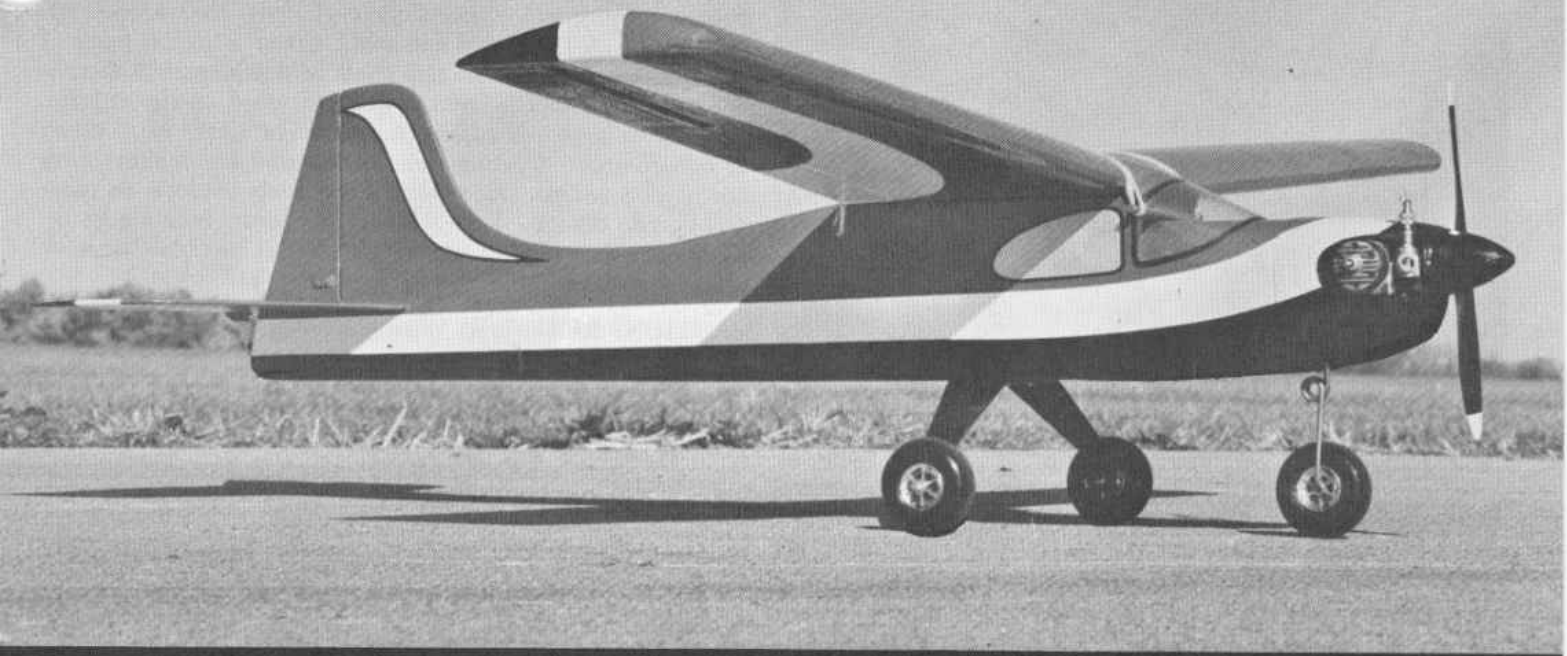
KLIPPER



BUILDING AND FLYING INSTRUCTIONS

SIG®
CRAFTSMAN'S KIT

RC36

The Klipper, quick and easy to build, is good for flying in confined areas or as an all-round sport model. We recommend a larger model, such as the Sig Kadet, as a first beginner's trainer, but the Klipper can be flown without trouble by relatively inexperienced pilots with a low number of RC flying hours.

For best results, install 3 channel equipment in the Klipper. One or two channel equipment can be used with less flexibility in control. Also you can install 4 or more channel equipment and use only 3 of the channels. The fuselage is large enough to carry a standard battery pack and standard size servos.

This kit is arranged so that no separate full-size plan is needed. The center section of the booklet does show some full-size patterns which will be helpful during construction. A preliminary study of the instructions and drawings of the construction steps will make it clear where several building operations may be accomplished at the same time While one part is drying, another part can be started. References to right and left refer to your right and left as if you were seated in the cockpit facing forward.

Cut all long pieces of balsa first, followed by medium lengths, before cutting up any full length strips into short pieces. Remove die-cut 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. Leave parts in the sheets until needed in construction.

A jig saw is best for cutting out the printed sheet parts. Cut just outside the lines, leaving all of the line on the part. When fitting into place in the structure or joining with an adjacent part, use the sanding block to bring the edges to an exact fit. If an X-Acto knife is used, don't cut too close to the lines but leave enough margin to true up and finish the edge with a sanding block. It is easier to cut at an angle with a knife so more tolerance may be needed for final fitting with a block.

A piece of Celotex-type wallboard makes a handy building board, into which pins can easily be pushed. Lay the building board on a table with a flat and untwisted top. Pins can be pushed through all pieces of balsa in the kit without any lasting harm. The holes will fill during sanding and doping.

OIL PROOF YOUR MODEL!

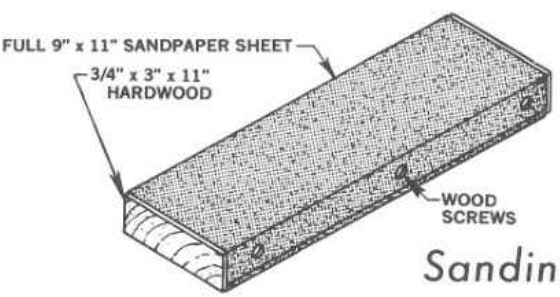
One of the most destructive things that can happen to a model is allowing engine oil to soak into bare, untreated balsa or plywood. It will cause glue joints to loosen and results in a steady increase in weight. An oil soaked model cannot be properly repaired or repainted after a crackup, since glue and finish will not hold. Cover all wood parts of the model and put on enough coats of finish so that oil cannot soak in. Don't leave any exposed wood on the outside. Around the nose and engine compartment, apply extra effort at oil proofing. Coating the firewall and front joints with epoxy glue is best, but several extra coats of dope or paint will also do the job. Take special care during building to use plenty of epoxy glue to attach the firewall and coat the back of the firewall and the firewall braces with the glue.

CAUTION: READ THIS WARNING!

Do not let solvent base model cement, dope or fiberglass resin come in contact with the foam wing. These and other products will melt the foam. Sig Plastinamel was used to paint the wing. See instructions on page 16. Epoxy glue may be used on the wing should repairs be necessary. Sig Bond glue is also compatible. Test any other glues or paints on scrap foam before using, to make certain they will not damage the wing.

(1.) PRELIMINARY

The first construction requirement is to make (if you don't already have one) a large sanding block that will take a full sheet of sandpaper. You will find it to be an almost indispensible tool for many operations and well worth the small effort involved in making it. Use several wood screws along one edge to hold the sheet in place.

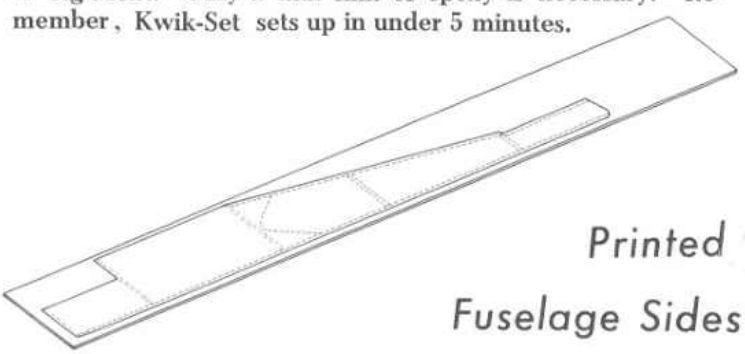


Sanding Block

(2.) PRINTED FUSELAGE SIDES

The internal framework of the fuselage is built directly on the printed wood sides.

Do not use Sig-Bond or any other water-base adhesive to glue the plywood doubler to the fuselage sides. The water causes the parts to curl. Use Sig Epoxy, Kwik-Set Epoxy or Sig-Ment. Only a thin film of epoxy is necessary. Remember, Kwik-Set sets up in under 5 minutes.

