When designing the Ninja, our goal was to insure that it was one of the finest slope soaring kits available on the market (what else would you expect from a Sig kit?). The design parameters we followed are listed below:

1. **Outstanding Flight Performance**

   The model had to be very forgiving and easy to fly with no bad habits for low-time pilots. Also, it had to be aerobatic enough to please even the hottest flyers. Selecting the proper airfoil was without a doubt one of the most critical decisions in designing the Ninja. After trying a number of models with different airfoils, the Eppler 374 was chosen because of it's superior inverted performance, high speed range, and it's excellent lift-to-drag ratio. Also, 1 degree of wingtip washout has been incorporated into the foam wing cores to give the Ninja outstanding low speed stability.

2. **Easy To Build**

   Modelers who value their leisure time want to spend less time in the work shop and more time flying. The rugged die-cut Lite-Ply fuselage sides and formers that feature our popular Tee-Lock construction will greatly reduce the building time. The precision-cut foam wing cores allow the modeler to build a wing in less than half the time it would take to build a conventional built-up wing. Low parts count and minimal sanding/shaping were also deemed necessary to reduce building time.

3. **Appearance**

   We must have made a hundred different drawings before deciding on the final design of the Ninja (can't stand an ugly model). Our goal was to maintain a low frontal area for the best possible performance while keeping the lines simple and clean. The color scheme adds dramatically to the striking appearance of the Ninja, and it looks like it is going 100 miles per hour when it's standing still.

Radio Equipment Requirements

The Ninja requires only elevator and aileron control, so any radio with 2 or more channels may be used as long as it is on an aircraft approved frequency.

NOTE: If the optional rudder is to be used, a radio with at least 3 channels is required.

Notes Before Beginning Construction

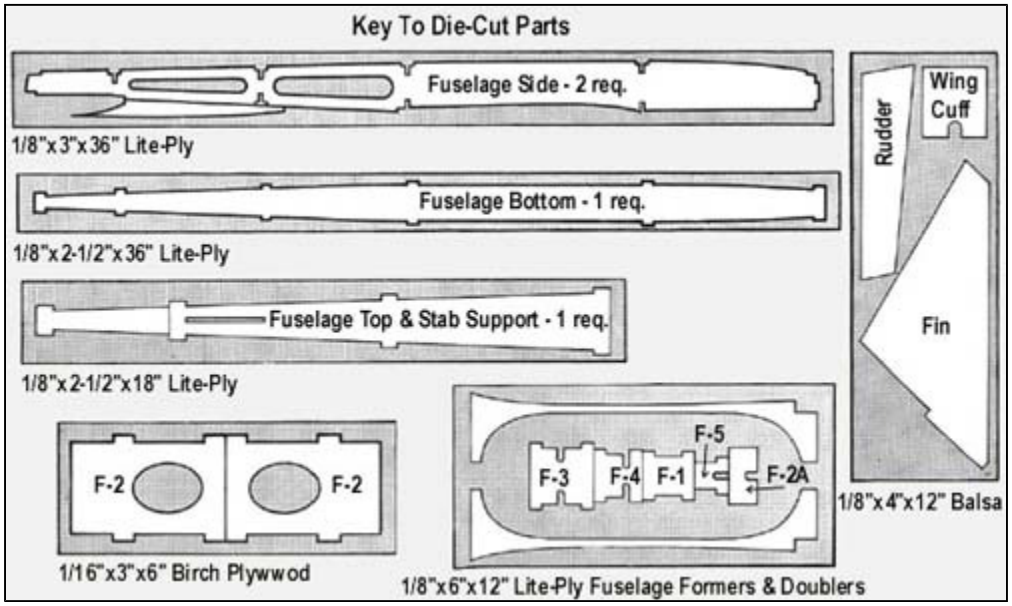
Any references to left or right refer to your left and right as if you could be seated in the cockpit of the model. References to inboard mean towards fuselage, while references to outboard means away from the fuselage.

To build good flying models, you need a good straight building board. Crooked models don't fly well! The building board can be a table, a workbench, a reject "door core" from the lumber yard, or whatever - as long as it is perfectly flat and untwisted. Cover the top surface of the building board with a piece of celotex-type wall board or foam board, into which pins can be easily pushed. Don't hesitate to use plenty of pins during assembly to hold the drying parts in the correct position.

Don't use ball point pens for making marks on the model during construction. If not sanded off, these marks will show through the model's final finish. Use a pencil instead.

Identifying Kit Parts

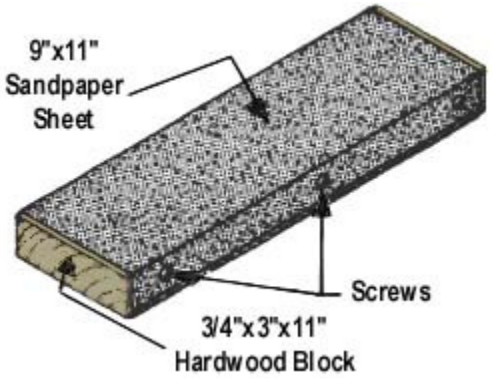
Leave all die-cut parts in the sheets until needed in construction. Then remove the pieces from the sheets carefully. If difficulty is encountered, do not force the part from the sheet. Use a modeling knife to cut it free.
Die-cut plywood parts can be identified by using "THE KEY TO DIE-CUT PARTS". All of the other parts can be identified by the "COMPLETE KIT PARTS LIST" . Sort the different sizes of sticks and sheets into individual piles to avoid confusion during building. Cut all long pieces of balsa first, followed by medium length before cutting up any full length strips into short pieces.
NOTE: Save any scrap balsa and plywood for later use during the construction of this model.



COMPLETE KIT PARTS LIST							
Die-Cut Balsa Sheets							
I	1/8"x4"x12" Fin, Rudder and Wing Cuff						
Sheet Balsa							
10	1/16"x3"x30" Wing Sheeting	1	3/32"x3"x9" Canopy Sheeting				
Stick Balsa							
1	3/8"x3/4"x1-1/2" Nose Fill-In	4	1/4"x1/2"x30" Leading and Trailing Edges	I	1/8" sq.x24" Canopy Reinforcement	1	1/4"x12" Triangle Stock
Balsa Blocks							
2	1"x1"x8" Wing Tips						
Special Shaped Balsa							
1	3/16"x4"x18" Pre-Cut Stabilizer	2	5/16"x1-1/2"x24" Pre-Cut Ailerons	1	3/16" x 1-1/2"x 18" Pre-Cut Elevators	2	5/16" x 1-1/2"x 6" Pre-Cut Grooved Torque Rod Blocks
1	1-3/8"x2-1/2"x3" Nose Block						
Die-Cut Poplar Plywood (Lite-Ply)							
2	1/8"x3"x36" Fuselage Side, Canopy	I	1/8"x2-1/2"x36" Fuselage Bottom	1	1/8"x2-1/2"x18" Fuselage Top, Stab Support	1	1/8"x6"x12" Formers F-I, F-3, F-4, F-5 Doublers

Die-Cut Birch Plywood							
1	1/16"x3"x6" F-2 Fuse Former						
Foam							
I	Foam Wing Core						
Hardwood							
I	3/8"x5/8"x I-5/8" Basswood Wing Hold Down Block	2	1/4"x3/8"x I" Basswood Servo Mounts	I	1/4" dia.x1-1/12" Birch Wing Hold-Down Dowel		
Formed Wire Parts							
I	1/32"dia. Canopy Latch	1	4-40x8" threaded rod L.H. Aileron Torque Rod (with 1/8" o.d.x4" brass bearing)	I	4-40x8" threaded rod R.H. Aileron Torque Rod (with 1/8" o.d.x4" brass bearing)		
Plastic							
I	.030x1/2"x12" ABS Plastic Skid						
Miscellaneous Parts							
I	2"x24" Fiberglass Tape (for wing center joint)	I	1/16"x1/2"x18" Servo Tape (for mounting skid and servo)	I	4"x8" Decal	I	18"x24" Plan
1	Photo Illustrated Instruction Book						
Hardware							
2	#2x1/2"; Sheet Metal Screws (for control horn)	I	10-32 x I" Nylon Wing Bolt	2	4-40 Nylon Aileron Connectors	3	2-56 R/C Links (2/ailerons, 1/elevator)
I	Small R.H. Nylon Control Horn	I	.190"o.d.x24"; Outer Nylon Pushrod Tubing (for elevator)	I	.130"o.d.x 28"; Inner Nylon Pushrod Tubing (for elevator)	4	2-56x10"; Threaded Rods (2/ailerons, 2/elevator)
I	Pkg. of 10 Easy Hinges						

You can't get along without a good sanding block



An assortment of different size sanding blocks are indispensable tools for model construction. A good general purpose block can be made by wrapping a 9"x11" sheet of sandpaper around a piece of hardwood or plywood. Use three screws along one edge to hold the overlapped ends of the sandpaper. Put 80-grit paper on the block during general construction. Switch to 220-grit paper for final finish sanding just before covering.
Another handy block can be made by gluing sandpaper onto a 24" or 36" long piece of aluminum channel stock. Most hardware stores carry a rack of aluminum in various sizes and shapes. This long block is very useful for sanding leading and trailing edges accurately.

Glues

There are so many different glues available today for model construction that it can be confusing even for the experienced modeler. To simplify matters, most glues can be classified as one of four basic types:

1. Fast cyanoacrylate adhesives (abbreviated in these instructions as "C/A") such as SIG CA, Hot Stuff, Jet, etc ...
2. Easy-to-use water-based glues such as SIG-BOND (yellow) and SIG SUPER-WELD (white).
3. Super strong (but heavier) two-part epoxy glues such as SIG KWIK-SET (5-minute cure) and SIG EPOXY (3-hour cure).
4. Traditional solvent-based model cements such as SIG-MENT.

Each of these types has different characteristics and advantages. Often times, the choice of which type to use is strictly a matter of personal preference based on your experience with a previous model. However, because of the vast use of Lite-Ply and hardwoods in the NINJA, we have found that the C/A glues seem to work the best for general construction. In fact, the construction sequence of the fuselage is designed with the use of C/A glue in mind. Other glues could be used, but C/A is recommended as our first choice because of its ability to penetrate an already assembled joint. In other words, the fuse parts can first be assembled dry (without glue), the alignment checked and adjusted, and then the glue can be applied to the joints. You should also have on hand some epoxy (both 5-minute and slow dry) and SIG-BOND because these glues are called out in several of the steps in these instructions.

SIG CA, like most brands of cyanoacrylates, comes in three viscosities thin, medium, and thick. An accelerator spray and debonder are also available and are described below.

SIG CA THIN
Watery in consistency, thin C/A should only be used when the two parts to be joined are in perfect contact with zero gap. Capillary action pulls this glue deep into the wood resulting in a very strong bond and it dries in just a few seconds. Thin C/A can be used to tack assemblies together, but these joints should be glued again later with medium or thick C/A. Thin C/A is also necessary for installing EASY HINGES.

SIG CA MEDIUM
Our medium thickness C/A is excellent for almost any step during construction, and is particularly recommended for gluing the plywood fuselage parts. The extra thickness allows the glue to fill small gaps, but it dries a little slower than thin C/A. If you want only one type of C/A, use medium thickness.

SIG CA SLOW
This thickest formula is good for filling large gaps and building up strong fillets at joints requiring extra strength. It also dries slow enough to allow you to apply it to one part and position it on another before it dries. (With the thin and medium C/A's, the parts must be in contact and positioned correctly before glue application.) This feature is useful when laminating large sheeted areas like a fuselage side and a fuselage doubler.

SIG KWIK-SHOT ACCELERATOR
Spraying accelerator on C/A (any thickness) will cure it almost instantly. Although C/A is fast, it's sometimes nice to speed it up even more.

DEBONDER
This can be used to separate parts, but you'll probably use it for unsticking your fingers more than anything else!

> CAUTION:
> Some people have experienced allergic reactions when exposed to epoxy or cyanoacrylate glues. This is very rare. However, it is always important that such glues, and also paints, thinners and solvents, be used with adequate ventilation to carry fumes away.

