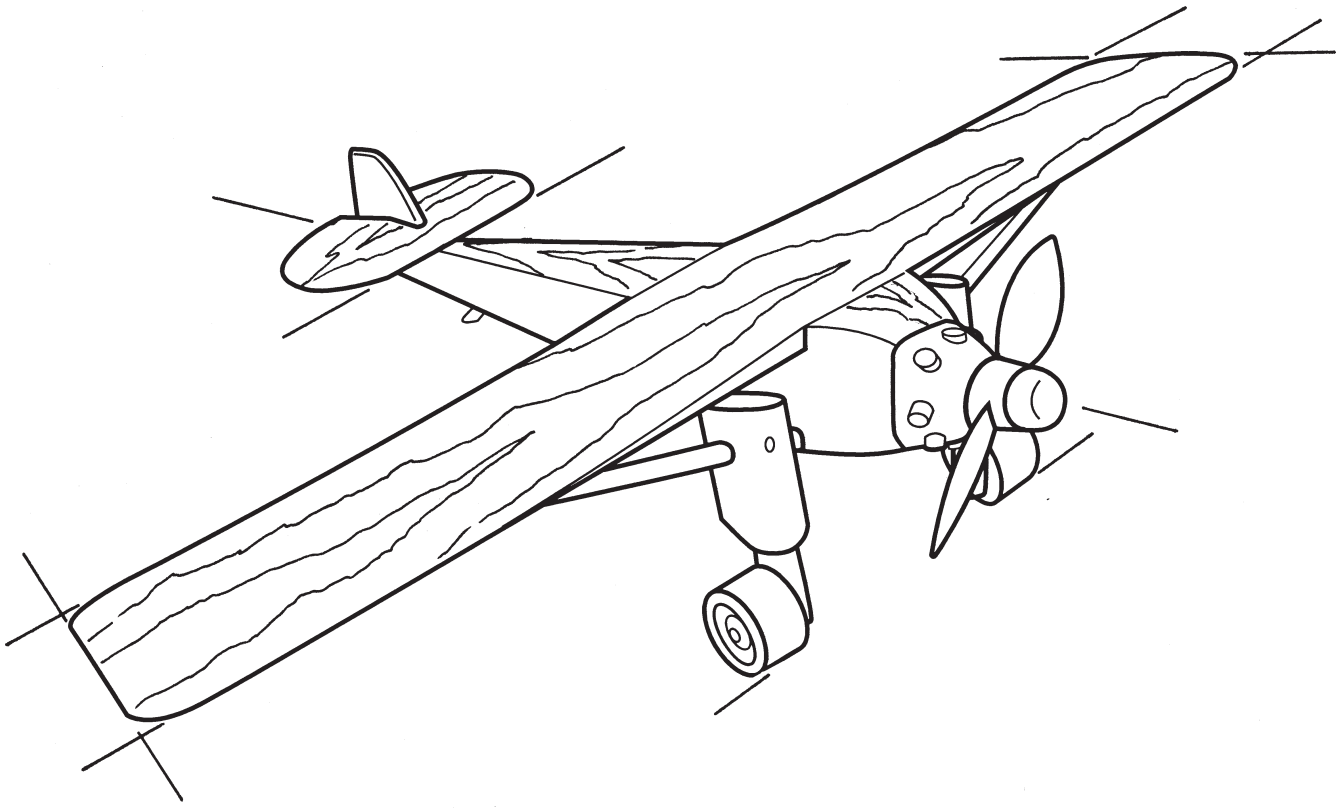
MINWAX®

WOODWORKS: INTERMEDIATE PROJECT

VINTAGE MODEL AIRPLANE

DO GOOD WITH WOOD™ MINWAX®



Inspired by Charles Lindbergh's "Spirit of St. Louis," which made the legendary first transatlantic crossing from New York to Paris in 1927, this model recalls the exciting challenges of the early days of American aviation. With all the different steps and tasks involved, from bandsawing to precision cutting and drilling to using a traditional spokeshave, completing this airplane will surely advance your skills. And after you build it, you'll learn how to apply and use finishes to protect the wood and keep it looking beautiful.