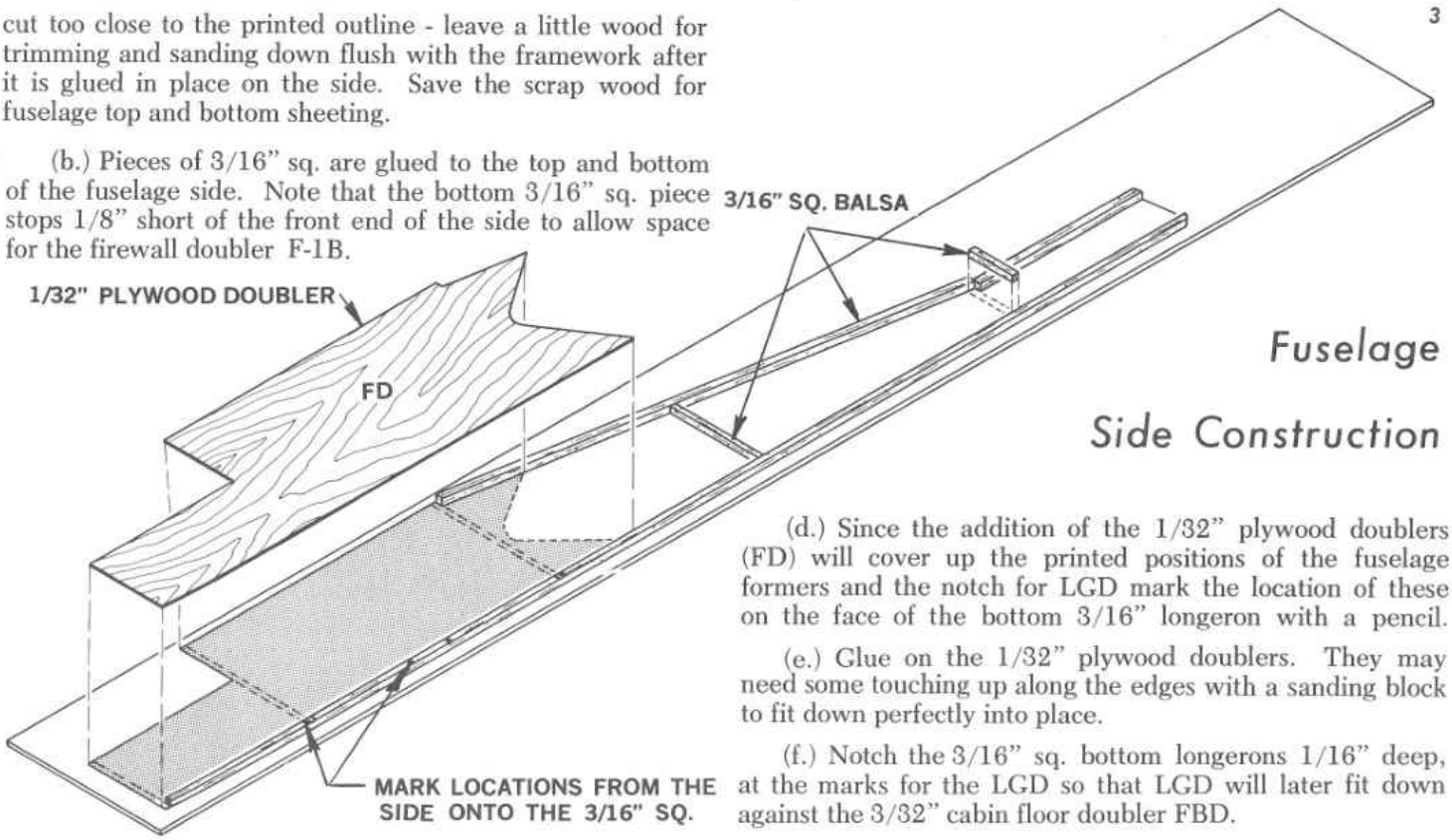


Printed Fuselage Sides

(a.) Cut out the fuselage side from the sheet. Don't

cut too close to the printed outline - leave a little wood for trimming and sanding down flush with the framework after it is glued in place on the side. Save the scrap wood for fuselage top and bottom sheeting.

(b.) Pieces of 3/16" sq. are glued to the top and bottom of the fuselage side. Note that the bottom 3/16" sq. piece stops 1/8" short of the front end of the side to allow space for the firewall doubler F-1B.



Fuselage Side Construction

(c.) Add the vertical 3/16" square pieces.

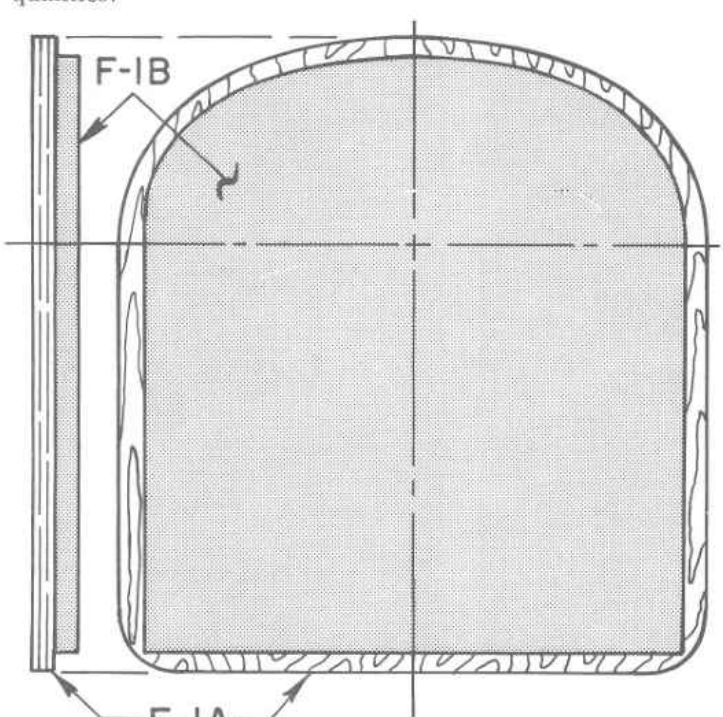
(d.) Since the addition of the 1/32" plywood doublers (FD) will cover up the printed positions of the fuselage formers and the notch for LGD mark the location of these on the face of the bottom 3/16" longeron with a pencil.

(e.) Glue on the 1/32" plywood doublers. They may need some touching up along the edges with a sanding block to fit down perfectly into place.

(f.) Notch the 3/16" sq. bottom longerons 1/16" deep, at the marks for the LGD so that LGD will later fit down against the 3/32" cabin floor doubler FBD.

(3.) FIREWALL ASSEMBLY

(a.) The firewall is made by gluing the two 1/8" plywood die-cut parts F-1A and F-1B together to form a 1/4" thick firewall. See the full-size drawing of the firewall in this book for placement of the two parts in relation to each other. Use Sig Epoxy glue, for its strength and fuel proof qualities.



Firewall Assembly

(b.) The engine may be mounted vertically or horizontally. If a horizontal mount is chosen, use a Tatone EM-1 manifold to discharge the exhaust outside the cowl. (See photos of the manifold installation in this booklet.) The vertical installation is best if you wish to use a muffler. The vertical installation is also best if you wish to fly without either a muffler or a manifold, since the exhaust emission is out in the open enough not to cause any trouble when ejected into the airstream. No down thrust or right thrust engine offset was used on the prototype. The motor was mounted zero-zero with good results. If your personal preference is for offset, be certain to allow for this when mounting the cowling and fitting the spinner.

(c.) It is best to install the engine mounts and landing gear bracket before the firewall is attached to the fuselage The engine should be mounted on the aluminum mounts so that the spinner backplate is about 3/32" to 1/8" ahead of the cowling. The hole for the tank cap can be installed now. (See Tank section.) The back of the cowling is flush with the back of the firewall unless you need a bit more room for an extra large or long engine, in which case it can be mounted on the cowl blocks with only about 1/16" lapping over the firewall, thereby gaining 3/16" in cowl length. For some smaller engines you may need to shorten the cowl slightly to get the prop drive washer outside the front when the engine is at the end of the mounts. A 1-3/4" Carl Goldberg spinner was used on the prototype model. Note that the backplate on the Goldberg spinner has a recessed back, so the engine must be mounted about 1/8" farther ahead on the mounts than when using other brands of spinners. This is not a problem, but it is best to have the spinner on hand - whatever the brand - when installing the cowl, to be sure of good alignment.

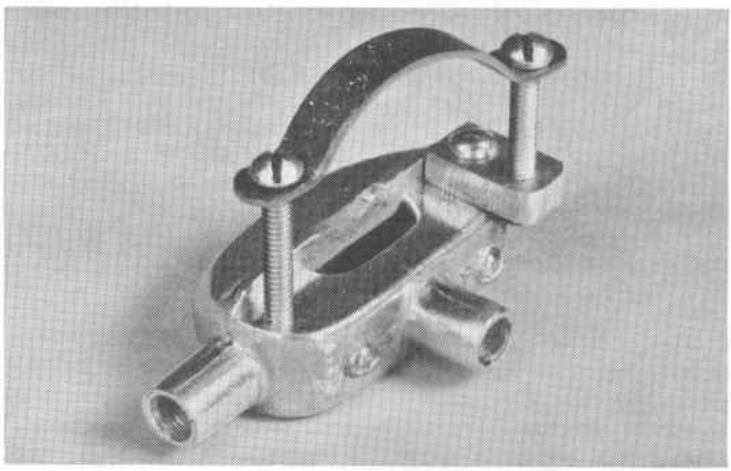
(d.) Drill out the mounts to match the engine being used. A No. 43 is the correct size number drill or a 3/32"

diameter could be substituted. Tap the holes with a 4-40 size tap.

