

FEI BAO JETS

L-39 Assembly Manual



Written by Curtis Mattikow In collaboration with R/C Jet Models

DISCLAIMER:

THIS IS NOT A TOY. This is a high-performance miniature aircraft, capable of high speeds and damage to life, limb, and property. The manufacturer and its distributors cannot control how you assemble this model, what equipment you use to fit it out, or how you fly it, and can assume no liability whatsoever for any damages that may occur when you fly your aircraft. By assembling this model, you are agreeing to indemnify and hold blameless the manufacturer and/or his agents from any and all torts and liability associated with the use of this product. Please inspect all parts before beginning assembly. If any parts appear to be suspect, contact your dealer or the manufacturer for repair or replacement BEFORE you begin. Once you have assembled the aircraft, you are the pilot in command and assume any and all responsibility for the use of the model and any damages that might occur by flying or attempting to fly this aircraft. R/C model jets require a high level of skill in both their assembly and their flying. If you do not feel confident in either your building or flying skills, PLEASE seek assistance from more experienced modelers. It is a wise idea, no matter what level of skills you possess, to have a second experienced modeler go over your installation after assembly. A second set of eyes may spot a problem you have missed. If you have not flown a model like this before, it is HIGHLY recommended that you get an experienced turbine pilot to do your maiden flight. Very often, the first few seconds of a maiden flight are critical until the aircraft is trimmed out, and having an experienced pilot at the controls can make the difference between a wrecked aircraft and once that enjoys many hundreds of flights. Be sure to select a suitable field for flying...take the time to find a large paved runway if at all possible, especially for test flights, until you feel comfortable getting the aircraft in and out of smaller grass fields.

BEFORE YOU BEGIN:

Keep this in mind as you proceed:

Look at EVERY assembly step you finish, and ask yourself:

"Is this going to crash my airplane?"

A chain is only as strong as its weakest link, and this is a high-performance aircraft that will be very intolerant of sloppy assembly techniques. Even the smallest component is important and can cause the loss of your airplane, so take the time to do things right. Or REdo them if they are wrong. Careful work will result in a long-lasting plane that gives you years of pleasure, one loose component could result in the complete loss of the aircraft and all the components inside it, and someone can even get hurt. So pause every once in a while when building it and double-check your workmanship.

A. Introduction:

You have chosen a model that represents the pinnacle of ARF technology. While there is not a lot of building to do, there is enough to keep you busy for a few evenings.

Even if you have assembled maybe other ARF jets, we highly recommend following our assembly sequence and procedures anyway.

Chances are it will save you a lot of time, prevent you from running down dead ends, and perhaps remind you of a few small things that might end up saving your aircraft.

We have tried to arrange a construction sequence that will allow you to keep moving forward, rather than standing around waiting for glue to dry before you can proceed to the next step.

Just because the model is almost completely built does not mean you can rush through the final assembly.

You need to employ fine craftsmanship every step of the way, turbine models are critical. Keep this in mind with everything you do, every part you install...look at the work you just did, evaluate it critically, and ask yourself "is this going to potentially crash my airplane?" If there is any doubt about the work you have done, back up, and re-do it properly.

B. Adhesives:

The correct adhesive to use for all procedures is Loctite Hysol 9462. This is a very strong white epoxy that is thixotropic. "Thixotropic" means it does not run at all, but stays only where you put it. It is infinitely superior to regular epoxy, even slow-setting epoxy, for our purposes, because of this characteristic. Regular epoxy will run downhill with gravity as it dries, taking it away from where

it is supposed to be. A good example is in the hinges...using regular epoxy, a good portion of the glue will migrate down away from the hinge into the inside of the wing as it dries, and you won't even know it is happening. Hysol stays where you put it.

The downside of Hysol is it takes overnight to dry properly, but we have tried to arrange things to keep you busy while waiting for glue to dry.

We also highly recommend that you only use a proper Hysol dispensing gun, and only the long-type mixing nozzles.

The short nozzles do not mix this glue enough, and only a thin nozzle and gun will let you fill the hinge and control horn holes properly with glue, you can't do it mixing your Hysol on a flat surface and trying to get the glue in the proper place by a brush or stick.