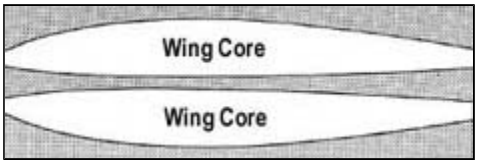
About The Building Sequence

The quickest and most efficient way to complete a model is to work on several pieces at the same time. While the glue is drying on one section, you can start on or proceed with another part. Keep in mind that the number sequence used in these instructions book was chosen as the best way to explain the building of each major component and is not intended to be followed in exact one-two-three fashion. Start on the wing at NO.1 and after doing as many steps as is convenient, flip over to "FUSELAGE CONSTRUCTION" and do a step or two there, then back to "WING CONSTRUCTION" and so forth. You will arrive at points where you can go no farther until another component is available. Plan ahead! Read the book completely and study the plan before beginning construction.

WING CONSTRUCTION

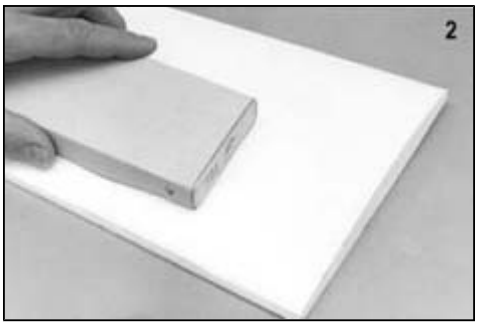
1. The foam wing cores are shipped in the block from which they were cut. Untape the foam block and remove the wing cores.

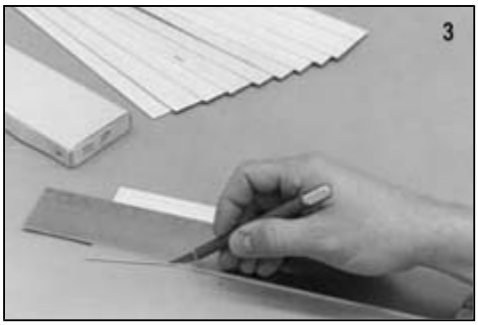
   NOTE: Save the foam shipping cradles as they will be needed later in construction.



2. Lightly sand any irregularities or cutting wire marks from the foam wing cores with 220 grit sandpaper used on a long sanding block.

3. Using a metal straight edge, true up the edges of the ten 1/16"x3"x30" balsa sheets provided for covering the wing. Use a sanding block for final touch-up if necessary.





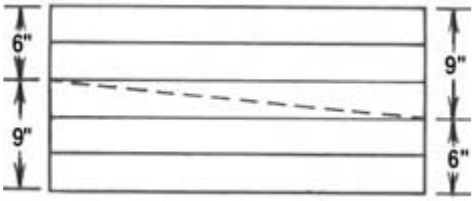
THE SECRET OF A PERFECT FOAM WING

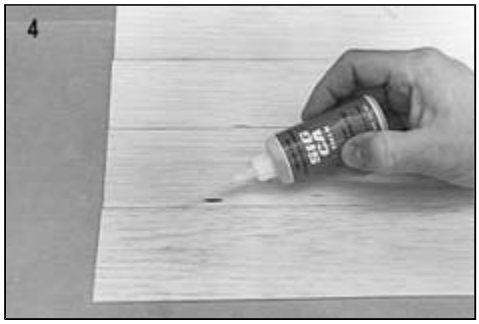
It's a simple matter of a FLAT table. Most tables are not flat, as can be seen by checking them with a good straightedge. If a foam core is covered on a bowed or twisted surface, then the wing will be bowed or twisted. And a table that checks out true but is flexible and will yield as you press on it will also spoil a wing. The ideal working surface is a sheet of plate glass. Or, it is possible to find a thick piece of plywood that is perfectly true.

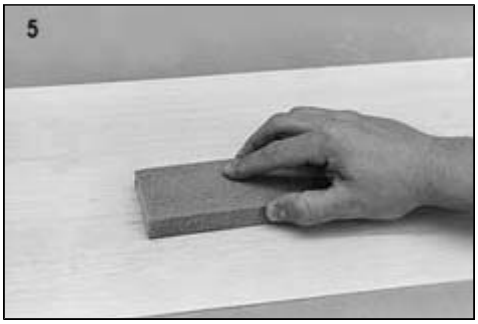
4. Place a sheet of wax paper onto your building board. Glue five of the 1/16"x3"x30" balsa sheets together with Sig thin C/A glue. To prevent a hard-to-sand seam, apply the C/A glue sparingly. Repeat the above procedure to glue the remaining five balsa sheets together in the same manner.

5. Using a large sanding block with 150-grit sandpaper, carefully sand the glue seams smooth on both sides of the 5-sheet layouts. Be careful not to sand too much, just enough to remove any edges that might be sticking up.

6. Cut both 5-sheet layouts diagonally in two, as shown by the dotted line in the diagram to the right. This will yield four wing skins, ready to be glued onto the foam cores.







NOTE: The wing skins will be glued onto the foam cores with the grain running parallel to the trailing edge. Mark each of the four wing skins as to whether they go on top or bottom, right or left of the foam core, and also mark which side of the skin the glue should be applied.

The following instructions refer to the use of Sig Core-Bond

7. Apply a thin, even coat of Sig Core-Bond to both sides of the foam wing cores and to the four wing skins. Since they are coated on both sides, stand the foam cores on end to dry. Allow the cores and the wing skins to dry completely - at least one hour. Core-Bond must be completely dry for good adhesion. Read and follow the full instructions on the back of the Core-Bond can carefully.

8. Place one of the balsa wing skins, glue side up, on a perfectly flat building board. Remember that the wing skins are to be attached to the cores with the grain of the balsa running parallel to the trailing edge. Hold the trailing edge of the foam core just above the wing skin. Make sure it is properly aligned before you let it come in contact with the wing skin, because it cannot be removed and repositioned once contact is made. Then carefully lower the trailing edge ONLY of the foam wing core into contact with the balsa wing skin. Proceed immediately to the next step.

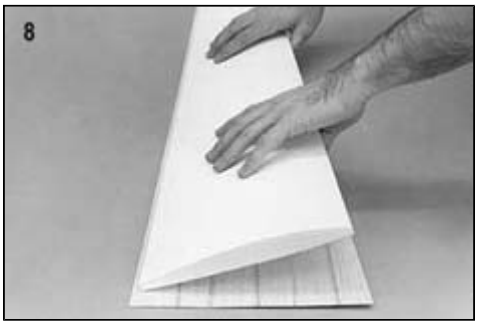
CHOOSE THE RIGHT GLUE
FOR APPLYING YOUR WINGSKINS

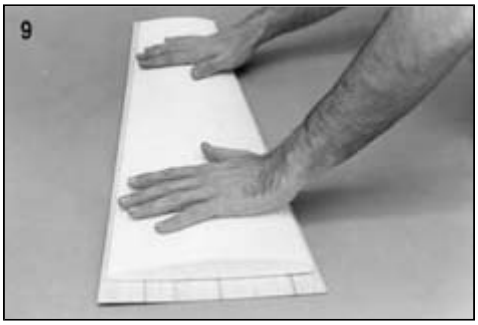
Sig Core-Bond is recommended for applying the wing skins to the foam wing cores.
This is a special adhesive, designed exclusively for skinning foam wings. it is light and strong, and most important easy to use, even for modelers who have never covered a foam wing before. As many modelers have found out the hard way, some so-called "foam wing" glues contain very volatile solvents that make them touchy to use. If the wing skin is put on the foam core while the glue is still even slightly wet, the volatile solvents will be trapped under the wing skin and will attack and dissolve part of the foam wing core, ruining the wing. Because it is waterbased, and doesn't contain harmful solvents, Sig Core-Bond won't cause this type of damage.

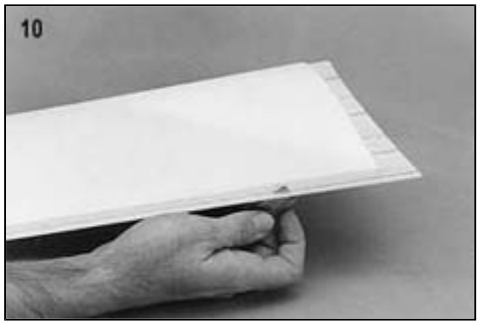
Our second choice recommendation, for those looking for a faster method, is to use 3M Spray Adhesive #77 for gluing the skins to the foam wing cores. Work with only one foam wing panel and one balsa wing skin at a time. Spray the glue onto one side of the foam core and onto one wing skin. Allow the glue to dry for several minutes, until it becomes aggressively tacky but not visibly wet, before putting the skin in place. Use caution, because if the glue is too wet when you apply the skin, the foam core could be damaged by trapped glue solvents.

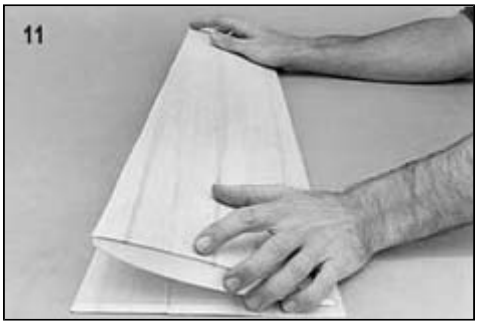
9. Roll the foam core forward onto the wing skin with a rocking motion until the entire skin is attached.

10. Trim off most of the excess balsa wing skin, to within about 1/16" of the foam core, with a sharp single-edge razor blade or a modeling knife. It is not necessary to trim the balsa completely flush with the foam wing core at this time.









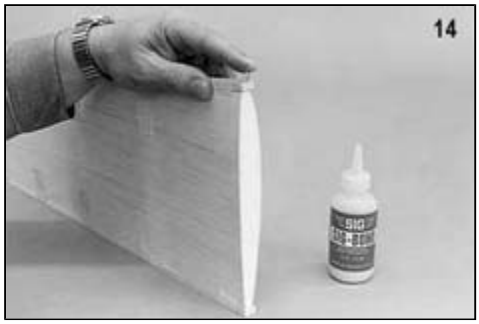
11. Repeat steps 1 through 10 to skin the other three sides of the foam cores.

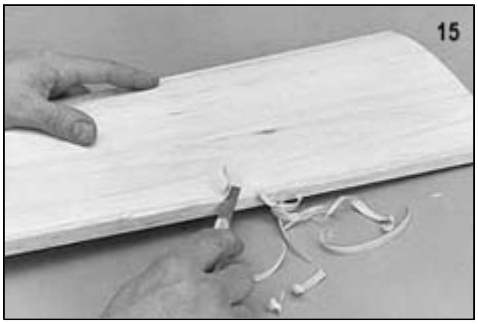
12. After sheeting all four sides of the wing panels, stack the panels back in the foam shipping cradles. Place on a flat surface or building board and weight down. (Notice in this picture that four one gallon jugs filled with water have been placed on a piece of plywood larger than the foam.) Allow to dry overnight before proceeding.
13. Sand the edges of the balsa wing skins flush with the foam core with a long sanding block. Take care to sand just up to the foam, not into it.

14. Glue the 1/4"x1/2"x30" balsa leading and trailing edges in place with Kwik-Set epoxy or Sig-Bond glue. Use masking tape and straight pins to hold the pieces in place until dry.

15. Carve the leading and trailing edges to their approximate shape with a #26 X-Acto blade.

    BUILDER'S TIP: Wrap the tip of the blade with masking tape to prevent gouging of the wing skins.



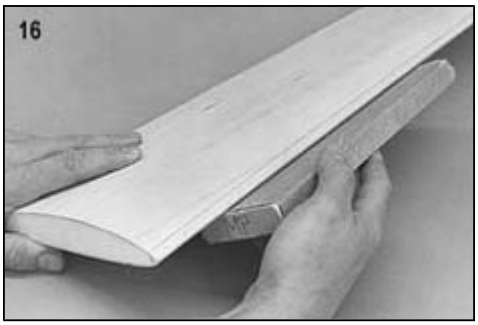


16. Finish shaping the leading and trailing edges to shape. Finish shaping the leading and trailing edges with a long sanding block.

    (NOTE: A pencil line down the center of the leading edge from root to tip will help keep the shape true all along the way.)

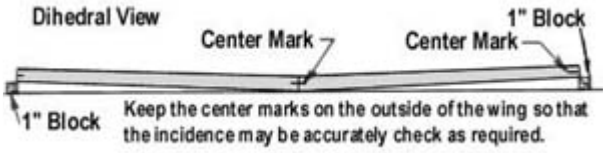
17. Glue in place the 1"x1"x8" balsa wing tip blocks with epoxy or SigBond glue. Use masking tape or a straight pin to hold in place until dry.