TOOLS REQUIRED

Hand Tools
– Spokeshave
– Hand plane
– Wood file
– Clamps
_ Chisel

Power Tools
– Table saw
– Thickness planer
– Bandsaw
– Orbital sander
– Drill

Miscellaneous
– Pencil
– Safety glasses
– Carpenter's glue
– Sandpaper
– Masking tape
– Clean, lint-free cloths
– Respirator
– Gloves for finishing
– Mineral spirits
– Water-filled metal container with tight-fitting lid
– Minwax® Wood Finish Stain Brush, Minwax® Polyurethane Brush or other good quality, natural bristle brush (for oil-based stains and finishes)
– Minwax® Polycrylic® Brush or other good quality, synthetic bristle brush (for water-based stains and finishes)
– Small artist-style brushes

SHOPPING LIST

Item	Quantity
1" x 7-1/2" x 24" clear, knot-free board	1
7/16"-dia. dowel, 1-5/8" long	2
1/8"-dia. dowel, 1" long	1
1/4"-dia. dowel, 24" long	1
1/4"x 1" fluted dowel	8

Recommended Wood: Pine
Alternate Wood: Poplar or Alder

CUTTING LIST

Key	Pcs.	Part	Size
A	1	Body	1-7/8" x 3-3/8" x 10-1/2"
B	1	Engine	3/4" x 1-1/2" hexagon
C	1	Wing	1/4" x 2-5/8" x 19"
D	1	Elevator	1/4" x 2-1/8" x 4-1/4"
E	2	Shock absorbers	3/4" x 1-1/4" x 1-3/4"
F	2	Wheel posts	7/16"-dia. dowel, 1-5/8" long
G	2	Shock absorber pins	1/8"-dia. dowel, 1/2" long
H	2	Wheels	5/8" x 1-1/8"-dia. disc
I	2	Wheel axles	ready-made; see Source
J	1	Propeller	1/4" x 1" x 4"
K	1	Nose cone	5/8" x 1" disc mounted on 1/4" dia. dowel, 3/4" long
L	4	Struts	1/4"-dia. dowel, 5-1/2" long
M	8	Mufflers	1/4" fluted dowels
N	1	Skid	1/4"-dia. dowel, 1" long

WOOD FINISHING PRODUCTS

Finishing Note: If you chose more than one color to stain the plane (such as the Recommended Finish), you will find it easier to prep and stain the individual pieces prior to assembly. Be sure to avoid staining areas that will receive glue since that can weaken the glue bond.

Recommended Finish

Prep: Minwax® Water Based Pre-Stain Wood Conditioner
Stain: Minwax® Water Based Wood Stain
Body– River Stone*
Nose– Harvest Grain*
Propeller and Wheels – Onyx*
Finish: Minwax® Polycrylic® Protective Finish Semi-Gloss

*Or a Minwax® Water Based Wood Stain of your choice, available in 50 custom-mixed colors and a White Wash Pickling Stain.

Alternate Finish

Prep: Minwax® Pre-Stain Wood Conditioner
Stain: Minwax® Wood Finish™
Body– Golden Pecan**
Nose– Golden Pecan**
Propeller and Wheels – Ebony**
Finish: Minwax® Fast-Drying Polyurethane Semi-Gloss

**Or your choice of 24 Minwax® Wood Finish™ Stain colors.

BEFORE YOU BEGIN

Good craftsmanship begins and ends with good work habits, so make the following steps part of your routine workshop practice. If you have any doubts or questions about how to proceed with a project, always discuss them with your shop instructor.

- Carefully and fully review plans and instructions before putting a tool to the project lumber.
- Work sensibly and safely. Wear safety goggles when doing work that creates flying chips and sawdust; wear the appropriate respirator whenever making sawdust or working with thinners or other solvents.
- At the end of every work session, clean up your shop area and put away all portable tools.

CUTTING AND ASSEMBLY PROCEDURE

NOTE TO TEACHERS: This project includes scaled drawings of the plane parts. Photocopy the drawings to 250%, glue them to 1/4" hardboard, and cut them out to produce templates you can use over and over.

Prepare the Pieces

1. After familiarizing yourself with all the parts as shown in Fig. A, prepare and glue together two 1" x 3-1/2" x 11" pieces to make a block for the body (A). Allow the glue to dry.

2. Plane pieces for the wing (C), elevator (D) and propeller (J) to thickness slightly greater than dimensions shown on Cutting List. This will allow for planing, shaving and finish sanding to the exact thickness.

Make the Body and Engine

3. To start shaping the body, machine the body block to 1- 7/8" x 3-1/4" x 11".

4. Using the templates found in Fig. B, trace the outlines of the side and top on to the body. Mark the hole locations for the struts and skid.

