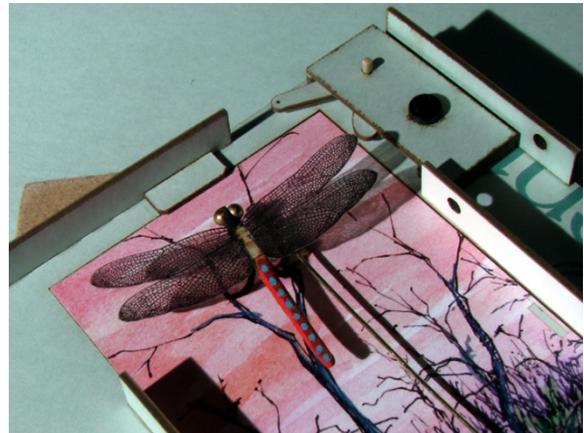
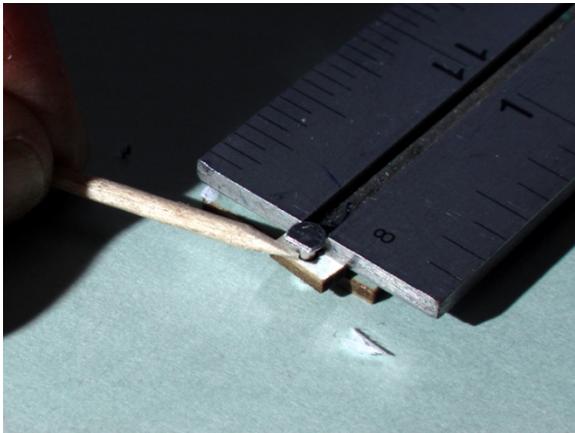
Once the rod is properly adjusted, glue the dragonfly's feet, such that they line up with the branches, in the graphic.



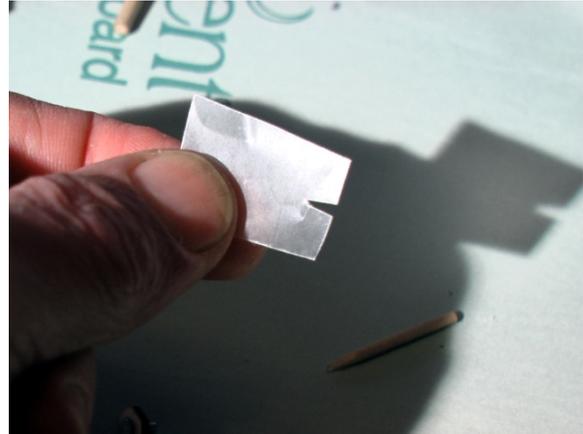
Clip off one edge of the heads of both 1/16" x 3/16" long rivets (42).



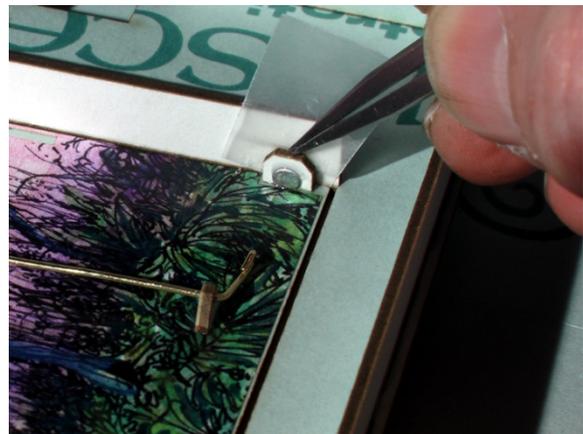
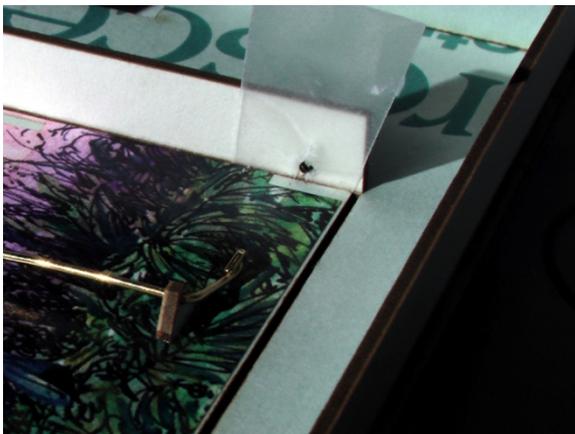
Put glue under the rivet head, as it enters the hinge. Allow rivet to set thoroughly before proceeding. Be certain that the door is snug, up against the top of the frame...