18. Roughly carve the wing tip block to profile shape with a #26 X-Acto blade, as shown in the photo. For now, just rough out the block. Leave plenty of extra wood at the trailing edge, for final carving later on after the aileron is attached (NOTE: This final shaping will be done in step 27).

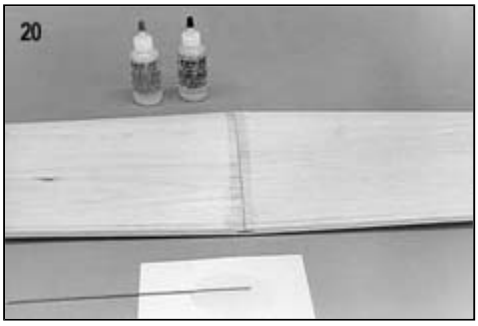


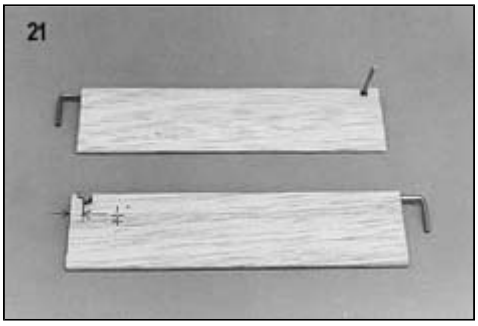
19. The angle already cut into the ends of the foam wing halves sets an approximate correct dihedral angle. To check it, set up the wing halves as shown. If necessary, sand the root ends of the wing panels to make the center joint fit correctly together.

20. Using a soft lead pencil, mark center lines on the leading and trailing edges of each wing panel. When joining the two wing panels together, line up these marks to properly align the two wing panels. Glue the wing panels together with Sig Epoxy Glue or Kwik-Set Glue. Use plenty of glue where the balsa sheeting meets so that the joint between the two halves is completely filled.



21. Locate the two pieces of 5/16"x1-1/2"x6" aileron stock that have been grooved to accept the aileron torque rods. Cut a 1/8" notch in each of them, 1/4" from the end as shown in the photo. Be certain you make a left and a right, and keep in mind that the aileron torque rods must exit the bottom of the grooved aileron stock.

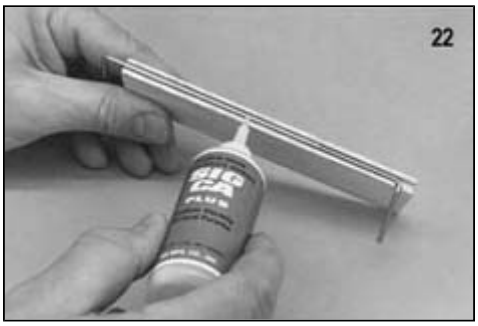




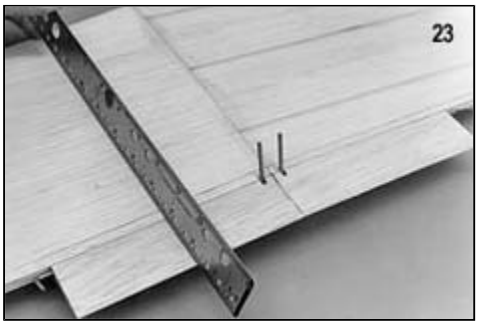
22. Glue the torque rods in place in the grooved aileron stock. Glue the brass bearings only! Be very careful not to get any glue inside the brass bearings or on the wire. Notice that the outer end of the brass bearing should be even with the outer end of the grooved aileron stock.

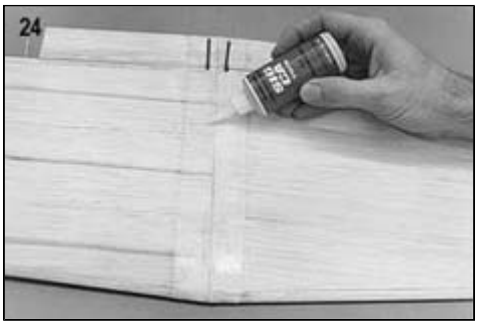
23. Glue the torque rod/grooved aileron stock assemblies in place on the trailing edge of the wing. Use a ruler to line them up with the bottom surface of the wing. Again, be very careful not to get any glue in the bearings or on the wires. Notch out the back side of the wing trailing edge slightly to allow forward movement of the aileron torque rods.

    NOTE: The aileron torque rods have been pre-bent so that the threaded portions leans rearward slightly inside the fuselage (see the wing crosssection on the plans). That small angle will provide a bit of differential movement (more up than down) in the ailerons, which makes for smoother turn and roll characteristics.



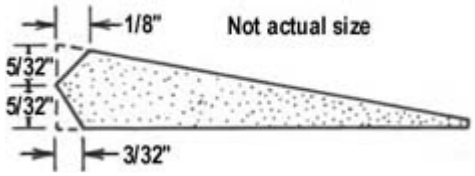
24. Reinforce the wing center joint, top and bottom, with 2" glass cloth tape and epoxy glue. DO NOT OMIT THIS STEP! We have found it easiest to first smear a thin coat of epoxy glue on the wing. Next lay the tape over the glue. Then holding one end of the tape so it won't slip, squeegee the glue through the tape with a small paddle of scrap balsa. Scrape over the tape several times to smooth it out and remove all excess glue.





An alternate method of attaching the glass tape is to lightly spray one side of the tape with a spray adhesive (such as 3M "77"). Place the tape on the wing joint (sticky side down) and smooth out any wrinkles. Soak the glass tape with thin C/A.
The spray adhesive simply holds the tape in place - it won't affect the strength of the C/A. A second coat of C/A will help fill in the weave of the fiberglass, resulting in a smoother surface. Rub the second coat with your finger (protected with a plastic wrap - keep it moving) to smooth out the glue. Use a small fan to keep the fumes away from your face. When dry, sand lightly to remove any rough spots while avoiding sanding into the fiberglass tape.

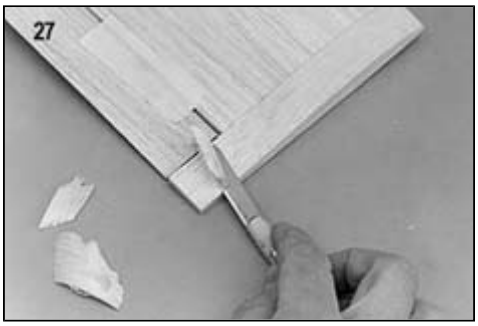
25. Draw shaping and center lines on the leading edge of the 5/16"x1-1/2" shaped aileron stock as shown. Roughly carve to shape with a razor blade and finish shaping with a sanding block.



26. Position the aileron on the back of the wing and mark the location of the aileron torque rod.
Carefully drill into the aileron leading edge with a 3/32" dia. drill to receive the torque rod wire.
Next cut a slot in the front of the aileron allowing the torque rod wire to fit flush.

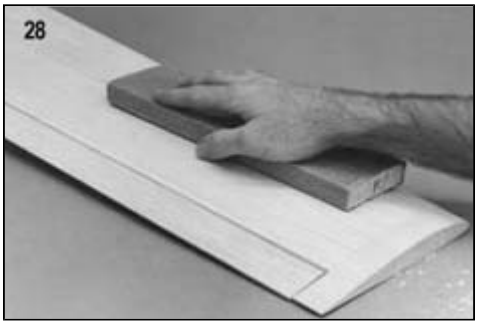
NOTE:
Do not glue ailerons in place at this time. They will be installed during the FINAL ASSEMBLY section.

27. Temporarily install the ailerons with masking tape.
Then finish carving and sanding the wing tip blocks to their final shape with a long sanding block.



NOTE:
The aileron end of the wing tips should be the same thickness as the aileron trailing edge.

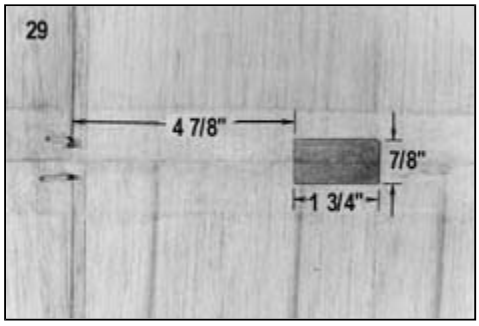
28. Carefully block sand the entire wing for the final time with 150-220 grit sandpaper.



29. Using the dimensions shown in the photo, draw the exact location of the aileron servo cutout on the bottom wing sheeting.
Using a modeling knife, carefully cut out the outlined area of sheeting.
Next, excavate the foam down out of the cavity, all the way down to the balsa top sheeting on the opposite side. When finished, coat the entire inside of the cutout with Kwik-Set epoxy glue.

30. Two 1/4"x3/8"x1" basswood servo rails have been provided for mounting the aileron servo. Cut away the balsa wing sheeting and epoxy glue the rails in place.

NOTE: The dimensions of your particular servo will determine the exact location of the servo rails.



FUSELAGE CONSTRUCTION

NOTE BEFORE BEGINNING:

The Ninja was designed around standard servos (such as the Futaba 848 and Airtronics 94102) that are about 1.5" tall. If you are planning to use older standard servos that are slightly taller than this, it may be necessary to move up the location of the outer pushrod hole in former F-2 to fit your particular servo (see step 33). If smaller than standard servos are used, it will not be necessary to change the pushrod hole location, simply mount the servo a little bit higher.

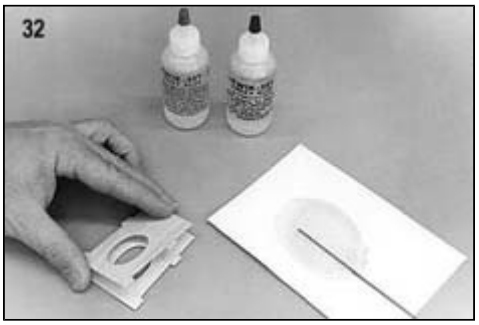
31. Carefully remove the die-cut Lite-Ply fuselage sides, top, bottom, formers, and doublers from their sheets. Remove any rough edges on these parts with a small sanding block with 220 grit sandpaper.

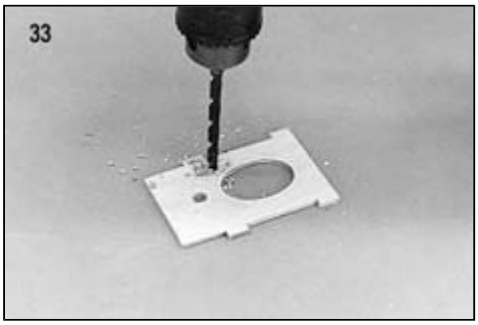
32. Glue together the two die-cut plywood F-2 pieces using Kwik-Set epoxy or slow C/A. Clamp together or weight down until dry.

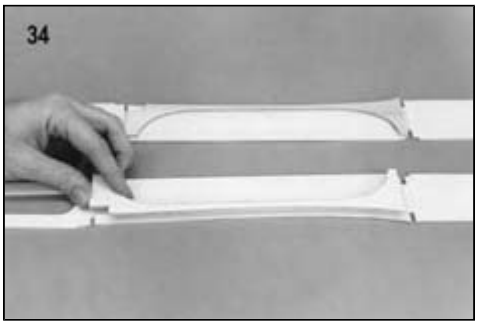
33. There are two small dimples in the F-2 former. The top center dimple is for the wing hold down dowel; drill this one out with a 1/4" drill bit. The second dimple that is located near the side of the former, is for the elevator outer nylon pushrod tubing; drill it out with a 3/16" drill bit.

    NOTE:
    Even though the NINJA is designed for 2 channels (aileron/elevator), and it flies beautifully that way, some people will undoubtedly wish to add a third channel for rudder control. If you want to consider this option, refer to "Optional Rudder" steps 102-107 at this time, before going any further.

34. Glue the die-cut plywood fuselage doublers to the die-cut fuselage sides using slow C/A or Kwik-Set epoxy, and allow to dry. Be sure to make one left side and one right side!

