## **TABLE OF CONTENTS**

Fable of Contents & Specifications	1
Preface and Warning	2
Parts Available from Yellow Aircraft	3
Gluing Instructions	4
Assembly Instructions	5
Flying	20
Parts List	21

## **SPECIFICATIONS**

Center of Gravity (CG)

3/4" Forward of the Front Side of the Front Main Bulkhead with the Gear Retracted.

**Control Deflections:** 

Ailerons	3/8" Up and 3/8" Down
Elevator	3/4" Up and 3/4" Down
Rudder	2" Left and 2" Right
Flap	35 Degrees

#### Specifications:

Weight28-32 lbsLength72"Wing Span100"

<u>Recommended Engines:</u> Moki 1.8 or 2.1, OS BGX, Zenoah G-38 or G-45 up to A3.2 Sachs-Dohlmer etc.

## PREFACE

Construction of the P-38 requires building the model in an exact sequence. Before you start building your model, you should read and understand the entire ASSEMBLY INSTRUCTIONS. You must also read and understand the GLUING INSTRUCTIONS prior to the building. You cannot build this model properly without reading the ASSEMBLY INSTRUCTIONS.

## WARNING

Although the P-38 Lightning is a docile plane, it is definitely not a trainer or first airplane. This is not a toy! For your own safety and the safety of those around you, please observe all product safety warnings. We strongly urge you to belong to AMA and join an AMA or IMAA flying club as well. Always observe the safety rules.

Yellow Aircraft International LLC assumes no liability for the operation or the use of this product. It is the responsibility of the builder and the owner to have the necessary experience and to exercise common sense. After the sale of this kit we can not maintain any control over it's construction or usage.

### **Parts Available from Yellow Aircraft**

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<b>Quantities Required</b>	
1 set	Retractable scale landing gear (P38200)
2	Fiberglass Static Propeller with Spinner (P38121)
	Fiberglass Small Bomb Kit (P38131)
	Fiberglass Large Bomb Kit (P38132)
	Fiberglass Drop Tank (P38141)
1	Prebuilt and Painted Cockpit Interior (P38153)
1 set	Custom Machined Aluminum Wheels & Tires (P38221)
1 pr	Pneumatic Brakes with Control Valve (P38222)
1	UP3 Door & Strut Sequencing Valve (A1603)
1 set	Pneumatic Door Cylinders (P38DC)
2	Scale Aluminum Spinner with Machined Aluminum Backing
	Plate (P38710)
5 pr	Offset Door Hinge (A2202)

# **GLUING INSTRUCTIONS**

The Yellow Aircraft P38 come with polyester fiberglass, wood and foam parts. While most experienced modelers have their own favorite glues and methods of gluing these parts together, we are offering some suggestions for the less experienced modelers.

We suggest the following glue applications:

(a) (b) (c)	Wood to Wood Wood to Foam or Foam to Foam Wood to Glass or Glass to Glass	E E S	Epoxy or CA Epoxy or Foam compatible CA Stablit and if necessary, reinforce by glass cloth and polyester resin
(d)	Foam to Glass	E	Epoxy and microballons mixture.

Since applications (a) and (b) are well known to most modelers if not all, we'll offer instructions for application (c) and (d) only.

Stablit is a relatively less known glue imported from W. Germany (available from Yellow Aircraft or Hobby Lobby). It is activated by mixing a powdery hardener with a creamy paste. This glue is deal for gluing parts to polyester fiberglass. It is very strong and bonds extremely well to polyester fiberglass. The working time (8 min) and hardening time (20 min) are very reasonable and the relatively high viscosity allow you to form fillets around glue joints without the need to mix the glue with a filler. After Stablit has cured, you may also reinforce the glue joint and the surrounding glass area by glass cloth and polyester resin (polyester resin will not cure over some glue such as epoxy or CA). The disadvantage of Stablit is that it will attack foam. Therefore, we suggest the use of an epoxy and microballons mixture (1/3 part A epoxy, 1/3 part B epoxy, 1/3 microballons by volume) to glue foam parts to fiberglass parts.

To glue parts to fiberglass, you should follow the following steps:

- (1) Determine and mark the exact location of the fiberglass area to be glued by trial fitting. Since fiberglass is semi-transparent, use a black magic marker on the other side of the glass.
- (2) Prepare the fiberglass area to be glued by sanding and cleaning. Since all fiberglass parts comes with a mold release agent on it's surface, you must and until the cloth just start to expose. Use 40 grit sand paper or a Dremel tool with the proper bit but be careful not to over sand and weaken the fiberglass. After sanding remove the dust and wipe clean with a small amount of acetone.
- (3) Glue the parts together. While the gluing of most parts are straight forward, certain cases required some attention. If you are gluing a former to the fuselage, start by positioning the former to it's exact location in the fuselage. Then use a screwdriver or equivalent to open a small gap between the fuselage and the former and inject Stablit into the gap with a glue syringe. Work on a small section at a time and around the entire former. When the screwdriver is removed, Stablit will be squeezed out from the gap. Instead of removing this excess glue, use your finger with a silicone glove and form a nice 1/4" concave fillet on both sides of the former. In addition to reinforcing the joint, this fillet will also help to distribute the stress on the fuselage over a wider area. If you are gluing a foam part to another fiberglass part, you should use an epoxy and microballons mixture. Drill a number of 1/8" holes on the fiberglass area to be glued. When the two parts are glued together, the epoxy mixture will be forced through the holes drilled and thereby creating some extra holding power.
- (4) When Stablit has cured, reinforce the glue joint and surrounding fiberglass area by fiberglass cloth and polyester resin (use epoxy resin if reinforcing over foam parts). This step is necessary on high stress areas only. The extra fiberglass will help to distribute the stress over a much wider area. If you are not using Stablit be sure that the resin you are using will cure over your glue.

## **ASSEMBLY INSTRUCTIONS**

The Yellow Aircraft P-38 Kit is not a difficult model to build. However, it is a very complex model. Anyone who has built foam and glass kits will be familiar with the building techniques.

Standard size servos of 70 oz/in can be used on all control surfaces. Smaller servos may be used on throttles and retract valve. A heavy duty servo should be used on the nose wheel steering. "Y" harnesses will be needed for throttles, elevator and ailerons. "W" harnesses will be needed for throttles.

