(c.) Complete the bottom planking. This ends on the second rib from the middle joint and does not go all the way to the center line. The gap will be filled later when the fairing is added to the bottom of the center section.

(d.) Locate the back edges of the rear spars on the surface of the planking and draw guide lines on both top and bottom about 1/32" behind this so there is no danger of cutting into the spars in the next step.

(e.) Cut through the planking on the guide lines with a sharp knife.

(f.) Remove the blade from an X-acto razor saw by prying apart the crimped metal backing with a screwdriver. Insert the blade into the slits just cut in the planking and saw through each of the ribs.

(g.) Saw through the trailing edge and remove the ailerons.

(h.) Trim and sand the back of the wing with a sanding block so the planking is flush with the back of the rear spars.

(i.) Cover the open back of the wing with 1/16" sheet wood.

(j.) Cut through the ailerons from the bottom line with the die-cut slits. Be careful not to damage the top planking which must be left protruding in front of the aileron ribs.

(k.) Fit a piece of 1/16" sheet to the face of the aileron. Bevel the edge of the piece of sheet to fit against the top planking that protrudes in front of the aileron ribs.

(l.) Complete the construction and sanding of the lower wing in the same manner previously described for the upper wing in steps (u.) through (y.).

**Single Aileron Hinging**

3/32" WIRE TORQUE ROD
CONTROL HORN

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**Cutting Off The Ailerons**

1. Saw aileron off at back of rear spar.
2. Cut through bottom planking and ribs in line with die cut slit.
3. Leave top planking protruding uncut in front of rib.
4. Face front of aileron with 1/16" sheet stock and trim aileron to contour.
5. Cover back of wing with 1/16" sheet stock.
6. Trim wing to contour.

**Center Wing Rib Gauge Pattern**

Glue to cardboard. Use to set angle for Dihedral.

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**Dihedral Gauge**

Lower Wing Dihedral
1/16" PLY BRACE

Double Aileron Type A

NOTE: MATERIAL SUPPLIED IN KIT FOR TYPE B DOUBLE AILERONS. TYPE A IS OPTIONAL.

1/16" PLY BRACE

1/16" PLY BRACE

1/16" PLY BRACE

Double Aileron Type B

MATERIAL SUPPLIED IN KIT FOR TYPE B LINKAGE ONLY.

3/32" WIRE TORQUE ROD CONTROL HORN

PUT A SMALL PIECE OF PLASTIC WRAP OVER THE HORN TO KEEP GLUE OFF.

(a.) Sheet the bottom of the aileron horn compartment with 1/16" balsa.

(b.) Cut off the four small nylon horns as shown by the accompanying pattern. Discard the attached horn mounting plate, it will not be needed.

(c.) The torque rod will be just below the surface of the wing. Carefully shape the edges of the planking to close the gap over the rod. This allows silk ing and doping over it without sticking problems.

Planking Over Control Horn

(a.) Cut a slot into the aileron in which to imbed the torque rods. Have them slightly below the surface.

(b.) Epoxy the hinges into the ailerons. Check the operation of the ailerons with them attached dry to the wing to make sure there is no binding before epoxying in the torque rods, the hinges into the wing and the nylon bearing that supports the ends of the torque rods in the center section.

(c.) The torque rod will be just below the surface of the wing. Carefully shape the edges of the planking to close the gap over the rod. This allows silk ing and doping over it without sticking problems.

(20.) NOTES ON DOUBLE AILERONS

For double aileron pushrod hookup, refer to the plans and mount the bellcrank on 1/8" plywood between the wing ribs. The exact location of the 1/16" wire will be determined by the type of servo you will be using and the position of the output arms. In most cases the servo board will be mounted as low in the wing as possible, usually sitting directly on the 1/16" bottom planking of the center section. (See center section Bottom Fairing section.) Mark the spots on the ribs through which the pushrod will pass. Put a small 1/16" scrap bearing on a rib midway between the servo and the bellcrank. Check out the aileron movement before closing up the wing covering to make certain the correct amount of movement with your brand of servo is achieved. The lower gap in the aileron should almost completely close in one extreme servo position. If not, move the pushrods to the other holes in the bellcrank to attain the desired amount of movement. This also can be regulated to a certain extent by choice of holes in the nylon aileron horn but it is best to be certain that the internal hookup is in the ballpark before covering the wing.