You can buy a complete Hysol setup with a gun, nozzles, and two cartridges of glue from your dealer for approximately \$60.

Consider it a great investment, the glue is the best you will use. One cartridge is plenty to assemble your Velox.

C. WORKING WITH PNEUMATIC SYSTEMS:

The L-39 uses pneumatic brakes and retracts. If you follow a few tips, you should have very reliable, leak-free operation. Neatness counts.

All airlines should be secured to the airframe to keep them from flopping around or getting kinked. Use tie wraps for this.

The other very important thing is to cut off the end of each airline dead square before installing it on the nipple.

This is VITAL. You can either purchase a professional tubing cutter from your dealer (they are approximately \$10), or you can make up a little jig to hold the airline and keep a sharp, new razor blade perfectly upright as you cut.

Either one works, just ensure that all ends of all airlines are cut off dead square. Make sure all airlines are pushed ALL THE WAY onto their nipples.

They should not need to be secured otherwise, but you can add fine wire safety wraps if you like. Make sure all left and right matching airlines are the same length, particularly the brake lines, or you will get uneven retraction or braking action.

It's worth taking the time to get everything pneumatic right the first time, as having your landing gear fail to retract is not THAT bad, but having it fail to deploy can really ruin you day and the paint on the bottom of your model.

D. FUEL SYSTEM:

The L-39 has a very simple fuel system...one main tank leading to a UAT or similar header tank.



There is not much to go wrong, but like the pneumatic system, it does need to be done right the first time, with some careful craftsmanship.

Like the airlines, all fuel lines must be cut off Dead Square. Each fuel connection should be given a tie-wrap or two for extra security.

Everything needs to be dead clean, especially the inside of the main tank. The front tray is set up to accommodate a BVM Ultimate Air Trap or it's equivalent, to keep any bubbles from getting to your engine.

You can also make up your own header tank with a bubbles filter, or a geometrically centered pickup, but any way you do it, you should not attempt to fly without a header tank system.

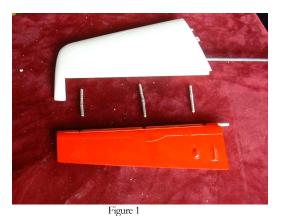
5. Hinging the control surfaces:

While there are many ways of doing this, this method will let you do all the surfaces at once, assures proper alignment and movement, and let you move on to other assembly work while the glue on the hinges dries.

Most techniques involve gluing one side of the hinges, letting it dry and then doing the other side the next night. This lets you do both sides at once, and guarantees proper alignment. Follow the procedure fully for best results.

Put a towel or cloth down on your bench to keep the airplane from being scratched. Locate all the control surfaces to their correct place on the wings and tails. Note that the factory has kept some hinges in place on the control surfaces to help you locate which surface goes where, left and right. Check for proper mating, hinge location, and movement on all surfaces. Start with one wing. Remove the control surfaces and remove the hinges.

1. Remove the elevators and their hinges from the stabs. You will need to shorten two of the hinges as Shown.



2. Coat the leading edge of the elevator with a thin layer of vaseline to keep any glue from sticking to it.



Figure 2

3. Coat the center point of each hinge with vaselene also.



Figure 3

4. Coat the carbon fiber stab spar with Vaseline.



Figure 4

5. Insert the stab spar into one of the stabs.

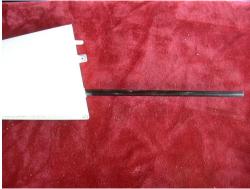


Figure 5

6. Fill each hinge hole with hysol. Coat each hinge with hysol and insert into place.



Figure 6

7. Fill the hinge holes in the elevators with glue, coat the hinges with glue, and press the elevator into place. Carefully check alignment and free movement.



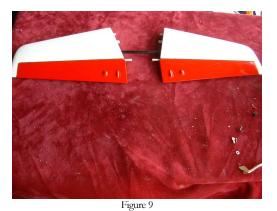
Figure 7

8. Insert the spar into the other stab and glue the hinges into that stab.



Figure 8

9. Add glue to the other elevator and press into place. Set aside to dry. Note the importance of vaseline on the spar, and that the spar must be in place before the hinges are glued.