5. Cut the body shape with a bandsaw. Cut the side profiles first, tape the parts back together using masking tape, then cut the top and bottom profiles.

6. Draw the 1/4"-deep by 2-5/8"-wide wing notch on the top of the body. Turn the body on its side and use a bandsaw to make several 1/4"-deep cuts, one about every 1/8" across the width of the notch. Clamp the body in a vise and clean out the remaining waste with a chisel. Make sure the base of the notch is flat.

7. Locate, mark and drill a 1/4" hole in the center of the front end of the plane body for later mounting of the engine (B).

8. Lay out the engine (B) by drawing a hexagon measuring 1-1/2" between opposite corners. Cut the shape out carefully with a bandsaw. Draw the octagon on one end of a narrow board so you can keep your hands away from the blade while making the cuts. Or clamp the board in a vise and use a jigsaw.

9. Drill 1/4" holes centered in each side of the octagon as shown in Fig. C to prepare for the mufflers.

10. Drill a 1/4" hole through the center of the octagon.

11. Glue the engine (B) to the front end of the body (A), using a 1/4" dowel to align the parts. Allow the glue to dry.

12. Drill the holes for the struts (L) and the skid (N).

13. File and sand the body to remove any saw marks and sharp corners. Also file the engine (B) to make it flush with the body (A).

14. Glue the mufflers (M) into the holes in the engine hub. Allow the glue to dry, and trim the dowels so they project 1/4".

Make the Wing and Elevator

15. Rip (saw wood along the grain) the wing (C) to width to fit the notch in the plane body. Cut it to length. Trace and cut the wing shape.

16. Center the wing in the notch in the plane body and mark on the wing the outline of the body.

17. Shape the wing with a spokeshave, plane, file and sandpaper. Work from the body outline marks outward. Use the setup shown in Fig. D.

18. Trace and cut the elevator (D). File and sand it to shape.

Make the Shock Absorbers, Wheel Posts and Wheels

19. Make two shock absorber blanks each 3/4" x 4" x 4". Mark out the shock absorbers (E) and drill the 1/4" strut hole and the 1/8" hole for the shock absorber pin (G) as shown in Fig. B. Large pieces are easier to work with than small pieces at this stage.

20. Round over the front corners of the shock absorber blank with a file.

21. Cut the shock absorber teardrop shape using the bandsaw. Sand out the saw marks.

22. Cut the shock absorbers to finish length, (1-3/4") and drill the hole for the wheel post (F).

23. Cut the wheel post from 7/16"-dia. dowel and glue it into the shock absorber. Wait for the glue to dry and then drill a 7/32" hole through the wheel post for the ready-made wheel axle (I).

24. Counterbore a 1/8"-deep hole in the wheel (H), then use a 1-3/8" hole saw to cut the wheels out. Sand the edges and corners. (Besides the wheel axles, you can also buy ready-made wheels from the Source listed at the end of this project.)

25. Slip the wheel axles through the wheels and glue the axles into the wheel posts. Make sure the wheels spin freely. Sand the protruding ends of the axles flush with the wheel posts.

Make the Propeller and Nose Cone

26. Trace and cut the propeller (J), and drill the 5/16" center hole.

27. Pitch the propeller blades by filing and sanding from front to back corners. See the photo of the finished model.

28. Cut a 1" disc for the nose cone (K) and drill a 1/4" hole, 1/4" deep in the center. Glue in a 1/4" dowel. Allow glue to dry.

29. Secure the nose cone dowel in a drill chuck and use a file and sandpaper to shape the nose cone while the drill is running as shown in Fig. E. Test it against the propeller. The diameter of the nose cone and the circular center of the propeller should match.

Make the Struts and Skid

30. Working with one strut at a time, set each strut in its hole in the body. Use a ruler as a straight edge to strike a line on the dowel as shown in Fig.F. It should be 4-3/4" from the body to the inside edge of the dowel. Carefully cut and sand the dowel to this line so it fits to the wing bottom.

31. Glue the skid (N) into the hole at the rear underside of the body.

FINAL ASSEMBLY

Woodworker's Tip: *With the range of colors and detail in this model, it is recommended that you do the prep and staining before the final assembly. Avoid staining areas that will receive glue.*

32. Glue and clamp the wing into the notch of the body, the elevator to the tail, and the nose cone through the propeller and into the body. Be sure the propeller spins freely. Allow glue to dry.

