WING

1. (a) Join 4 pieces of 3/32" x 3" x 36" balsa sheet as shown in the drawing. Two of these assemblies are required to make the four wing skins.
   (b) Tape joints with masking tape.
   (c) Bend joints open and glue with SIG BOND.
   (d) Lay sheets flat, scrape off excess glue and let dry.
   (e) Cut skins oversize (dotted line) for easier application.

2. Apply SIG CORE BOND to the inside surface of the wing skins and both sides of the foam core. Let dry about one hour, depending on humidity. Make sure all pieces are dry.

3. Use the outer waste pieces of the foam shipping block as a flat surface as work cradles for sheeting the very flexible cores. This will help prevent warping and enable the wash-out undercambered shape to be retained. Cover the cradle with wax paper.

4. Place the wing core, bottom side up, on the wax paper in exact alignment. Apply balsa skin, making certain the sheet is correctly positioned before making contact along the leading edge. With easy hand pressure, rub gently toward the outer edges until completely attached.

5. Turn wing half over and use the same method on the shipping-block cradle for the other side. More hand pressure can be applied on this side. Sight down the leading and trailing edges. Remove any bowing by gently twisting and bending.

6. Trim the skinned panels to plan outline and square the edges with a sanding block.

7. Glue the leading edge and rear spar in place, using SIG Bond and securing with pins and masking tape. Check wing for any bowing and straighten it before glue sets. Add wing tip block. Allow wing to dry thoroughly.

8. Trim the leading edge, wing tip and rear spar to rough shape. Tack glue aileron trailing edge in place and shape panels to final contour with a sanding block.

9. Wing dihedral for racing is a personal preference. At least 2" and up to 3" should be used under each tip at the leading edge. Sand the desired dihedral angle into the wing root. Do not join panels until later.

10. Cut out the aileron (Section WB) from the trailing edge. Notch section WA to pass the 1/8" wire torque rod and open up the horn clearance hole.

11. Drill a hole and cut a notch into WB for the torque rod. Glue section WC in place.

12. Grease the aileron torque rod with vaseline or paraffin. Almost fill the notch in WA with Sig Epoxy and also put a thin film on the mating edge of the wing. Place the greased torque rod into the epoxied notch of WA and join to wing, using a small piece of wax paper to separate WA and WB. Place wing on a wax-papered flat surface and line up the trailing edges of WA, WB and WC. Allow epoxy to fully cure. Work the vertical torque rod arm back and forth until it pops free of the epoxy.

13. Epoxy the wing panels together, using masking tape around the root joint to retain the epoxy. With the desired dihedral blocked into each leading edge, check that the trailing edge is 3/16" higher than the leading edge at the tip.

14. Allow epoxy to cure and recheck. If one panel has more that wing. This can be corrected withaileron trim, but causes more drag. By weighting down the wing for a week with an opposite twist in the cradle it is usually possible to remove warps.

15. Reinforce the center joint with a 3" piece of Celastic. Epoxy the hard balsa center section front plate, landing gear plate and blind nuts and rear wing bolt plate to the wing.

16. At this point the resin base finish should be applied to the wing. Refer to the finish directions on this procedure.

17. Assemble ailerons to the wing using nylon hinges, toothpicks and epoxy.

FUSELAGE

18. Using SIG BOND glue, attach the 1/4" square balsa bottom strips and the wing saddle doubler to the fuselage sides.

19. The formers F-3, F-4 and F-6, firewall F-2 and the cockpit floor are laminated for greater strength. Glue together with SIG BOND or SIG EPOXY.

20. Join the fuselage sides, using F-6 and 1/4" square balsa.

21. (a) Cement F-3 in place.
   (b) Install cockpit floor between the sides and flush with the top of the sides.
   (c) Add former F-4.

