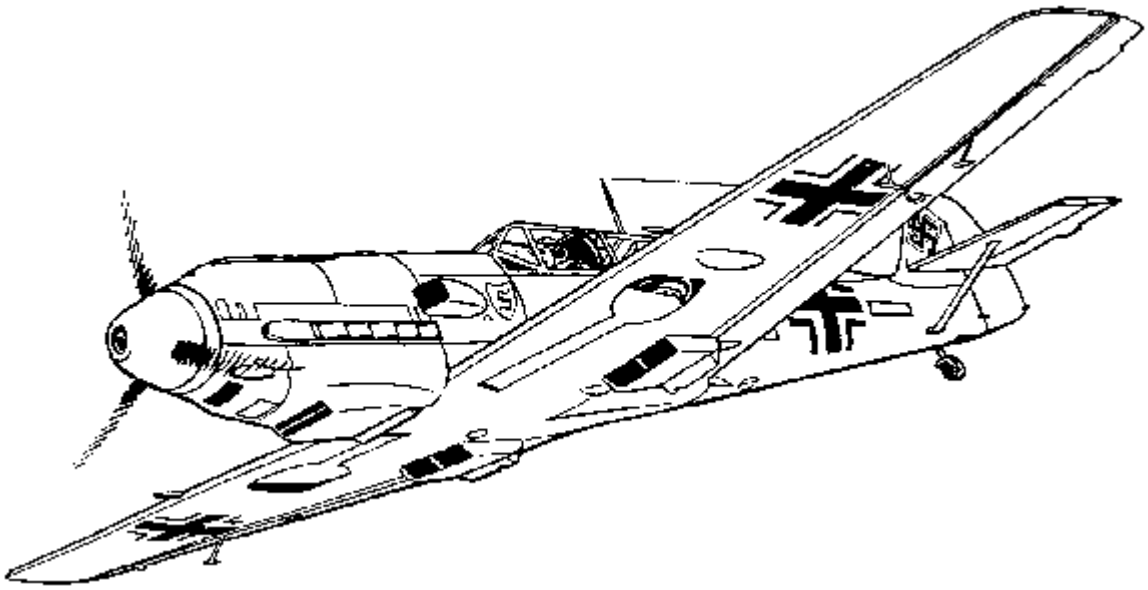
NOTHING FLIES LIKE A MEISTER

www.meister-scale.com

84” WING SPAN MESSERSCHMITT BF-109



THIS IS A VERY EASY PLANE TO BUILD

(JUST ASK DICK BERNIER)

B1 Assembly

1. **Join the FS-2 and FS-2a using a straight edge along the top of these parts.**

2. **When ready to make up the other side, assemble it right on top of the first side thus assuring that both sides are exactly the same. Use wax paper between the sides so they do not glue together.**

3. **Check to make sure both sides are exactly the same.**

4. **Glue the FS-3 to the bottom of FS-2 – FS-2a assembly. Use a straight edge at the bottom of FS-2a when sliding the FS-3 into position. Check wing saddle to be sure it matches. Again, lay the next side onto completed one and install FS-3.**

5. **Install the 1" triangle to B-1. Use a square to block B-1 to insure the tri-piece is flush to B-1. Draw a centerline down B-1. Now lay the tri-piece on B-1. It should be flush, almost back to the outward notches. Now the tri-piece should meet on the centerline at the rear. After both pieces of tri-stock are in place, you can sand or cut off excess tri-stock making sure it is flush with B-1. Make sure you don't cut or sand off the outward notches.**

6. **Now take angle brace F-6A and at each former location, make a mark up the sides of the tri-stock. (The marks should slant towards rear B-1) Now with a knife, make a cut 1/8" wide by 1/8" deep at each of the marked locations. Now you should have a slot that each of the formers should fit in. Also at the correct angle.**

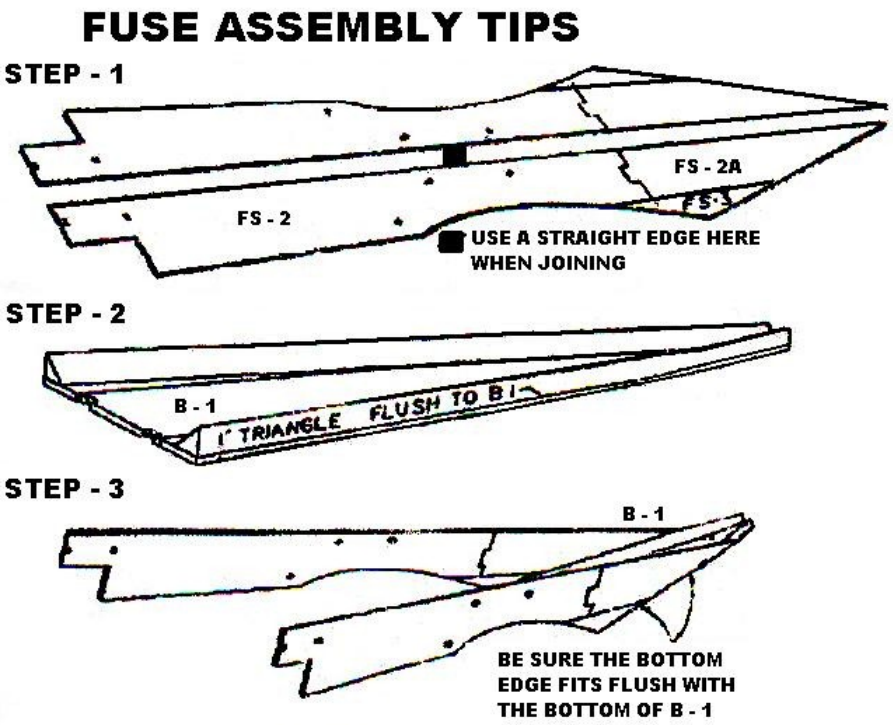
Nose Assembly

Note: It is important that you keep F-2C very straight during assembly. So check F-2C throughout assembly.