33. Set the rear struts by gluing them into the body and to the bottom of the wing. Allow glue to dry.

34. Slide the shock absorbers onto the front struts. Glue the struts into the body and onto the wing. Allow glue to dry.

35. Locate each shock absorber 1/2" from the body and hold it perpendicular to the wing. Using the 1/8" hole as a guide, drill the hole deeper into and through the strut. Glue and insert the shock absorber mounting pin (G) into the hole as shown in Fig. A. Allow glue to dry. Sand the pin flush with the shock absorber.

STAINING AND FINISHING

Woodworker's Tip: *Though you may be tempted to cut short your sanding, preparation and application, don't do it. These tasks are very important steps in obtaining a high-quality finish. Remember, it is the finish, just as much as the fit and smoothness of the parts, that will determine how people judge your craftsmanship. To ensure an excellent result, follow the steps listed below and also the instructions the manufacturers put on their products.*

FINISHING TIPS

- Test the stains and finishes you are planning to use on scraps of wood. On the back of the scrap, mark the stain/finish combination and the type of wood. Allow all samples to dry thoroughly before making your final finish selection. Save your samples for quick reference on future projects.
- All stains and finishes must be allowed to dry thoroughly between coats. Remember that drying times can vary due to humidity and other climatic conditions.
- If you have some leftover stain or finish, wipe the can rim so that stain or finish in the rim won't dry out and prevent the lid from forming a tight seal.
- Given the number of small pieces in this project, you may find it helpful to use small artist-style brushes when staining and finishing the individual pieces.
- Brushes used for oil-based finishes must be cleaned with mineral spirits; for water-based products, such as Minwax® Water-Based Wood Stains or Minwax® Polycrylic® Protective Finish, clean brushes with warm water and soap.

36. Before staining and finishing, finish-sand all surfaces and ease all the edges. Wipe the piece down with a lightly dampened cloth.

Recommended Finish

37. Using a nylon/polyester brush, apply a generous coat of Minwax® Pre-Stain Water-Based Wood Conditioner following the directions on the can. After 1 to 5 minutes, wipe off all excess conditioner using a clean, lint-free cloth. Wait 15 to 30 minutes and then use fine-grade sandpaper to sand off any "whiskers" raised by the conditioner. Proceed to the staining within 2 hours.

Woodworker's Tip: *Minwax® Water-Based Wood Stain is available in 50 custom-mixed colors and a White Wash Pickling Stain.*

38. Apply the Minwax® Water-Based Wood Stain you've chosen using either a nylon/polyester brush or soft cloth. Be sure to work one piece or area at a time and allow stain to penetrate no longer than 3 minutes. While stain is still wet, wipe off excess with a clean cloth that's been lightly dampened with stain. If a second coat is desired, allow the piece to dry for 2 hours before applying stain. Set the piece aside to dry thoroughly before applying the protective clear finish.

39. Apply Minwax® Polycrylic® Protective Finish following the directions on the can. Stir the can contents thoroughly before starting and periodically repeat the stirring during your work session.

40. Working a small area at a time to maintain a wet edge, apply the first coat using a nylon/polyester brush. Work quickly and make the final strokes in each newly finished section using with-the-grain brushstrokes.

41. Allow the finish to dry a minimum of 2 hours. Then lightly sand with 220-grit sandpaper. Thoroughly wipe off all surfaces with a clean soft cloth.

42. Repeat steps 39 and 40 to apply the second coat. Allow the finish to cure overnight before handling the airplane.

Alternate Finish

43. Using a natural bristle brush or a soft cloth, apply a generous coat of Minwax® Pre-Stain Wood Conditioner following the directions on the can. After 1 to 5 minutes, wipe off all excess conditioner using a clean, lint-free cloth. Proceed to the staining within 2 hours.

44. Apply Minwax® Wood Finish™ using a natural bristle brush or a clean, lint-free cloth. Allow the stain to set for about 5 to 15 minutes, then wipe off any excess using a clean cloth lightly dampened with stain. Allow the stain to dry overnight before applying the protective clear finish.

Woodworker's Tip: *When wiping off stain, make certain that your last wipe with the cloth goes with the grain of the wood.*

45. Apply Minwax® Fast-Drying Polyurethane following the directions on the can. Use a good quality, natural bristle brush intended for use with polyurethane. Allow the first coat to dry overnight.