22. (a) Use 6-32 blind nuts to install the engine mount. Note that the engine is canted slightly to accomodate the cheek cowls. No thrust offset is used.
   (b) Locate the firewall. Some engines may require a different position and the firewall must be modified accordingly. Epoxy firewall in place. Add 3/8" triangular braces.
   (c) Bevel the fuselage sides and 1/4" square bottom strips to fit together. (See Fuselage Top View).
   (d) Pull tail together and secure with pins and masking tape.
   (e) Add former 7.

23. (a) Install the 3/32" sheet balsa rear deck.
   (b) Pull sides together for nose ring installation with masking tape. Tack glue the nose ring in place.
   (c) Add 1/4" sheet balsa front deck.

24. (a) Notch and glue bottom block in place.
   (b) Install two 3/32" ply pieces for wing dowel anchors.
   (c) Sand a bevel into the front fuselage sides and the 1/4" sheet front deck. (See "Section at F-2" view).
   (d) Add 1/4" sheet balsa pieces to the front deck.
   (e) Cut pushrod holes in F-6 and F-7.
   (f) Apply 1/8" sheet balsa fuselage bottom.
   (g) Rear deck must be about 1/16" undersize on both sides to form a glue flange for the formed plastic turtle deck. Glue rear deck in place but install the plastic turtle deck later.

25. Cut out the engine installation hole, no bigger than necessary since the cowl must cover the hole. Temporarily install the motor and mount. Remove the tack-glued plywood ring and permanently glue it in place, exactly centered on the motor shaft. A spinner backplate on the shaft will aid in this operation. Carve and sand the fuselage to shape.

26. (a) Locate and cut a form-fitting hole for the plastic air tunnel into the left side of the fuselage.
   (b) Use one closed and behind the firewall.
   (c) Use the remainder of the plastic piece to fit along the side of the fuselage with the open end facing into the air intake of the cheek cowl.
   (d) The tunnel should be caulked air-tight with Sig Epoxolite putty where required, but not until after resin finish coating. Check to insure that any mounting bolts in the tunnel area are not long enough to pull into the tunnel wall and break it. Fit the fuel tank to the fuselage but do not mount it permanently.

27. Add the bottom dummy air scoop, shaped from a balsa block. This also serves as a skid to protect the spinner and engine shaft.

TAIL SECTION

28. Draw a centerline on the outer edges of the tail section with a ballpoint pen. Shape and sand to symmetrical section. Add the 1/16" plywood horn inserts and 3/32" wire elevator connector. Drill rudder for installation of tail wheel wire. Don't assemble tail section until after resin finish coat is applied. (See resin finishing directions).

29. Install nylon hinges in the elevators with epoxy. Cut the toothpicks retaining the hinge off flush with the surface. Fit elevators to the horizontal stabilizer. Repeat the process with rudder and fin.

FUSELAGE COMPLETION

30. Block up the wing on a flat surface and trial fit the fuselage wing saddle. Sand out saddle if necessary to obtain correct alignment on all axis. Glue 1/32" plywood fillet bases to the fuselage, protect wing with wax paper and place fuselage back on the wing. Weight down to insure good contact at all points along the fillet. Let dry. Add 3/16" balsa corners at ends of fillets. Glue 1/2" x 5/8" hardwood wing hold down blocks to the fuselage interior. Epoxy 1/4" diameter wood dowels into wing. Locate and drill holes for dowels in the fuselage plywood former. Install wing in correct alignment. Locate and drill one 1/8" hole through the wing and into a hardwood block. Push a piece of tubing into the hole to hold the location. Recheck. If still o. k., drill the second hole. Drill and tap for 1/4-20 nylon screws.

31. Glue the resined and sanded tail sections in place. Round toothpicks strengthen the fin attachment. Install the 3/8" triangular stock stab fillet.

32. Cut a slot in the formed plastic turtle deck to pass the fin and cement in place on the rear deck with Sig-Ment. Avoid large puddles of Sig-Ment which may distort the plastic. Use a thin, even coating.

33. Sand the fuselage to blend smoothly into the plastic top. At this point the fuselage should be resined. (See resin finish instructions). Do not resin the plastic.