There are two ways recommended for interconnecting the ailerons. The method (A) shown in this book is better balanced and transfers less load on the servos. However, to disconnect the linkages when removing the wings, it is necessary to use the radio to drive the servo to one extreme or the other so as to bring the RC links near the surface of the wing where they are easily reached. This is also the case when installing the wings. The spars must be cut away to clear the movement of the brass horn SA. Replace the wing planking over these cutouts with 1/16" plywood to retain wing strength. So while this method gives a technically ideal installation, the advantages must be balanced against the building intricacies involved.

Shown here and on the plan is another method (B) that is more practical, since the linkages can be removed without the use of radio. It does not appear to produce an undue load on the servos.
(c.) Epoxy the horns to the bottom planking and to the rib. The epoxy will fill the holes and "nail" the horn to the wood.

(d.) Plank the top of the horn section with 1/16" sheet balsa.

Type A Aileron Construction

(e.) Use the aileron connecting rod pattern to make up the linkage to hook the top to the lower.

(21.) WING SADDLE
The next fuselage construction steps require the completed and planked bottom wing. For best finished fit, the wing should be covered and the first coats of dope applied.

(a.) Sand the fuselage to match exactly the contour of the bottom wing. If you are using a fillet, allow for the fact that the 1/32" plywood wing saddle FZ will be added to the opening between the wing and fuselage. Tack glue some small scraps of 1/32" in the opening to hold the wing in the same relationship to the fuselage it will be when the 1/32" wing saddle is finally installed.

(b.) Check the position of the wing leading edge when it is in place on the fuselage against F7 and mark and drill a hole in the center of the wing leading edge so that the dowel installed in it will hit the approximate hole location in F7 shown on the cross-section on the plan.

NOTE: Some fliers prefer the extra rigidity and strength provided by two dowels in the leading edge. Follow the same procedure, but glue the dowels to the first two ribs on each side of the center.

(c.) Push a 1/4" x 1-1/2" dowel into this hole until only about 1/16" protrudes. (Note that this is a temporary dimension for checking purposes only. When finally glued in the dowel should stick out 1/4" to 3/8") Hold the wing up against the wing opening in the fuselage and mark the spot where the end of the dowel hits F7.

Suggested Two Dowel Installation

(d.) Remove the wing and drill a 1/4" hole in the marked spot of F7.

(e.) Put the wing back on to check the position of the dowel hole. It is probable that the alignment is not yet perfect. Enlarge the wing dowel hole as required to shift the dowel so that the wing will fit snugly against the fuselage. Plug the enlargement with scrap slivers. Pull the dowel out with about 1/4" to 3/8" protruding from the leading edge. Glue the dowel into the wing with Sig Kwik-Set 5-minute type epoxy glue and hold the wing in place on the fuselage until it sets up. Be careful not to let the glue ooze out of the dowel hole into F7. Use only a minimum amount since it can be glued additionally once the alignment is set. When the epoxy sets up remove the wing and surround the dowel inside the wing with pieces of scrap balsa, bracing it against the bottom planking and to the top. If the dowel is being inserted into a hardwood servo mount block, as on a single aileron version (see photo in Radio Equipment Section), no further bracing will be required, just fill the hole with epoxy.

(f.) Hold the wing in position and by pushing a long pin through it, locate the proper spots on the bottom of the wing to drill through to hit the hardwood wing bolt anchor blocks in the desired location. (Or do this before installing the plastic top and the block positions can be marked on the top of the wing by reaching through the open fuselage.) Drill through the wing and anchor block with a No. 7 drill. Tap the hardwood blocks with a 1/4-20 tap. Enlarge the holes in the wing to pass the nylon wing bolts by drilling through them with a 1/4" diameter bit.