1. **Install the F-2 firewall to the F-2C at 90 degrees. You should have your centerlines drawn on the firewall.**
2. **Slide the F-2 is 90 degrees to F-2C. F-23 should also be flush with the back of F-2C. Make sure you sand it flush and at 90 degrees before you install F-3.**
3. **Install F-1's and F-3 next. Everything should be 90 degrees w/F-2C**
4. **Install F-1A's**
5. **Install F-T**

6. Install ¼ x ¼ stringers to bottom of the assembly

Here is a group of drawings showing the assembly of fuse sides to B-1



7. Set the B-1 assembly on a reasonably flat surface. Use a level to assure this. Check the fuse sides by looking at the assembly from the side. The top edges of the FS-2 and FS-2A sides should appear to be parallel with each other. (If not, figure out what went wrong!)

8. Now once you are happy with the fit of the fuse sides, glue each side to B-1. Making sure that the sides fit into the Outward notches on B-1 and they are flush with the bottom of B-1. Look at step #3.

9. Make sure of the fit of all formers in between the fuse sides. If you have to make adjustments to width of a former, sand equal amounts from center of the former until proper fit acquired. Once the correct fit is attained glue the former halves together. Do this to F-6 - F-9

10. Don't apply any glue until you are Sure of the fit of all formers. Now fit all formers into place F-6 – F-10. Using angle brace F-6A on the back of each former to check the angle. Put F-11 in place on top of the formers. Again make sure that all the formers are at the correct angle.

11. Now draw a straight line on your building board. This will be your centerline to make sure your fuse is straight. At one end glue F-10A to the board. Now slide B-1 into F-10A. Slide it until F-10 touches F-10A. F-10 should fit flush against F-10A. Now at the front of B-1 tack or pin the center of B-1 on the centerline drawn on the board.

12. Now place all the formers back onto B-1. Check the angles and straightness again. Make any final adjustments. Glue all at this time.

Joining the Nose Assembly and B-1

1. **B-1 is already in place and tacked on the table. Slide the nose assembly in place. Using clamps or rubber bands hold the nose in place.**

2. **Two bricks are handy to hold the sides against the F-3 and to hold F-3 over the centerline.**

3. **The tabs on F-3 will lock it to the holes and the sides but you might want to block up the F-1's to the proper level.**

4. **When satisfied spot glue the sides to F-1 & F-3 tabs. Install F-4 & F-5**

5. **Eyeball the top of the entire assembly for straightness. Adjust the nose as needed. Add stringers from F-1A to F-6 and to the top of the nose.**
   Note: where stringers make a sharp change in direction, cut through and relieve the stress for proper fit.

6. **The lower stringer should join into and stop at the 1" triangular stock.**

7. **In order to properly locate the FS-1A part to the fuse side, measure along the lower side stringers 24 1/8" from the front of the F-1's.**

8. **Install the FS-1's with front edge on the 24 1/8" marks. Install FS-1.**

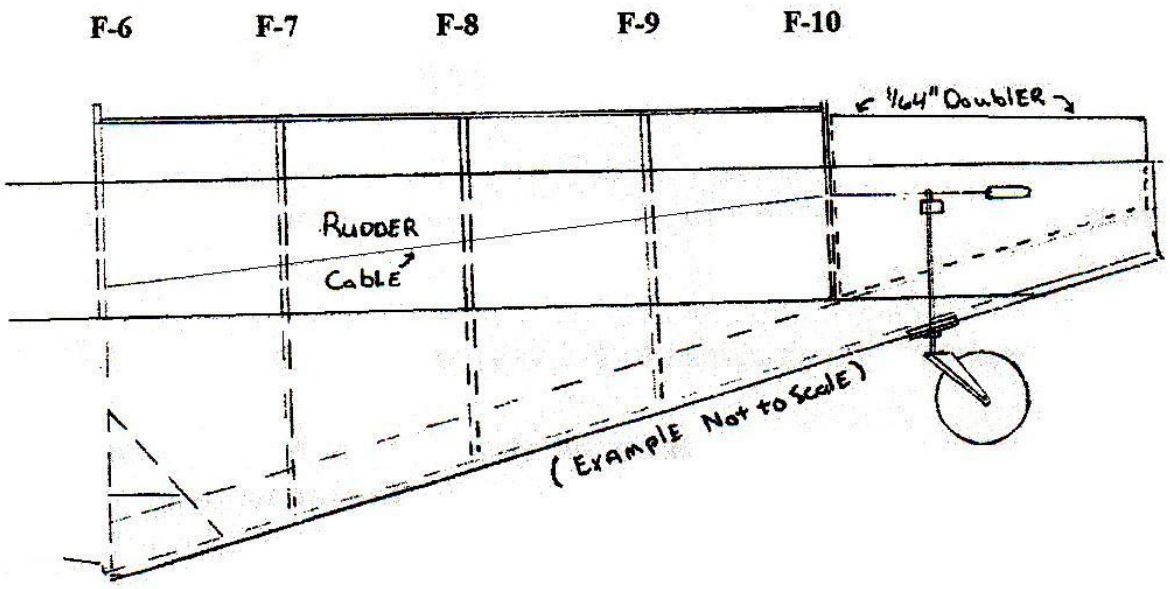
9. **You should consider installing all the control rods at this time. We use the Sullivan 48" white & black ones. (carbon fiber) for the elevators. We used a pull-pull system for the rudder and tail wheel. Don't glue then in, place the outside rods in place until pushed in place later on.**