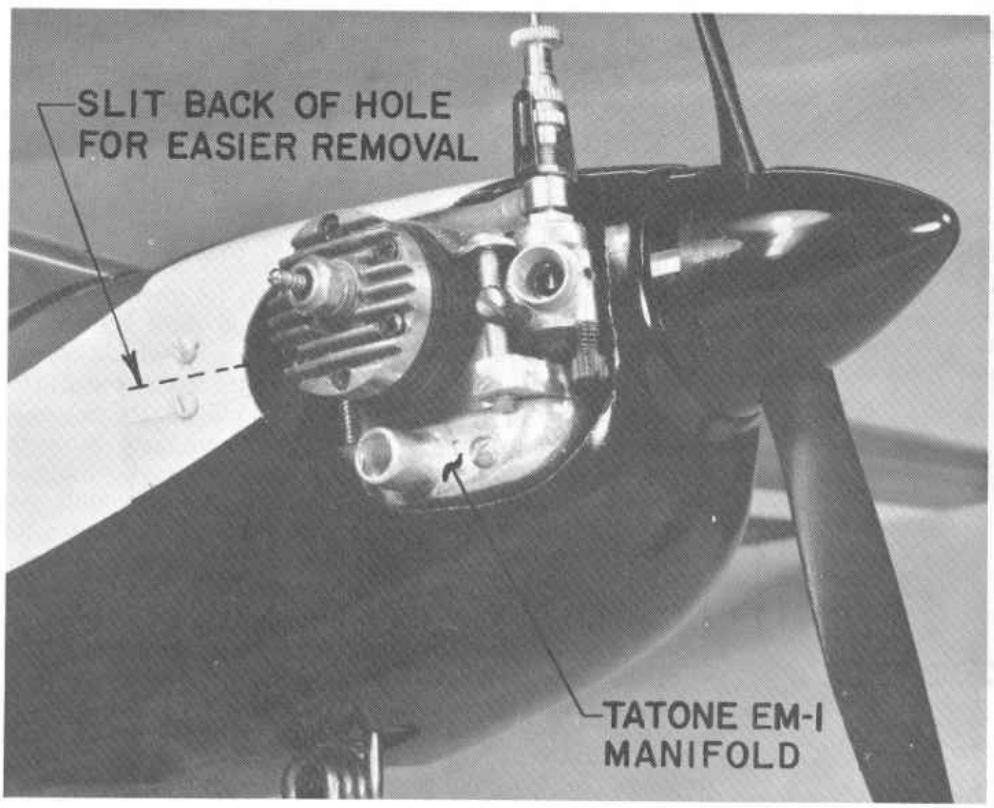
(e.) With the firewall laying face up on the work bench, place the mounted engine in the approximate location on the firewall with several spots of five minute epoxy on the edges of the mounts. Set the cowling in place over the mounted engine until the spinner backplate is in the right spot to line up exactly with the cowling. Allow the epoxy glue tacking spots to set up. Remove the cowl. Mark the location of the mount holes and drill out. Epoxy 4-40 blind nuts to the back of the firewall to retain the motor mounts.

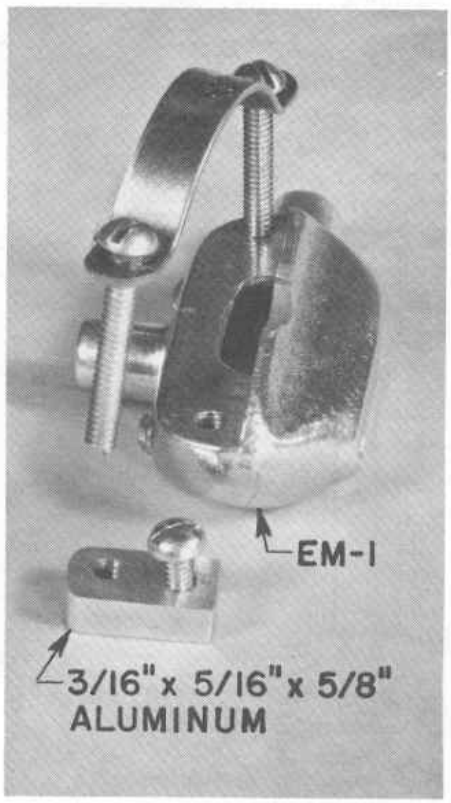
(f.) The nose gear bracket is positioned as shown on the fuselage nose plan and holes drilled for installation of 4-40 blind nuts on the back of the firewall to hold the bracket in place. Cover the openings in the blind nuts with a small piece of plastic tape so that the glue will not ooze into them when the firewall is being epoxied to the fuselage.

The engine may be mounted upright or horizontal. Upright mounting is simpler to install and is shown at right, above. The tank should be mounted higher in the fuselage with an upright engine. For a horizontal mounted engine, a Tatone EM-1 manifold is suggested to carry the exhaust out of the cowling. It will fit most .15 engines. However, in the case of the O.S. 15 used in the prototype Klipper, there was not enough clearance between the head and carburetor to pass the EM-1 front mounting bolt. So a modification in the mounting was made with a piece of 3/16" x 5/16" x 5/8" aluminum, tapped for the 6-32 mounting bolt. This staggered the mounting strap enough to get the front bolt far enough ahead of the carburetor to allow attaching the manifold. Details are shown in the pictures at right. Rubber tubing is supplied with the manifold to fit over the outlet tube. Put a 2" piece of this tubing on the outlet tube so that the oil and fuel residue from the exhaust will be carried clear of the fuselage. Cut a slit through the back of the cowl on the horizontally mounted engine. This allows the cowling to be flexed around the cylinder head while being put on the fuselage. In the picture below, the slit was concealed with a piece of white tape for better display appearance, though the slit is not conspicuous.



Engine Installation



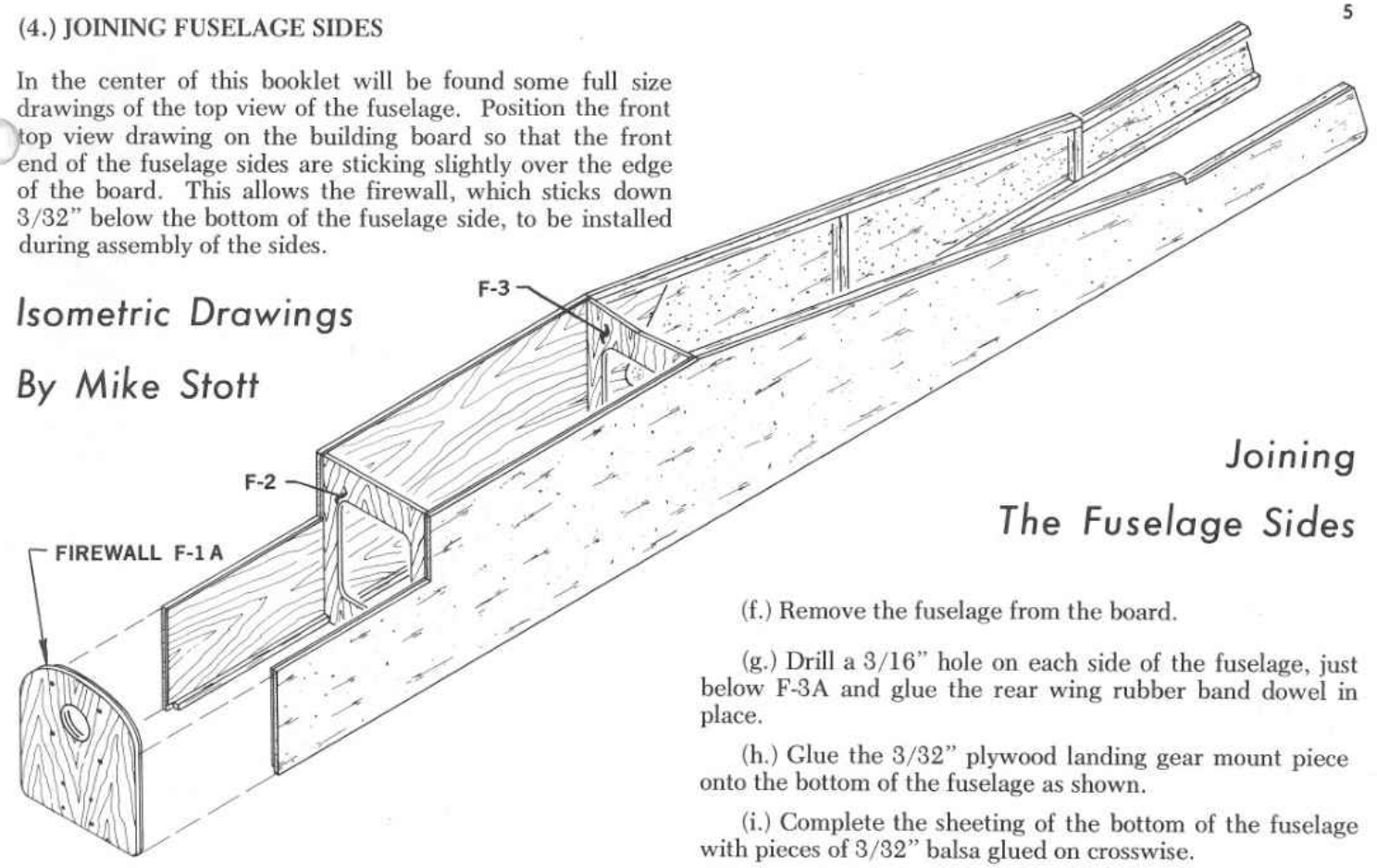


(4.) JOINING FUSELAGE SIDES

In the center of this booklet will be found some full size drawings of the top view of the fuselage. Position the front top view drawing on the building board so that the front end of the fuselage sides are sticking slightly over the edge of the board. This allows the firewall, which sticks down 3/32" below the bottom of the fuselage side, to be installed during assembly of the sides.

Isometric Drawings

By Mike Stott



Joining The Fuselage Sides

(a.) Assemble the fuselage sides over the front top view drawing. Glue plywood formers F-2 and F-3 in place first.

(b.) Next, add the firewall. Use epoxy. Allow to set.

(c.) Move the fuselage over to the rear top view drawing and pin in place from F-3 forward.

(d.) Pull the rear ends of the fuselage sides together and join with 3/16" crosspieces. Hold with pins and tape until dry.

(e.) Glue balsa former F-3A to the back of F-3.