(g.) On models using the optional fillet remove the tack-glued scraps of 1/32" that have been holding the wing at the correct location. Protect the top of the wing from epoxy leakage by taping plastic wrap to it. Turn the fuselage upside down and put the plywood wing saddles FZ in place on each side using Sig
Epoxy Glue. (Not Kwik-Set, as more time than 5 minutes will probably be needed). Replace the wing and bolt it in position with the nylon wing bolts. This will force the FZ plywood saddles up tightly against the fuselage. If FZ does not seat down against the wing surface in some spots, drive a sliver of wood between the saddle and the fuselage to force FZ against the wing while the epoxy is setting up.

(22.) BOTTOM FAIRING
Don't install the bottom fairing on the lower wing center section until the wing is fitted to the fuselage and in place on it. Put a piece of plastic wrap over the leading and trailing edge when mounting the wing to protect F7 and FIG from glue when adding F8 and F9.

(b.) Add the WC side parts, trimming and insetting where necessary to be flush with F8 and F9. Glue WC to the W2 rib.

(c.) Do any remaining chores, such as mounting the servo and strengthening the wing dowels with scrap or Epoxolite putty before closing up the bottom.

(d.) Plank the fairing frame with 1/16" sheet balsa.

(e.) Add pieces of sheet balsa to each side to provide carving wood to complete the shape of the bottom and match F7 and F10. The thicker wood at each end will need some sanding to contour to fit the block against the curve of the wing. The outline of the outer edge of the bottom fairing is shown on the full size plan of the bottom wing.

(f.) Carve and sand to shape, blending into the contours of the front and rear parts of the fuselage bottom.

(g.) The wing bolt heads are inset into the fairing blocks and rest on the planking. Since the planking is backed up by a solid block fill-in, this proved sufficient support on the original model. If you wish to really beef this up, inset a small square of 1/16" plywood into the planking for the nylon wing bolt head to seat against.

(23.) MOUNTING THE TOP WING
The wing is attached to the cabane struts by setting it on the brass parts SS and sliding the 1/8" dowel in from the back of the wing. Round the end of the dowel so it will be easier to insert into the holes in the SS parts. The rear 2-56 machine bolt and blind nut retains it in the wing. A small piece of vinyl tape placed over the head of the bolt after tightening is a good safety measure to keep it from vibrating loose. Place the piece of tape over the head of the bolt and also the hole in the back of the wing for double protection.
To remove the dowel, push it out from the front by inserting a wire through the eyelet in the leading edge. Replace the dowel when it shows signs of wear. Reversing it will change the wear spots. If you do a lot of flying you may want to replace it with a piece of 1/8" wire or brass tubing (fill the ends with a small piece of dowel and epoxy so it can be pushed out). It is advisable to use the dowel on test flights since it has a break-away capability that will reduce damage in a crackup.

(24.) OUTER STRUTS
Sand the front and back edges of the die-cut struts to a rounded section. They are slightly over length to accommodate any small individual differences between models. Mount the wings on the fuselage and use pieces of masking tape from tip to tip to hold the top wing level. Measure from tip to tip at each end to check alignment. Make cardboard patterns by tracing around the die-cut struts with a pencil. Cut these out and fit them into the strut slots in the wings, trimming the patterns with scissors as necessary to get a good fit. A small notch must be made in the struts at each spar location to clear the spar. Trim the plywood struts according to the cardboard patterns. Mark the holes in brass parts ST onto the struts and drill them to take 2-56 blind nuts. Put the blind nuts on the inside of the struts, facing toward the fuselage. The struts can then be mounted by placing them in the slots in the wings and inserting a 2-56 X 3/8" bolt through each brass part ST and into the strut and blind nut.

Bottom Fairing

(25.) CONTROL DIFFERENTIAL
Many fliers have a personal preference for variations in amount of control movement from one side of the servo to the other. On the original Skybolt it was found that better balance in outside and inside maneuvers was obtained by having more up movement of the elevators than down. This is obtained by moving the nylon control horn back from the hinge line. The farther back it is moved, the greater the difference will be between up and down. The plan shows position used but individual fliers may want more or less after test flying.