The P-38 can be powered by any engines ranging from the Moki 1.8 or 2.1, OS BGX, Zenoah G-38 or G-45 up to A3.2 Sachs-Dohlmer. If you use the chainsaw type engines, you will need to cut openings in the cowls for the carburetor and spark plug access. The model is very realistic in both take-off performance and flight when using the Zenoah G-38's.

Before staring construction, thoroughly wash the fiberglass parts with warm soap and water. This will remove the parting agent that was used to remove the parting agent that was used to remove the parts from their molds.

Whenever the instructions call for gluing to the fiberglass parts, sand thoroughly with coarse sandpaper.

#### WING PANEL PREPRATION

1. Carve and sand the leading edges of both wings so they are flush with the wing sheeting. Do not form the leading edge radius at this time. Place the wings back into their foam cradles. Align the spar cutouts in the wings with the cutouts in the cradles. (Photo 1)

#### OUTBOARD FLAP ASSEMBLY

2. Working on one wing a time, square up the corners of the flap recess in the bottom of the wing panel. Locate one of the 1/64" x 3" x 9 7/8" plywood flap recess liners. Cut this piece to fit and epoxy into place. (Photo 2)

3. Glue pieces of scrap 1/64" ply to the ends of the flap recess. Sand these flush when dry. (Photo 3)

4. Locate the 1/4" x 9/16" x 9" balsa flap recess leading edge. Fit into the front of the flap recess and epoxy into place. Sand flush when dry. (Photo 4)

5. Locate the pre-formed balsa outboard flap. The flaps are marked left and right, so make sure you have the correct one. Fit the flap into the recess allowing enough clearance for finishing and painting later.

6. Mark the centerlines on the leading edge of the flap and on the leading edge of the flap recess. This is the centerline of the hinges. Drill 3/16" hole for hinge points 1" in from both ends. (Photo 6)

7. Sand a radius on the leading edge of the flap.

8. Counter bore the hinge holes in the flap so the hinges will go far enough into the leading edge that the hinge pin will be in the center of the leading edge radius. You will need to cut away some additional material so the hinges can rotate far enough to get full flap deflection. Position the hinges into the flap. (It will be necessary to shorten the hinge slightly.) (Photos 8A & 8B)

9. Assemble the flap to the wing. Lay the flap flat into the recess and block sand the flap so it is flush with the bottom surface of the wing. (Photo 9)

10. Repeat steps 2 thru 9 for the other wing.

#### AILERON ASSEMBLY

11. Mark out the inboard edge of the aileron on the top and bottom of the wing. This line is parallel to the wing root and 1/4" outboard of the flap. (Photo 11)

12. Using a Zona saw, cut the aileron from the wing. Cut off the 1/2" piece of foam from the leading edge of the aileron and discard. (Photo 12)

13. Cap the inboard end of the aileron opening with a scrap piece of 1/8" balsa. Sand flush when dry. (Photo 13)

14. Glue the 5/16" x 1 1/4" x 17 3/4" balsa trailing edge sheet to the front of the aileron opening. Carve and sand flush when dry.(Photo 14)

15. Trim 5/16" from the inner end of the aileron and 3/16" from the outer end. Cap both ends with scrap 1/8" balsa. Sand flush when dry. (Photos 15A & 15B)

16. Glue the 17 3/4" half round balsa leading edge to the aileron. Center this piece carefully on the leading edge of the aileron. Sand flush when dry. (Photo 16)

17. Mark a hinge centerline lengthwise on both the aileron and the wing. Drill 3/16" holes in 3 places for hinge points in both the aileron and the wing.

18. Carve and sand a radius to the aileron leading edge.

19. Counter bore the hinge holes in the aileron so the hinges will go far enough into the leading edge that the hinge pin will be in the center of the leading edge radius. You will need to cut away some additional material so the hinges can rotate far enough to get full deflection both up and down.

20. Trail fit the aileron to the wing and check that it moves far enough in both directions. Remove the aileron.

21. Locate (2) 1/4" x 17 3/4" balsa aileron gap covers. Position one of the gap covers to the bottom edge of the wing along the trailing edge at the aileron. Make the flat surface flush with the bottom of the wing. Leaving enough clearance for finishing, tack glue the gap cover in place using thin zap. Repeat for the other side of the wing.

22. Assemble the aileron back to the wing and check for movements again. Sand the leading edge of the aileron and trim the gap covers as required. (Photo 22)

23. Remove the aileron and run a bead of thin zap to the inner joint of both gap covers. Sand the gap covers flush with the surface of the wing.

24. Locate the correct fiberglass wingtip. The top surface is flat and the bottom surface tapers up. Sand lightly with 320grit paper. Sand the root with 60-grit paper. Epoxy the wing tip to the wing, aligning the leading edge and the airfoil top and bottom. Don't worry about the trailing edge at this time. Hold in position until dry. 25. Sand the trailing edge of the aileron to follow the radius of the wingtip. (Photo 25)

26. Repeat steps 11 thru 26 for the other wing.

#### SERVO WELL LINERS AND COVERS

27. Locate (8) 1/64" x 1 1/4" x 4 7/8" ply servo well liners and (4) 1/16" x 2 1/4" x 2 1/2" ply servo well covers. Also get 16 of the plastic servo well corner brackets.

28. Square the corners of the servo wells. Be sure to remove the foam so the liners will fit all the way into the corners.

29. Cut and fit the servo well liners to the servo wells. Make sure you cut the liners for the servo lead openings. Epoxy them in place and sand flush with wing surface when the epoxy has cured. (Photos 29A and 29B)

30. Trim the 1/16" x 2 1/4" x 2 1/2" ply servo well covers to fit in the wells.

31. Sand the mounting surfaces of the plastic corner brackets with 100 grit sandpaper. (Photo 31)

32. Glue the corner brackets into the corners of the servo wells. Use ZAP-A-GAP for this. Make sure they are below the surface of the wing by the thickness of the servo well cover. (Photo 32)

33. Fit the servo well covers to the wells. Mark the corners for #2 sheet metal screws. Make sure you have them lined up with the pre-drilled holes in the corner brackets. Drill the holes in the corners.