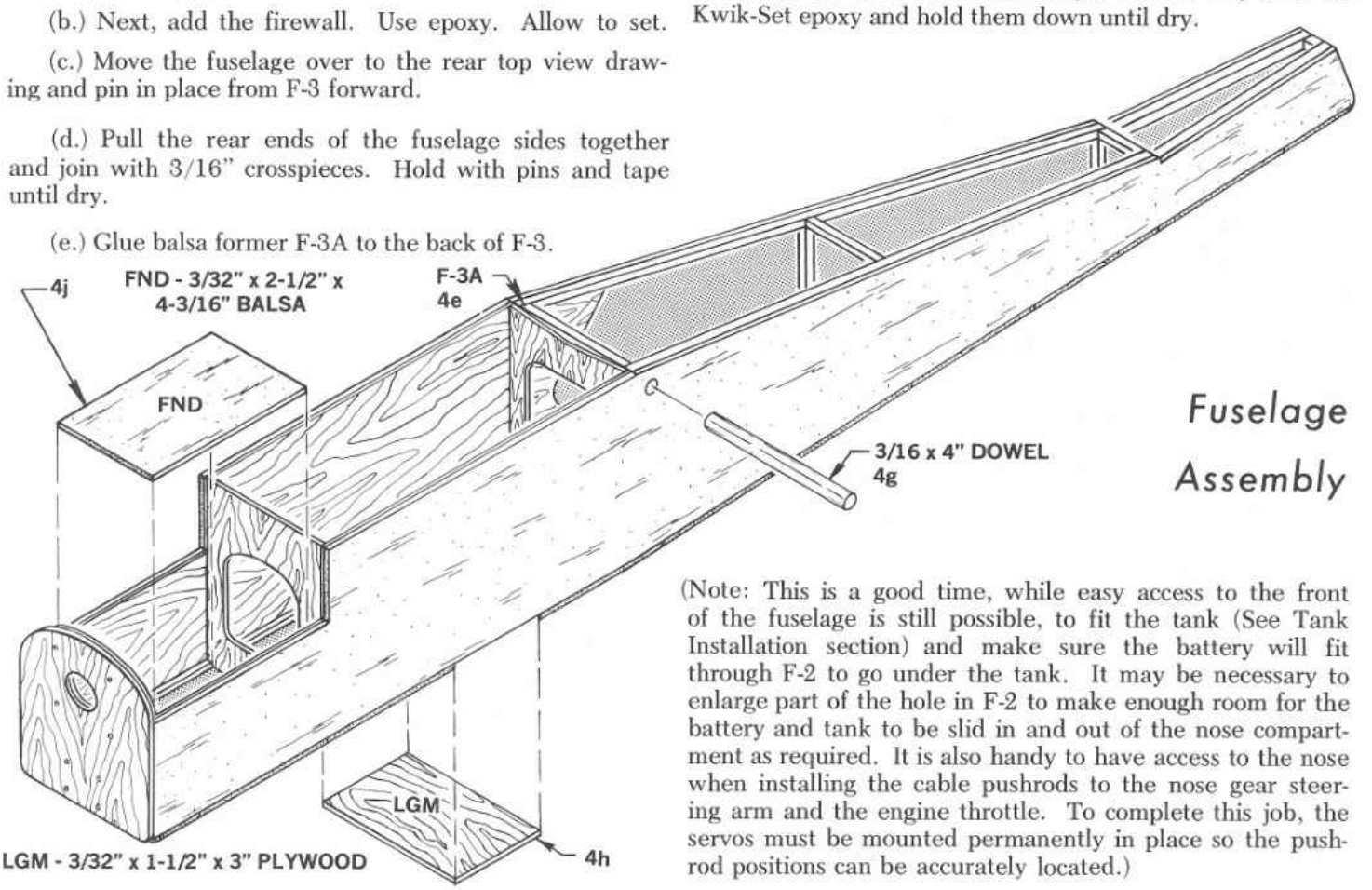
(f.) Remove the fuselage from the board.

(g.) Drill a 3/16" hole on each side of the fuselage, just below F-3A and glue the rear wing rubber band dowel in place.

(h.) Glue the 3/32" plywood landing gear mount piece onto the bottom of the fuselage as shown.

(i.) Complete the sheeting of the bottom of the fuselage with pieces of 3/32" balsa glued on crosswise.

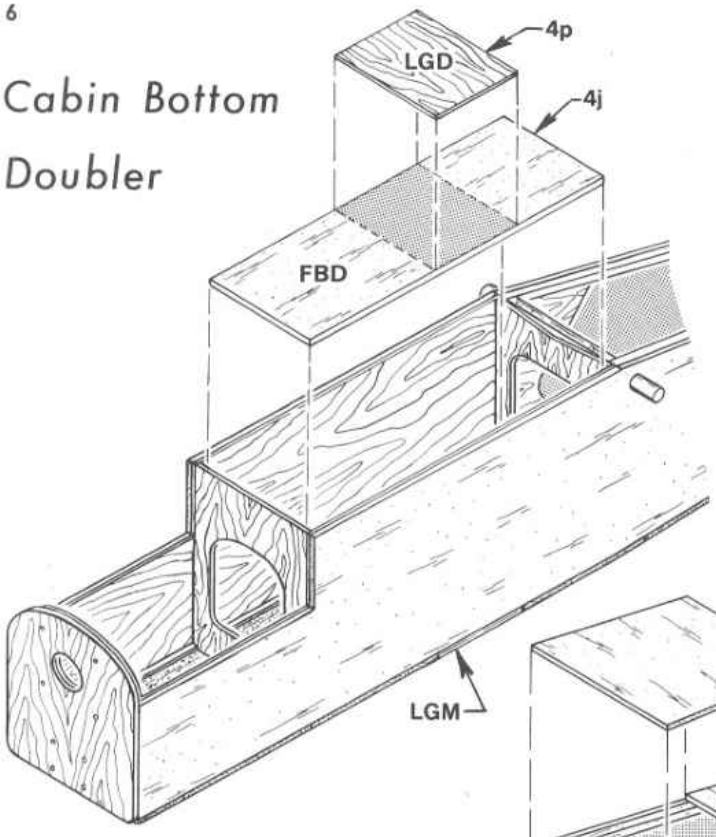
(j.) Glue the 3/32" sheet balsa bottom doublers, FND and FBD, into the bottom of the fuselage. Easiest way is to use Kwik-Set epoxy and hold them down until dry.



Fuselage Assembly

(Note: This is a good time, while easy access to the front of the fuselage is still possible, to fit the tank (See Tank Installation section) and make sure the battery will fit through F-2 to go under the tank. It may be necessary to enlarge part of the hole in F-2 to make enough room for the battery and tank to be slid in and out of the nose compartment as required. It is also handy to have access to the nose when installing the cable pushrods to the nose gear steering arm and the engine throttle. To complete this job, the servos must be mounted permanently in place so the pushrod positions can be accurately located.)

Cabin Bottom Doubler



LGD - 1/16" x 1-1/2" x 2-3/4" PLYWOOD
FBD - 3/32" x 2-1/2" x 7" BALSA

(k.) Add 3/8" triangular stock braces behind the firewall to brace it to the fuselage sides.

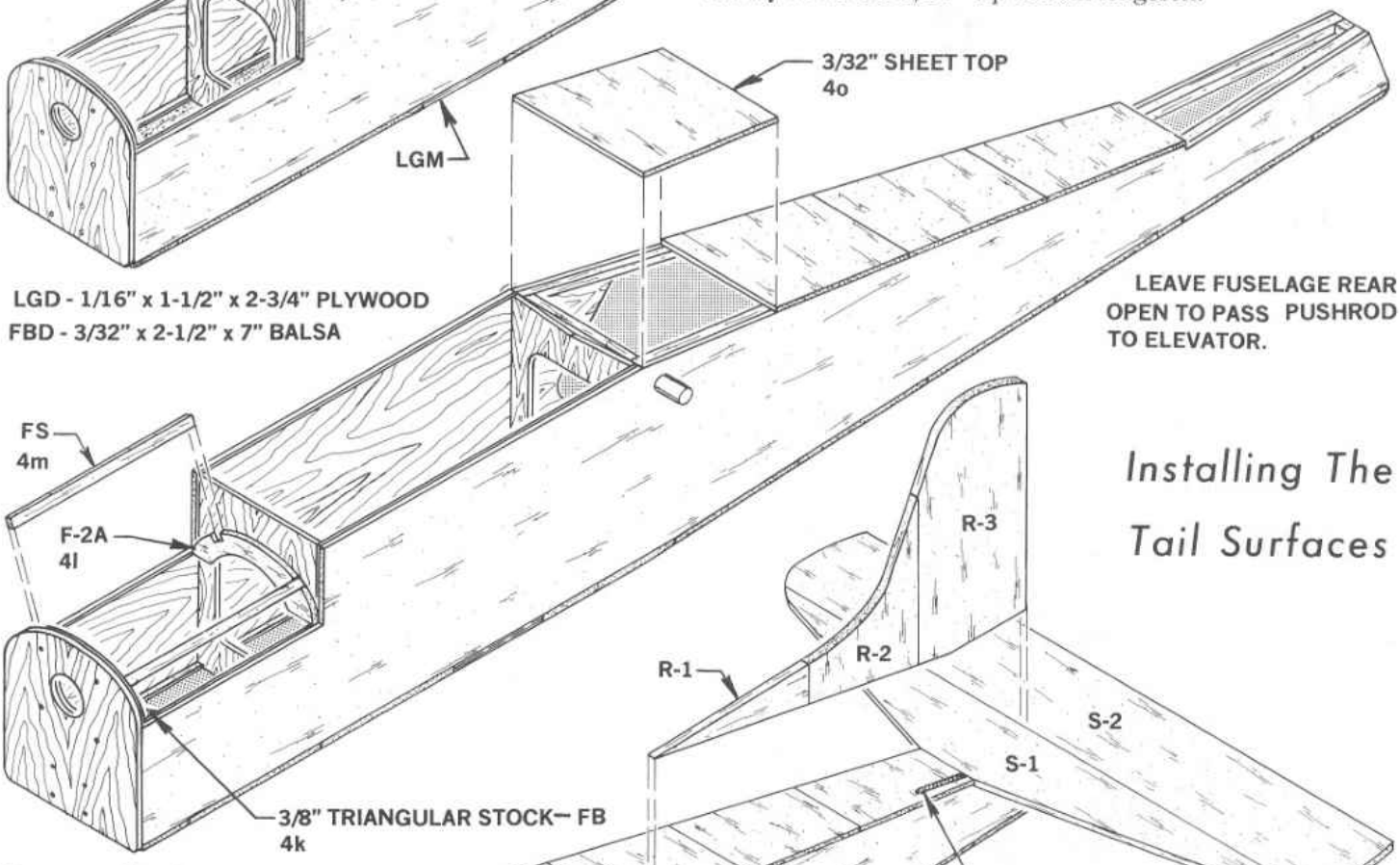
(l.) Glue F-2A to the front of F-2.