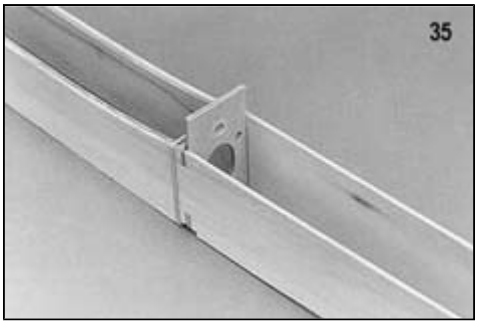


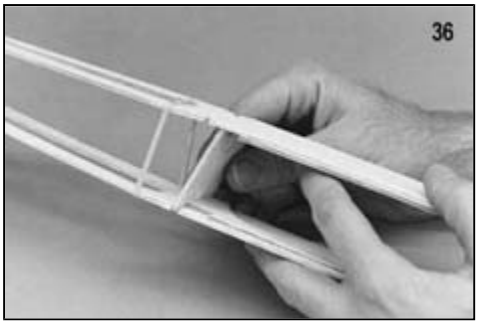


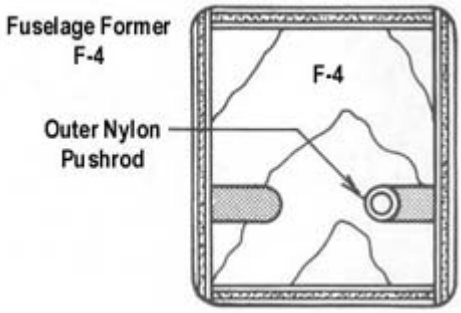


35. Install former F-2 in it's proper location between both fuselage sides and hold it in place with either masking tape or a rubber band.

36. Working from F-2 rearward, slip fuselage formers F-3, F-4, and F-5 into place. Put a rubber band around the fuselage at each former location to hold it tightly together.
    NOTE:
    The die-cut notches in the fuselage formers F-3, F-4, and F-5 are for properly locating and gluing in place the outer nylon push rod tubing. Be sure to position the push rod notches in F-4 towards the bottom, as shown in the drawing.

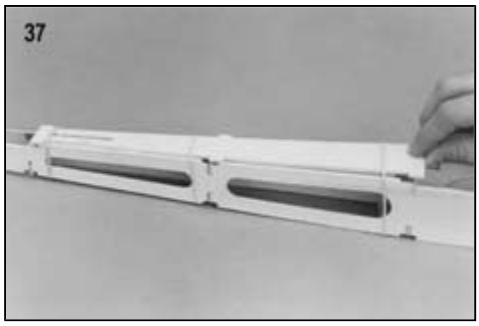


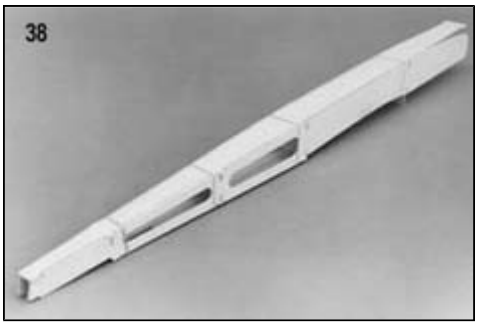




37. Slide the die-cut Lite-Ply fuselage top rearward, under the rubber bands, until it snaps into it's proper location between the fuse sides.

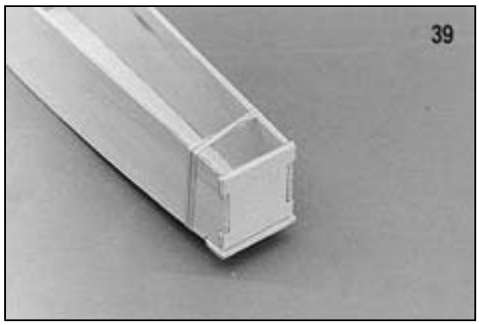
    NOTE: The Tee-Lock tabs on the fuselage top, bottom, and formers are made slightly oversize and will protrude past the fuselage sides at this time. These will be sanded off later after the fuselage has been completely assembled .

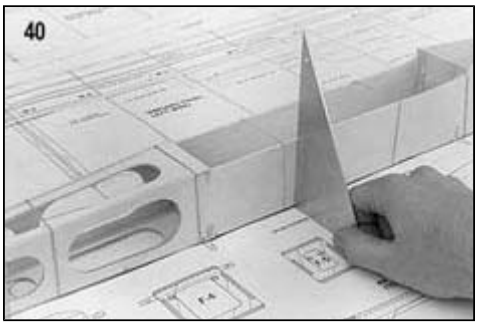




38. Slide the die-cut Lite-Ply fuselage bottom rearward, under the rubber bands, until it snaps into it's proper location between the fuse sides.

39. Install fuselage former F-1 and secure it in place with a rubber band.

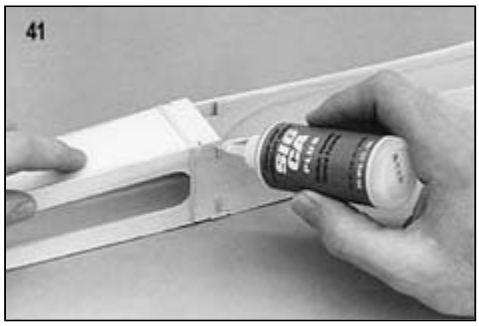


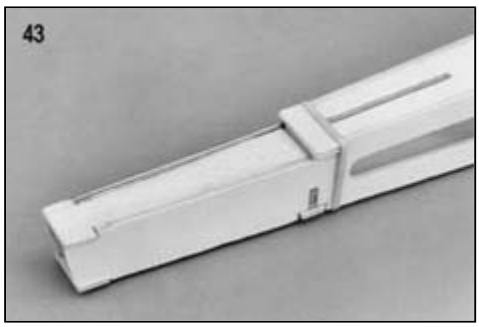


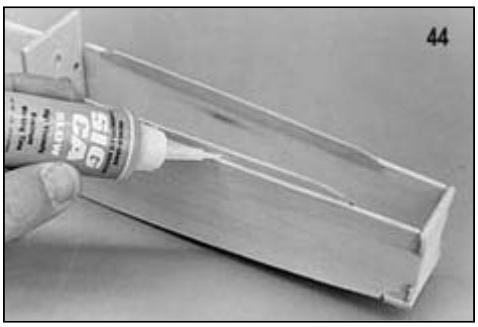
40. Place the fuselage over the top view to check the overall alignment of the fuselage to make sure it is straight and square. Use a 90 deg. triangle to verify that the sides are perpendicular. Correct if necessary by gently twisting the fuselage before proceeding.

41. When satisfied with the fuselage alignment, tack glue all of the TeeLock tabs (except the very last one on the bottom at former F-1) from the outside using medium viscosity C/A glue. This will keep the fuselage square as you proceed with the final gluing.

42. Again, using medium viscosity C/A glue, carefully glue all the parts permanently to each other from the inside of the fuselage. Be sure to glue both sides of each former to the top, bottom, and sides of the fuselage. Do not remove the rubber bands until all the glue joints have completely dried.
    NOTE: When gluing the bottom sheet in place between formers F-1 and F-2, you will have to gently bow the bottom so that it follows the curve of the fuse sides. Bow it into position so that it fits perfectly flush with the fuselage sides and hold securely while gluing with C/A.





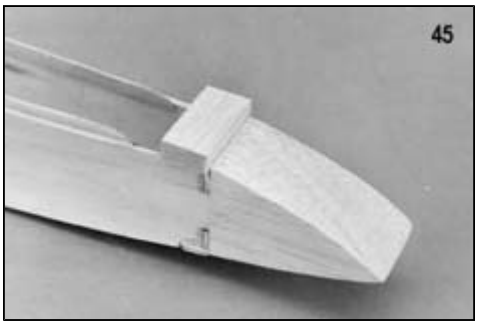


43. Install the die-cut Lite-Ply stab support so that it is flush with the top of the fuselage sides. Glue securely.

44. Make two canopy side rails from scrap 1/16" birch plywood. Use the pattern that is provided on the plan and glue them in place as shown.

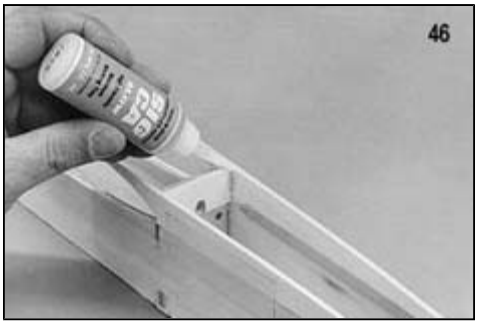
45. Glue in place the preshaped balsa nose block and the 3/8"x3/4"x1-1/2" balsa fill-in.
    NOTE: The top of the nose block has more curvature than the bottom of the block.

46. Tape the die-cut Lite-Ply canopy sides in their proper locations along the top of the fuselage sides. Slide former F-2A down between the canopy sides until flush with the top of F-2 and glue it to the canopy sides. Extreme care must be taken to insure that no glue seeps down onto former F-2 or the fuse sides.

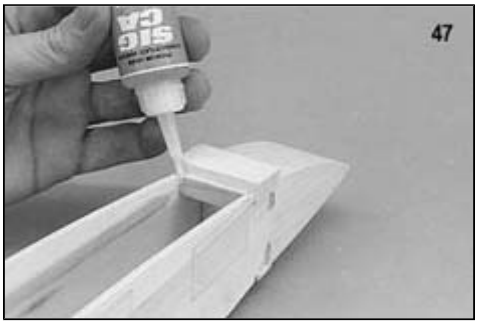


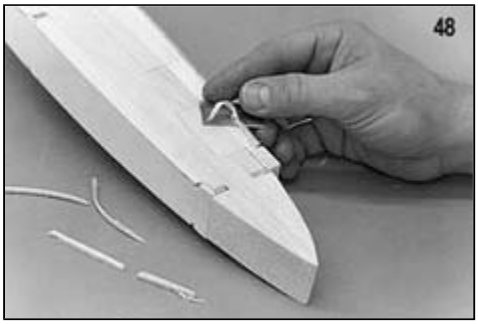
47. Using the pattern on the plan, make the front former for the canopy from scrap Lite-Ply and glue in place. Again, extreme care must be taken to insure that no glue is allowed between the former and the fuse sides.

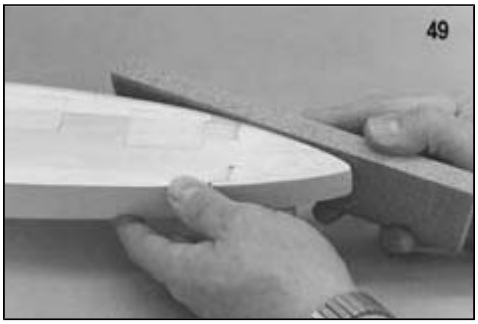
48. Cut and glue in place cross-grain pieces of 3/32" balsa sheeting on top of the canopy sides. Trim off the excess balsa.with a single-edge razor blade



49. Retape the canopy in place on the fuselage and sand the nose block to exact shape with a sanding block.



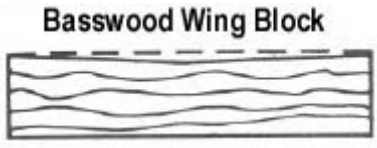




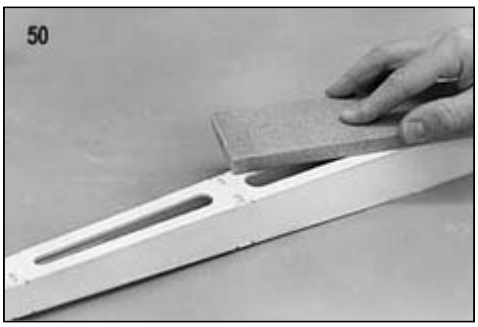
50. The fuselage is now ready for final sanding. Sand off all Tee-Lock stubs and round the edges of the fuselage with a sanding block. Start out with 150 grit sandpaper and switch to 220 grit sandpaper for the final sanding.

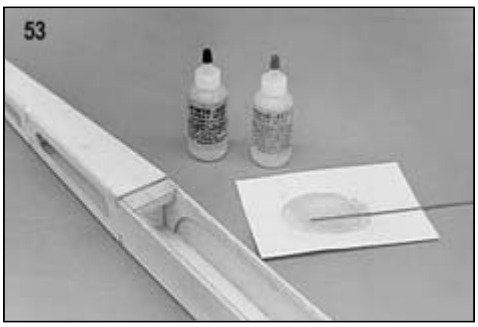
51. Remove the canopy from the fuselage and add 1/8" sq. balsa reinforcement to the inside corners of the canopy.