10. Follow all the same procedures to hinge the rudder.



Figure 10

11. Remove the retract units from the wings and set them aside.

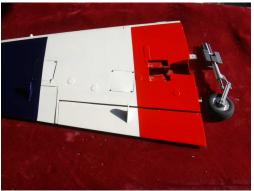


Figure 11

12. Check each hinge line for free movement. Sand the trailing edge of the wing if needed to make an adequate gap between the bottom skins.



Figure 12

13. Remove the aileron servo cover and set it and its screws aside

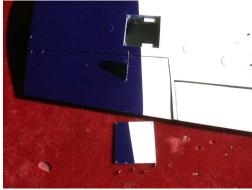


Figure 13

14. Secure mounts to the aileron servo as shown. Do not use servo grommets.



Figure 14

15. Center the servo and prepare the servo horn as shown.



Figure 15

16. Add a twelve-inch extension to the servo and tape the connection for security.

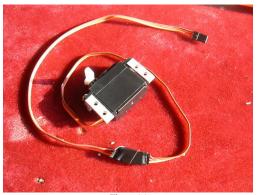


Figure 16

17. Tie a wheel collar or other weight to a piece of string and tie the string to the aileron servo extension.



Figure 17

18. Drop the wheel collar in from the servo bay through the wing and out the hole in the root rib as shown and pull the servo extension through.



Figure 18

19. Push the servo into place on the wooden mounts and carefully check alignment.

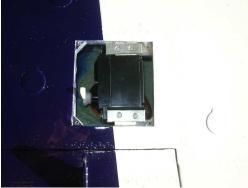


Figure 19

20. Drill four pilot holes for the mounting screws.



Figure 20

21. Secure the servo with four provided screws.



Figure 21

22. Cut a notch in the servo door for the servo horn and screw the door back into place.



Figure 22

23. You will need to shorten the provided links. Start by dissasembling the links, leaving a locking collar at one end.



Figure 23

24. Cut down the rod as shown in the bottom of the picture. Bevel the threaded end and then unscrew the locking collar to clean up the threads.



25. Solder a clevis onto the other end of the rod as shown.



Figure 25

26. Add a bolt-on link to the other end as shown.



Figure 26

27. Install the new shortened linkage as shown. You will need to properly size the hole in the surface control horn for the bolt.

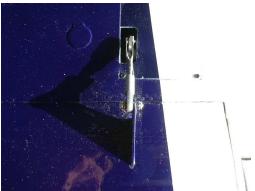


Figure 27

28. The flap servos are assembled in the same way, but note that the servo needs to be all the way at one end of travel when the flap is neutral, and that servo extensions are not needed.

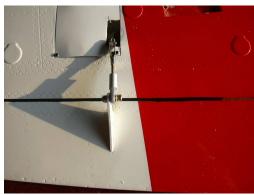


Figure 28

29. Use hemostats to install one end of the clear tubing roll to the brake nipple. Secure the brake line to the strut also, using a tie wrap.



Figure 29

30. Install both ends of the colored tubing to both nipples of the retract unit.



Figure 30

31. Drop the wheel collar and string in through the retract bay to the flap servo bay and then down out of the wing through the same hole the servo extensions go through.



Figure 31

32. Tie the end of the string to the middle of the colored tubing going to the retracts, then tape the end of the brake line tubing to the colored tubing as shown.



Figure 32

33. Pull the airlines through the wing. Be very careful not to kink the tubing.



Figure 33

34. Install the retract unit with four screws. Again, pay close attention not to pinch or kink any tubing.



Figure 34

35. Cut off all three air lines about three inches from the root. Install a quick disconnect between the two retract lines, and one to the brake line.



Figure 35

36. Install the tip tank with the provided screws. Repeat all the procedures for the other side, and the wings are complete.



Figure 36

37. Construct a servo tray for the rudder



Figure 37

38. Install the rudder servo to the tray using the provided screws. Do not use grommets.



Figure 38

39. Shorten a link as shown and solder a clevis to it. Make a servo horn using the innermost hole on the horn. Neutralize the servo and install the horn and link.