(m.) Install the two 3/16" stringers between F-1B and F-2A. The stringers fit into notches in F-2A but are butt-joined to the back face of F-1B.

(n.) Cover the top of the nose with 3/32" sheet balsa, graining running lengthwise. Wetting the top of the pieces with a damp sponge will help them curve into place. Hold until dry with pins or tape.

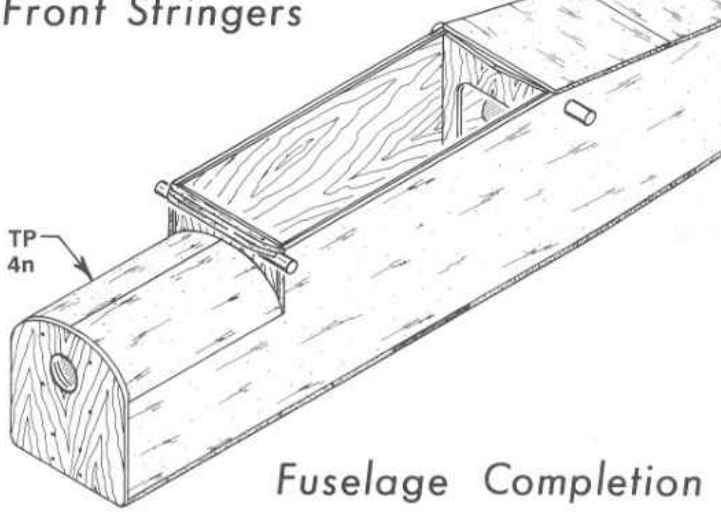
(o.) Cover the top of the fuselage with pieces of 3/32" sheet balsa with the grain running crosswise.

(p.) Glue the interior 1/16" plywood landing gear doubler LGD on top of FBD, locating it in the notches previously cut in the 3/16" sq. bottom longeron.



Front Stringers

Installing The Tail Surfaces



Fuselage Completion

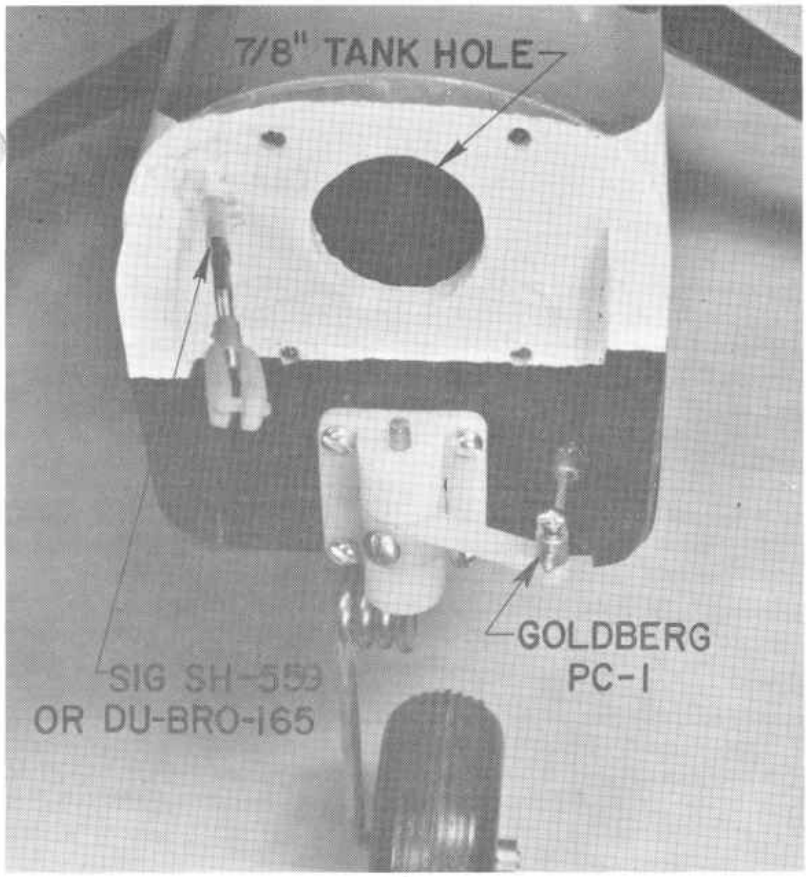
(q.) Sand the entire fuselage smooth. Round the corners with a sanding block.

(5.) FITTING THE WINDSHIELD

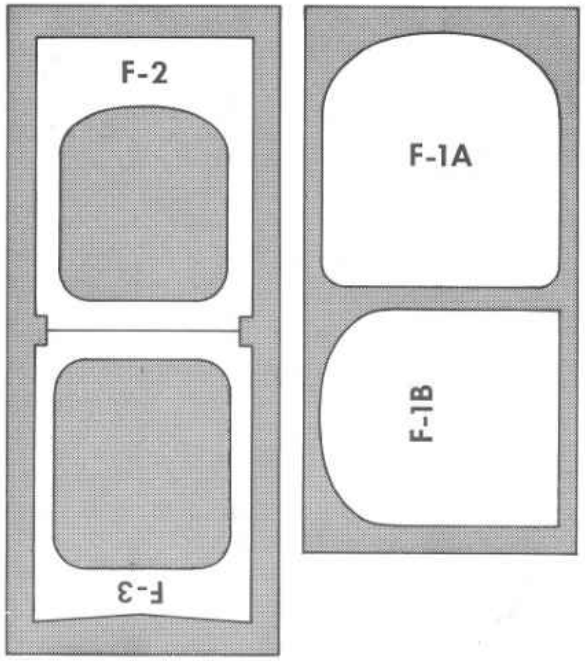
(a.) Tape the foam wing in place on the fuselage with a piece of wax paper between the plywood former F-2 and the front face of the center section streamlined fairing on the foam wing. This will prevent glue from sticking to the foam wing during the next steps.

(b.) Glue former WA in place on top of plywood former F-2, beveling WA as may be necessary to have a good fit against the center section fairing of the foam wing.

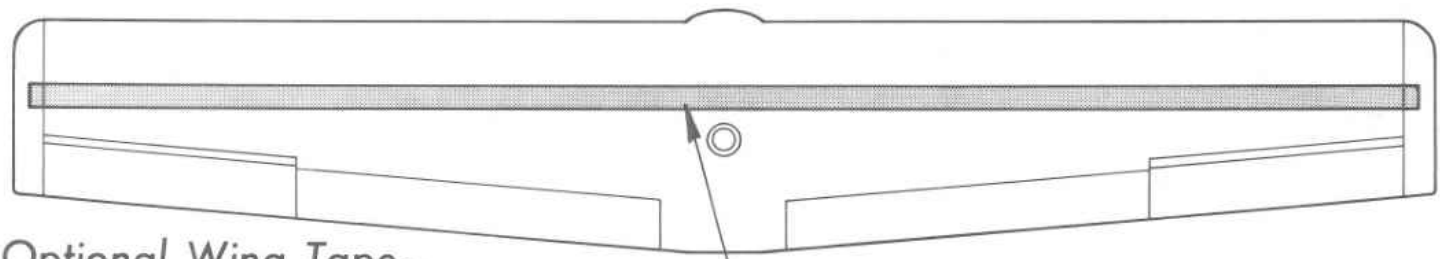
(Continued on page 17.)



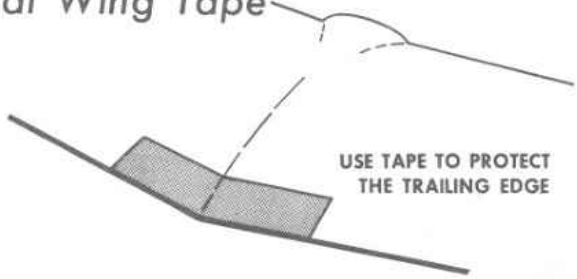
Front End Details



Key To Plywood Parts



Optional Wing Tape



RECOMMENDED:

For extra strength, a strip of 3/4" "Scotch Filament Tape" may be applied spanwise across the bottom of the wing. Apply patches of the tape to the trailing edge at the points where the attachment rubber bands are located. Other brands of non-stretchable and tear resistant tape would also be satisfactory.