46. The next day, lightly sand all surfaces with 220-grit sandpaper using with-the-grain strokes. Wipe off all surfaces with a clean soft cloth. Apply a second coat of polyurethane and set the piece aside to dry.

47. When completely dry repeat step 46, applying the third and final coat of polyurethane. Allow the finish to cure overnight before handling the airplane.

PRODUCT SAFETY

For your safety and the safety of those you work with, always read the safety warnings, which manufacturers print on their labels, and follow them to the letter. Typical safety advice and instructions will contain information such as the following:

WARNING! Removal of old paint by sanding, scraping or other means may generate dust or fumes that contain lead. Exposure to lead dust or fumes may cause brain damage or other adverse health effects, especially in children or pregnant women. Controlling exposure to lead or other hazardous substances requires the use of proper protective equipment, such as properly fitted respirator (NIOSH approved) and proper containment and cleanup. For more information, call the National Lead Information Center at 1-800-424-LEAD (in US) or contact your local health authority.

When using oil-based wood finishing products:

CAUTIONS: CONTAINS ALIPHATIC HYDROCARBONS. Contents are COMBUSTIBLE. Keep away from heat and open flame. **VAPOR HARMFUL.** Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

FIRST AID: In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately.
NOTICE: Reports have associated repeated and prolonged occupational exposure to solvents with permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal.
WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.
DO NOT TAKE INTERNALLY. KEEP OUT OF REACH OF CHILDREN.

When using water-based wood finishing products:

CAUTIONS: Use Only With Adequate Ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved), or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

FIRST AID: In case of eye contact, flush thoroughly with large amounts of water. Get medical attention if irritation persists. If swallowed, get medical attention immediately.

WARNING: Contains Alkyl propanols, ethylene glycol, n-methyl pyrrolidone. **VAPOR HARMFUL.** Use only with adequate ventilation. To avoid overexposure, open windows and doors or use other means to ensure fresh air entry during application and drying. If you experience eye watering, headaches, or dizziness, increase fresh air, or wear respiratory protection (NIOSH approved) or leave the area. Avoid contact with eyes and skin. Wash hands after using. Keep container closed when not in use. Do not transfer contents to other containers for storage.

DO NOT TAKE INTERNALLY.
FIRST AID: In case of eye contact, flush thoroughly with large amounts of water for 15 minutes and get medical attention. For skin contact, wash thoroughly with soap and water. In case of respiratory difficulty, provide fresh air and call physician. If swallowed, call Poison Control Center, hospital emergency room, or physician immediately.

DELAYED EFFECTS FROM LONG-TERM OVEREXPOSURE.
Contains solvents which can cause permanent brain and nervous system damage. Intentional misuse by deliberately concentrating and inhaling contents may be harmful or fatal.
WARNING: This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.
KEEP OUT OF REACH OF CHILDREN.

SAFE DISPOSAL OF RAGS AND WASTE.
Please be mindful of the safe way to dispose of rags and other waste. Rags, steel wool and other waste products soaked with oil finishes or solvents may spontaneously catch fire if improperly discarded. Place rags, steel wool and other waste immediately after use in a water-filled metal container. Tightly seal and dispose of the waste materials in accordance with local trash removal regulations. Be sure to keep the waste out of reach of children.

Source
Commercially made wheels and axles are available from
Woodcraft Supply
www.woodcraft.com
(800) 225-1153
1-1/4" wheels; part #50S41; 12 wheels $3.25
Axle pegs, part # 50Q31; 12 axles $1.50
Also available at local hobby stores

