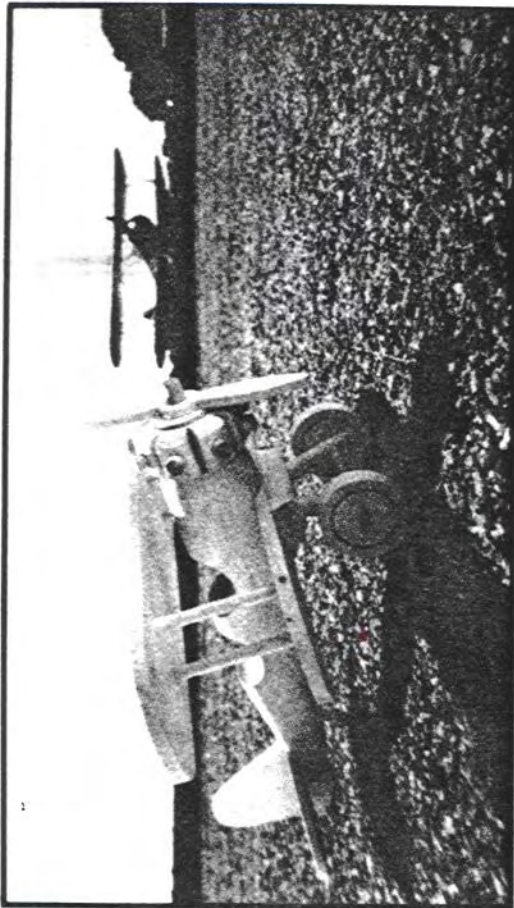


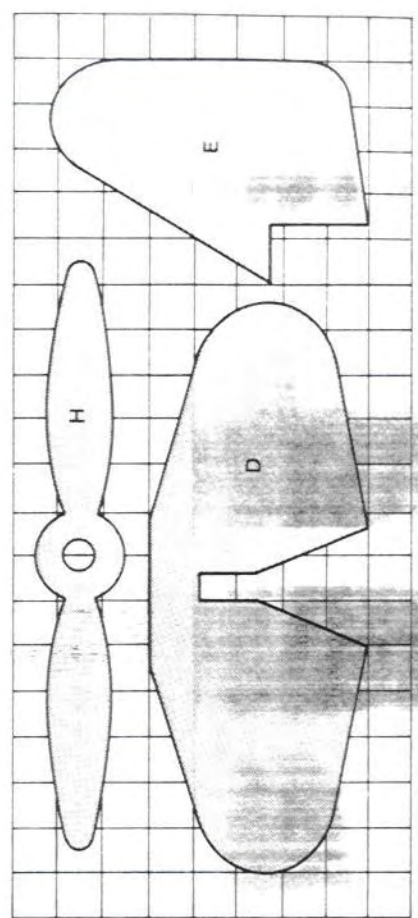
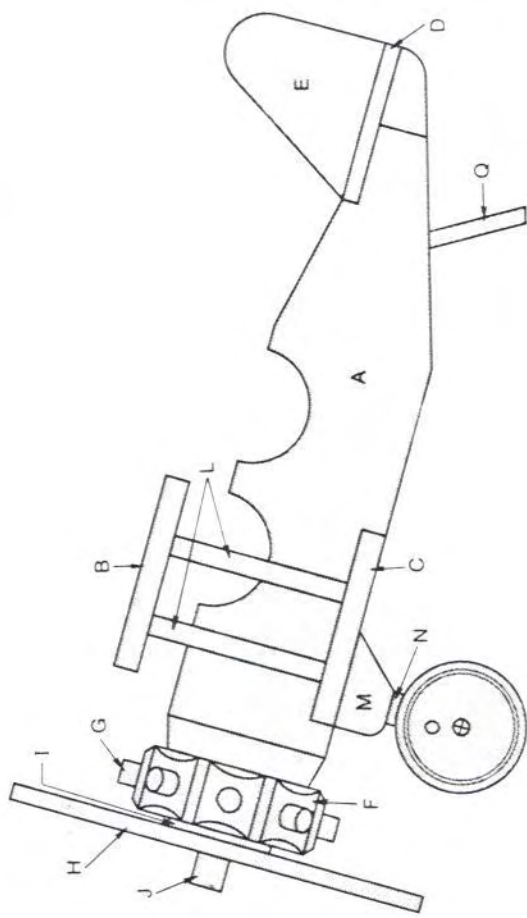
# BIPLANE



**T**he Stearman Trainer Biplane was the standard training plane for the Air Force and Navy prior to and during World War II. Because the original color of the plane was yellow and so many students scared so many instructors during training flights, the aircraft picked up the nickname *Yellow Peril*.