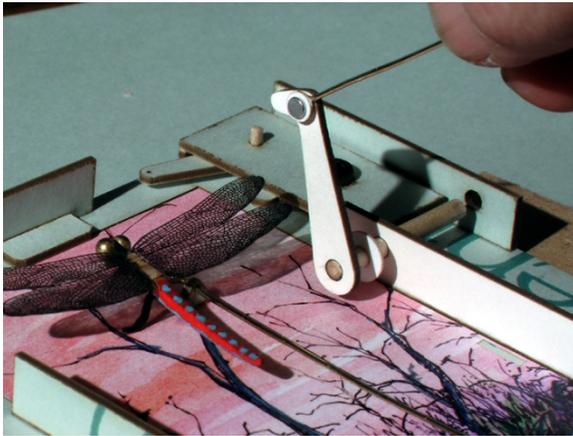
... leaving a 1/16" gap at the bottom. **Without this gap, the door will not open!** Prepare two small pieces of wax paper, with cut-outs as shown. The cut-outs are 1/16" wide x 3/16" high.



Place the wax paper in between the door and the frame, such that the cut-outs allow the rivet to pass through. Apply glue to the receiving area for the hinge, and install the hinge assembly. Holding the assembly in place for at least 15 seconds is advisable.



Install the Spacer (36) on the door-raiser assembly axle, and insert through the wall holes, as shown. Apply glue to the receiving pad for the Door Strut Mount, and install, as shown, orienting the flat side of the spacer against the door. Allow 30 minutes before attempting to operate the door. Take your time, and be gentle, when doing this for the first time. Use a razor blade knife to remove any glue that may have seeped from the hinge, into the door jamb. Forcing it will damage the hinges.

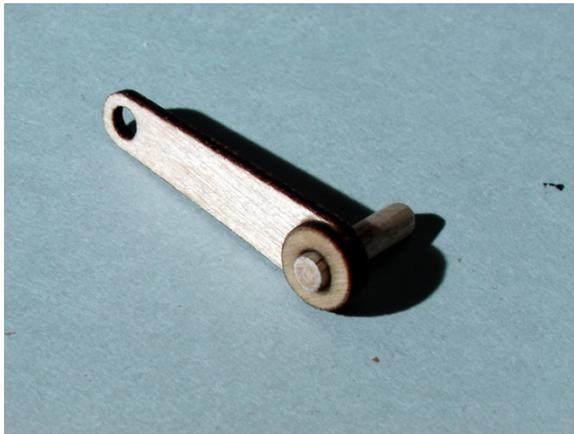


Tie a triple knot in the end of the Nylon String (13) and pull through the hole in the end of the cam follower.

Apply glue to the open edges of all the walls, and attach to the Mailer Box (44) such that the left inside wall is flush up against the left edge of the graphic, on the inside of the mailer, and such that both the front and rear mailer box flaps may be raised, perpendicular, without interference with the top plate. Allow to dry, at least 15 minutes.



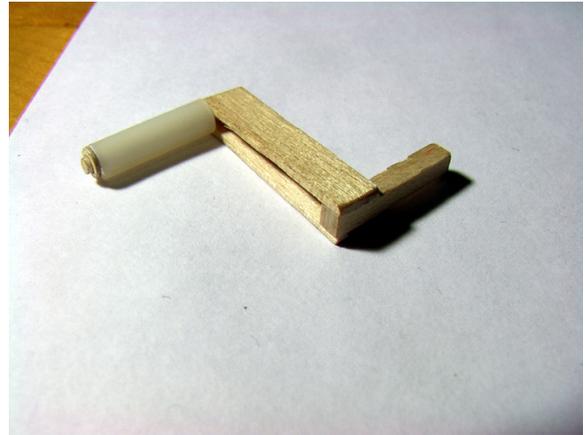
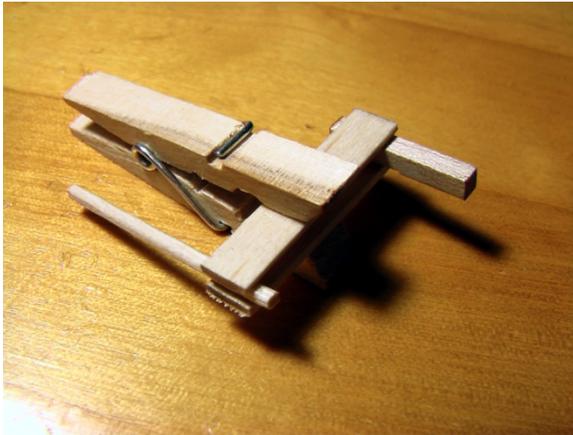
Using the Door Handle (22) for alignment, glue the Crank Arm Hub (19) to the larger end of the Crank Arm (18), as shown. Remove the handle before the glue grabs it. Glue the handle on the other end of the arm, opposite from the hub.