Figure 39

40. Slip the servo assembly into the fuselage, with the linkage pointing out the square hole in the fin mount.

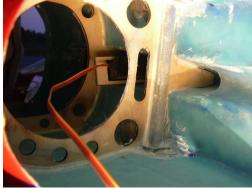


Figure 40

41. The linkage needs to stick out the hole as shown2.



Figure 41

42. Connect the linkage to the rudder horn as shown. Use a safety clip also.



Figure 42

43. Insert the rudder and fin into place.



Figure 43

44. Tighten the fin retaining clamp using the supplied wrench.



Figure 44

45. Locate this provided bolt and large washer.



Figure 45

46. Tighten the bolt and washer into place inside the fuselage as shown.



Figure 46

47. Slide the rudder servo back and forth and adjust the linkage until the rudder is neutral and you are happy with the action. Hysol the servo tray into place.



Figure 47

48. Add a thirty-six inch extension to the rudder servo, tape it for security.

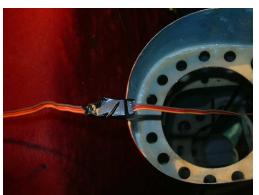


Figure 48

49. Clean the carbon fiber spar rod thoroughly, and then rough it up with sandpaper.



Figure 49

50. Roughen up the stab roots and remove the paint to expose the fiberglass underneath.



Figure 50

51. Roughen up the stab mounts on the fuse the same way. You may also drill small holes in both parts to give the glue a better grip, too.

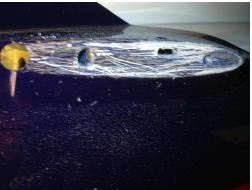


Figure 51

52. Coat the center of the stab spar with hysol and insert it into the fuse.



Figure 52

53. Hysol the stabs into place. Be sure to use adequate glue, both on the roots and the spar.



Figure 53

54. Secure the stabs with the two provided bolts. Check alignment throughly while drying.



Figure 54

55. Attach the elevator horns to the provided fiberlgass elevator pushrods as shown.



Figure 55

56. Install the pushrods and secure them using the provided allen wrench.

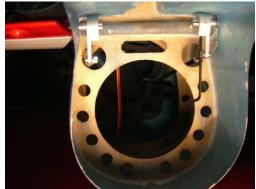


Figure 56

57. Use aluminum tape to secure the rudder servo extension to the top and side of the fuselage, it must not hang and touch the hot tailpipe. Coil up the elevator and rudder extensions and tempo



Figure 57

58. Install the elevator servos and connect them the servo extensions.



Figure 58

59. Remove the radio trays from the nose of the fuse. Paint them if you like, and set them aside for later.



Figure 59

60. Link the two air bottles together with a short section of tubing. Cut the tubing in the middle and install a y-connector.



Figure 60

61. Install the air tanks with silicone to the floor beneath the rear radio tray. Leave a one-inch gap between the two tanks for wiring to run through.



Figure 61

62. Remove the nose gear unit.



Figure 62

63. Attach a section of tubing about 18 inches long to the nipples of the nose gear retract unit.



Figure 63

64. Crimp the ends of the steering cable to the outer holes on the nose gear steering arm, then cut the cable in half to make two separate pieces.



Figure 64

65. Reinstall the nose gear unit and feed the steering cables through the white plastic tubes. Hemostats are handy for this.



Figure 65

66. Make up three lengths of tubing about 18 inches long. Divide each into half and add a y connector to each.



Figure 66

67. Run the airlines bellow the intakes.



Figure 67

68. Feed the three long lines forward through the bulkhead in front of the main wheel wells.



Figure 68

69. Feed one side of each teed off section through the holes on each side of the bulkhead behind the wheel wells.



Figure 69

70. Pull the lines out through the holes in the wing roots.



Figure 70

71. Secure the lines to the bulkhead on each side with tie wraps as shown.



Figure 71

72. Cut off any excess line, leaving about three inches, and add one complete air disconnect to the pair of retract lines and half of one to the brake line on each side.