This biplane design is generic and uses only the general features of the Stearman Trainer. Since special construction techniques are required for this toy, read all the instructions before making any cuts. Also, it's quite easy to make more than one of these planes at a time.

Here is the flight plan for the biplane.

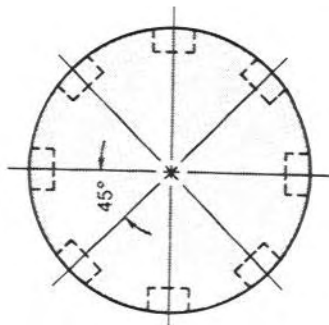


ONE SQUARE = 1/2"

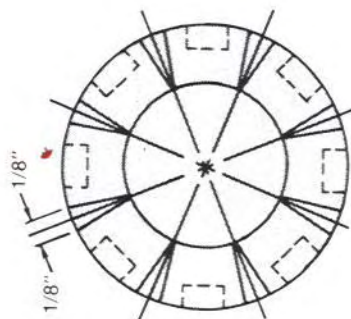




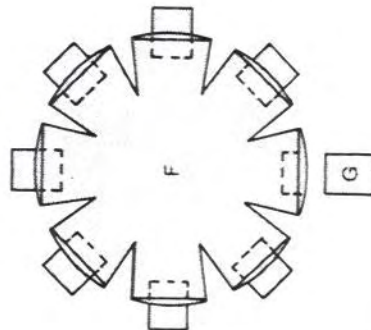


**DETAIL A**

MARK OFF LINES EVERY 45°  
DRILL 7/16"-DIA. x 1/4"-DEEP HOLES FOR CYLINDER HEADS

**DETAIL B**

DIVIDE THE 45° ANGLES  
MARK 1/8" ON EACH SIDE OF LINE  
DRAW A 1-5/8" CIRCLE  
CONNECT MARKS TO INTERSECTION

**PROCEDURE****1. FUSELAGE**

Glue and clamp three pieces of 3/4" x 2-1/2" x 11" stock to form the fuselage block. If making more than one plane, allow about 11" length for each fuselage. Cut the block to finished dimensions; then draw the top and side profiles on it.

Cut out the wing notch on the bottom and the rear tail notches. Taper the sides of the fuselage with a scroll saw or bandsaw. Tape back the scrap pieces. Place the fuselage on its side and cut the side profile.

Finally, with a rasp or power sander, round off the edges of the fuselage; then bevel the nose.

Set the fuselage aside.

**2. WINGS**

Make the upper and lower wings (B, C) at the same time. Begin with a piece of stock at least 3/4" thick and 13-1/2" long. The proper width of the wings is determined by the notch already cut on the fuselage. Remove the excess width of the wing stock until it fits the notch.

Lay out the location of the wing strut holes and drill them with a 5/16"-diameter drill bit. Resaw the stock into two 3/8" thick wing blanks. Form the round contour on the wing tips as shown; then sand the tips smooth.

Glue and clamp the lower wing (C) to the fuselage. Assemble the upper wing (B) to the fuselage with the wing struts (D). Sand the wing's tips flush with the wings; set the assembly aside.

**3. HORIZONTAL AND VERTICAL TAILS**

Make a cardboard template as in the previous step and transfer the design to 3/4" stock. Cut out the contours with a bandsaw or scroll saw; sand the edges smooth. Resaw the stock to yield 1/4"-thick parts.

Glue and clamp the horizontal tail (D) to the fuselage; then glue and clamp the vertical tail (E) in place. Set the assembly aside.

**4. ENGINE**

Glue and clamp two pieces of stock to form a 1-1/2"-thick piece. Next, resaw the stock to a 1-1/4" thickness. With a compass and straightedge, draw the outside circumference of the block and locate the piston and cylinder positions. To do this, draw a 2-3/4"-diameter circle; then draw lines from the center of the circle to the circumference every 45°. These lines locate the centers of the cylinders.

Next, draw a 1-5/8"-diameter circle and bisect each of the 45° angles with another line to the outside circumference. Mark 1/8" on each side of these bisection marks and connect them to the 1-5/8"-diameter circle (see detail in the plans).

Now it's time to start machining. Use a scroll saw or bandsaw to cut the block round. Sand the edge smooth; then drill the 5/16"-diameter cylinder holes 1/4" deep. After drilling the holes, form the pistons with a scroll saw or bandsaw (see Fig. 1).

Finish the engine block by chamfering the edges with a power sander or rasp. Glue the cylinder heads (G) into place; then set the engine block aside.