10. **Now install FS-1B. Once this installed, the fuse is ridged enough to be removed from the building board.**

11. **Before gluing anything to F-1's, check to see if its parallel to the F-2 firewall. If not, your spinner will not fit correctly. Adjust with the braces until the balance of parts are installed.**

12. **Install four ¼ x ¼ stringers between F-1's & F-1A's. The two upper most will butt against F-1's (no notches). Install the four wing saddle doublers now.**

13. **When installing the four wing saddle doublers, be prepared to pull the sides in against the F-4 & F-5. Use tri stock to help hold it when gluing to the F-4 and F-5.**



14. **The stringer at the top of FS-1B should end at F-10. Now before you add F-S4A make a 1/64 or 1/32 ply doubler, which goes from F-10 to the rear of FS-1B. The doubler should stick up above FS-B so it will be flush with the top of FS-1B when it is put in place. There should be a doubler placed on both sides.**

15. **Now you may plank the rest of the fuse at your leisure. Do not plank the section on the fuse on the bottom between F-1 & F-3. You sheet it only after the wing has been built and mated to the fuse. After you have planked the rest of the plane then install the tail wheel assembly.**

Wing Assembly

Note: This wing design has a flat bottom airfoil thus there's no need for jigs, etc. However, you will need a flat surface to build your wing. You can get a 24" to 30" hollow door at your local home depot type store.

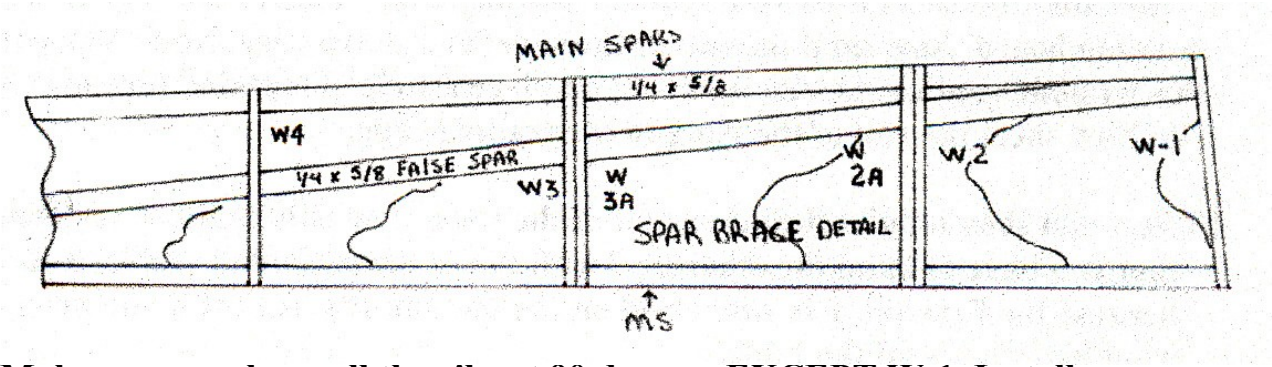
1. **After all the ribs have been cutout do yourself a favor, check that all spar notches for exact depth and width now!! Make up the "spar brace" now. It should be 5/8" wide.**

2. **Make up the 5/8 x ¼ x 36 top and bottom spars to splice with the ¼ x ¼ x 15" joining pieces.**

3. **Make up ribs W-2 and W-3 with their doublers. The doublers set the angle for the landing gear plate.**

4. **Make up a bottom wing sheet. It should go from mid spar toward the trailing edge. It should be wide enough to extend ¼ beyond the tip of the ribs. Set-aside for now.**

5. **Place the plans on the building board. Cover with wax paper. Pin your bottom spar in place. Place your spar brace on top of the spar. Place all the ribs over their correct locations W-1 through W-12. W-1 angle should match up to the line on your "spar brace". This smaller version of the Meister 109 was intended to be built as a one piece wing. So we are gluing the spar brace in place along with the top, bottom and middle spar.**



6. **Make sure you keep all the ribs at 90 degrees EXCEPT W-1. Install the false spar by cutting pieces of the ¼ x 5/8" stock and placing the pieces in the space between the ribs. These pieces are placed on top of the "spar brace". Install the top spar. Make sure all the ribs remain flat on the table. If the trailing edge of a rib appears lifted, make your adjustment now Install the 1/8" shear webbing to front & rear of the spar W-1 & W-12.**

6a. Install the wing tongue hold down plate between W-1 & W-2. The W-1 and the wing tongue are notched to fit each other. The front of the wing tongue plate is to be flush with the front of rib W-2. You will see that the wing tongue plate is at an angle.