#### AILERON AND FLAP SERVOS, CONTROL HORNS AND LINKAGES

34. Locate (4) 1/4" x 5/8" x 3/4" ply servo mounting blocks.

35. Position your aileron servo to the inner surface of the aileron servo well cover. Make sure the servo arm is on the outboard side of the wing. Place 2 of the mounting blocks on the cover at the correct spacing for the servo you are using and epoxy in place. (Photo 35)

36. Place the servo onto the blocks and drill holes in the blocks for the servo mounting screws. Assemble the servo to the cover.

37. Mark the cover for the servo arm slot. Remove the servo and cut the slot in the cover. Also soak the mounting blocks with thin CA. This will prevent the mounting blocks from delaminating. (Photo 35)

38. Reassemble the servo to the cover and assemble the servo cover to the wing. (Photo 38)

39. Cut (1) 1/8" x 1" x 1" ply control horn mounting plates from scrap.

40. Draw a line parallel to the aileron servo from the servo arm back onto the aileron.

41. Place a horn mounting plate centered on this line and even with the rear edge of the balsa aileron leading edge. Cut and remove the sheeting and foam so the plate will sit flush with the surface of the aileron. Epoxy the plate into the aileron. (Photo 41)

42. Mount a 5/8" Robart control horn on the mounting plate. (Photo 42)

43. Position your flap servo to the inner surface of the flap servo well cover. Place 2 of the mounting blocks on the cover at the correct spacing for the servo you are using and epoxy in place. 44. Place the servo onto the blocks and drill holes in the blocks for the servo mounting screws. Assemble the servo to the cover.

#### NOTE: When you assemble the flap servo for the other wing make sure you have it positioned with the servo arm facing the same way.

45. Mark the cover for the servo arm slot. Remove the servo and cut the slot in the cover. Also soak the mounting blocks with thin CA. This will prevent the mounting blocks from delaminating.

46. Reassemble the servo to the cover and assemble the servo cover to the wing.

47. Cut (1) 1/8" x 1" x 1" ply control horn mounting plates from scrap.

48. Draw a line parallel to the flap servo from the servo arm back onto the flap.

49. Place a horn mounting plate centered on this line and 3/8" behind the leading edge of the flap. Mark around the plate and remove 1/8" of balsa from the marked area so the plate will sit flush with the surface of the flap. Epoxy the plate into the flap.

50. Mount a 1" Robart control horn on the mounting plate.

51. Repeat steps 34 thru 50 for the other wing panel.

52. Make up your aileron and flap control linkages with 4-40 hardware. Mark the location on the linkages and set aside for final assembly.

#### MOUNTING WING TO FUSELAGE

53. Remove the (4) aluminum wing spar receivers from the fuselage bulkheads. Sand the backsides of the reveivers with coarse paper. Epoxy and bolt the receivers back into place.

54. Locate (1) straight aluminum wing spar and (1) bent aluminum wing spar and (2) set screws. Stand the fuselage on its side. Assemble the straight spar into the front receiver and lightly snug the set screw.

55. Locate (2) 1/4" x 1 7/8" x 3 13/16" balsa blocks. Place these blocks into the front wing spar cutout. Position the wing to the fuselage over the front spar. The spar goes in between the balsa blocks. The blocks are slightly too thick so you can sand them to adjust the alignment of the wing. Align the leading edge and the airfoil to the fuselage.

56. Once you have a good fit on the front spar, repeat the process for the rear spar using the (2) 1/4" x 15/16" x 3 13/16" balsa blocks. Remember the rear spar has the bend.

57. Remove the wing from the fuselage and epoxy the (4) balsa blocks into the spar cutouts.

58. Sand the aluminum spars where they will glue into the wings with coarse paper. Tape the area around the spars so that glue will not get into the receivers when you glue the spars into the wings.

59. Apply epoxy to the spars and into the wing spar cavities. Position the wing onto the spars and the fuselage. Carefully align the wing with the fuselage and make sure that it is setting flush on the root. Tape the wing in position so that it does not move while the epoxy cures. This will set the proper incidence and dihedral. (Photo 59)

60. Before removing the wing from the fuselage, mark the leading edge shape on the wing root. Remove the wing and sand the leading edge to shape.

61. Epoxy small strips of 1/8" ply to the cavities above and below the wing spars. This gives added strength at the glue joint of the spars.

62. Locate the 1/32 x 2 1/2" x 14 1/2" ply wing root cap. Fit over the wing spars and position to the wing root. Trace around the airfoil remove the cover and cut to shape. Epoxy the cover to the wing root. Sand flush with wing surface when epoxy has cured. Cut a hole thru the cap inline with the servo lead slot. (Photo 62)

63. Repeat steps 54 thru 62 for the other wing.

64. Finish sand and fill any imperfections on the wings. Cover the wings with 1 ounce fiberglass cloth and Z-poxy finishing resin. The flaps and ailerons can be covered with .6 ounce cloth.

#### INBOARD FLAP ASSEMBLY

65. Locate the (4) 1/2" x 1/2" x 2" balsa flap hinge mounting blocks. Shape these blocks to fit inside the wing center section against the lip formed by the front of the flap pocket. Glue these blocks in place using Zap-A-Dap-A Goo at the locations shown on the plans. Allow it to dry for 24 hours. (Photo 65)

66. Locate the (2) inboard flaps. Notice that they are marked left and right. Shape them to fit into the flap pockets with clearance for finishing later.

67. Draw a centerline on the leading edge of each flap and on the hinge surface of each flap pocket. Drill (2) 3/16" holes in each flap and flap pocket for hinge points in the locations shown on the plans.

68. Sand a radius on the leading edge of the flap.

69. Counter bore the hinge holes in the flap so the hinges will go far enough into the leading edge that the hinge pin will be in the center of the leading edge radius. You will need to cut away some additional material so the hinges can rotate far enough to get full flap deflection. Assemble the flaps into the pockets. (Photo 69)

70. Mark the hinge centerline on the bottom of the wing inboard of the flap pockets. Remove the flaps and drill 1/8" holes through the inboard edge of the flap pocket at these locations. This will be the hole for the flap torque rods to pass through.