In aileron movement, it is held that better results are obtained when less down movement is used compared to up. In the double aileron version this is obtained automatically by the location of the nylon aileron horn behind the hinge line. To have differential movement in the single aileron setup, bend the 3/32" wire control horn arms forward as shown here. Servos with rotary output wheels and a variety of pushrod hole locations can be set up for differential movement by selection of the proper hole to obtain the desired effect.
Shown here and on page 27 is the pilot's cockpit and instrument panel. The legend "Aerobatics by Dick Rutt" was added at the time the airplane was repainted with the airbrushed striping. The model uses the original sharp edge color scheme and the covered front cockpit and no bubble canopy as shown on the cover of Private Pilot for August 1973.
Most Skybolts do not have wing fillets.

LaMar Steen
(26.) TANK INSTALLATION

Use a Sullivan RST-12 rectangular plastic tank. (see Sig Catalog.) A side mounted engine is recommended for use in the Skybolt. The plan shows the correct location of the tank for proper fuel draw and idle.

Fuel Tank

(a.) Drill a 7/8" hole in the firewall for the neck of the fuel tank. If you prefer, the outlet tubes can be run through individual holes, though this makes it more difficult to install and remove the tank. In either case, the holes are plugged and sealed against leakage of exhaust oil into the fuselage with G. E. Silicone bathtub sealant - obtainable at hardware stores.

(b.) If the tank is equipped with an internal fuel line cut from Sig Heat Proof tubing it can easily be left in the fuselage for a full season of flying since this line will not harden when immersed in fuel. So install the tank semi-permanently with cross pieces of plywood or balsa to hold it in place. Should the need arise to remove it, break away the scrap supports and bathtub seal and pull the tank out through the lower wing opening. In this connection, be sure and leave enough room in front of the servo installation.

(27.) SANDING AND FINISHING PLASTIC PARTS

All of the plastic parts should be sanded to remove the gloss on the surface of the plastic before they are painted. Don't sand the plastic fuselage top with coarse sandpaper, which can cut deep scratches. These scratches may open up during doping and become more noticeable. Instead use something like 220 grit 3-M Tri-M-ite no load silicon paper. (See Sig Catalog.) Polish down the first sanding with 360 grit Tri-M-ite or 400 wet paper before color doping.

The same sanding caution applies to other parts, however in fitting halves of the cowling or pants together there are often relatively large bumps to be worked down on the seams. In this case it is permissible to use a coarser paper or block as long as time is taken to take out any scratches made thereby by polishing down with finer grades of paper.

The plastic parts may be sprayed or brushed with Sig Supercoat Dope. Care should be taken not to apply heavy, wet coats of dope. Put on very light coats and allow them to dry thoroughly before applying a second coat. Spraying is the best method of getting a good finish with a minimum amount of dope - preferably with a spray gun and using as little retarder mixed with the thinner as the humidity will allow. Spray only extremely light, dustlike coats with adequate drying time allowed between them. Be especially careful with spray cans not to get the plastic too wet.

Seal the edge of the masking tape with clear dope before using colored dope. Be careful when removing masking tape from plastic not to start a peeling action on the film of color dope when getting to a corner or going around a curve. Pull the tape back over itself slowly and watch the edge. Use a new sharp modeling knife to cut the paint film if necessary to make the tape peel easily without pulling up the color dope film.

The plastic parts may also be painted with SIG Plastinamel, K & B Super Poxy, Hobbypoxy or DuPont Dulux enamel. Do not use other paints, dopes or finishes without first testing on scrap plastic to make certain they are compatible with the plastic.

(28.) COVERING AND PAINTING

The model should be covered with silk, or other cloth material, rather than Silkspan, due to the large unplanked area. After final sanding of the finished framework give it two coats of dope wherever you want the silk to adhere to the framework. Give these areas another final, light sanding. Remember that covering and paint won't cover up poor workmanship. Be sure all surfaces are smooth. Apply the silk wet but do not stretch too tightly, as it will only encourage warping later on. Pull the silk up just enough to get out all the slack and wrinkles. Paint dope around the edges. This will soak through and adhere to the pre-doped framework. Let dry before trimming with a sharp double-edge (for thinness) razor blade. Check for any spots that are not stuck down and apply more dope.