RADIO EQUIPMENT REQUIREMENTS:

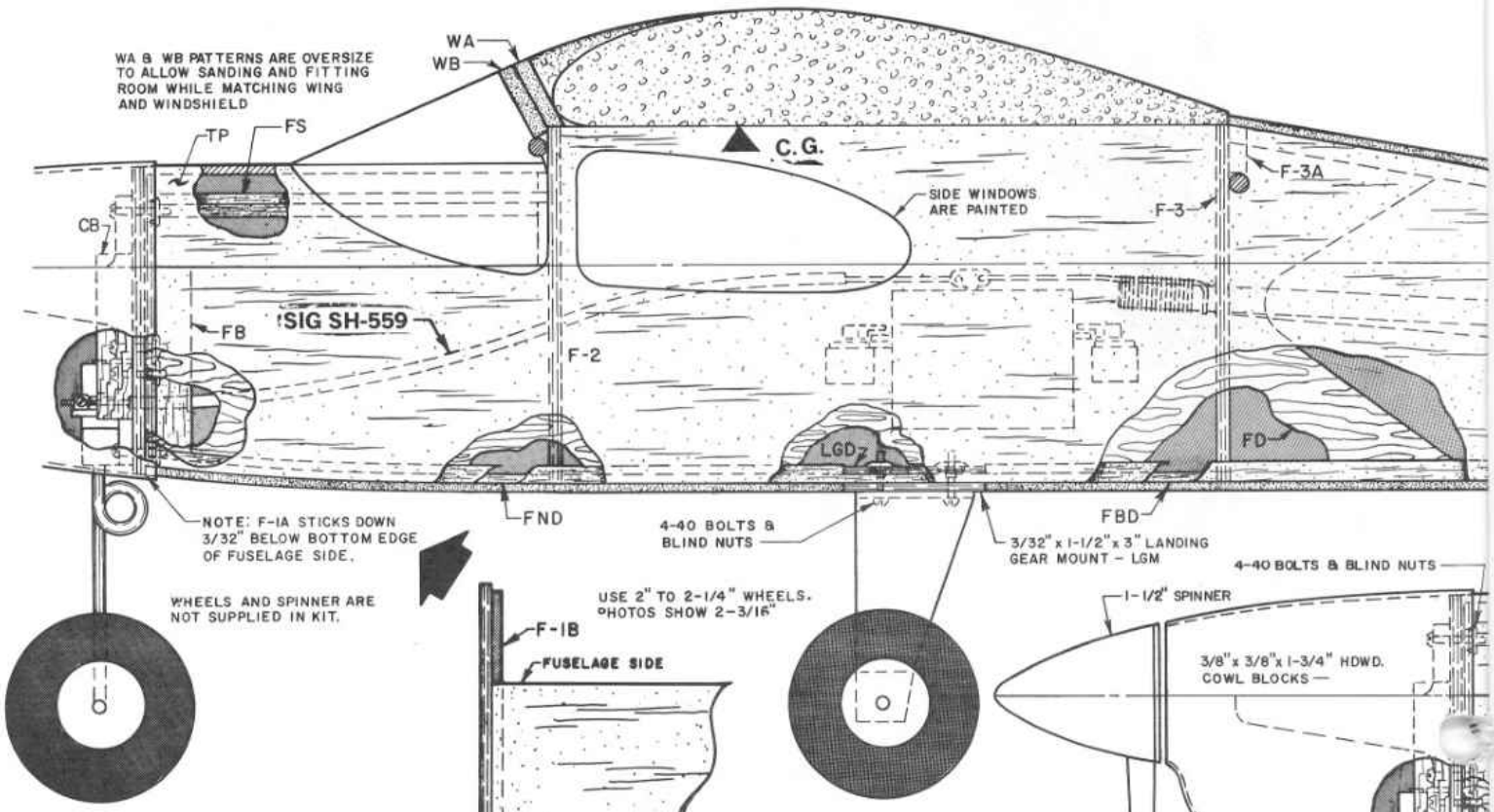
Selection of radio equipment should be based on the amount of money you wish to spend, the type of airplanes you intend to be flying and your future goals. If you plan to stay in the hobby and work up to larger airplanes with complete controls, it might be best to consider purchase of a four, or more, channel set in the beginning. It could be used with three servos to fly the Klipper and later installed in an intermediate aileron trainer like the Sig Komander with the simple addition of another servo. This would eliminate the necessity of disposing of a initial investment in beginner's equipment of less than 4 channels and buying a new set when your flying skills are ready for an advanced model. IMPORTANT: If the Klipper is flown with 4 channel radio equipment, plug the rudder servo into the receiver outlet marked "aileron". This will enable you to develop the proper left and right reactions that will later be needed when advancing to an aileron-controlled model. On an aileron model, the rudder is used only for ground steering and some specialized aerobatic maneuvers. Getting used to this extra function, using your other hand, is a much easier transition from three to four channel operation than would be the case if you had to change hands on the primary turning function. (Which would be required if you had been flying the Klipper with the rudder servo plugged into the "rudder" output socket of the receiver.) The important thing you are learning is an automatic left and right reaction on a particular transmitter stick with a particular hand. Forget which control surface is doing the turning on the Klipper, assume that the rudder is an aileron.

Fuselage Top View

SCALE: 1/2 ACTUAL SIZE

WING AND TAIL ARE ZERO INCIDENCE. NO THRUST OFFSET WAS USED. 0° - 0° MOTOR ANGLE.

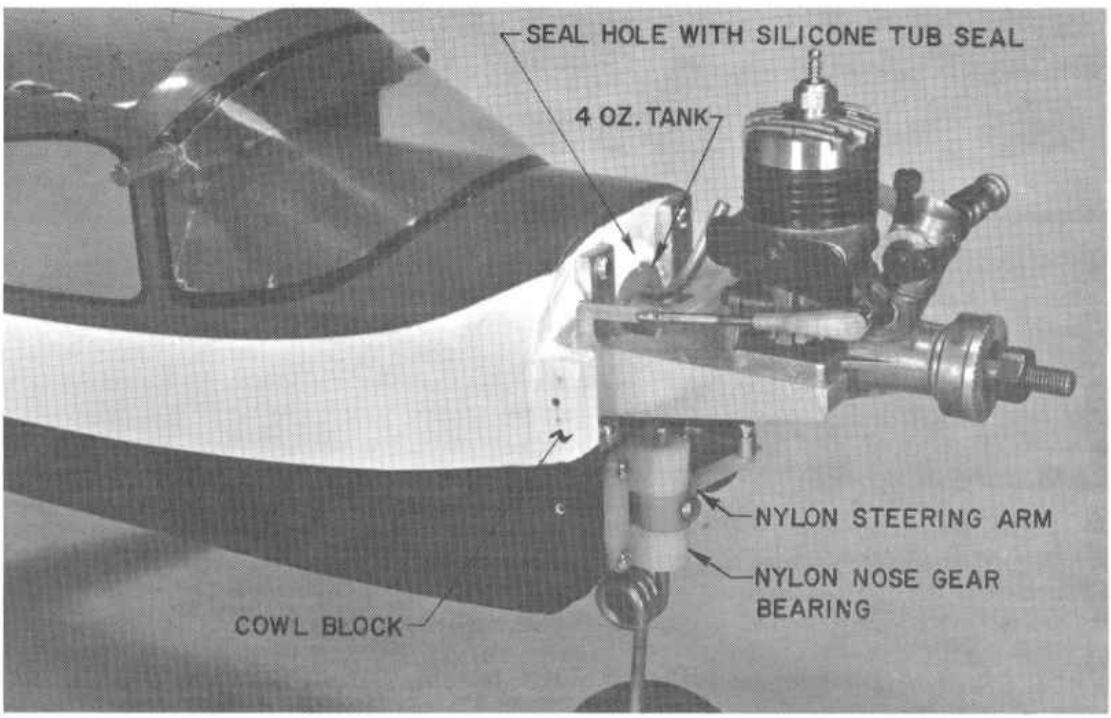
SIG CRAFTSMAN'S KIT

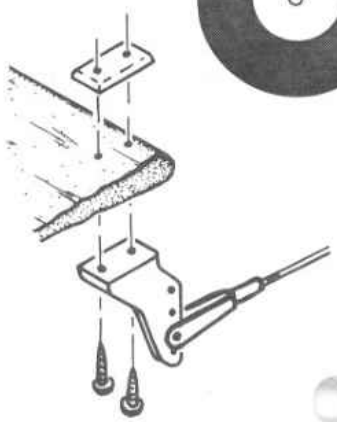


BALANCE - 2" BACK FROM LEADING EDGE.

USE MIDDLE HOLE ON NOSE GEAR STEERING ARM.

Upright Engine Installation View





IF THE RC LINK FITS TOO TIGHTLY IN THE NYLON HORN HOLES, DRILL THE HOLES OUT WITH A NO. 51 SIZE DRILL.

Nylon Control Horn

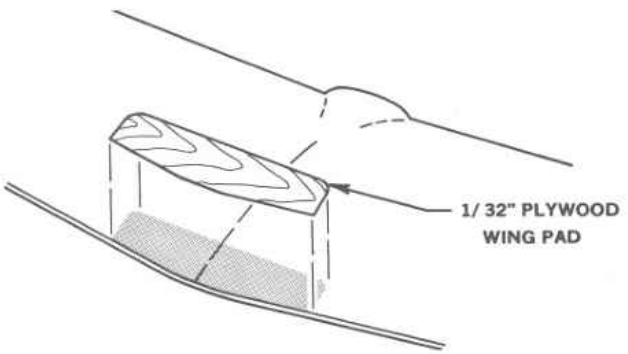
FOAM WING INSTRUCTIONS

CAUTION: Never let solvent base model cement, cyanoacrylate adhesive, dope, lacquer, or fiberglass resin come in contact with the foam wing. These products will all melt foam on contact. Epoxy glues can be used on the foam wing if repairs become necessary. Test all other products on a scrap of foam before use on the wing.