71. Locate the (2) flap torque rods. Drill and notch the flaps for these rods as shown on the plans. Make sure the rods are centered on the hinge pins. (Photo 71)

72. Position the torque rods through the holes in the flap pockets from the inside and assemble the flaps to the wing. Fit a piece of 1/2" square hard balsa to the inside of the fuselage just below the toque rods and stretching across the fuselage between the toque rods. Cut slots for the toque rod bearings to fit into. When you have a good fit sand the fiberglass and glue torque rod support in place. (Photo 72)

73. Remove the flaps and torque rods. Adjust the clevis connectors on the torque rods so they are the same length as the horns on the outboard flaps. Reassemble the torque rods and glue the bearing tabs in place.

#### ELEVATOR ASSEMBLY

74. Locate the fiberglass elevator. Mark the centerlines on the leading edge of the elevator and on the trailing edge of the horizontal stabilizer. This is the centerline of the hinges.

75. Refer to the plans and mark the centers of the hinge locations. Drill 3/8" hole at each location. Cut 4 pieces of 3/8" dowel rod long enough to reach the back edge of the elevator. Taper the ends so they do not distort the surface of the elevator. Assemble the dowels into the elevator using Zap-A-Dap-A Goo. (Photo 75)

76. Position the elevator to horizontal stab and mark the hinge locations on the stab. Drill 3/16" holes in both the elevator and the stab.

77. Counter bore the hinge holes in the elevator so the hinges will go far enough into the leading edge that the hinge pin will be in the center of the leading edge radius. You will need to cut away some additional material so the hinges can rotate far enough to get full elevator deflection both up and down.

78. Trail fit the elevator to the stab with hinge points and check that it moves far enough in both directions.

79. Locate the (2) elevator torque rods and (2) 1/4" x 25/32" x 25/32 predrilled ply torque rod supports. Notch and drill the ends of the elevator to accept the torque rods. Assemble the elevator to the stab with the torque rods. Make sure the torque rods are on the centerline of the hinges. Cut and fit the toque rod supports to fit in the outer stabs. Glue in place when satisfied with fit.

80. Remove the elevator and torque rods. Reinforce the torque rod supports with small pieces of glass cloth and resin.

81. Place the torque rods back in the supports. Fill in the open ends of elevator pocket with the provided pre-shaped balsa pieces. Some final shaping will be necessary. Be careful not to distort the stab. (Photo 81)

82. Cut the elevator for the counterbalance. There is a mark on the elevator for this. Glue the counterbalance in place. Make sure you have it straight.

83. Reassemble the elevator to the stab. Make up (2) elevator pushrods from carbon fiber shafts and 4-40 hardware. Make up only the one end at this time. Assemble to the torque rod using bolt on ball links. The other end of the pushrods will be made up once the servos are in place. (NOTE: Make sure that the connection to the elevator horn is secure, as once you assemble the vertical fins it is impossible to get it to these connections.) (Photo 83)

#### **RUDDER PREPARATION**

84. Locate (4) 11/16" x 11/16" x 1 1/4" balsa rudder hinge blocks and both rudders. (NOTE: There are (6) hinge blocks.) Shape the blocks to fit inside the rudders in the locations shown on the plans. Glue in place with Zap-A-Dap-A Goo. Allow to dry for 24 hours.

85. Shape a 3/4" piece of hardwood to fit above the lower hinge block. Glue in place with Zap-A-Dap-A Goo. This will be the mounting block for the rudder control horn.

86. Using the pre-shaped balsa parts, close up the stab cutout in the rudders. Do not distory the rudders when gluing these pieces in place.

#### VERTICAL FIN PREPARATION AND ASSEMBLY

87. Locate the balsa vertical post parts and the fiberglass vertical fins. Refer to the plans for the shapes of these parts.

88. Zap together the center vertical fin post and the two upper post parts as shown.(Photo 88)

89. Position into the opening in the horizontal stab. Position to the correct height and mark the area to be removed for elevator linkage clearance. Remove and grind a pocket in the vertical fin post to clear the elevator linkage. Reassemble and check that you removed enough material. (Photo 89A & 89B)

90. Fit the vertical fin post assembly to the correct fiberglass upper vertical fin for the side on which you are working. (NOTE: The navigation light goes to the outside.) Sand to shape and make sure that the stab is not distorted. Glue the post into the vertical fin with 5-minute epoxy. Take care that the hinge pocket at the rear of the vertical fin is even over its full length. Lightly clamp together and set aside to dry.

91. Repeat the process for the other vertical fin.

92. Trial fit the vertical fin assemblies. Make sure that they are setting vertically. When satisfied, glue into place using 30minute epoxy.

93. Turn the fuselage assembly onto is back. Trial fit the lower vertical fin parts. Zap the (2) vertical fin post parts to the center vertical fin post. Sand to fit as you did on the upper parts. Trial fit the lower fiberglass vertical fin to the post and boom. 94. When you are satisfied with the fit, glue to the vertical fin post and the boom with 30-minute epoxy.

95. Repeat this process for the other lower vertical fin.

96. When the epoxy has cured, mark the centerlines on the leading edge of the rudders and on the trailing edge of the vertical fins. This is the centerline of the hinges.

97. Refer to the plans and mark the centers of the hinge locations on the rudders.

98. Position the rudders to vertical fins and mark the hinge locations on the fins. Drill 3/16" holes in both the rudders and the fins.

99. Counter bore the hinge holes in the rudders so the hinges will go far enough into the leading edge that the hinge pin will be in the center of the leading edge radius. You will need to cut away some additional material so the hinges can rotate far enough to get full rudder deflection left up and right.

100. Trail fit the rudders to the fins with hinge points and check that it moves far enough in both directions.

101. Assemble the rudder control horns to the inside of each rudder. Using your Dremel tool cut a small opening on the inside rear of each boom for rudder pushrods. The location is shown on the plans.

102. Make-up your rudder pushrods from carbon fiber shafts and 4-40 hardware. Assemble only the rudder end at this time. Attach to the rudder control horn.

#### ENGINE ASSEMBLY

103. Remove the rudders and stand the fuselage assembly on end. Set the engines on the firewalls. Position the cowls over the engines. (NOTE: The cowls are marked L & R on the front spinner lip) Measure the distance from the engine prop hub to the front of the cowl add 1/32" to this dimension and you have the length spacers you will need. The 1/32" is to give clearance to the spinner backplate.