FIG A. VINTAGE MODEL AIRPLANE

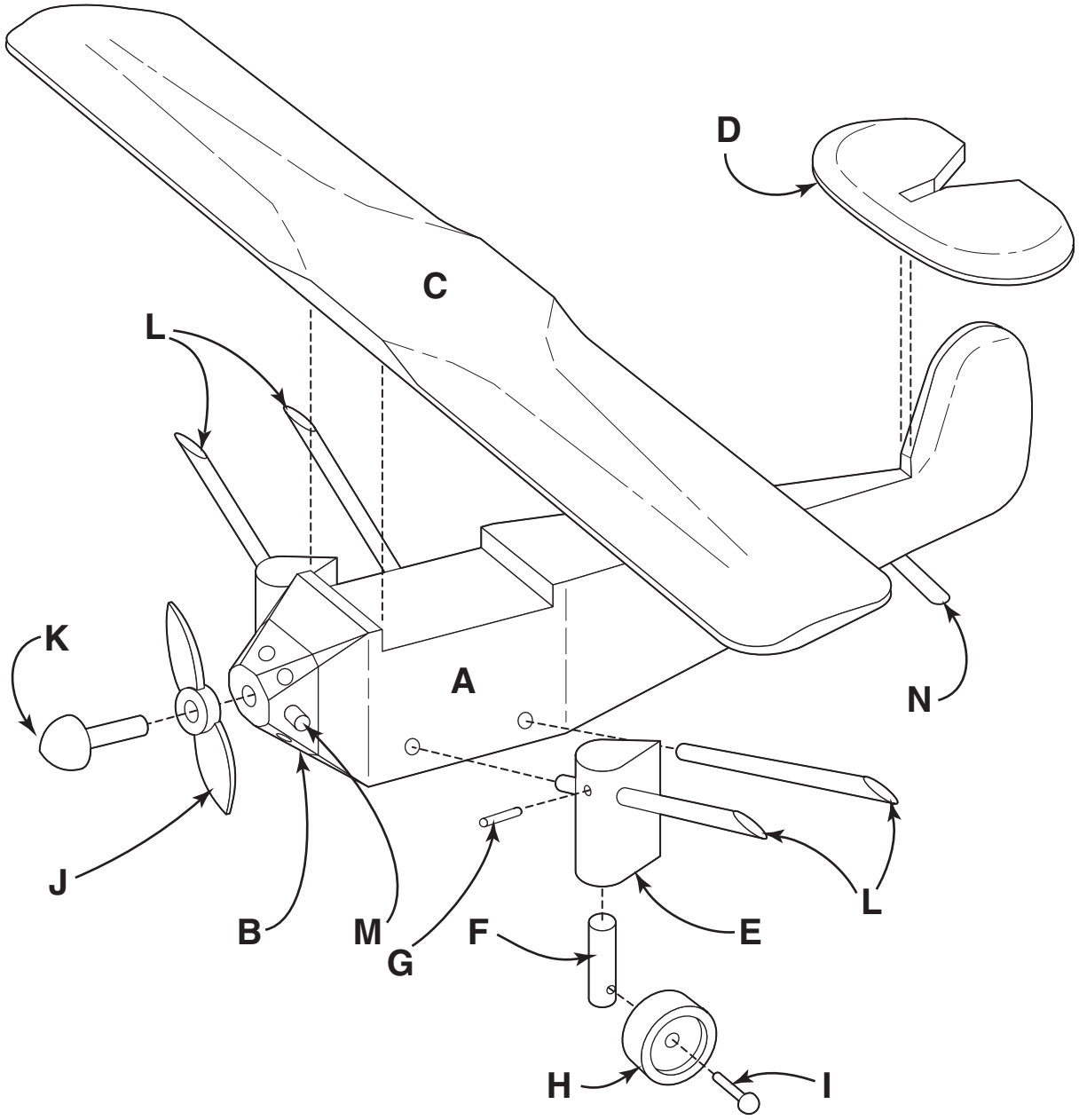