In covering the fuselage sides, lap about 1/2" of the silk up onto the plastic top and dope it to the plastic. Use a 1" wide scrap of silk to tape over the seam between the firewall and the plastic fuselage top.

Next, give the entire airplane two or three brushed coats of SIG Supercoat Clear Dope to shrink the silk and remove any wrinkles. Apply the first coat lightly so that the dope will not flow through the silk and run down on the inside. If these two or three coats of regular Clear Dope take out the slackness and any wrinkles from the silk, switch to Sig Lite-Coat Low Shrink Clear dope for about one to three more coats to complete filling the grain of the silk. Lite-Coat doesn't shrink much and use of it helps keep down the chance of warps developing.

The entire airplane should now be given two coats of white dope. We recommend spraying the color dope. Reduce the dope at least fifty-fifty with Supercoat Thinner for spraying. If you brush, add enough so that it flows out easily without brush marks. Better have the dope a little thin with an extra coat required than trying to spray or brush it on too thickly. When the white is completely dry, mask off the first trim color
areas. Brush around the edges of the masking tape with clear dope. This seals the tape, preventing leakage of colors underneath the edge. Use a good grade of paper to cover the areas not to be painted as much of the outline masking tape as possible, using another layer of masking tape to hold the masking paper in place. The paper and double layer of tape will prevent the dope from soaking through and staining the white with residue from the tape. Don't leave the masking tape on any longer than necessary—the longer it is on, the tighter it sticks to the finish. Repeat the above process for the second trim color. After all trim color dope is applied (but not the decals), spray two to four coats of Lite-Coat Low Shrink Clear dope over the entire model. If the plastic parts have been trimmed with color dope, they should also be sprayed with top coats of Clear. The model will be easier to keep clean when top coats of clear are used.

(29.) WING FILLET (OPTIONAL)
(Full size Skybolts do not have wing fillets, but the fillet used on the prototype model made a good wing seat for the lower wing.)

The fuselage should be covered before the wing fillet is applied. Tape the outline of the wing fillet off with masking tape to avoid getting Epoxolite smears on the fuselage. Mix the putty according to the directions on the cans. Smooth into the fillet area with a paddle. As the putty begins to set up it can be smoothed with a wetted finger tip. Allow to set for 24 hours before sanding. Use fairly coarse garnet paper wrapped around a round object for initial sanding, and shaping. Finish with fine garnet or no-fill silicon paper. Allow the Epoxolite to cure for at least 48 hours before painting. Use very light coats of dope and allow them to dry thoroughly before applying another coat.

(30.) WINDSHIELD
Cut the windshield from clear plastic sheet, using the pattern in this booklet. Fasten it to the model with Sig-Ment used sparingly. The "super" type, cyanoacrylate glues are also handy for attaching the windshield since they take hold almost instantly. Cover the glue seam with a strip of Stripe-Rite colored plastic tape or a strip of ABS plastic to simulate the windshield attachment strip of the full size airplane.

(31.) DECALS
Model fuels are hard on decals. Even if you are using no nitromethane, the oil will get to and loosen them. So try to direct all fuel overflow and exhaust spray out to an area without decals. Keep a coat of auto paste wax over the decals and replace it at regular re-applications.

"DKM" STIK-TITE PRESSURE SENSITIVE DECALS
Cut out the decals with a pair of sharp scissors. Leave about 1/32" to 1/16" of clear edge around the decal. Round the corners as you are cutting. Wet the surface on which the decal will be placed with soapy water (use dishwater detergent). Place the decal on the model and squeegee the water from underneath with a balsa paddle. Allow to dry. This procedure will prevent air from being trapped underneath as is possible when the decals are applied dry.
(33.) RADIO EQUIPMENT INSTALLATION

The most convenient method of installing servos is on the plastic mounts which most of the radio equipment makers offer with their outfits or as an accessory. These are screwed to hardwood mounting rails for fuselage servos or to hardwood blocks for mounting in the wing. Instructions for the use of these mounts are included with them.