**5. PROPELLER**

Lay out the profile of the propeller (H) on a piece of 1/4" plywood or clear stock. Drill the 5/16"-diameter shaft hole in the center of the piece; then cut out the propeller with a

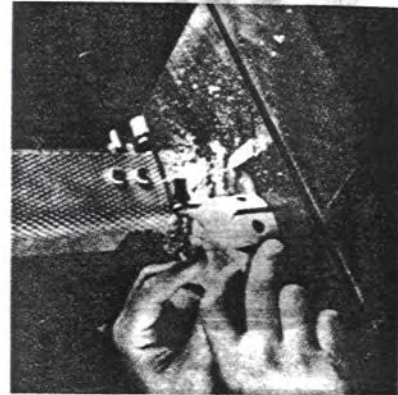


Fig. 1. Cut out the wedges in the engine block to create the cylinders. Make the cuts with a bandsaw or scroll saw.



scroll saw. Sand the edges smooth.

Drill a 1/4"-diameter hole into the end of a length of 1/2" dowel stock to make the propeller hub (J). Cut the hub to length; cut and glue the propeller shaft (K) into the hub.

With a 1-3/4" diameter hole saw, cut a 1-5/8"-diameter blank from 1/8"-thick stock to make the propeller spacer (I). Glue and clamp the spacer to the engine block.

To assemble the engine and the propeller parts to the fuselage, glue the engine block to the fuselage assembly. The spacer has a 1/4"-diameter hole that can be used as a guide for drilling the propeller shaft hole through the engine and into the fuselage. Use a 1/4"-diameter drill bit and make the hole according to the plans. Glue the propeller shaft and propeller into place, being careful not to get glue on the propeller.

#### 6. WHEEL STRUT ASSEMBLY

This plane has a wheel strut block that goes under the fuselage. To fabricate the piece, cut stock to the proper length and width. Set up a drill press to drill holes in the block at a 30° angle as shown. After drilling the holes, form the con-

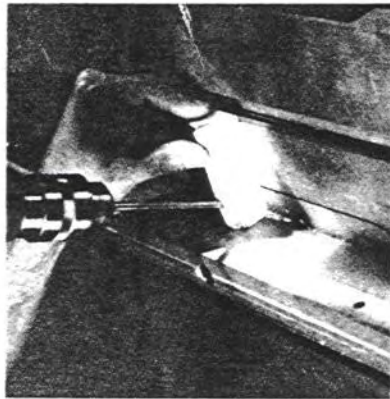


Fig. 2. With the table tilted 30°, secure the wheel strut in a V-block to drill the axle hole.

tours by tapering the sides 30° and the trailing edge 45°. Round the bottom front edge with a power sander or a rasp to contour.

Make a V-block to hold round stock, and drill the 5/16"-diameter axle holes in the wheel struts (N) at 30° (see Fig. 2). After drilling the holes, glue the struts into the wheel strut block, using the axle to keep the struts aligned. When the glue dries, sand any excess strut sticking through the block. Glue and clamp the block to the fuselage.

#### 7. WHEELS

With a 1-1/2"-diameter hole

saw, make 1/8"-deep kerfs on 1/2"-thick stock. Use a 2-1/8"-diameter hole saw to cut out the wheels; sand them smooth; glue the wheels and the axle to the struts.

#### 8. FINAL TOUCHES

To finish, put the tail skag (O) on the plane; its location and angle are not critical. Drill the 5/16"-diameter holes and glue the skag in place.

If painting is your finishing choice, paint the entire aircraft yellow, engine and tires flat black, and the propeller silver. Make insignias out of contact paper and vinyl lettering.

## MATERIALS

Part	Description	Pieces	Dimensions
A	Fuselage	1	(finished dimensions in inches) 2-1/4 × 2-1/2 × 10
B	Upper wing	1	3/8 × 3 × 13-1/2
C	Lower wing	1	3/8 × 3 × 11-1/2
D	Horizontal tail	1	1/4 × 2-1/2 × 6-1/4
E	Vertical tail	1	1/4 × 2-1/2 × 3-5/8
F	Engine block	1	2-3/4 dia. × 1-1/4
G	Engine cylinder heads	8	7/16 dia. × 1/2
H	Propeller	1	1/4 × 1 × 6-1/2
I	Propeller spacer	1	1-5/8 dia. × 1/8
J	Propeller hub	1	1/2 dia. × 1/2
K	Propeller shaft	1	1/4 dia. × 2-3/4
L	Wing struts	4	5/16 dia. × 3-1/2
M	Wheel strut block	1	3/4 × 1-1/2 × 3-1/2
N	Wheel struts	2	1/2 dia. × 3
O	Wheels	2	2 dia. × 1/2
P	Wheel axle (not shown)	1	1/4 dia. × 5
Q	Tail skag	1	5/16 dia. × 1-1/2