7. Install the "bolt plate" at the rear of W-1 & W-3. Make sure the notch in the ribs is deep enough to allow the ribs to touch the building board. Now install the 1/8" balsa leading edge. Its made up from 5/8" x 38 x 1-1/8". Check for a bow in this piece. Correct bow if needed. Now remove the wing from the building board and place the wing sheet you made 1/8" from the front edge of the spar. With the sheet pinned in place run a line of glue along the front of the wing sheet. Now position the wing on top of the sheet. Now glue all the ribs to the sheet. NOTE: YOU MUST MAKE SURE EVERYTHING IS STRAIGHT WHEN YOU DO THIS.

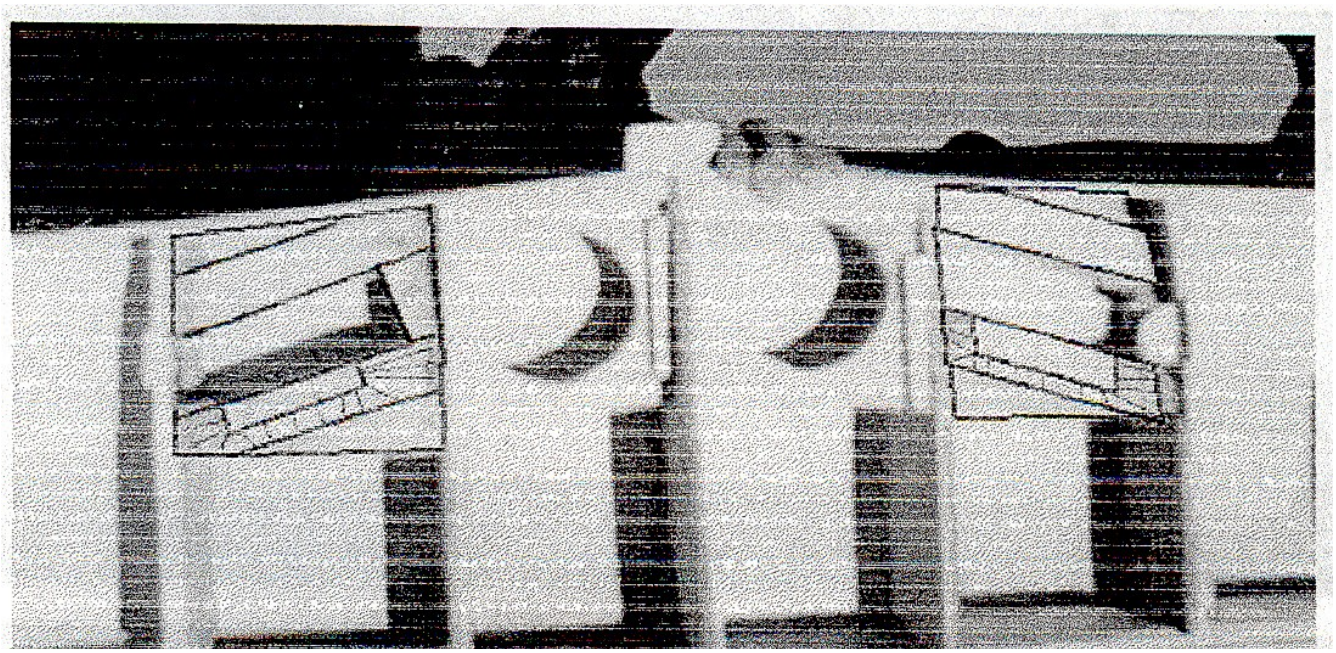
7a. There's a hole in the bolt plate. Drill the hole through the bottom sheet with a 13/64-drill bit. Now take scrap balsa and fill the area over the hole (between the ribs and approx. 1" wide). Sand until flush with the ribs. You will sheet over this later and drill the hole through the bottom.

8. Now apply your first sheet of the top sheeting. I found the best way is to do 4" sheets at a time with the first sheet starting at mid spar and working rearward. Mark your spar where the sheet will start. Now mark each rib on the backside of the sheet. Apply CA to all areas that the sheeting will touch. I lightly spray the sheet with CA kicker. Apply the wing sheet. After the sheet is in place I use 3" x 1-1/16 x 36", cut 3/8 to ½" pieces. Put the tabs full length of the first sheet. This gives you a good gluing surface for the next sheet.

9. After the first sheet is down slide the trailing edge wing to the edge of the building board. Now sand the end of the sheet to a sharp edge. NOTE: You can do this without sanding the ribs away if you place a strip of masking tape over each rib. Now sheet the rest of the wing to the trailing edge.

10. Now you should build the other half of the wing. The only thing you have to remember is that you have to build the other half at the edge of the table. You do this because the first half has 1/8" sheeting on the bottom. Its easier if you prop up the wing half that is off the table.