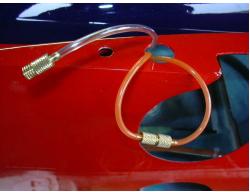


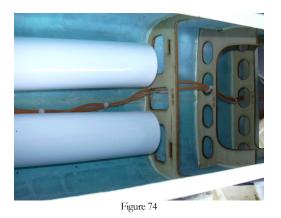
Figure 72

73. Run all the long lines forward to the nose section. They go under the main spar tube and through all the holes in the bulkheads, and between the air tanks.



Figure 7:

74. Bundle the three lines together with tie wraps for neatness. Do not pinch the lines with the tie wraps.



75. Add a y connector to each of the two lines from the nose gear retract.



Figure 75

76. Cut off any excess tubing and connect the two retract lines from the rear to the ones from the nose gear.

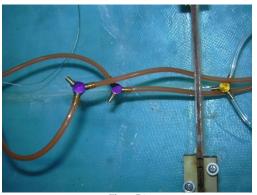
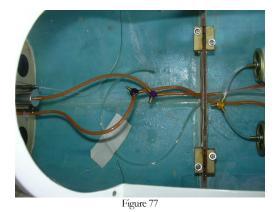


Figure 76

77. Leave the brake line long for now and tape it out of the way to the bottom of the fuse in the nose.



78. Add two 36-inch extensions to each side, starting at the wing root, for the flaps and ailerons.



79. Route these extensions forward, following the exact same path as the airlines. Do the same for the elevator and rudder extensions.



80. Bundle all the extensions together with tie wraps.



Figure 80

81. Silicone your receiver batteries as far forward as far forward as you can get to the floor of the front radio compartment.



Figure 81

82. Check you fuel tank for likings before installation.



Figure 82

83. Glue the tank into place with silicone.



Figure 83

84. The tank should touch the intakes and be glued with a little silicone there, too.



Figure 84

85. Add a ball link to each of the air valves.



Figure 85

86. Make up a hardwood block to mount the valves to. It should be about the size of one of the valves



Figure 86

87. Screw the valves to the block.



Figure 87

88. Screw and glue the valve assembly to the forward radio tray.



Figure 88

89. Cut out a hole big enough to just accommodate two mini servos for the valves.



Figure 89

90. Cut the scrap you just removed in two and glue it on the bottom of the tray for reinforcement for the servo mounting screws.

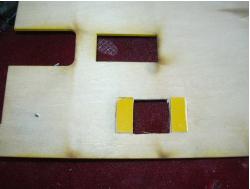


Figure 90

91. Install the two servos.



Figure 91

92. Add ball links to the servos.



Figure 92

93. Connect the servos and valves with linkages.



Figure 93

94. Drill a hole and add the filler valve to the forward radio tray.

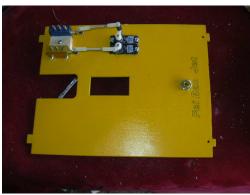


Figure 94

95. Test fit the tray and mark the clearance needed for the retract nipple on the nose gear.

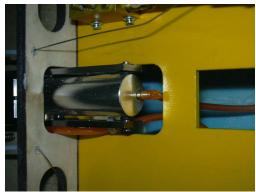


Figure 95

96. Cut a notch to make sure the nose gear line is not pinched.



Figure 96

97. Glue some pieces of scrap ply to the bottom of the tray for the nosegear servo mounting screws.

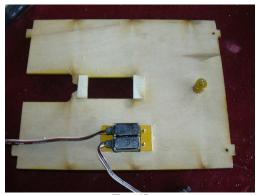


Figure 97

98. Mount the nose gear steering servo to the tray.



Figure 98

99. Drill a three quarter inch hole as shown for airlines.



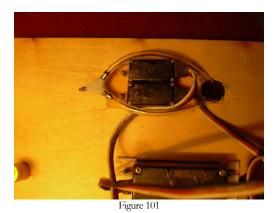
Figure 99

100. Connect the two nipples shown with a six-inch section of airline and feed the line down through the hole.



Figure 100

101. Cut that line in two and reconnect it with a y connector.



102. Add a short section of line to connect the y-connector to the fill valve.



Figure 102

103. Cut that line in half and add a y-connector between.



Figure 103

104. Add another section of line about 9 inches long to the remaining nipple of the connector.

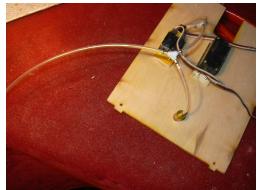


Figure 104

105. Add two sections of airline about 9 inches long to the remaining nipples on the retract valve and run them out the hole.