52. Following this pattern, sand a slight bevel in the top of the wing hold down block. This bevel allows the wing to properly seat itself in the wing saddle.



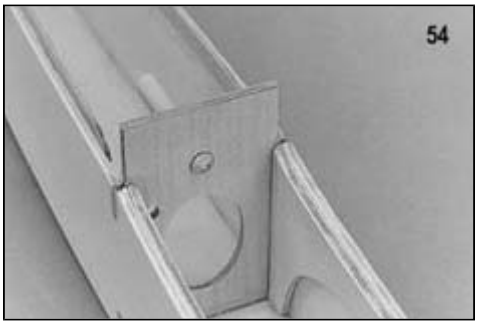
53. Epoxy glue the 3/8"x5/8"x1-5/8" basswood wing hold down block into notches in the fuselage doublers.





Mounting The Wing To The Fuselage

54. Locate the 1/4" dia. x1-1/2" wing hold down dowel and sharpen one end to a point - keep the point symmetrical and centered. Push the dowel into the hole in F-2 so that only the point remains sticking out into the wing opening. Slide the wing into position, making sure it is centered on the fuselage. When you remove the wing, there should be a small indentation in the leading edge.
55. Drill a 1/4" diameter hole through the leading edge at the indentation. Make the hole 1 inch deep.

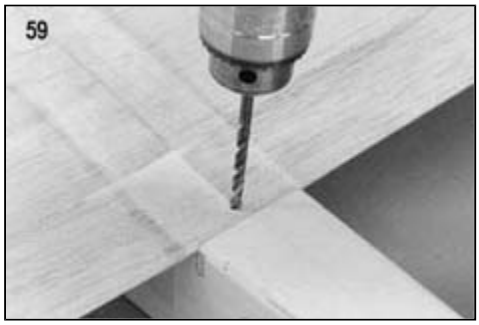


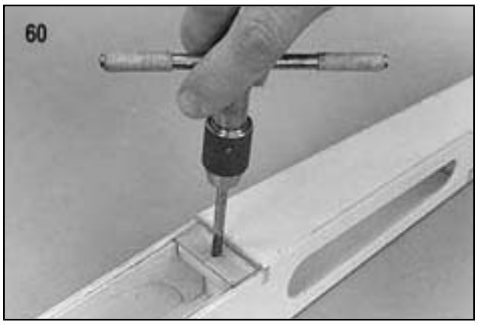
56. Remove the dowel from F-2 and slide it into the hole in the wing leading edge, pointed side first, leaving about 1/2" of the dowel protruding out from the leading edge of the wing.

57. Trial fit the wing onto the fuselage wing saddle making sure it is properly seated. If not, slightly enlarge the dowel hole in the wing leading edge until it does seat properly.

58. Remove the wing from the fuse and glue the wing dowel permanently in place in the wing with Kwik-Set epoxy glue and let dry.
NOTE: Do not use C/A glues for this step, as it will melt the foam wing core!

59. Install the wing on the fuselage and properly align it. Measure to make sure both wing tips are the exactly same distance from the rear end of the fuselage. Tape the wing to the fuse so it can't move. Next, carefully measure 1/4" in front of fuse former F-3, and mark the location for the wing hold down bolt. Drill through the wing and the basswood block at the same time with a 5/32" drill.





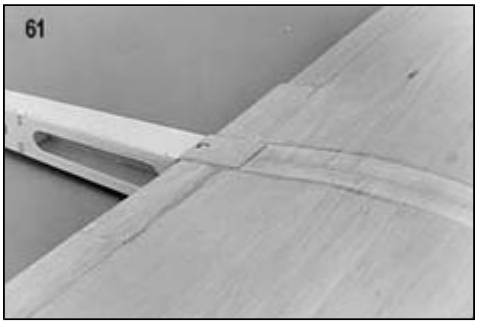
60. Tap the basswood block with a 10-32 tap. Take the wing off and redrill the hole in the wing with a 3/16" drill to allow the nylon bolt to pass though.

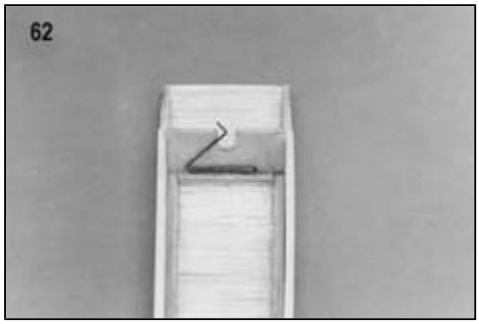
> BUILDER` TIP: Stengthen the threads and the wing bolt holes with a few drops of thin C/A glue. When dry, clean the excess glue from the threads with a 10-32 tap.

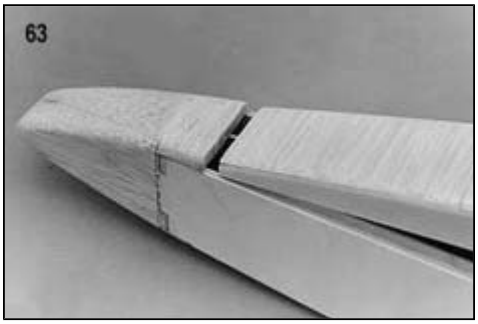
61. Sand a bevel in the top of the die-cut 1/8" balsa wing cuff with a sanding block. Carefully glue the cuff in place onto the wing making sure that no glue is allowed onto the nylon wing bolt.

62. Position the pre-bent 1/32" music wire canopy latch onto the front of fuselage former F-2A. Make sure the latch is slightly over center of the wing dowel slot in the former and glue the wire latch in place. Glue only the bottom leg of the wire latch to the fuse former.

63. Make a front hold down pin for the canopy out of a scrap piece of wire or a round tooth pick. Drill a hole in the front former of the canopy and glue in place. Also drill a hole in the balsa fill-in to accept the pin.

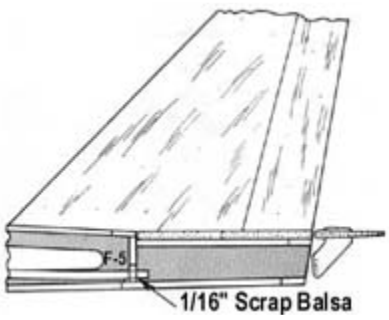


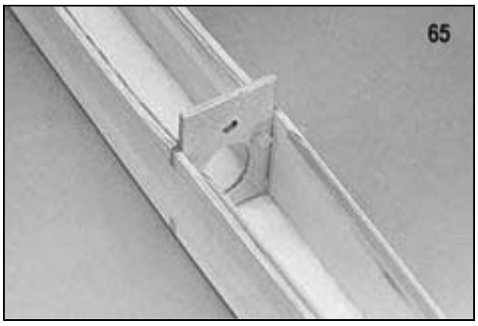




Elevator Servo And Pushrod Installation

64. Cut a small piece of 1/16" scrap balsa, 3/16" wide x1/2" long. Glue it onto the fuselage bottom sheeting, in the push rod slot at the bottom of former F-5. (See drawing.) This shim is to elevate the entire pushrod slightly to keep the R/C link from rubbing on the bottom sheeting.

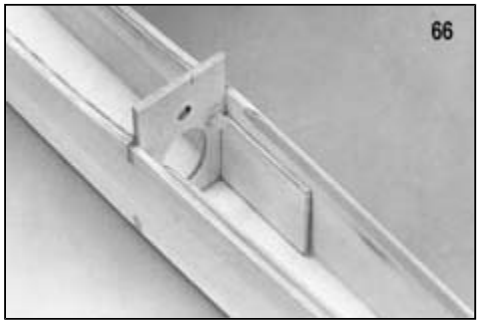




65. Install the 3/16" o.d. nylon outer pushrod tubing by passing it through the pre-drilled hole in former F-2 and through the die-cut notches in F-3, F-4, and F-5. Make sure the tube extends past former F-5 for 1/4". Also, make sure that the other end extends forward of former F-2 for 3/16". When you have the length properly determined, cut off the excess. Then epoxy glue the tubing permanently to each of the fuse formers and to the fuselage side between formers F-2 and F-3.

66. For adequate servo arm clearance, the servo must be moved slightly inboard. Using the pattern on the plan, make a spacer for the servo from 3/32" balsa, and glue it to the inside of the fuselage where the servo will be mounted.

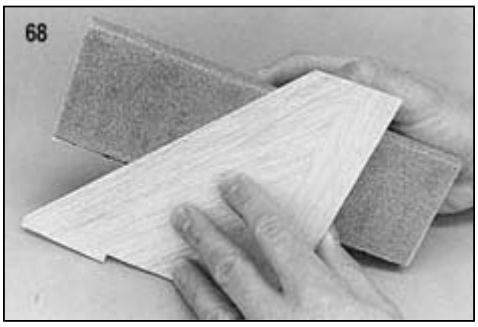
67. Apply the servo tape to the back of the servo and remove the paper backing. Press the servo onto the 3/32" balsa spacer.



BUILDER'S TIP: Apply a thin coat of slow C/A to the balsa spacer and allow the glue to dry before taping the servo in place. This will greatly increase the bond of the servo tape. The remainder of the elevator pushrod installation details will be done later during "Final Assembly", after the tail surfaces are mounted to the fuselage.

FLYER'S TIP: If you are new to the sport of slope soaring or your favorite site has a rough landing area, we recommend reinforcing the fuselage with 3/4 oz. glass cloth and epoxy. Apply the glass cloth and epoxy to the outside of the fuselage from former F-4 forward to the nose.

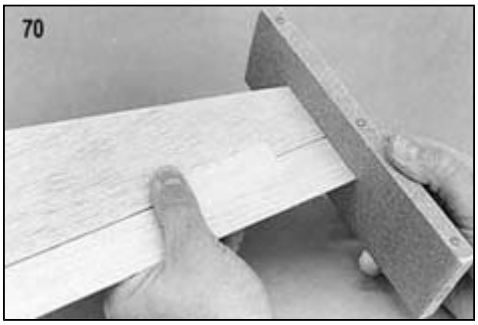
Fin And Rudder



68. Glue the die-cut balsa fin and rudder together using medium viscosity C/A glue. When dry, sand the seam smooth.

69. Round the leading edge, trailing edge, and the tip with a sanding block and 150 grit sandpaper. Do not sand the alignment tab on the bottom of the fin.

Stabilizer And Elevator



70. Sand the pre-cut 3/16" balsa stabilizer leading edges round except for the short length in the center, which should be left flat to fit against the back of F-5.

71. Locate the pre-cut 3/16" balsa elevator and sand the leading edge round with a sanding block.

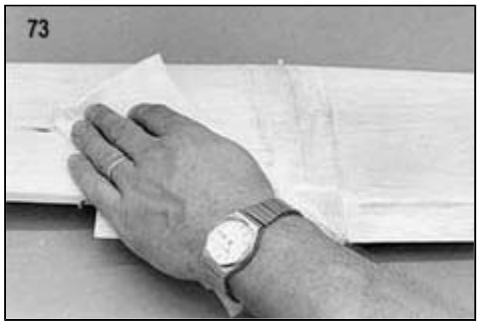
72. Temporarily tape the elevator to the back of the stabilizer, then use a sanding block to sand both of them at the tips until they match perfectly. The tips can be left square or sanded round if you prefer.

COVERING AND FINISHING

Preparing For Covering

Regardless of what type of covering material you elect to use, a good covering job starts with good surface preparation. You can't hide poor workmanship with covering material! Fill any small surface gaps with a light-weight filler or spackling paste. Sand the entire model including the ailerons and tail surfaces, with 220 grit sandpaper, then again with 360 or 400 grit sandpaper.

73. The structure that is to be covered must be clean, dry, and dust free. Wipe the entire surface with a tack rag or a cloth dampened with alcohol to remove all excess dust.



BUILDER'S TIP:
Before starting the actual application of the covering material, use your wife's or mom's (ask first) favorite vacuum cleaner with the soft brush attachment and vacuum the entire model and the work bench. This greatly helps eliminate the dust particles tnat get under the covering.

Select A Covering

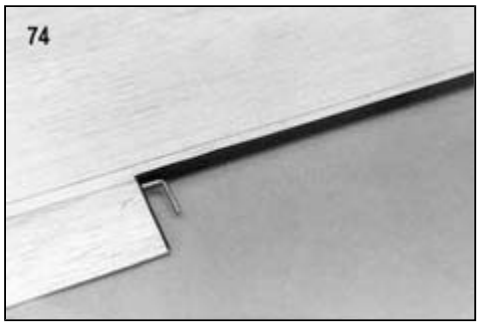
All of the Ninja prototypes were covered with Sig Supercoat Iron-on Plastic Covering. Supercoat is ideal for slope soarers because of its light weight and ease of application.