11. **After you have the second half at the same point, its time to totally install the retracts. With your wing upside down, start by taking your landing gear plate which maybe oversized and sand it to fit in between W-2 & W-3. It should slide down onto the W-2 & W-3 doublers. Once you have the proper fit, epoxy into place. Now cut the LG plate doublers out of ¼" A/C ply. Make them ¾" wide and sand to fit top of LG plate.**



Here is a retouched photo of the gear plates installed and the top of the wing sheeted. They are epoxied in top and bottom. You maybe able to see here that after the gear is fitted on the rear doubler, its sanded angled downward to it will fit under the sheeting. When finished, the back of the gear mechanism will be flush with the bottom of the wing sheeting. Nothing should be done to the front doubler

12. **The prototype ME 109 used CJM gear. After the gear plate has been installed into the wing, fit the retracts into place. The cutout in the LG plate may have to be slightly enlarged for the gear to fit. Make a hole in W-3 to accept the air cylinder. Work a little at a time until the retract mechanism is down flush with the gear plate.**

13. **NOTE: This wing has the spar moved back 1" from the original location so a larger wheel can be fitted. You can angle the retracts so your wheel is far back as possible.**

14. **Sheet the rest of the wing at your leisure.**

15. **Now you have finished sheeting the wing. Mark off on back of the wing the ailerons and flaps (If you are going to use them). Using an ink pen, make your marks. Then mark ½" on each side of the mark. It is easiest if you use a band saw. Cut away the ailerons/flaps on the ½" marks. Take a large block sander and make sure the cut outs are straight. There are several pictures to show you the steps to follow. Read #16 before you continue.**

16. **Now its time to cap the open ends of the wings and ailerons/flaps. Before you add the ½" balsa, consider where the hinges will be installed. Inside the back of the wing and aileron/flaps add ½" scrap balsa in between the ribs at the hinge locations. This will give you a more solid anchor for the hinges.**

17. **Now apply the 1/8" balsa vertical grain to open wing and aileron/flap. When applying the 1/8" balsa ends make sure that you sand enough off the ends so that the aileron/flap will not stick out from the edge of the wing. Then apply the ½" balsa to the back of the wing and front of the aileron/flaps. Now slide the aileron/flap back into place and sand to match the wing.**

18. **Before you hinge the aileron/flap go ahead and add the ½" leading edge and the wing tip. I find the leading edge is done the best if you place a centerline down the entire length of the leading edge. Then razor plane away the excess balsa. Sand back to shape. While sanding try and leave the line you drew. Sand the entire wing and get ready for the fiber-glassing procedure.**

19. **Hinge your aileron/flap.**

20. **I choose to cut out the wing before cutting and removing the access doors for the retracts. If you do this, when the wing is glassed go slowly and reinstall the retract uppers, then put the legs back on and cut the openings for the leg and wheels.**

JOINING THE WING TO THE FUSALAGE

1. **You can join the wing to the fuse before or after the wing is glassed. That's your choice. The fuse should not be glasses. Start with the fuse on its nose.**
   Slide the wing tongue into the wing tongue hole in the fuse. Now you may have to sand a little of the wing saddle to get the wings trailing edge to fit flush with the bottom of the fuse at former F-6

2. **Once you are satisfied with the wings fit in the saddle go ahead and add the wing tongue doubler to the inside of F-3. Drill the holes through the wing at the bolt location with the 13/64" drill bit. Mark the fuse the distance from F-6 that the holes will be. Take a piece of ¼" x 2" x 9" A/C grade plywood, mark a centerline on the 2" wide piece. Take this piece and hold it over the 2 sides of the wing saddle. With the centerline on the marks you made for the hole locations. From inside the fuse, mark the width of this piece. Now cut just outside the lines and sand to fit inside the wing saddle. This is the plate you will bolt the wing to. On top of the plate make two ¼" x 2" x 2" doublers and glue to top of the wing bolt plate you have installed.**

3. **Put the wing back in place. Make sure you line the wing up along the centerline of the plane. Now with a 13/64" drill, drill through the bottom of the wing into the plate you installed. Remove the wing and tap the holes in the wing bolt plate with 14 x 20 tap. Drill the holes out in the bottom of the wing with a ¼" drill bit.**

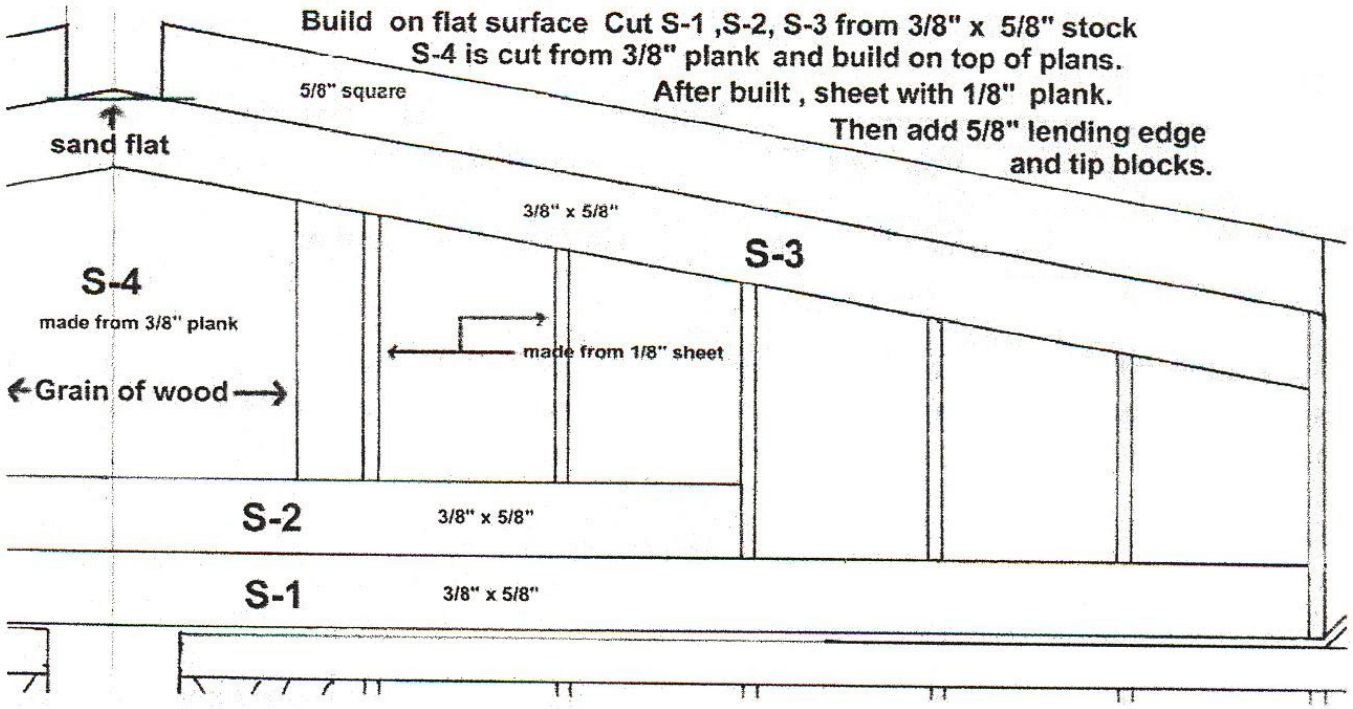
4. **Your wing is now installed. You may consider securing your wing bolt plate by taking a small drill bit and from the outside and drill through the wing saddle into the bolt plate. Then add glue and a large diameter toothpick. Do this at least twice on each side.**