A variety of quickly detachable pushrod retainers (Rocket City # 07 or Sig # 184) are available from the Sig Catalog for hooking the pushrods to the servos. Avoid metal-to-metal contact in linkages because this may produce harmful radio interference.

A flexible steel cable pushrod with nylon outer tubing (not furnished) such as the Sig SH-559, or Du Bro FC-149 is recommended for hookup of the throttle to the motor control servo.

(32.) FUSELAGE PUSHRODS

5/16" square balsa is provided to make the fuselage pushrods that run to the elevator and rudder. Bind the fittings to each end with heavy carpet thread and epoxy glue. Use the R/C links at the tail end so that trimming adjustments can be quickly made.

A new improved aileron control horn with self-threading nylon connectors is furnished.
For the single aileron version, Du Bro AH-79 or Rocket City #05 strip aileron horn wire connectors are suggested to hook the servo to the wire aileron horns. The receiver battery pack should be wrapped in foam rubber sheet, held on with rubber bands. Place it as far forward as possible, under the tank. It is a good idea to put the package in a small plastic bag, taped shut around the battery cable to protect the battery from accidental fuel leakage.

The receiver should be similarly wrapped up in foam rubber to protect it from engine vibration. Cover it with a plastic bag also. Stow this completed package in front of the servos. Make certain that the receiver will stay in place during aerobatic maneuvers.

"Brick" type receiver and servo combinations will have to be mounted on rails as specified by the manufacturer of the radio equipment.

Note: No servo mounting material or hardware is supplied in the kit.

(35.) FLYING THE SKYBOLT

If you are a newcomer to model flying it is suggested that you not attempt flying without the assistance of a modeler with experience. Contact your local club or ask your hobby dealer for the names of good fliers in the vicinity and a suitable location for flying. Many hours of work are involved in the construction of a model and it can all be lost in a moment of beginner's indecision. A skilled flier can help you get past the first critical test and trimming flights without damage to the model and give instruction in proper control.

Balance the model at the C.G. point indicated on this page. If it balances farther back, add lead to the nose as required. For test flights add some extra lead to the nose to move it 3/8" further ahead.

Trying to fly with the C.G. too far back is much more dangerous than the slight increase in wing loading caused by adding lead to the nose. Balance with an empty fuel tank. When slightly nose heavy the model is much more stable and less likely to snap roll or stall. The reaction to control movements is less sensitive so it's not as easy to over control. Some aerobatic ability may be sacrificed with a forward C.G. so you may wish, after test and familiarization flights, to move it farther back to get more aerobatic ability. Do this slowly and check results and control response in the air at a good altitude.

Hold a small amount of up elevator during the first part of the takeoff to keep the tailwheel steering effective until air speed is high enough for the rudder to take over. The model will drift to the left from torque during takeoff. Feed in some right rudder as soon as the tail wheel clears the ground, earlier if required. The model is not difficult to manage in the air and can be flown by anyone who is capable of handling a multi-channel model.

**BOOKLET ILLUSTRATIONS BY MIKE STOTT**

**SKYBOLT PHOTOS**

SPORTS PLANES, APRIL - MAY 1973. COLOR COVER & BLACK AND WHITE PHOTOS. BACK ISSUE.

PRIVATE PILOT, AUGUST, 1973. COLOR COVER AND BLACK & WHITE PHOTOS.

SPORT AVIATION, FEBRUARY 1978. EXCELLENT COLOR SCHEME, MANY COLOR PHOTOS. EAA, Box 229, HALES CORNERS, WISC. 53130

TWO 3-1/2" x 5" COLOR PRINTS OF STEEN'S SKYBOLT IN MARKINGS USED ON MODEL ARE AVAILABLE FROM SIG - ORDER PP-234

TWO COLOR PHOTOS, SHOWING STEEN'S AND WALLACE'S SKYBOLTS, APPEAR IN SIG CATALOG 33 AND LATER EDITIONS.

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