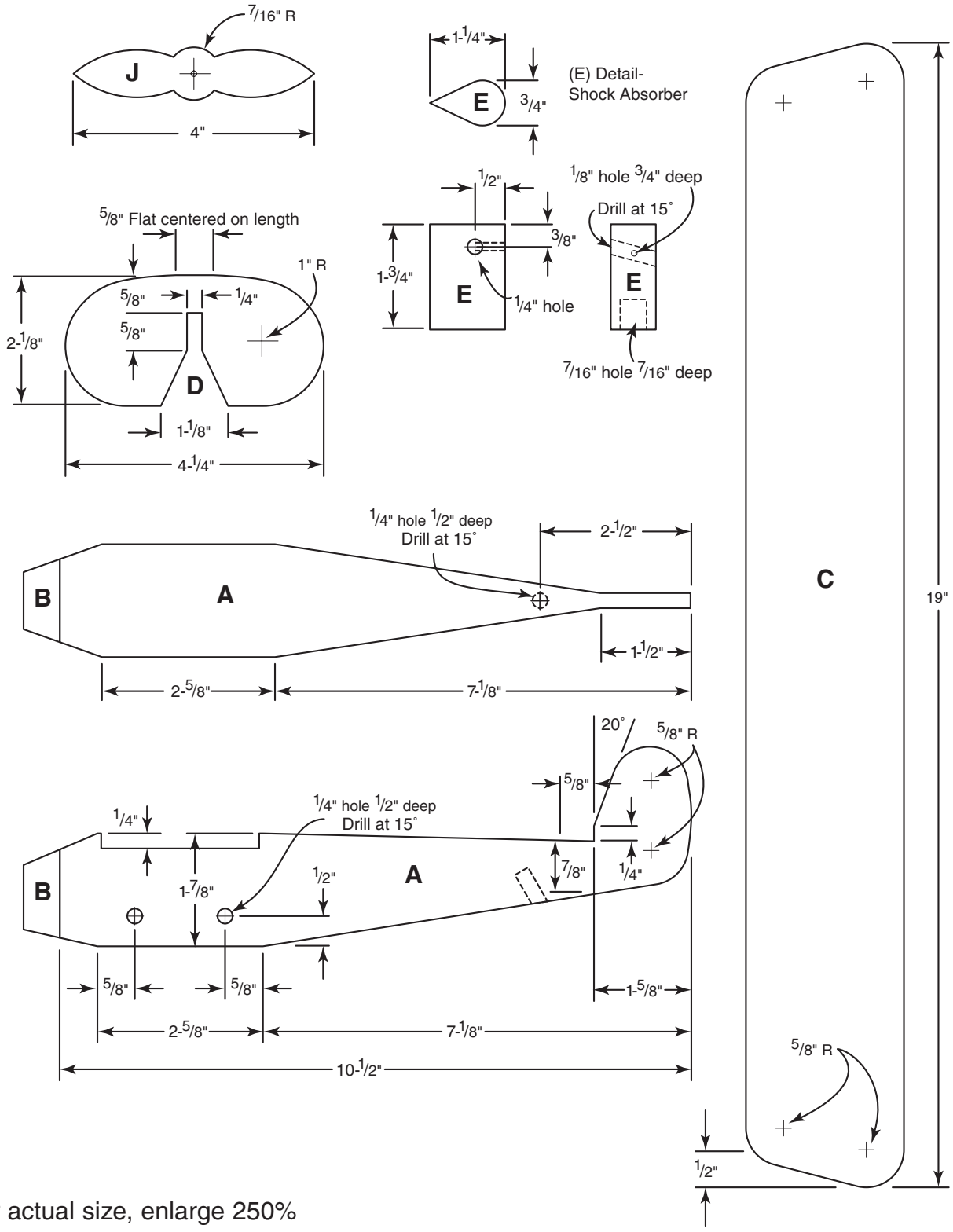