104. Make up the spacers from aluminum or steel and zap to the mounting flange of the engines. Set the engines back into place and set the cowls in place. Attach the spinner backplates to the engines. Center the engines in the cowls by lining up the spinners to the cowls. Some finetuning may be needed on the spacers so that the backplates have the same clearance all the way around.

105. When you have everything the way you want it, carefully remove the cowls without moving the engines. Zap the spacers in place and drill holes in the firewall for blind nuts. The size will be determined by the type of engine you have chosen. Assemble the blind nuts and reassemble the engines. (Photo 105)

106. The cowls may be mounted by using (5) screws from the outside or you may want to glue mounting blocks to the inside of the cowls for hidden mounts. If you use the first method, you will need to glue (5) of the supplied  $1/8" \times 3/8" \times 3/8"$  ply screw backing plates to the inside of the booms where the screws will mount and use the supplied 3mm x 10mm sheet metal screws. If you choose the hidden mounts, their locations will be determined by your engine choice make sure they do not block any of the cooling air outlets.

#### FUEL TANK INSTALLATION

107. The following parts must be made for the fuel tank mounts:

- (2) 1/8" x 3 1/8" x 7 7/8" ply floors
- (4) 1/4" sq. x 3 5/8" spruce supports
- (4) 1/8" x 1/4" x 1/4" ply spacers
- (2) 1/32" x 5/8" x 3 5/8" ply backing plates

108. Using the spruce strip and 1/8" spacer, make (2) fuel tank floor front supports as shown on the plans. Sand the front surface of the tank floors to fit snugly into these supports.

109. Epoxy the supports to the backside of the firewalls in a position that will allow the tanks to sit level and centered on the engine carburetors.

110. Rubber band the fuel tanks to the floors with foam rubber for insulation. Slip the tank assemblies into the booms and into the front supports. You will probably need to grind clearance notches into the top of the main spar opening to clear the tanks.

111. Cut pieces of 1/8" ply to glue to the rear of the tank floors to support them. Drill through these supports and secure to the main spar with #4 sheet metal screws. (Photo 111)

112. Drill holes in the firewalls for fuel lines. Their exact location will be determined by your engine selection.

#### **RETRACT GEAR INSTALLATION**

113. Position one main gear unit to its mounting plate so that it is 5/8" forward of the rear main spar. Position so that the strut is 1/4" from the inner edge of the gear

door opening. Make sure that the unit is straight. Make sure that the gear will retract without hitting the side of the gear door opening. When satisfied with the location of the gear, mark the mounting hole locations. Drill for the 6-32 blind nuts. Assemble blind nuts to the mounting plate. Assemble the gear unit using  $6-32 \times 1/2^{"}$  allen screws. (Photo 113)

114. Repeat process for the other main gear

115. Position the nose gear to its mounting plate so that the strut exits the pod 3/8" to the rear of the most forward edge of the gear door opening lip. Center the strut in the opening and make sure that it is straight from front to rear. Make sure that it will retract without hitting on either side of the gear door opening. Assemble to plate with blind nuts as you did the main gear. (Photo 115)

#### GEAR DOORS

NOTE: You may choose to make your own offset hinges from aluminum and operate the gear doors with a mechanical set up or, use the molded offset hinges, pneumatic door cylinders and sequencing valves available from Yellow Aircraft. If you choose to use the accessories available from Yellow Aircraft, go to step 128.

#### **Mechanical Operated Doors**

116. Make up (10) gear door hinges and anchor blocks from aluminum as shown on the plans.

1117. Locate the hinges on the gear doors in the locations shown on the plans. Cut a slot in the inner liner of the gear doors. Insert and glue the hinges in place. 118. Assemble pivot blocks to the hinges with 2-56 screws. Position doors and glue the pivot blocks into position. It will now be possible for you to remove the doors for painting or maintenance.

119. Locate position of control horns on each gear door as shown on the plans. The main doors use small horns and the nose door uses a large horn.

120. Cut openings in the gear door inner liners for the horns.

121. Bolt the horns to small pieces of 1/8" ply with short screws. The screws must not come through the backside of the ply plates.

122. Epoxy the horns and plates into the openings in the gear doors. Make sure they face the hinge line.

123. Make the gear door closer yokes as shown on the plans.

124. Assemble the yokes shown on the plans and secure with the landing gear straps.

125. Assemble the spring holders to the bulkheads as shown.

126. Assemble the Qwik-links to the door horns and the closer yokes. Adjust the lengths so that the doors close and do not over strain the doors.

127. Go to step 167.

#### Pneumatic Cylinder Operated Doors

128. You will need to obtain the following accessories from Yellow Aircraft:

(5 pr) Offset Hinge (Part #A2202)

(1 set ) Pneumatic Cylinder (Part #P38DC) (1) UP3 Sequencing Valve (Part #A1603)

NOTE: For pneumatic cylinder operated doors, do not use the hinge locations shown on the plan.

129. Remove the retractable landing gears.

130. Locate the (5) gear doors and place them in the proper door openings. Mark identifications on each door. Also mark the hinge side of each door. The nose door will be hinged on the right side.

131. Position an offset hinge on an inboard main door so the centerline of the hinge is 3 13/16" from the rear edge of the door. Also make sure the edge of the mounting base of the hinge is 5/16" from the inboard edge of the door. (Photo 131A & 131B)

132. Hold the offset hinge in position and drill (4) mounting holes through the door with a #57 drill bit. Remove the hinge and enlarge the mounting holes with a #50m drill bit.

133. Secure the hinge to the door with the supplied 1.25mm x 8mm screws. Take care not to tighten the screws too much and distort the door.

134. Mount a second offset hinge the same way on the main door so the centerline of the hinge is 2 1/4" from the front edge of the door. (Photo 134)

135. Mount (2) offset hinges to the outboard side of the outboard main door the exact same way. (Photo 135)

136. Place the two main doors in the proper door opening and position it so there is a 1/32" gap between the outside edges of the doors and the step in the door opening. Mark the exact locations of the doors on the fuselage. (Photo 136)

137. Remove the outboard door. Hold the anchor plate of the inboard door hinges in position. Drill (2) mounting holes for each hinge through the fuselage with a #57 drill bit. Remove the door and enlarge the mounting holes with a #50m drill bit.