The wing is fuel resistant and could be left completely uncovered and unpainted. However, this is not recommended as finishing will greatly increase the life of the wing. Two different approaches to finishing a foam wing are outlined below - Method I discusses painting, and Method II uses an iron-on plastic covering material. Read about both methods before deciding which seems best for you.

Before finishing the wing by either method, use a sanding block with 250-400 grit sandpaper to remove any mold flash from the leading and trailing edges of the wing. Avoid sanding too long or too hard in one spot and changing the shape of the airfoil. Next very lightly sand over the entire wing surface with very fine 400-600 grit paper to knock off the tiny molding vent marks.

Use scrap 1/32" ply from the fuselage doubler to make a WING PAD which protects the foam wing's trailing edge from the rubber bands that will be used to hold the wing onto the fuselage. Epoxy the pad in place on the top of the wing along the trailing edge.



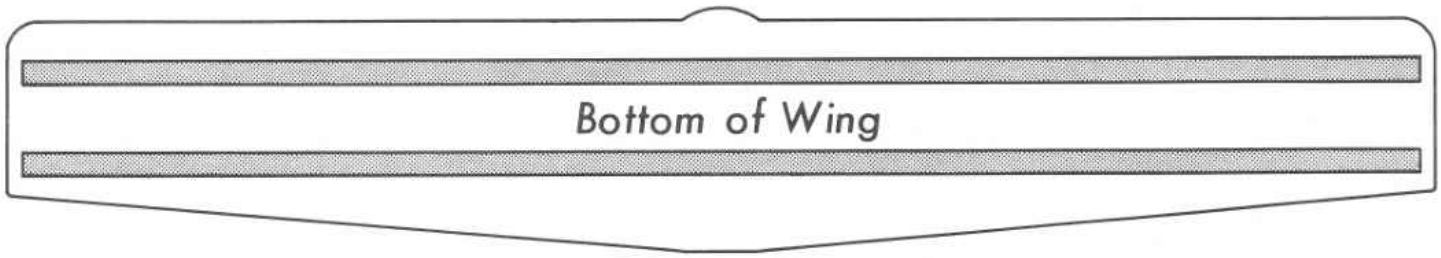
METHOD I:
The wing of the first prototype model pictured on the label was painted with SIG PLASTINAMEL. This special paint is ideal for the wing since it is completely compatible with the foam and provides a glossy and fuel proof finish. After sanding, the entire wing was painted overall with white PLASTINAMEL. Plastinamel cannot be sprayed - the extra thinner needed for spraying will attack the foam. It must be brushed on, but it smoothes out readily after application. Two coats are usually desirable. Sand lightly with fine paper after the first coat to remove any bumps or "fuzz". The second coat will then go on perfectly smooth. Allow plenty of drying time between coats. Because of the beaded surface of the foam, masking tape does not work very well for applying trim colors. On the prototype model pictured, the red wing tips were brushed on freehand using a pencil guideline to get it fairly straight. After the paint was dry, 1/4" wide black striping tape was used to cover up the irregular line. Another alternative is to use a "ruling pen" (as used in mechanical drawing) to outline the trim color area with Plastinamel and then fill in between the lines with a brush. Use a ruler and/or french curves to steady and guide the ruling pen.

METHOD II:
A low heat iron-on covering material can be applied successfully on the molded foam wing if a few basic precautions are followed. Any covering material involving the use of heat over 150° F. should be used with EXTREME CAUTION, as this high heat can melt or warp the foam wing. SIG POLYKOTE or ECONOKOTE by Top Flite is recommended. Do not use Super Monokote or Coverite. A small electric household iron or a Top Flite Sealing Iron are best for applying the covering material to the wing. Having your iron set at the correct working temperature is very important. Experiment until you reach the proper setting needed to bond the covering to the wing while not harming the foam. This is usually just below the "perma-press" setting on a household iron or at No. 1 ½ on the Top Flite Sealing Iron.

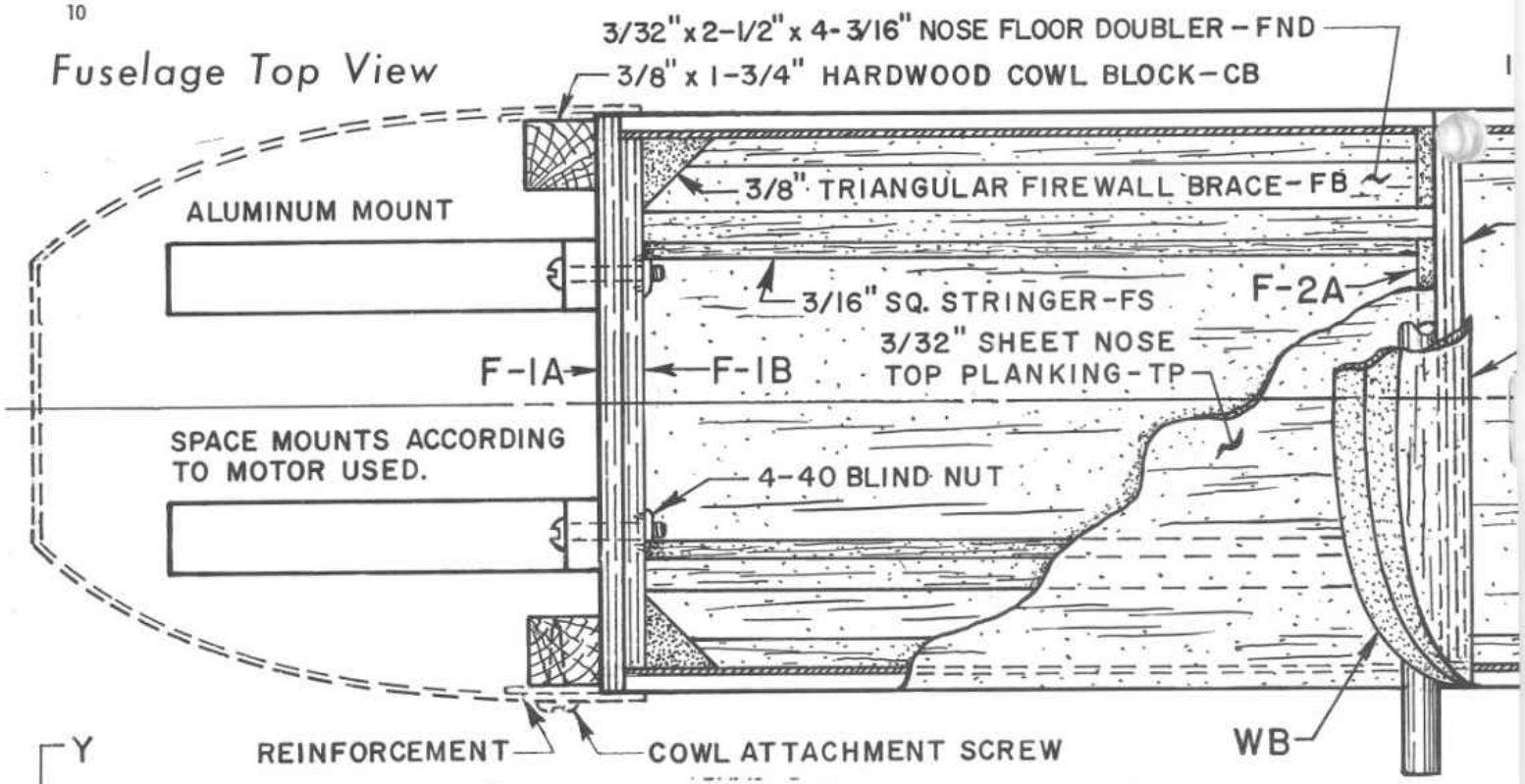
The instructions with the covering explain the covering techniques very thoroughly, so they won't be repeated here. The only big difference in covering a Scamp foam wing as opposed to a balsa structure is that we do not recommend the use of a "heat gun" (or hair dryer) to shrink the covering after the edges have been sealed down. Our experience shows that it is very difficult when using a heat gun, to avoid putting too much heat too long in one area, causing the wing to warp. The sealing iron, set at low heat, takes slightly longer but is much safer to use in shrinking the covering. After getting all the wrinkles out, use the iron to bond the covering to the foam over the entire surface of the wing - not just around the edges as is often done with a balsa wing. Apply only slight pressure with the iron. Let the heat do the bonding.