COWLS AND FILLET

34. Trim and fit cheek cowls. Install left cowl with Sig-Ment, fillet with Epoxolite. Locate the hardwood attachment block for the right cowl on the fuselage side behind the fuel outlet hole. Drill an alignment hole through the cowl and block and drill and tap the block for an 8-32 nylon bolt.

35. (a) Fasten the cowl in place and draw a line around the cheek...
   (b) Remove cowl and grease a one-inch wide area all around the cowl edge on the outside surface.
   (c) Replace the cheek cowl and hold on with nylon bolt.
   (d) Cut several long pieces of light weight Celastic, about 3/8" wide and dry fit them.
   (e) Soak pieces in thinner, blot off the excess and lay in place on fuselage cowl.
   (f) Allow to dry until set, but not hard - about 5 to 10 minutes.
   (g) Carefully remove the cowl before the Celastic hardens. Don't touch or bump the Celastic edge. Let dry. Back fill the hollows in the Celastic fillet with Epoxolite. Be sure all grease is removed before applying.

36. Cut a pattern from paper for the wing fillet and check fit before cutting it from Celastic. Dip in thinner and blot off the excess. Carefully place in position on the fuselage and plywood fillet base. Feather out the edges and be sure of good contact all around.

37. Locate the top canopy fillet line on the canopy and paint that line on the inside, approximately 3/8" wide all around. Attach canopy with 5-Minute Epoxy.

38. Mask off the canopy as shown on the Fuselage Side View for the Epoxolite fillet, following the previously painted line on the inside of the canopy. Lightly sand the area between the tapes to rough up the plastic. Fill the area with Epoxolite and form a fillet. When it has set about 10 minutes, feather the edge of the nearly hardened putty with a wet finger. Remove tape when putty is sufficiently hardened. Allow to cure thoroughly before sanding.

39. Match the wheel pant halves by sanding with a block. Hold them together and flow a few drops of acetone or butyrate thinner into the crack. The plastic will weld in a minute or less. Press the halves together while drying to aid adhesion. Re-inforce the crack on the inside with thin strips of scrap Celastic. Install the plywood plate to the inside of the pants with Sig-Ment. Drill holes though the landing gear and plate for blind nuts used to retain the pants. Axles should have slight toe-in for better steering and the wheels rotating friction-free.

RESIN BASE FINISH

The construction directions are planned specifically for the 2-coat Sig Polyester Glass Resin based finish used on the prototypes. This provides a smooth surface for color application with a minimum amount of work. The assembly sequence must be followed so that the resin is applied ONLY over bare wood. It will not cure properly over dope, Epoxolite, epoxy or any other type of resin-based glue or putty. To insure a good glue bond, leave the areas on the tail surfaces which must be cemented to the fuselage unresined.

Mix a small amount of Glass Resin according to the directions on the can to check coverage and set-up time. The tendency is to mix too large a quantity at a time. A large batch of resin sets up faster than a small batch. If the resin sets up too rapidly, reduce the amount of hardener used. Another method of slowing the set up time is to place the mixing container in a shallow pan filled with ice water. The lower temperature will slow the set up time.

After the first coat cures, sand with 80 garnet paper. Try not to cut into the wood. Sand the second coat with 320 Wet-or-Dry paper, used wet. Dope, lacquer or enamel may be used on top of the resin base, preferably sprayed. Silk can be applied on top of the resin on the fuselage if desired, but should not be used on the wing and tail because of warping tendencies on the thin surfaces.