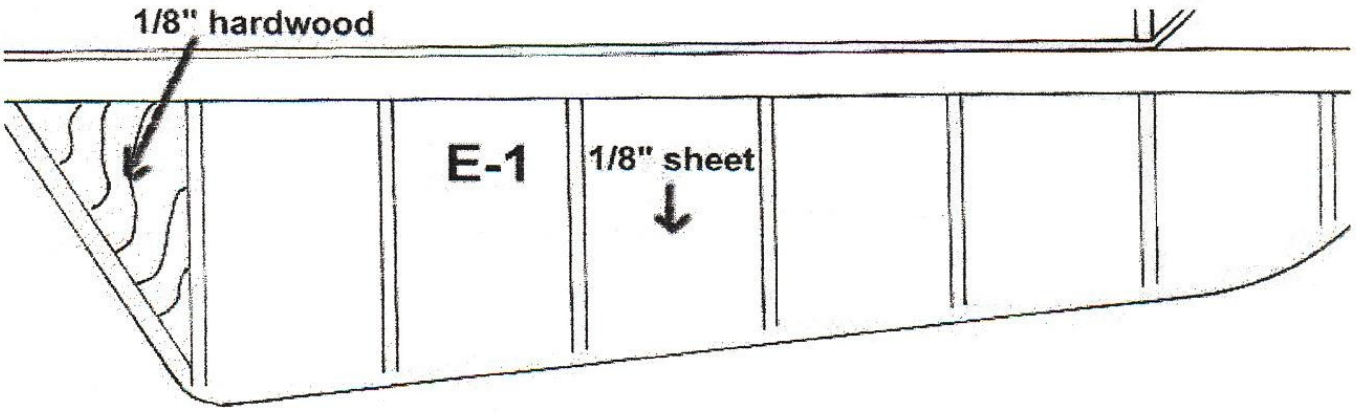
5. **Be sure to place the wing tongue doubler on backside of F-3 when the wing installation is complete. Add the stringers to the bottom of the front of the fuse and sheet the remainder of the fuse.**

6. **Now is a good time to glass your fuse and then put the wing fillet into place.**

Building Tail feathers

1. Build horizontal. See below...





2. You can build the elevator one or two ways. You can place E-1 on the building board and build it with a flat bottom airfoil. You do this by making the leading edge out of ¾' x 3/8". Then place the ribs on top and sand to a sharp edge. Then you have to place the 1/8" ply hard point for the control horn. The other way is to sandwich E-1 by placing the leading edge on each side. Use a 3/8" x 3/8" stick for the leading edge and then ribs on each side. You then need to place the tip blocks using this method

BUILDING THE VERTICAL

1. **Build over the plans on a flat surface. Take F-1 and apply the ½" x ¾" leading and the ¾" SQ front post.**

2. **Now slide the horizontal in place. Making sure that everything is squared up and on the centerline then glue in place.**

3. **It may be easier to sand the leading edges of the vertical and horizontal to shape prior to gluing them together.**

4. **The rudder is built with R-1 sandwiched between R-4 (3/4" x 3/8" leading edges.) The ribs are placed on each side and R-3 on each side. After all built up apply R-5 to the front of the rudder. Sand ribs and R-3 to a sharp edge.**

INSTALLING THE TAIL TO THE FUSE

1. **The fuse should be glassed, tail wheel installed with your pull-pull already finished for steering. All your control lines should be installed for the rudder and elevators. The tail should be glassed.**

2. **You will have to take a Dremel or knife and sand/cut the very rear of the triangular stock on B-1 square to accept the ¾" sq. tail/rudder post. Now trial fit your tail assembly. You will need to mount the wing on the fuse and check alignment. Make any adjustments that you need to so the tail is straight.**

3. **Once you are totally satisfied with the fit, take epoxy and glue in place. If you are good, you may use 5 min, If you like taking your time then use 12-30 min cure time.**