With the door raiser assembly fully open, glue the crank arm assembly into position, as shown, in contact with the mailer. Allow to dry thoroughly, before using the handle to operate the door.

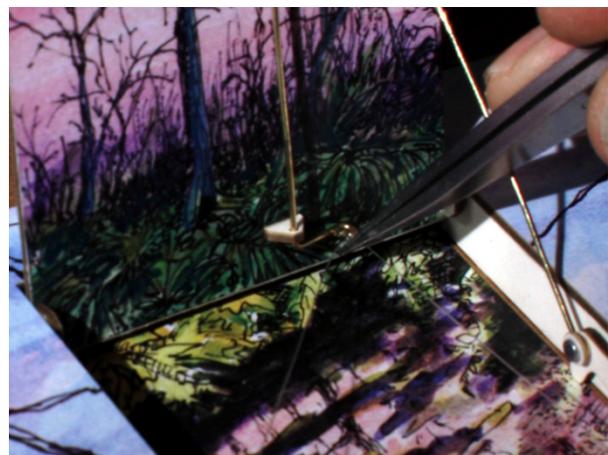


Assemble the crank, as shown (34)(35)(41). When completely dry, sand off excess wood, and install the sleeve (37) and its retainer (25). Sand off the excess spindle, after retainer spacer is well dried.



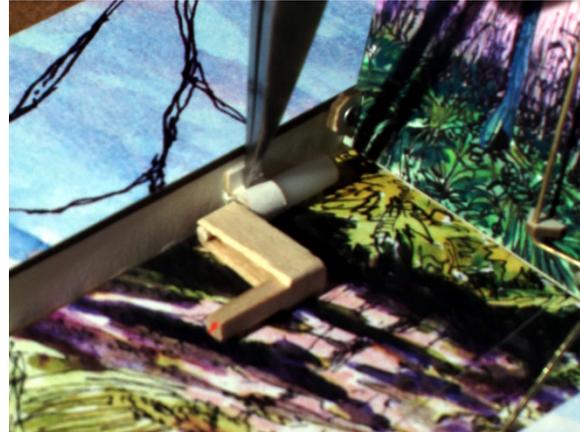
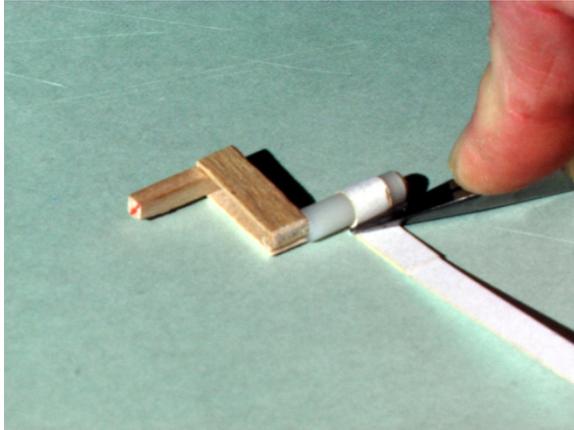
Fish the free end of the nylon string across the door opening, and through the underside of the control arm loop. Run the string end back under itself, on the right, and through the resulting loop, towards the left. Gently pull the loop closed, coaxing the forming knot up to the control arm. Insert the crank assembly in its receptacle in the hub, and rotate it to a point, where there is the most slack in the string. (This is when the cam follower is resting in a valley of the cam). Continue pulling the knot, snug up against the control arm loop, while keeping the loop in contact with the door, and making the string slightly taut. Do not push too hard! The hinges are fragile. When the string is released the arm loop should retract to its position, in contact with the door.

Once the knot is tight, operate the crank to make the wings flap. If you're satisfied with the action, put a little glue on the knot, and clip off the excess string when completely dry.



Tightly, wrap the crank strip (43) around the crank sleeve, tuck under and glue. Remove crank to avoid getting stuck by excess glue. When set, cut the strip off to approximately 5/16" including loop.

Glue strip/loop onto left side wall, near the hinge, and stow crank as shown.



Job done! I hope you enjoyed making this project, as much as I enjoyed designing and producing it. Only open/shut the door by the handle, and operate the wings, cranking in either direction (clockwise works best).

Finally, please remember - though this little sculpture is fairly robust, it is nonetheless made of paper. Wear and tear is a sure to follow, as you pass it around. So, enjoy it while it lasts.

Bradley W. Litwin

For more MechaniCard™ and kinetic sculpture fun, visit **MechaniCards.com** and **BradLitwin.com**