138. Secure the door to the fuselage with the supplied 1.25mm x 4mm screws. Take care not to tighten the screws too much and distort the fuselage. (Photo 138A & 138B)

139. Mount the outboard door to the fuselage the exact same way. (Photo 139)

140. Check the operation of both doors and be sure you are satisfied.

141. Mark the areas on the doors and fuselage where the hinge mounting and anchor plates are mounted and remove all the mounting screws. Sand these areas as well as the bottom of the hinge mounting and anchor plates.

142. Apply a small bead of Stabilit to the hinge mounting and anchor plates. Reinstall the hinges to the doors and fuselage with the mounting screws while the glue is curing.

143. When the glue has cured, mount a ball link to the control arm closest to the mounting plate of each of the forward hinge. Make sure the ball links are on the opposite side of the two hinges. (Photo 143)

144. Assemble a socket and a 90 degree cylinder mount to a pneumatic cylinder. (Photo 144)

145. Attach the socket and cylinder assembly to the ball link of one of the hinge.

146. Fully extended the cylinder and hold the door in it's scale opened position. Position the cylinder mount on the gear mounting plate. Drill and install the cylinder mount to the gear mounting plate with (2) #2 x 3/8" sheet metal screws. (Photo 146)

147. Repeat process for the other main door. (Photo 147A & 147B)

148. Repeat steps 131 thru 147 for the other two main doors.

149. Sand the bottom of the mounting and anchor plates of (2) offset hinges.

150. Cut a piece of 3/32" x 5/16" x 5/16" and a piece 3/16" x 5/16" x 5/16" ply from scrap.

151. Glue the 3/32" thick ply to the bottom of the mounting plate of one hinge and the 3/16" thick ply to the other.

152. Sand each ply to a wedge shape so ply has no thickness on the inside edge of the mounting plate. (Photo 152)

153. Position the offset hinge with the 3/32" thick ply on the nose door so the centerline of the hinge is 11/16" from the rear edge of the door. Also make sure the edge of the mounting base of the hinge is 5/16" from the inboard edge of the door. (Photo 153)

NOTE: Make sure you mount the offset hinges on the pilot's right side of the nose door.

154. Hold the offset hinge in position and drill (4) mounting holes through the door with a #57 drill bit. Remove the hinge and enlarge the mounting holes with a #50m drill bit.

155. Secure the hinge to the door with the supplied 1.25mm x 8mm screws. Take

care not to tighten the screws too much and distort the door.

156. Mount the offset hinge with the 3/16" thick ply the same way on the nose door so the centerline of the hinge is 2 1/8" from the front edge of the door. (Photo 156)

157. Place the nose door in the door opening and position it so there is a 1/32" gap between the edge on the hinged side of the doors and the step in the door opening. Tape the door in place.

158. Hold the anchor plate of the hinges in position. Drill (2) mounting holes for each hinge through the fuselage with a #57 drill bit. Remove the door and enlarge the mounting holes with a #50m drill bit.

159. Secure the door to the fuselage with the supplied 1.25mm x 4mm screws. Take care not to tighten the screws too much and distort the fuselage. (Photo 159A & 159B)

160. Check the operation of door and be sure you are satisfied.

161. Mark the areas on the doors and fuselage where the hinge mounting and anchor plates are mounted and remove all the mounting screws. Sand these areas.

162. Apply a small bead of Stabilit to the hinge mounting and anchor plates. Reinstall the hinges to the door and fuselage with the mounting screws while the glue is curing.

163. When the glue has cured, mount a ball link to the control arm closest to the mounting plate of the rear hinge. Make sure the ball link is on the rear side of the hinge. (Photo 163)

164. Assemble a socket and a parallel cylinder mount to a pneumatic cylinder. (Photo 164)

165. Attach the socket and cylinder assembly to the ball link.

166. Fully extended the cylinder and hold the door in it's scale opened position. Position the cylinder mount on the front side of the front main bulkhead. Drill and install the cylinder mount to the bulkhead with (2)  $\#2 \times 3/8$ " sheet metal screws. (Photo 166)

#### **STEERING SERVO MOUNTING**

167. Locate the steering servo mounting parts:

- (1) 1/4" x 1 5/8" x 2 5/8" ply steering servo tray
- (1) 1/4" x 7/8" x 2 3/4" ply steering servo tray backing plate
- (2) 1/4" x 1/2" x 1 3/8" ply triangular shaped servo tray support

168. Glue the tray to the backing plate and glue the triangular shaped supports in place. (Photo 168)

169. Assemble your servo to the servo tray.

170. Measure the distance between the mounting holes in the backing plate and drill holes in the front bulkhead to match. Assemble the supplied 3 mm blind nuts to the backing plate. Assemble to front bulkhead with the supplied 3mm x 20mm machine screws and 3 mm washers.

171. Make up spring loaded cable linkages from the steering servo to the steering arms on the nose gear retract unit.

#### INBOARD FLAP SERVO MOUNTING

172. Locate your inboard flap servo and make up a W connector for the inboard and the two outboard servos.

173. Connect the flap servos to your receiver and turn on the radio. Determine whether the inboard servo should face the left or the right side of the model so both the inboard and outboard flaps will go up and down at the same time.

174. Make up a servo mounting assembly similar to the one you used for the nose gear steering.

175. Mount this assembly to the rear main spar so that the servo output arm is centered on the (2) flap torque rods at the same height.

176. Make up the pushrods from 4-40 Qwik-link rods. Make sure that the servo arm you use is the same length as the one you used on the outboard flaps.

#### ELEVATOR AND RUDDER SERVOS INSTALLATION

177. (4) Servo mounting plates and supports will need to be fabricated. Templates are provided on the plans. The rays are designed for the J.R. 2035 servo. You will need to modify the trays if you are using a different servo. The servos mount on either side of the main wheel and against the rear bulkhead. Make sure there is no interference. Glue and glass the plates and supports into position.

178. Assemble the servos into the trays. Elevator servos are outboard and rudder servos are inboard. You need to have one of the elevator servos reversed.

179. Cut the elevator arrow shaft pushrods to length and assemble 4-40 rods. Adjust

as necessary. Final adjust will be made after paint.