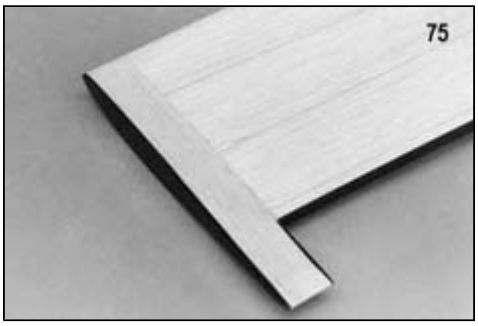
The color scheme that is pictured on the label is quite easy to duplicate and only requires two rolls of Sig Supercoat Covering. The colors needed are two rolls of Black. In addition you will need one roll of Sig Supertrim Cub Yellow, one roll Dark Orange, and one roll Waco Red. The canopy was covered in Silver, however any contrasting color can be used and still have the same effect.

You will notice in the following photos of the covering process, that we prefer to use a "sock" on our sealing iron. This is not necessary, but is a personal preference. A sock helps eliminate the unsightly small scratches that can be caused from the dragging the iron across the surface of the covering material. We also highly recommend that you use a temperature gauge to set the temperature of your iron to the exact setting the covering manufacturer recommends.

Covering The Wing

74. Start by covering the back of the trailing edges, including the insides of the wing tip and torque rod assembly, with 1/2" strips of covering material cut from the roll.





75. Cover the ends of the wing tips making sure to run the covering material "around the corner" about 1/8".

76. Cover the bottom of the wing first and then the top of the wing. This leaves the front seam overlapped on the bottom where it is less visible. Cut the covering to size, allowing approximately 1" excess around the edges. Lay it down and smooth out as many wrinkles as possible.

Using your hot sealing iron, carefully iron the covering material from the center of the wing panel out towards the wing tip, and then out towards the wing root. This is to help avoid trapping air bubbles under the covering. Work slowly and allow the iron to shrink the covering as you go along. Trim the covering off flush with leading edge and reseal it with the iron.

77. Trim off the excess covering material leaving a 1/8" overlap at the trailing edge. Seal the overlap down with an iron.

78. Cover the top of the wing in the same manner as described in the above steps 74 through 76. Leave a 3/16" overlap of covering material on the leading edge of the wing and seal it down with an iron.

    Repeat the process from steps 74 through 78 to finish covering the other wing panel.

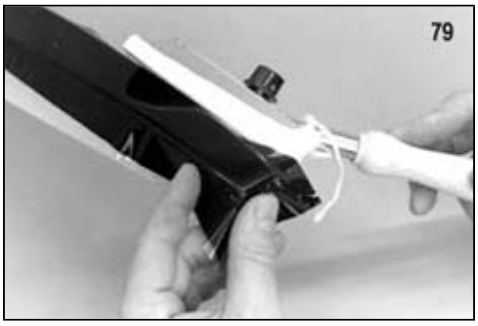
Covering The Fuselage

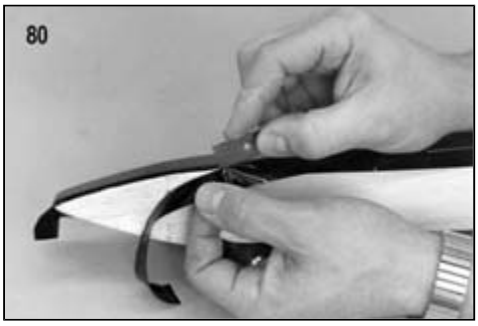
79. Cover the bottom of the fuselage first. When cutting the material for the bottom allow enough extra material around the nose, or any other area with compound curves, so you can get a good grip on it with your hand. Start by sealing the covering to the model at the tail. Work slowly forward with the sealing iron, sealing the covering smoothly to the bottom of the fuse. When you get to the nose area, work the iron over the covering with one hand while you pull on it with the other. As the covering becomes pliable from the heat, you can pull it gently around the curve. Work slowly, allowing the heat to do the work. Do not pull too hard or the covering might tear.

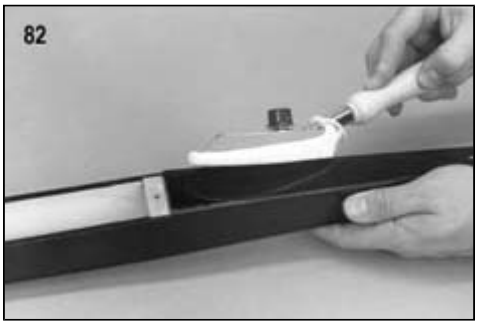
80. Trim off the excess covering material with a sharp single-edge razor blade and reseal the edges with the iron.

81. Repeat this procedure for covering both sides of the fuselage. Allow about 1/8" to 1/4" overlap onto the top and bottom of the fuse.

82. Cover the fuselage top in the same manner as the bottom and sides. Remember to reseal the edges after trimming.

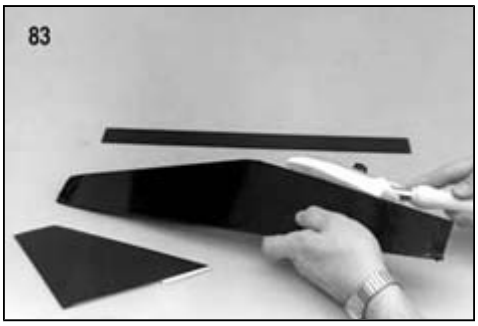


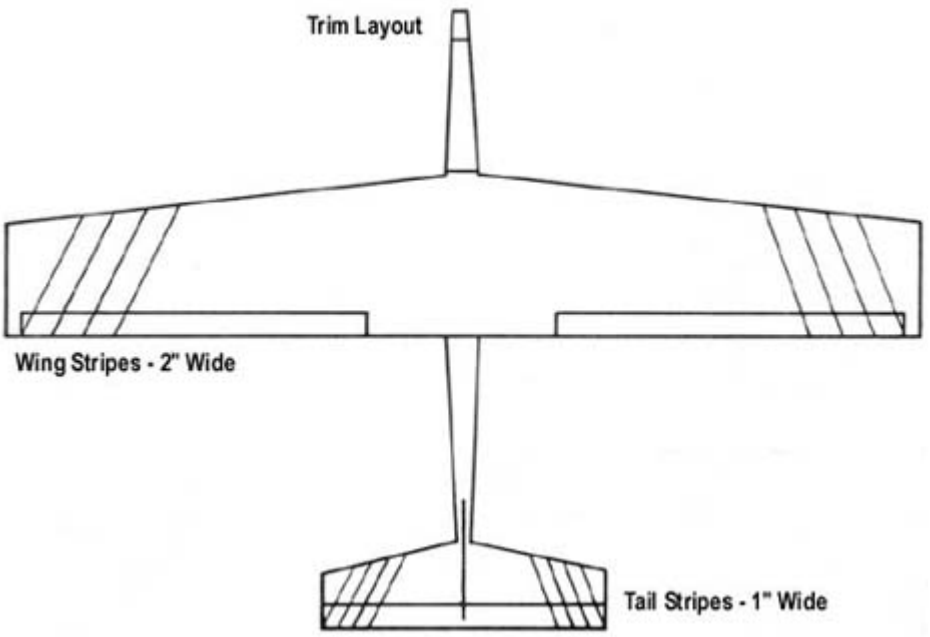




Covering The Tail Surfaces And Ailerons

83. The stabilizer, elevator, ailerons, and fin should each be covered with two pieces of material - cover each side separately. Iron the material from the center out to avoid trapping air bubbles. Once the ailerons have been covered, cut away the material to expose the slot and hole for the torque rods.





Installing Easy Hinges

Sig's famous EASY HINGES have been included in your kit to hinge all the control surfaces. Each ultra-thin hinge is actually a three-part laminate, a tough plastic inner core sandwiched by an absorbant wicking material on each side. They are specially designed to be installed with thin C/A glue. The hinges have been chemically treated to slow down the set time of the glue to allow it to soak all the way to the ends of the hinge and into the wood surrounding it, for a super strong bond. Once the glue has dried, the hinge cannot be pulled from the structure without tearing wood out with it! We recommend that all surfaces be completely covered before installing the EASY HINGES.

84. Use a #11 X-Acto blade (or similar) to cut slots in the stabilizer trailing edge and elevator leading edge to accept the EASY HINGES. Make the slots approximately 1/2" in depth and slightly wider than the hinges. Refer to the full-size plan for the exact hinge locations.

85. After all of the slots have been cut, insert EASY HINGES halfway into the stabilizer slots. DO NOT GLUE THE HINGES YET! Next, carefully slide the elevator onto the hinges. You'll find it easiest to slide the elevators onto the hinges at an angle, one at a time, instead of trying to push it straight onto all the hinges at once. Don't be concerned if the hinges aren't perfectly straight or centered in the slots - they don't have a center line.

86. To set the hinge gap, deflect the elevator to the maximum amount needed. For best control response, the gap should be as small as possible but big enough to allow full movement of the control surface.

87. Place three or four drops of thin C/A directly onto the hinges in the gap. The glue will wick into the slot as it penetrates both the wood and the hinge. Continue this process, gluing the same side of all the EASY HINGES. Then turn the stabilizer over and repeat the gluing process on the other side of each hinge.

88. After the glue has cured (3 to 5 minutes) the joint should be flexed to full deflection in each direction a couple of dozen times to reduce the stiffness. Don't worry about shortening the life of the hinges, as they are almost indestructible.

89. The ailerons are hinged exactly like the tail surfaces, except that the torque rods must be glued in at the same time the hinges are put in the slots. Start by cutting the slots in the wing and the ailerons (three per aileron) and slide the EASY HINGES halfway into the ailerons only. DO NOT GLUE THE HINGES YET!

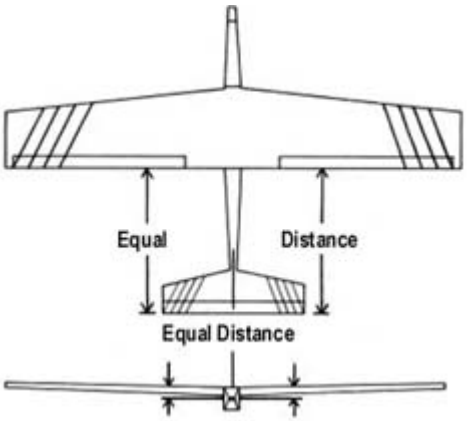
90. Next slide a small piece of wax paper between the torque rods and the wing. Working with only one wing at a time, apply Kwik-Set epoxy glue to the slot and hole in the aileron leading edge, and then slide the aileron onto the torque rod, working the EASY HINGES into the wing slots at the same time. Try not to get any epoxy on the brass tubing! Before the glue sets, be sure to deflect the aileron back and forth to set the proper hinge gap.

    Once the epoxy has dried, remove the wax paper and apply thin C/A to the EASY HINGES, in the same manner as you did earlier for the elevator.

FINAL ASSEMBLY

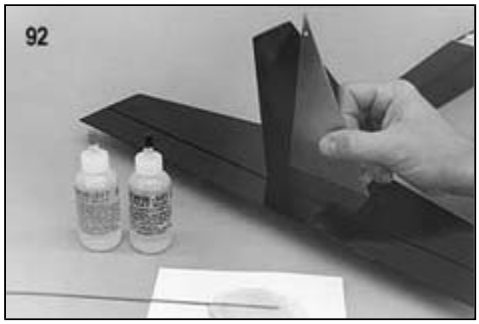
Bolt the wing in place and then position the stabilizer on the stab support at the back of the fuselage. Carefully align the stab with the wing. Refer to the alignment drawing and carefully align the stab with the wing. When satisfied with the alignment, draw cut lines on the bottom of the stabilizer at the fuselage sides. Cut away the covering on the bottom of the stab where it will be glued to the fuselage (there must be wood to wood contact in the glue joints). Use a sharp modeling knife or a single-edged razor blade and don't cut too deep into the wood.