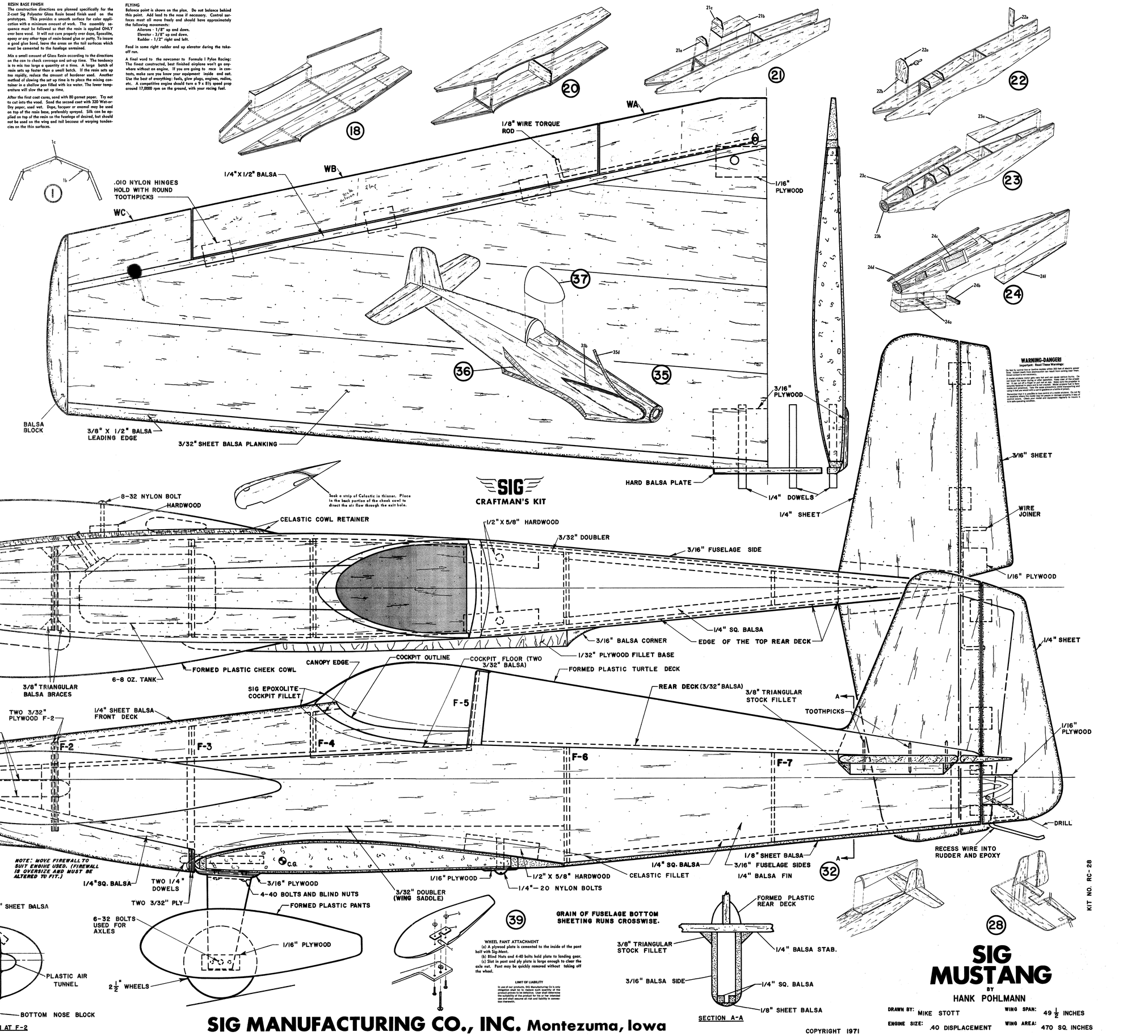
FLYING

Balance point is shown on the plan. Do not balance behind this point. Add lead to the nose if necessary. Control surfaces must all move freely and should have approximately the following movements:

Ailerons - 1/8" up and down.
Elevator - 3/8" up and down.
Rudder - 1/2" right and left.

Feed in some right rudder and up elevator during the take-off run.

A final word to the newcomer to Formula 1 Pylon Racing: The finest constructed, best finished airplane won't go anywhere without an engine. If you are going to race in contests, make sure you know your equipment inside and out. Use the best of everything: fuels, glow plugs, engines, radios, etc. A competitive engine should turn a 9 x 8½ speed prop around 17,000 rpm on the ground, with your racing fuel.



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