180. Cut the rudder arrow shaft pushrods to length and assemble 4-40 rods. Adjust as necessary. Final adjustments will be made after paint

#### THROTTLE SERVOS

181. Mount the throttle servos in a convenient location. Be sure the servos do not interfere with the main gears or the main door cylinders. Keep the linkage as straight as possible.

182. Drill holes through the firewalls and bulkheads in line with the servo arm and the carburetor arm. Make up linkages from nyrod and glue outer tube to bulkheads and firewalls.

183. Adjust the throttle linkages so that both engines are working together.

#### **RETRACT AND BRAKE SERVOS**

184. Mount the retract servo and switching valve on the bottom of the nose gear mounting plate. Mount the servo on its side. Make sure there is no interference with the nose gear as it retracts.

185. Mount the brake servo and valve in the same way as the retract only on the other side of the mounting plate.

#### **COCKPIT INSTALLATION**

186. Epoxy a piece of 1/4" square balsa to the front lower inside edge of the fiberglass radio box. Epoxy a 1/4" x 3/8" piece of spruce to the front top inside of the box.

187. Glue a piece of 1/16" x 5/8" ply to the front bottom edge of the radio box overlapping the balsa glued there previously.

188. Epoxy a piece of 1/4" x 3/8" spruce to the top rear of the rear main spar.

189. Position the radio box into the center pod and slide it back as far as it will go. The 1/16" ply plate should set on the spruce piece you glued to the rear spar. Drill holes and screw into place with #2 sheet metal screws.

190. Position the radio box into the center pod and slide it back as far as it will go. The 1/16" ply plate should set on the spruce piece you glued to the rear spar. Drill holes and screw into place with #2 sheet metal screws.

191. It is necessary to remove most of the instrument panel cowl from the center pod. Leave a 1/2" lip at the front edge and blend into the sides smoothly.

192. Position the cockpit tub into the center pod. Reshape the instrument panel until the sides of the tub fit flush with the sides of the cockpit opening.

193. Shim the front of the cockpit tub so that it sits level.

194. Cut pieces of 1/4" ply to fit between the nose gear mounting plate and the upper lip of the cockpit opening. Refer to the plans for the correct location. Epoxy these pieces into place.

195. Epoxy small pieces of hardwood to the sides of the cockpit tub right under the lip in place to fit against the ply plates just installed.

196. Place cockpit tub back in place. Drill holes through the hardwood blocks and

into the ply plates. Be careful not to go through the side of the fiberglass pod.

197. Screw the cockpit tub into place using the holes used for the radio box and the side holes just drilled. Make sure the screws in the side holes do not go through the sides.

198. Drill a hole to fit the control column at the marked spot in the cockpit tub floor. Back up this hole with a piece of balsa drilled to the same size.

199. Glue the control wheel to the control column.

200. It would be best to paint and detail the cockpit before assembling the seat back and pilot.

#### CANOPY ASSEMBLY

NOTE: It is highly recommended that you make the canopy removable. This will allow easy access to many components.

201. Careful cut the clear plastic canopy along the marked line. Trial fit into the fiberglass canopy frame. It should fit with a 1/4" lip all the way around.

202. Use RC 56 and glue the canopy into the frame taking care not to get glue on the exposed areas of the clear plastic. Set aside and allow to dry.

203.Position canopy to the cockpit opening. Mark locations for (6) mounting screws. Remove canopy and glue (6) of the supplied 1/8" x 3/8" x 3/8" screw backing plates inside the center pod at these locations.

204. Reassemble canopy and drill holes for the supplied 3mm x 10mm mounting screws. Screw canopy in place.

#### **SCALE RADIO ANTENNA**

205. Locate the marked position of the antenna on the bottom of the center pod using your Dremel tool, carefully cut out this opening.

206. Cut a piece of 3/8" x 1/2" x 1 1/4" hard balsa from scrap and glue it to this location on the inside of the fuselage. When the glue has cured, cut a hole for the antenna.

207.Position the antenna into this hole and epoxy in place. Take care to get it straight and extending from the bottom of the pod 3 1/2".

#### TURBOCHARGER INLET SCOOPS

208. Cut a small piece of 1/8" ply to fit in the base of the scoops. Epoxy in place.

209. Position scoops to side of booms at the locations molded into the booms. Drill from the inside of the boom into the scoops.

210. The scoops can now be assembled to the booms after the plane has been painted.

#### TURBOCHARGERS ASSEMBLY

211. Locate the 2 turbos and the 2 small plastic tubes. Epoxy the tube into the groove in the front of the turbo. After the epoxy has cured, you may fair in the tubes with filler.

212. Do not glue the turbos into place until after painting the plane.

#### **GUN INSTALLATION**

NOTE: Dowel rods are provided in the kit for guns. However, for a more scale appearance, guns can be made from pieces of tubing. This is your choice as to how scale you want it to look.

213. Cut a gun support bulkhead using the template shown on the plans. Glass this bulkhead into place as shown on the plans.

214. Drill holes in the gun positions on the front of the center pod. Carefully drill

through these holes into the gun support bulkhead.

215. Position the guns through the holes and into the holes in the bulkhead. Do not glue the guns in place until after painting the model.

#### **COOLING AIR SCOOP COVER**

216. The scoop covers are glued to the bottom of the booms just to the rear of the cooling air outlets.

This completes the building of the P-38. The location of the battery and the receiver will be determined when balancing the model. Be sure to balance the plane at the location shown on the plans and page 1. Also be sure to balance it with the gear retracted. Control throws are shown on the plans and page 1.

## FLYING

The first thing you must do is to make sure you have 2 reliable engines. Do not try to get the maximum RPM from both engines. For synchronizing the engines in use the method that Dan Parsons recommends.

1. Start one engine and adjust to a good peak without going lean. Hold the nose up and make sure it doesn't go lean. Shut the engine down.

2. Repeat the process with the other engine.

3. Now start both engines and richen the faster engine to match the slower engine if needed. You probably will not need to make any adjustment at all.

4. Don't be tempted to get all the power you can as it will only get you in trouble.

#### Take-Off

Do not open the throttle rapidly. Come up on the power gradually so that if one engine lags behind the other you will not swerve off the runway. Allow the plane to accelerate until it gets light on the gear. Pull in a little up and climb out gradually. The ailerons are not real effective at slow speeds so use those rudders.