4. **Now with micro-filler type blend the tail assembly onto the fuse.**

MEISTER SCALE 84” BF-109
PARTS LIST

2	**¾” x 4” x 36”**	**Tips for tail, turtle deck, vertical fin F-1, L.E. of vertical.**
1	**¾” x 3/8” x 36”**	**Rudder post.**
2	**3/8” x 5/8 x 36”**	**S-1, S-2, S-3.**
1	**3/8” x 3” x 36”**	**For S-4 which can be made up from many pieces of 5/8” x ¾” x 36”**
1	**5/8” x 5/8” x 36”**	**Leading edge of the horizontal**
2	**1/8” x 12” x 4”**	**(lite ply) Formers F1-F6, F10, F10A, WB Plate ETC…**
1	**¼” x 12” x 24”**	**F2 (Firewall), gear plates, Wing tongue, ETC…**
1	**1/64” or 1/32” x 12” x 12”**	**Rear fuse doubler, wing fillet**
	1/8” x 3” x 30”	**All fuse sides**
25	**1/8” x 4” x 42”**	**Wing sheets, ribs & tail sheets**
2	**1/8”x 4” x 36”**	**Leading edge of wing, Cap for back of wing and aileron**
1	**¾” tria. x 36”**	**Attach to B-1**
3	**1/8” x 3” x 36”**	**Shear webbing for wing**

ENGINE

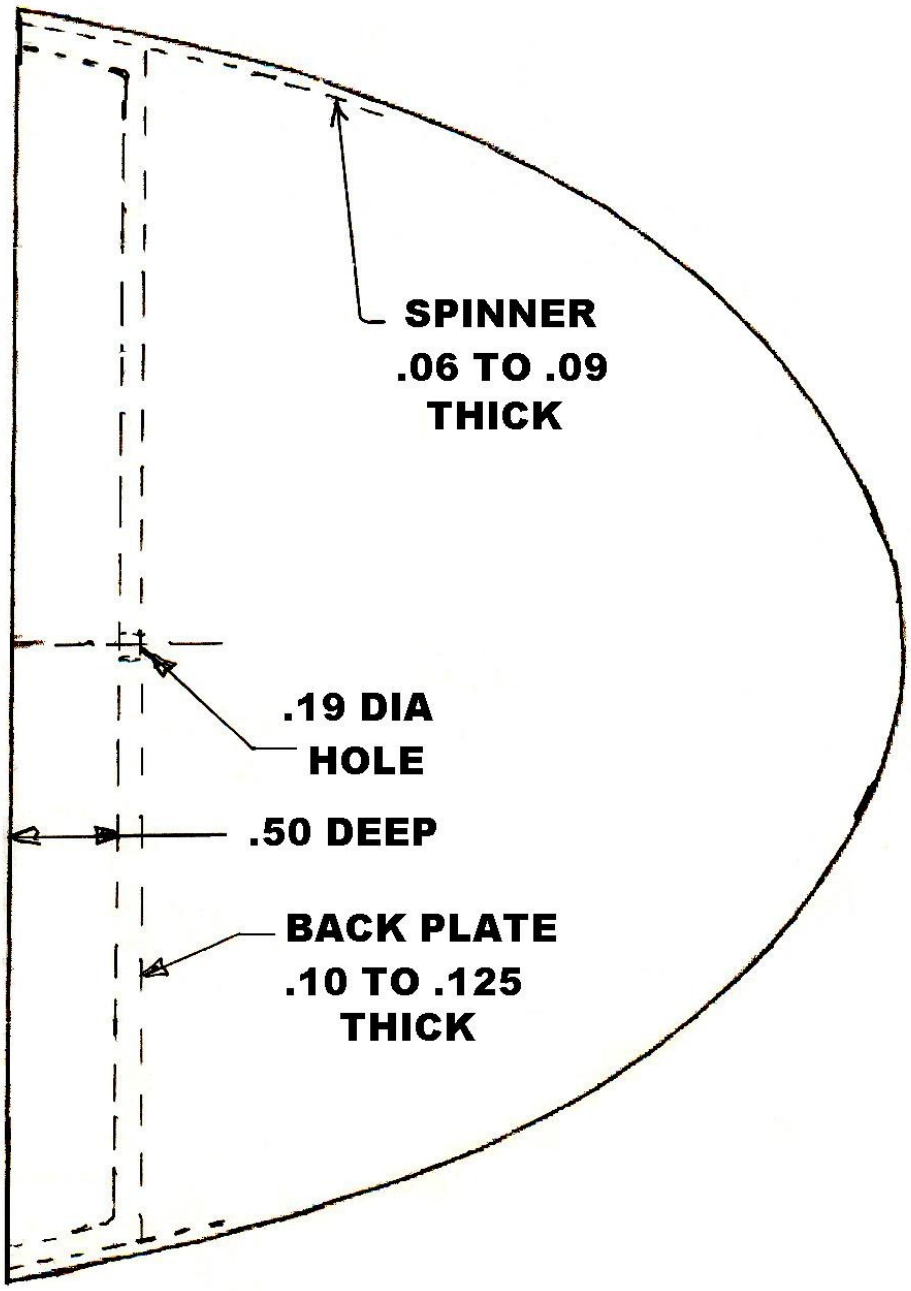
The prototype used the Quadra Q42. A Zenoah G-38 is also a good choice for the following reasons; both have rear exhaust, both have good factory mufflers and both fit inside conveniently. A Zenoah G-45 is recommended for flyers who would like more vertical performance and higher speed.