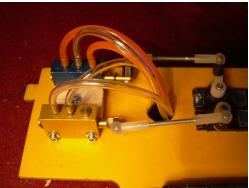


Figure 105

106. Bundle these lines together with tie wraps for neatness.



Figure 106

107. Add two high-quality switches.



Figure 107

108. Add your receiver.



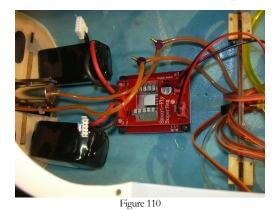
Figure 108

109. Cut a slot in the tray for the servo leads to come up to the receiver from beneath the tray.



Figure 109

110. Add a regulator or powerbox if desired, behind the batteries on the fuselage floor.



111. Connect the servo and battery leads to the receiver.



Figure 111

112. Connect the two retract lines from the valve to the y-connectors you installed earlier connecting the front and rear retracts.

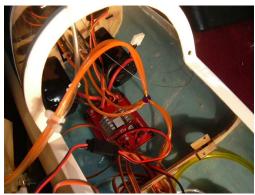


Figure 112

113. Connect the brake line to line coming from the brake valve. Use a quick disconnect, or connect it directly to the valve.

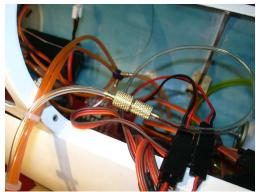


Figure 113

114. Connect the air supply line from the radio tray to the y-connector between the air tanks.

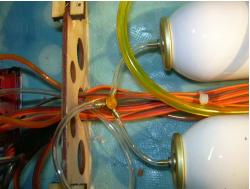


Figure 114

115. Place the radio tray into the fuse and secure with two screws.



Figure 115

116. Install the nose gear steering wires to the servo arms.

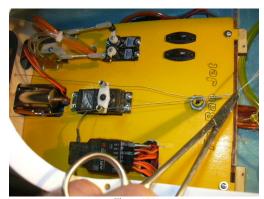


Figure 116

117. Try to fit the turbine.



Figure 117

118. You should cut one inch of the intake to center the turbine.



Figure 118

119. Carefully check the centering of the engine and screw into place. You need to pay attention to the engine manufacturer's specified distance between engine and pipe.



Figure 119

120. Plumb lines onto your UAT, then make up a balsa or hardwood block as shown to mount the UAT.



Figure 120

121. Drill a hole in the block for a tie wrap...attach the tie wrap but do not tighten yet.



Figure 121

122. Epoxi the UAT in place and connect the fuel line to the main tank.



Figure 122

123. Epoxy or silicone the propane tank to the other side of the fuse as shown.



Figure 123

124. Secure your ECU to the engine tray. You can lay out your tray any way you want, just keep distance between the pump and ECU and RX.



Figure 124

125. Install your fuel pump to the engine tray.



Figure 125

126. Install your fuel and gas solenoids. Again, you need to be aware of the cockpit tub, and make sure whatever you install works with the tub.



Figure 126

127. Place the engine tray into the fuse and secure with two screws. Connect your ECU to the engine and receiver according to the manufacturer's instructions.



Figure 127

128. Complete the plumbing of the fuel and gas systems according to your engine's instructions.



Figure 128

129. Make up a one eighth inch plywood plate to mount your ECU battery.



Figure 129

130. Install velcro on the battery and the plate.

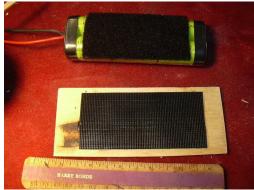


Figure 130

131. Epoxy the plate into place atop the two formers in the nose.



Figure 131

132. Put the ECU battery onto the tray with velcro.



Figure 132

133. Test the fit of the dashboard into the fuselage. You may need to notch it as shown to fit over the former.



Figure 133

Epoxy or silicone the dashboard into place when satisfied with the fit.