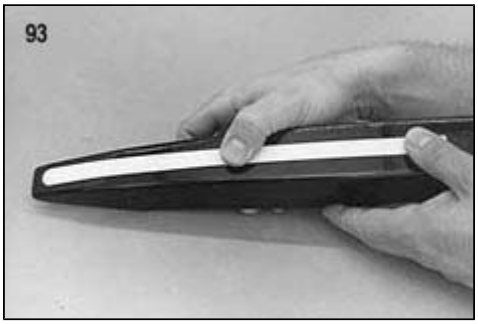
91. Glue the stab in place onto the fuselage. Use slow drying epoxy (SIGEG001) to allow you ample time to carefully realign the stabilizer with the fuse and wing. Check and double check the final alignment of the stab to the wing from the front and top before the glue dries. Step back about 10 feet and view the model from the front. Tilt the stab for proper alignment if necessary. Use a tape measure to make sure the stabilizer tips are at equal distances from the trailing edge of the wing. Use pins to hold the stab securely in position until dry.



92. Cut away a 1/8" strip of covering material from the center of the stabilizer where the fin is to be glued. Epoxy glue the fin onto the stab and into the die-cut slot in the fuselage top at the same time. Use a 90 deg. triangle to align the fin with the stabilizer, pin securely in place, and allow to dry.

93. A 1/2"x12" strip of ABS plastic is provided for a landing skid. Round the two front corners of the strip with a sanding block. Apply double-coated foam servo mounting tape to the plastic skid, remove the paper backing from the tape, and press the skid into place. NOTE: The ABS plastic skid can be painted a matching color with either enamel or dope.





Completing The Elevator Pushrod

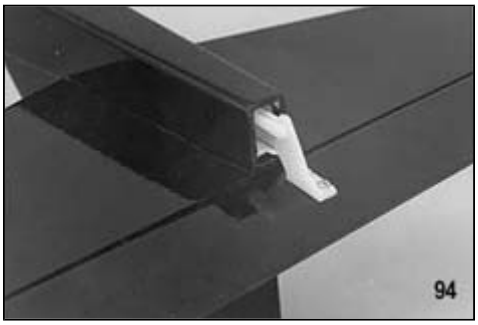
94. A small nylon control horn has been supplied for the elevator. Install the control horn onto the elevator with #2 x 1/2" sheet metal screws.

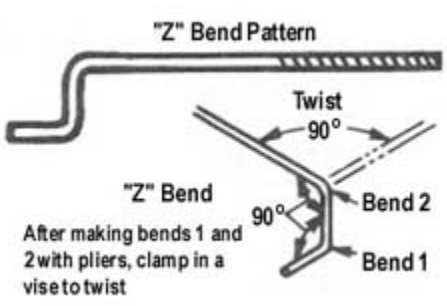
95. To complete the installation of the nylon elevator pusnrod, first cut one of the 2-56 x 10" threaded rods provided to 3-1/2" overall length, measuring from the threaded end. Slip the rod completely into the inner pushrod tube and then screw in about 1/4" of the threaded portion. Screw the nylon R/C link onto the rod leaving a gap of about 1/8" from the end of the inner pushrod.

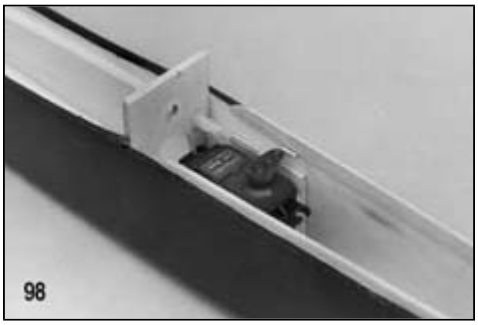
96. Slide the 1/8" o.d. nylon inner push rod tubing into the outer tubing from the elevator end of the fuselage and attach it to the nylon control horn. With the elevator level, cut off the protruding end of the inner pushrod 3/8" from the end of the other pushrod tubing. Unhook the nylon R/C link from the control horn, and push the inner pushrod forward towards the servo.

97. Locate and cut one of the 2-56 x10" threaded rods provided to 1-1/2" overall length, measuring from the threaded end. Then put a "Z" bend (or a "L" bend if you are going to use a pushrod keeper) in the non-threaded end of the rod.

98. Screw the threaded end of the wire approximately 1/4" into the 1/8" o.d. nylon inner push rod tubing. Install the "Z" bend through the servo arm and hook it up to the servo and reconnect the R/C link to the elevator control horn. NOTE: It may be necessary to trim the servo arm down to prevent it from rubbing on the side of the fuselage.

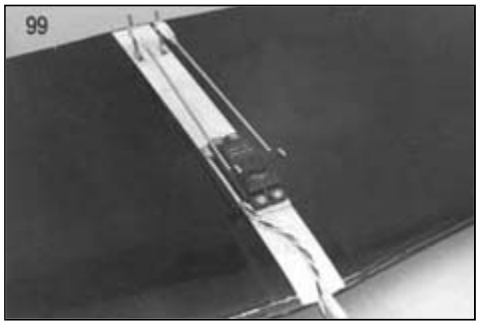






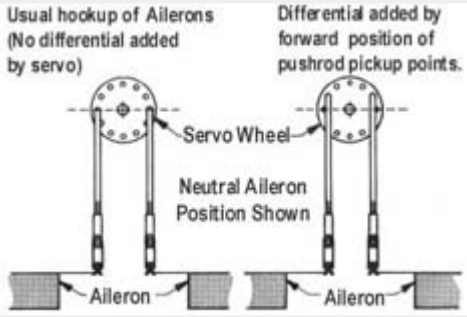
Aileron Pushrods

99. Mount the aileron servo to the hardwood rails in the manner recommended by the radio manufacturer.



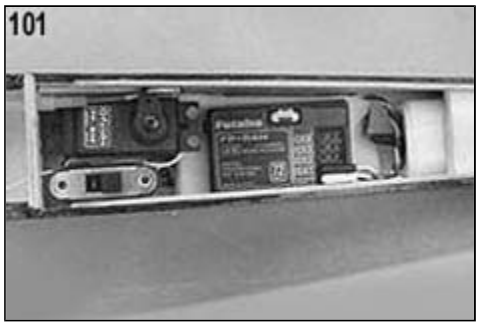
100. The aileron pushrods are made from two 2-56 x10" threaded rods. Screw a nylon R/C link onto the threaded end of each rod. Next screw the self-threading nylon aileron connectors that are provided 1/4 of the way down the aileron torque rods that are sticking out of the wing. Snap the R/C links into the aileron connectors and line up the pushrods with the servo arms. With the aileron servo neutralized and the ailerons level, measure 1/2" past the servo arm and cut off the wire. Put a "Z" bend in the end of the rods and install them in the outside end of the servo arm.

OPTIONAL AILERON SERVO HOOK UP



The aileron horns are offset for differential movement as much as is practical without striking the fuselage structure during movement. Some of this offset is cancelled out when the adjustable nylon fittings are added. The best way to increase the amount of differential in the ailerons is by offsetting the pickup points on the servo for the push rods as shown in the accompanying drawings. Any amount desired can be obtained in this manner. The farther up the wheels the pushrods are attached, the greater the differential, ie., more up. less down movement.

Radio Installation



101. A typical 2 channel radio installation is shown in the photo. The battery pack and the receiver are lightly packed in foam rubber and positioned just forward of the elevator servo. The switch harness is servo taped to the fuselage side just opposite the elevator servo. This allows the radio system to be easily turned on and off by removing the quick release hatch.

Recommended Control Surface Movements

The following control surface movements are recommended for initial flight tests and for newcomers to the sport of R/C slope soaring.		For the accomplished pilot and for all out aerobatic performance the following movements are suggested.	
ELEVATOR	3/8" UP and 3/8" DOWN	**ELEVATOR**	1/2" UP and 1/2" DOWN
AILERONS	1/2" UP and 7/16" DOWN	**AILERONS**	9/16" UP and 1/2" DOWN

Optional Rudder

There may be some of you, especially veteran slope fliers, who will want to modify the Ninja from two channels (aileron and elevator) to three channels (aileron, elevator, and rudder) for increased aerobatic performance. The hardware that is provided in the kit is for the two channel version only.

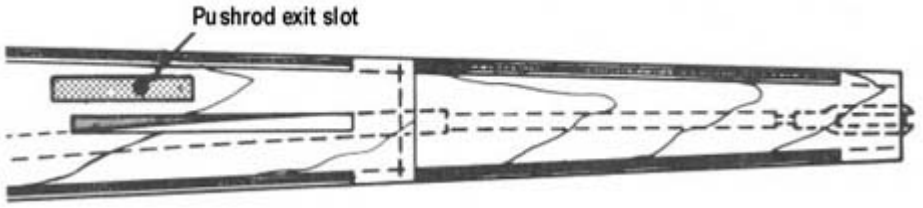
To convert the Ninja to three channel operation you will need the following items, (1) SIGSH568 30" nylon pushrod assembly, (1) SIGSH220 short nylon control horn, and (2) EASY HINGES.

102. Drill an additional 3/16" hole in the opposite side of fuselage former F-2 to accept the outer nylon push rod for the rudder. NOTE: The fuselage construction must be completed through step 66 before proceeding.

103. Cut a slot 3/16"x1-1/8" in the fuselage top for the outer nylon push rod tubing to exit through, as shown in the diagram.

104. Install the 3/16" o.d. outer nylon push rod tubing (SIGSH568) for the rudder by passing it through the pre-drilled hole in former F-2 and the diecut notches in formers F-3, F-4, and the push rod exit hole in the fuse top. Epoxy glue the outer push rod tubing in place at each of the fuse formers and to the fuse top.

    NOTE: Make sure that the outer push rod extends out in front of former F-2 for 3/16". Cut the outer push rod tubing oft flush with the top of the fuse.

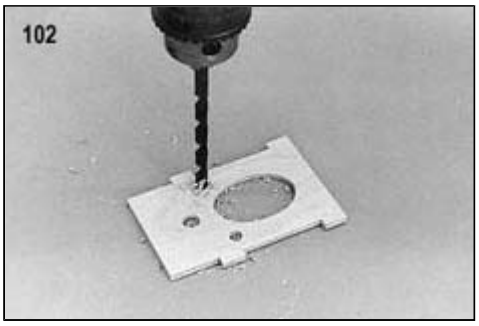


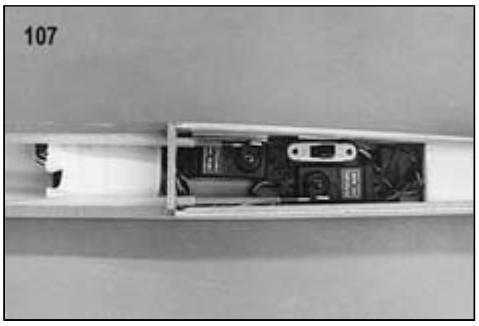
105. Hinge the fin and rudder with EASY HINGES.

106. After the fin/rudder assembly is glued in place on the fuselage and properly aligned, install a small molded nylon control horn (SIGSH220) onto the rudder with two #2 sheet metal screws.

107. Refer to the elevator servo and pushrod installation procedures elsewhere in this book for guidelines on completing the rudder servo and pushrod installation on the opposite side of the fuse.

108. Adjust the control throw of the rudder so that you have minimum of 3/4" left and 3/4" right of movement.

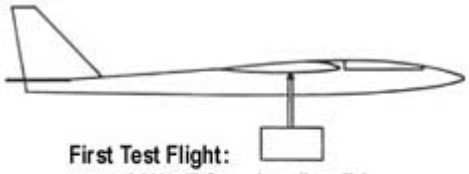




Balancing

Make a balancer from a block of wood and two pencils that are tipped with erasers. Drill two holes in the block of wood about 3" apart and install the pencils. To check the fore and aft balance of your model, mount the wing on the fuselage and place the model in the balancer. The fuselage side view plan shows two locations for balancing the Ninja. The forward C.G. location is best suited for the first test flights and newcomers to the sport of R/C slope soaring. The rearward location is for more experienced pilots. The rearward C.G. makes the Ninja more sensitive to control movements, improving it's aerobatic ability. Balance the Ninja within the recommended C.G. range to suit your needs. Do not attempt to fly the model with the balance point any further back than the rearward C.G. limit.

The spanwise balance of the wing is an often overlooked but essential part of balancing a model. Check the spanwise balance of the wing by placing the wing upside down on the balancer. Hold the wing level and then release it, observe which wing panel falls. Add very small amounts of weight to the opposite wing tip until it will balance. NOTE: Small finishing nails pushed into the end of the wing tip are ideal for this.