Note: The plastic extension on the Q42 carb has to be trimmed to clear fuse side.

Note: A simply way to prime the engine is to install a 1/8" dia. tube through the fuse centered on the carb inlet. With 1/4" of the protruding outside, it is a simple matter to prime with a syringe.

Note: Make your test flights without the cowl to insure adequate cooling. After engine is broken-in experiment with the cowl-
cooling situation.

MEISTER SCALE
84” ME-109



Messerschmitt Bf 109

STRUT DOOR INSTRUCTIONS
FOR
ECONO-CUSH STRUTS

1. All camps are made from .010 galvanized sheet metal available at all lumber yards and known as roof flashing.

2. Bend the two upper "B" clamps and the "D" clamp so that they fit snug. This will hold them in position while soldering to the brass tubes "A" and "C".

3. The lower clamp "B" is a loose fit, as it must be able to slide up and down.

4. When all is installed in the wing and properly adjusted, apply a little C.A. to sleeve "A" to secure in place.

5. If you want to put a curvature into the part of the door next to the wheel, cut a piece of 1/32 ply 5/8" wide and 5-1/4" long and clamp to door in position shown. Force door to desired curvature and then apply thin C.A.

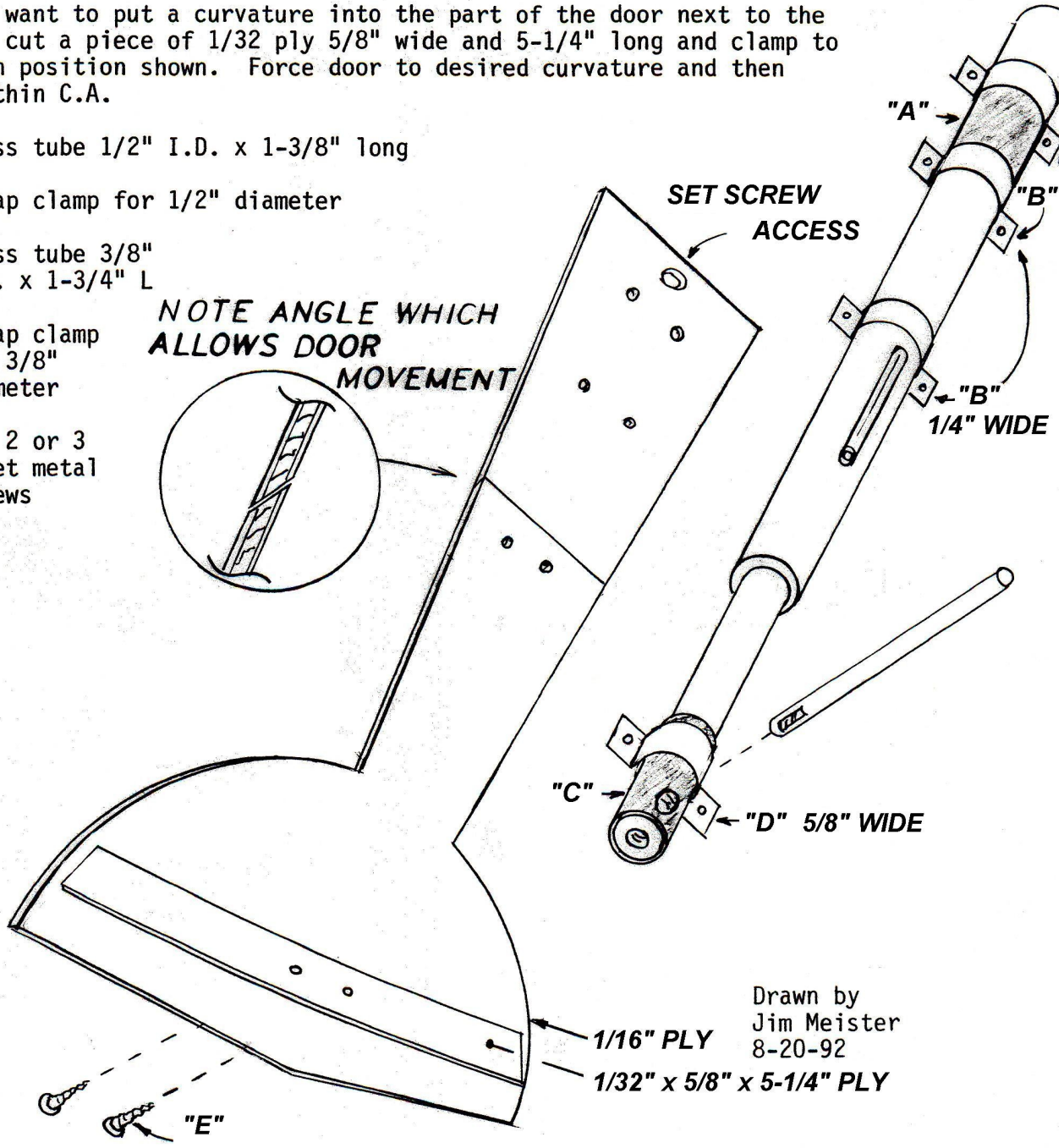
A. Brass tube 1/2" I.D. x 1-3/8" long

B. Strap clamp for 1/2" diameter

C. Brass tube 3/8" I.D. x 1-3/4" L

D. Strap clamp for 3/8" diameter

E. No. 2 or 3 sheet metal screws



Drawn by
Jim Meister
8-20-92