#### <u>Flight</u>

The P-38 flies like any other large model as long as both engines are running. The rudders are extremely effective at flying speed. Very little coordinated rudder is needed in turns. Rolls to the left are very smooth. Rolls to the right are very slow due to engine torque.

Always be ready for an engine failure. This should be rare if you follow the tuning instructions. If an engine quits in flight, immediately apply rudder opposite the dead engine. Call an emergency landing and bring the plane in. Don't try to fly it around with an engine out unless you are very experienced with twins.

#### <u>Landing</u>

Landings are no different with the P-38 than with any other highly loaded warbird. Do not slow it down too much and everything will be all right. I recommend that the first few landings be a little faster than you normally would.

### **PARTS LISTING**

PART NO.	DESCRIPTION	<u>QTY</u>
FIBERGLASS PARTS		
001	Fuselage	1
002	Cowl Left	1
003	Cowl Right	1
004		1
004		4
005	Elevator	1
Fiberglass Bag #1		
006	Nose Gear Door	1
007	Inboard Main Gear Door Left	1
008	Outboard Main Gear Door Left	1
009	Inboard Main Gear Door Right	1
010	Outboard Main Gear Door Right	1
Fiberglass Bag #2	5	
011	Rudder	1
012	Upper Vertical Fin Left	1
012	Lower Vertical Fin	1
CIS Fibergless Beg #2		1
Fiberglass bag #3	Deddar	
014	Rudder	1
015	Upper Vertical Fin Right	1
016	Lower Vertical Fin	1
Fiberglass Bag #4		
017	Turbocharger	2
018	Turbocharger Inlet Scoop	2
019	Counterbalance	1
020	Radio Antenna	1
021	Control Column	1
021	Control Wheel	1
UZZ Fibergless Beg #F	Control Wheel	1
Fiberglass bag #5	O salasit Tak	
023	Cockpit Tub	1
024	Seat Back	1
025	Radio Box	1
026	Wing Tip Left	1
027	Wing Tip Right	1
028	Cooling Air Scoop	2
PRESHEFTED FOAM SURF	ACES	
101	Wing Panel Left	1
102	Wing papel Pight	1
102	wing panel Right	I
VACUUM FORMED PARTS		
201	Сапору	1
WOOD PARTS		
Balsa Bag #1		
301	Outboard Flap Left	1
302	Outboard Flap Right	1
303	Inhoard Flan Left	1
304		1
Balsa Bag #2	inboard hap regit	
401	Flop Research and ing Edge 1/4" x 0/16" x 0"	2
401	Fiap Recess Leading Edge, 1/4 X 9/10 X 9	2
402	Wing Trailing Edge @ Alleron, 5/16 X 1 1/4 X 17 3/4	2
403	Alleron Leading Edge, Half Round, 17 3/4	2
404	Aileron Gap Cover, Tapered, 1/4" x 17 3/4"	4
405	Front Wing Spar Filler Block, 1/4" x1 7/8" x 3 3/16"	4
406	Rear Wing Spar Filler Block, 1/4" x 15/16" x 3 3/16"	4
407	Inboard Flap Hinge Mounting Block, 1/2" x 1/2" x 2"	4
408	Rudder Hinge Block/Lower Vertical Fin Post Part, 11/16" x 11/16" x 1 1/4"	8
409	Upper Vertical Fin Post Part. 11/16" x 11/16" x 2 3/16"	2
410	Center Vertical Fin Post Part 3/4" x 3/4" x 6 11/16"	2
411	Bridging Vertical Fin Post Part 1/4" x 3/4" x 2 9/16"	4
<u>412</u>	Scran Balsa Triangular shaned $1/4^{\circ}$ y $1/2^{\circ}$ y 5 $1/2^{\circ}$	4
712 /10	Sorap Dalsa, Itlatiyulai shaped, $1/4$ x $7/0$ x $2.0/16$	7
410	Sulap Daisa, I lialiyulai shapeu, 1/4 x //o X 3 3/10	2

Plywood Parts Ply Bag #1		
501	Servo Well Liner, 1/64" x 1/14" x 4 7/8"	8
502	Servo Well Cover, 1/16" x 2 1/4 x 2 1/2"	4
503	Servo Mounting Block, 1/4" x 5/8" x 3/4"	8
504	Plastic Servo Well Corner Bracket	16
Plywood Bag # 2		
601	Flap Recess Liner, 1/64" x 3" x 9 7/8"	2
602	Wing Root Cap. 1/32" x 2 1/2" x 14 1/2"	2
603	Elevator Torque Support, Predrilled, 1/4" x 25/32" x 25/32"	2
604	Steering Servo Tray, 1/4" x 1 5/8" x 2 5/8"	1
605	Steering Servo Tray Backing Plate, 1/4" x 7/8" x 2 3/4"	1
606	Steering Servo Tray Support. Triangular Shaped 1/4" x 1/2" x1 3/8"	2
607	Screw Backing Plate, 1/8" x 3/8" x 3/8"	17
608	Dowel. 1/4" x 5 3/4"	1
609	Dowel 1/4" x 4 1/2"	1
610	Dowel, 1/4" x 2 3/8"	2
611	Dowel 1/4" x 1 9/16"	1
612	Scrap Wood, 1/4" x 1/2" x 5 1/2"	1
613	Scrap Wood, 1/4" x 1/2" x 5 1/2"	2
HARDWARE Bag # 1	Front Aluminum Wing Spor, Straight	2
701	Pion Aluminum Wing Spar, Straight Poar Aluminum Wing Spar, Bont	2
702	Set Serow Ammy Spar, Deni	2
703	Set Screw, 4mm X omm	0
704	Intervet, Sillin	1 pr
705	Floveter Torque Rod	1 pr
700	Elevator Torque Rou Shast Matal Saraw 2mm v 10mm	1 pi
707	Sheet Metal Screw, Shift & Turnin Mashina Saraw 2mm x 20mm	24
700	Dind Nut 2mm	2
709		2
710	Washer, 3mm	2
711	Plastic Turbocharger Tube	Z
DECAL		
801	Decal	1 set
INSTRUCTIONS		
901	Owner's Manual & Photo Pack	1
902	Drawing	