Figure 134

135. You may detail out the cockpit tubs as you like. A simple and cheap solution is to make up two plywood plates, paint them black, and epoxy in place as shown.



Figure 135

136. Two pilot bust figures can be glued to these plywood platforms when dry.



Figure 136

137. Test fit the cockpit tub into the canopy and fuse and trim as required.



Figure 137

138. Slip the tub inside the canopy frame and glue into place with silicone or epoxy. When dry, latch the canopy into place.



Figure 138

139. Temporarily center the tailpipe in the rear former using scrap balsa sticks.



Figure 139

140. Cut four plywood rectangles to center the pipe.



Figure 140

141. Epoxy the plywood pieces into place to center the tailpipe and remove the balsa scraps when dry.



Figure 141

142. Measure the distance from the pipe to the tail cone of the engine according with the turbine manufacture recommendations.



Figure 142

143. Make up two plywood blocks...the height of these needs to be adjusted to get the pipe at the right height to center on the tail cone of the engine.



Figure 143

144. Epoxy the blocks to th engine mounts.

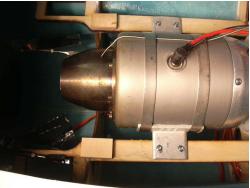


Figure 144

145. Drill pilot holes through the mounting tabs and the blocks and secure the pipe with two screws. Be sure to maintain the correct distance between pipe and engine.



Figure 145

146. Slide the main spar into the fuse. Make a mark four and a half inches from each end, to make sure you keep the spar centered when putting on the wings.



Figure 146

147. The wings are secured with the two provided bolts. Be sure to not over tighten them and strip the threads.



Figure 147

Congratulations, you have completed construction on your Fei Bao L-39. See the Pilots Notes for balance and control throws.



Technical data:

Center Of Gravity:

Balance your plane in the middle of the main spar, with the UAT full and the main tank empty and the gear retracted. You can move the CG forward or aft for later flights, but this is a nice safe position. Be cautious about playing it too safe and going too far forward, you don't need to. Avoid adding lead if possible, move equipment forward if you can. There is a slight trim change aft as the fuel burns off, but it is not significant. The plane should lift off by itself on takeoff, even though it may have a slightly negative angle of attack due to the nosegear strut compressing.

Engine Selection:

The L-39 was designed for engines from 12-18 pounds of thrust. It will fly fine, in a very scale-like manner, with only 12 pounds of thrust. 14 will give a little more push, and a P-70 or Wren Supersport in the 16-18 pound class should give very vivid performance. Be aware that while you can indeed use larger 66mm engines like the P-80, they do add more weight, and you might not be able to realize their full thrust potential using the stock FeiBao tailpipe. There is certainly room for a larger diameter pipe if you feel the need.

Control Throws:

Ailerons: Due to their gapless sealed construction, they may be more powerful than you expect, so do not overdo the throws. First flight should be 15mm up and down. You can adjust this later if you want more.

Rudder: 25mm left and right

NosegearL No more than 10mm left and right. You can set up dual rates to have

higher rates for taxying if need be. Elevator: 15mm up and down

Flap: 35mm, measured at the trailing edge at the root. You will need at least 2mm of down elevator trim with full flap to keep the nose from rising. Half flap requires no trim.

Conclusion:

It's a very nice plane to fly. It is quite docile, and the stall is soft and straight forward, and landings are easy. It is a nice first turbine model for someone with some high-speed experience. It is capable of most aerobatic maneuvers, and it looks very scale in the air. Enjoy your new model, when you chose FeiBao, you chose the most advanced, most prefabricated models available, and you have the full support of the factory and the extensive dealer network. Any time you feel a need, please reach out and get in touch, FeiBao is always glad to help in any way possible.

Credits:

Written by Curtis Mattikow Test Pilot: Curtis Mattikow Maiden at Floyd Bennett Field