First Test Flight:
30%, 4" from Leading Edge
Experience Pilots:
35%, 4-1/2" from Leading Edge

Note: Make all measurements at wing root.

Pre-Flight

Make sure the servos are securely mounted, the servo arms have their retaining screws in place, and all screws are tight. Range check the radio as per the manufacturer's instructions and make sure it is fully charged. If there are any problems, send the radio in for repairs.

DOUBLE CHECK EVERYTHING YOU CAN THINK OF! A model and radio that is not prepared and working properly on the ground before take-off will not improve in the air - IT WILL GET WORSE! There is no point in attempting to fly until everything is 100% correct.

First Test Flight

Choose an area that is free of obstructions such as buildings and trees, and pick a day when there is little or no wind. If your flying site is occupied by other fliers, check with them to be sure that your frequency won't interfere with theirs, and vice-versa.

Gently hand toss the glider into the wind with the nose pointed slightly down and the wings level. Start by running a couple of steps with.the model, then release it with a smooth spear-throwing action. Aim for a spot on the ground about 50 yards out ahead of you. The Ninja should glide smooth and flat with no veering to the left or right. After each test flight, readjust the R/C links on the push rods so that the trim levers on the transmitter can be returned to a neutral position. It may take several flights to completely trim out the model.

Introduction To Slope Soaring

Slope soaring offers a unique brand of flying excitement not found in other types of R/C model flying. From flying lazily along with a floater, to breathtaking high speed beach runs, slope racing, and aerobatics, there is something for every skill level of pilot. Besides being a lot of fun, how many other model pilots do you know who want the wind to blow?

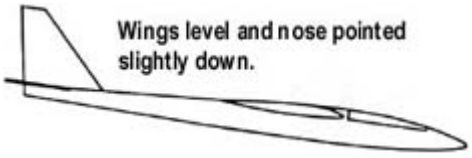
It is easy to see why slope soaring is fast becoming one of the most popular parts of R/C soaring. Slope soaring is no longer limited to just the east and west coasts. As the popularity of slope soaring grows, more flying sites are turning up throughout the country.

Finding a Hill

Wherever you can find a respectable-sized hill with a 10-20 m.p.h. wind blowing straight into the slope, you can slope soar. The wind is deflected upward by the slope of the hill creating the lift we soar on. The amount of lift generated by a particular hill is regulated by the wind velocity and the amount of slope in the hill. Also a hill that has a smooth approach to it (free of trees, buildings and etc.) will almost always produce stronger lift. Don't overlook places like dams, reservoirs, bluffs overlooking lakes and river valleys. They all make good flying sites. The ideal slope site is one in which there is a "bowl" created by either a curved hill or by a series of hills.

Flying Tips For The Novice Slope Soarer

Launch the Ninja into the wind out over the crest of the hill by throwing it with the wings level and nose pointed slightly down. Let the model travel out a little ways to build up speed and then make a turn that brings the flight path of the model parallel to the slope. When you need to turn the model around, make your turn into the wind away from the slope and again fly parallel to the slope. Repeat the above procedure when it is time to turn again. Flying this flattened figure eight coarse back and forth across the face of the slope is standard procedure. This helps keep the model in the maximum lift zone which yields the most altitude gain.



Ballast

The clean lines and the low frontal area of the Ninja allow it to penetrate winds in the 10-20 m.p.h. range without ballast. However, when flying in winds of excess of 20 m.p.h. some ballast may be needed. Stick-on lead weights are ideal for adding ballast. Simply press them in place inside the fuselage directly over the C.G.

Aerobatics

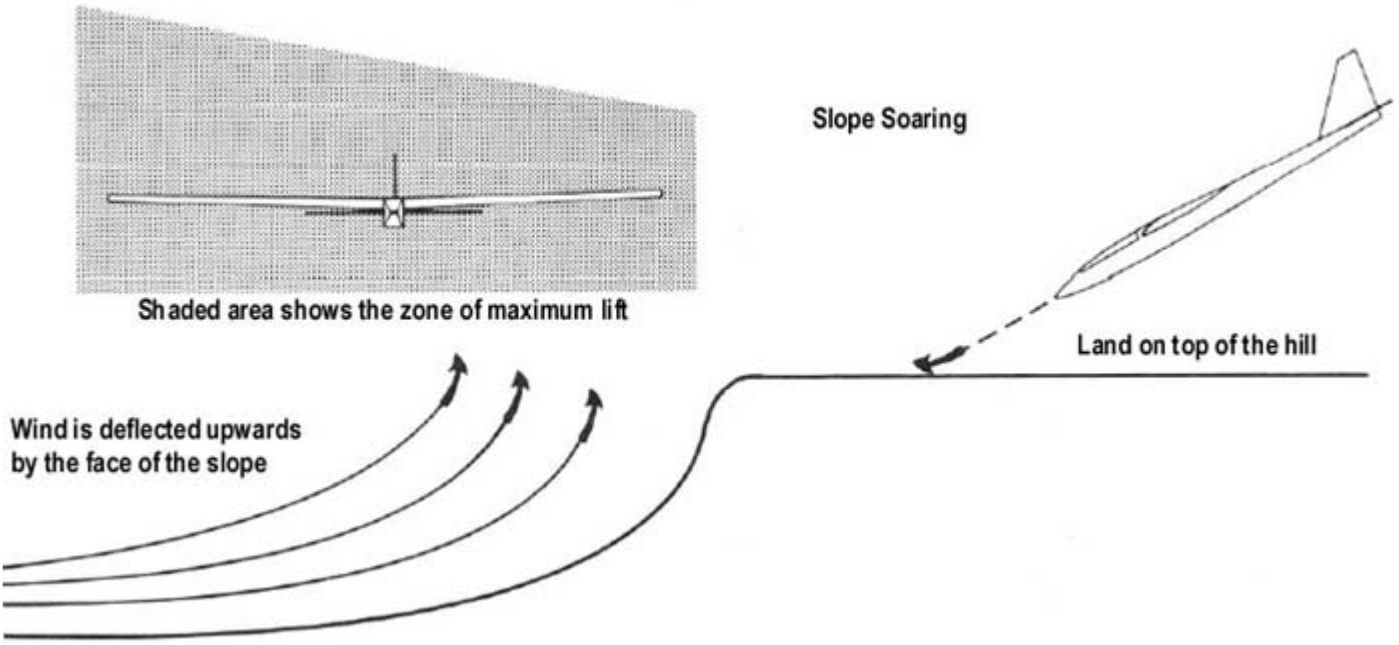
Slope soarers don't have engines to pull them through aerobatic maneuvers like power models do, so we have to rely on the lift and the speed of the model to perform aerobatics. Always pick up speed by diving the model before entering a maneuver. The amount of speed required, depends on the maneuver and the available lift. If you are new to slope soaring make your maneuvers into the wind at first until you feel comfortable. Aerobatics with the Ninja are a snap. It will do any maneuver in the book and then some.

When the Sig Factory Fliers go to the slope, we have a blast making up new aerobatic "maneuvers" on the spot. For instance, how about our death defying "Chicken Immelman" - start by diving straight at the hill, wait until the last possible second, then pull up into a quick half loop and roll out at the top. Crazy, but not boring! Or how about a "Reverse Corkscrew" start real high, dive straight down (We mean straight!!!), performing two aileron rolls on the way down. Then quickly pull the airplane straight up! Try to get in two more rolls before running out of airspeed. Tons of fun!!! If you come up with any, new ones, let us know.

Landing

To make a landing approach, start with a fair amount of altitude, then fly the model slightly behind the crest of the slope, and try to fly a steady descending path right down to a landing on top of the hill. If you are too high on your landing approach, make S-turns to lose altitude or go around and try it again. Most slope soaring sites create an air turbulence on the back side of the hill. Avoid getting caught in this turbulence as it might cause you to lose control of your model and crash.

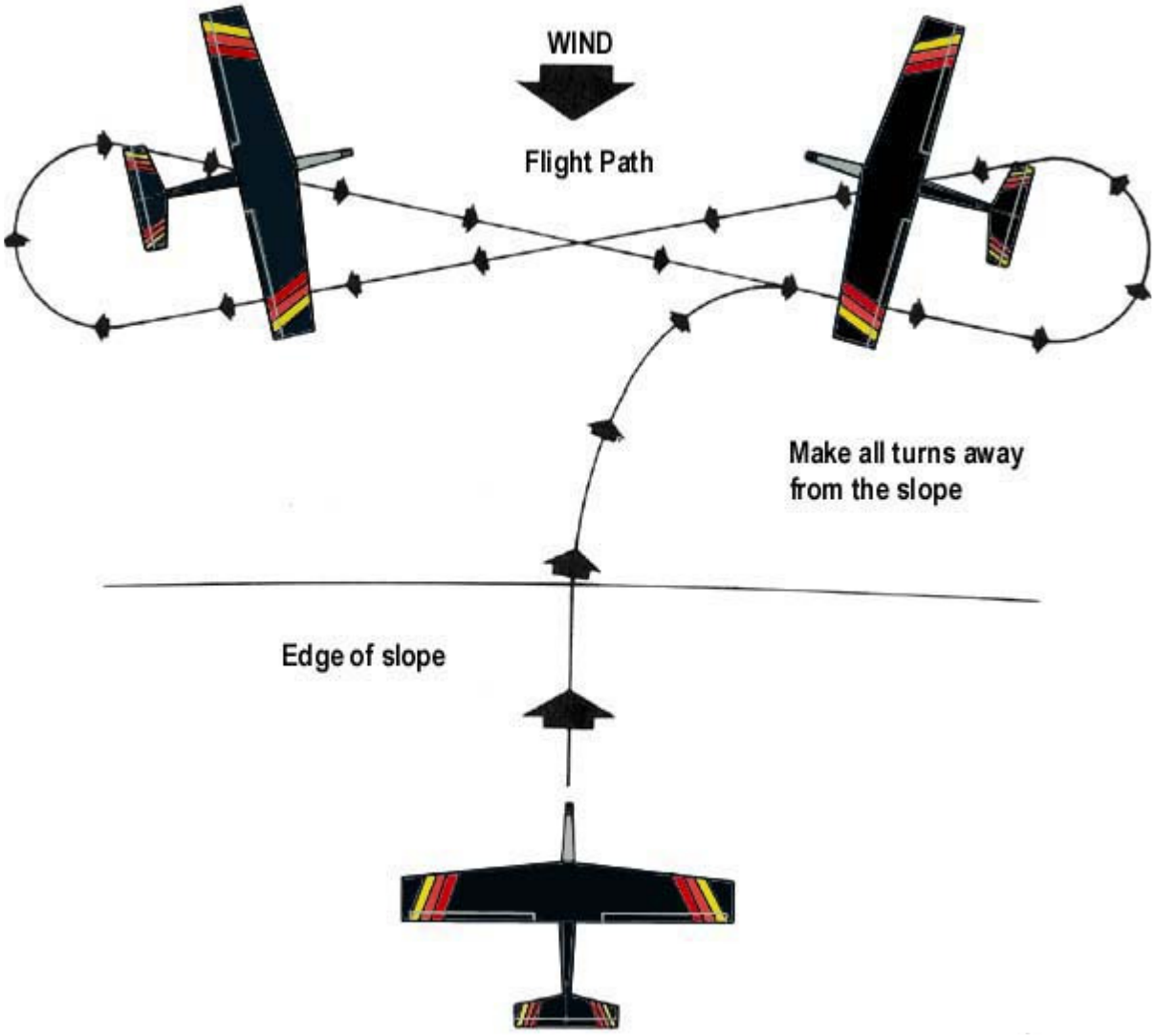
NOTE: When flying at established sites, check with the local flyers to determine what is the best approach for landing at this site.



Flying Off A High Start Or Winch

Launching the Ninja from a high start or winch is as simple and straight forward as launching any sailplane. Although most of the flights are short in duration, they can be quite exciting while doing loops, rolls, inverted flight, and other aerobatic maneuvers. Install a tow hook in the bottom of the fuselage 3-1/2" back from the fuselage former F-2. During periods of strong lift, it is possible to thermal the Ninja with flights lasting over 15 minutes.

It will take a little practice to master the art of slope soaring, but it is well worth the effort and a lot of fun. So, next time the wind blows, grab your Ninja and head for your favorite slope.



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