FIG B. VINTAGE MODEL AIRPLANE DIMENSIONS



For actual size, enlarge 250%

FIG C. DRILLING THE ENGINE

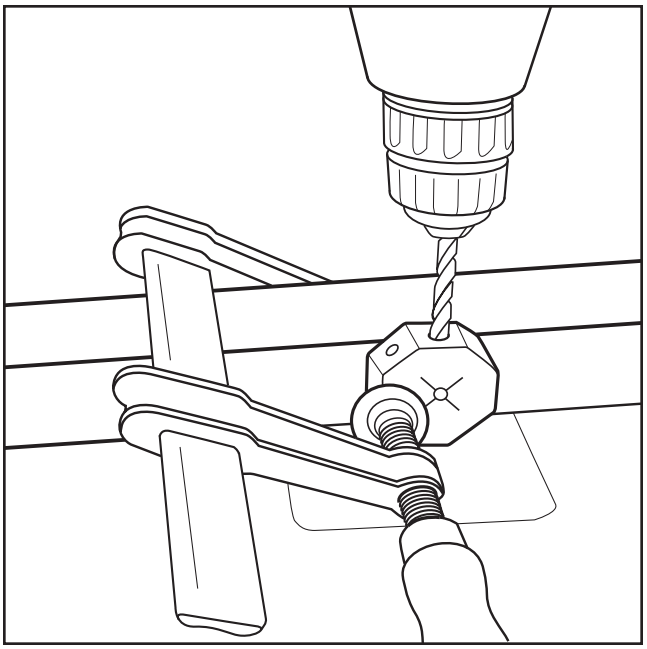


FIG D. SHAPING THE WING

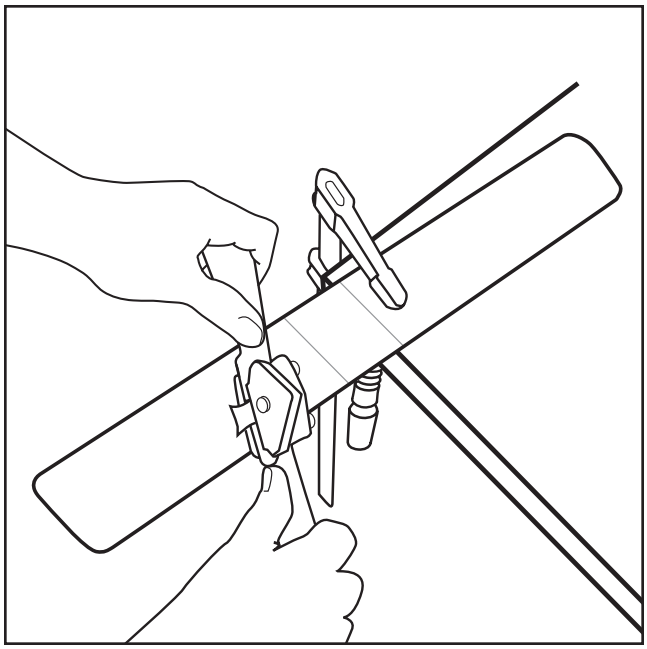


FIG E. SHAPING THE NOSE CONE

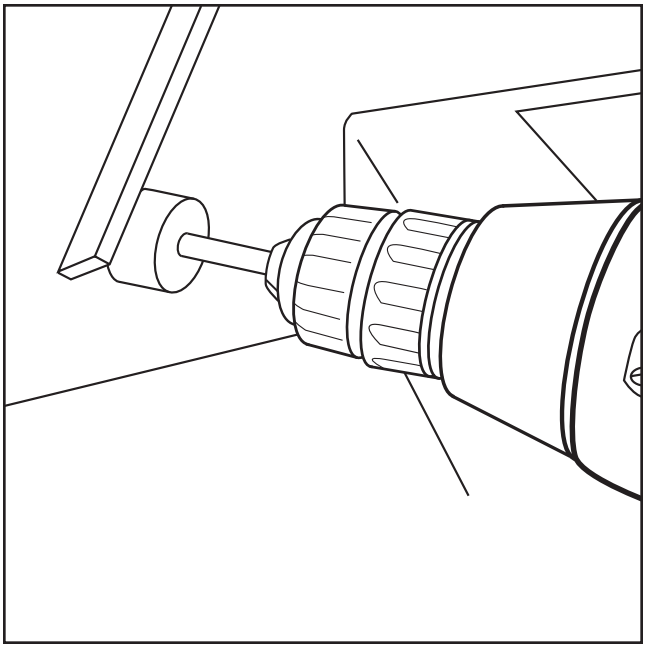
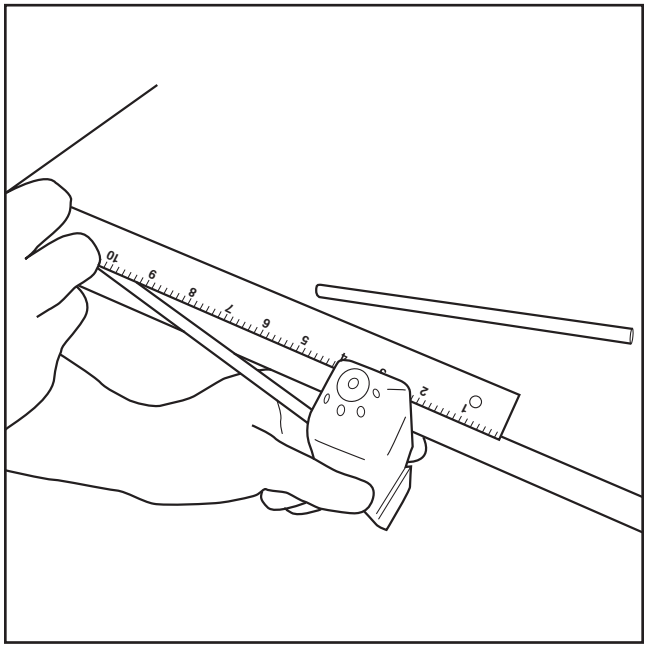



FIG F. MAKING THE STRUTS