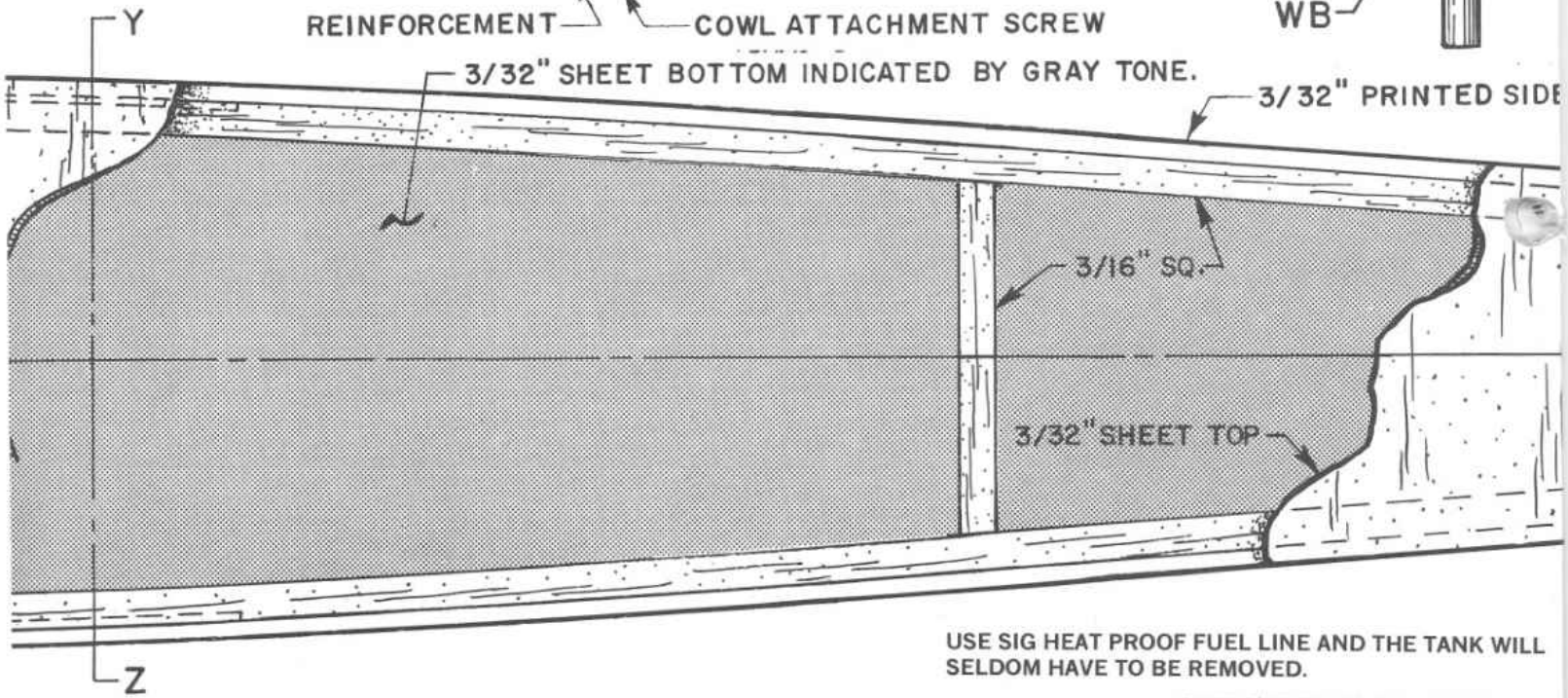
EITHER NYLON RC LINKS OR BLACK METAL LINKS ARE BEING FURNISHED IN THIS KIT. IF THE PINS FIT TOO TIGHTLY IN THE NYLON HORNS, OPEN UP THE HOLE WITH A NO. 51 DRILL.

IMPORTANT NOTE: For extra strength, two strips of ¾" wide "Filament Tape" should be applied spanwise across the bottom of the wing as shown. See SIG catalog for "Nylon Filament Tape", SH-571, ¾" x 18' roll. Other brands of non-stretchable, tear resistant tape (such as 3M "Scotch Filament Tape") would also be satisfactory. If you paint your wing as outlined above, do not apply the tape until after the painting is complete and dry. If you are covering your wing with iron-on plastic, put the tape on before covering.



Fuselage Top View

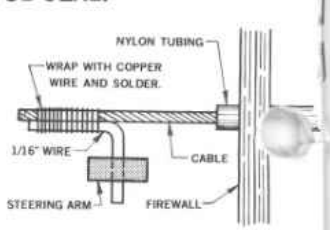




USE SIG HEAT PROOF FUEL LINE AND THE TANK WILL SELDOM HAVE TO BE REMOVED.

SUPPORT TANK ON BOTTOM AN REAR WITH TEMPORARY SCRAP PIECES AND PAPER OR FOAM STUFFING.

SEAL FIREWALL HOLE AROUND TH FUEL TANK CAP WITH SILICON BATHTUB SEAL.



ALTERNATE METHOD OF HOOKIN ROD CABLE TO NOSE GEAR STEER

Additional Materials List

IN ADDITION TO THE KIT CONTENTS YOU WILL NEED THESE ITEMS TO COMPLETE THIS MODEL.

.09 to .15 cu. in. Engine

1-1/2" Spinner

4-40 Engine Mounting Screws
(Can be bolts and nuts used in untapped holes or (recommended) socket head bolts used with tapped mount holes. 4 required.)

Propeller: 7"-4" for .09 Engines
8"-4" for .15 Engines

Tank: 2 oz. Round Plastic Clunk Tank for .09
4 oz. Round or Rectangular Plastic Clunk Tank for .15

Sig Heat Proof Fuel Line to Fit Engine Used.

Covering and Finishing Materials
(Recommended: 1 Sheet 24" x 36" of G M Silkspan, 8 oz. of Sig Supercoat or Lite Coat Clear Dope, 4 oz. Supercoat Basic Color, 4 oz. Supercoat Trim Color. If foam wing is to be painted use Sig Plastinamel 4 oz.)

Sig Bond Glue for General Construction

Sig Epoxy or Kwik-Set for Firewall Area

2 to 2-1/4" Diameter Wheels (3 required)

1/8" Wheel Collar for Nose Wheel.
(Wheel can also be retained by soldering a washer on the axle.)

Sig #64 Rubber Bands for Wing Attachment

Radio Equipment - 2 Channels Minimum
(If two channel, control of rudder and elevator are recommended.)

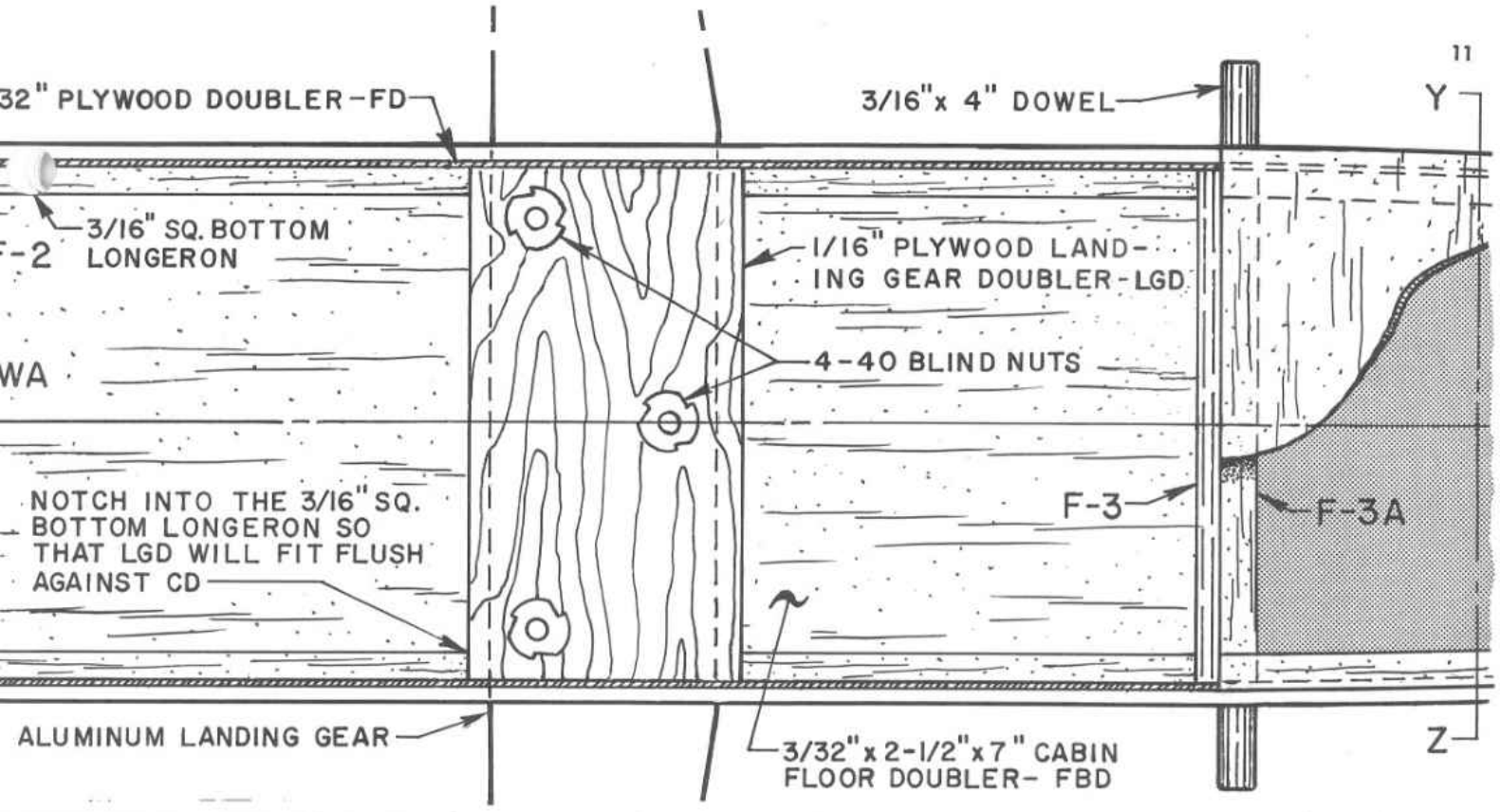
Servo Mounting Materials
(Refer to radio equipment manual for specific instructions.)

1/4" Foam Rubber Sheet for Wrapping Receiver and Battery Pack.

Flexible Pushrod for Nose Gear Steering

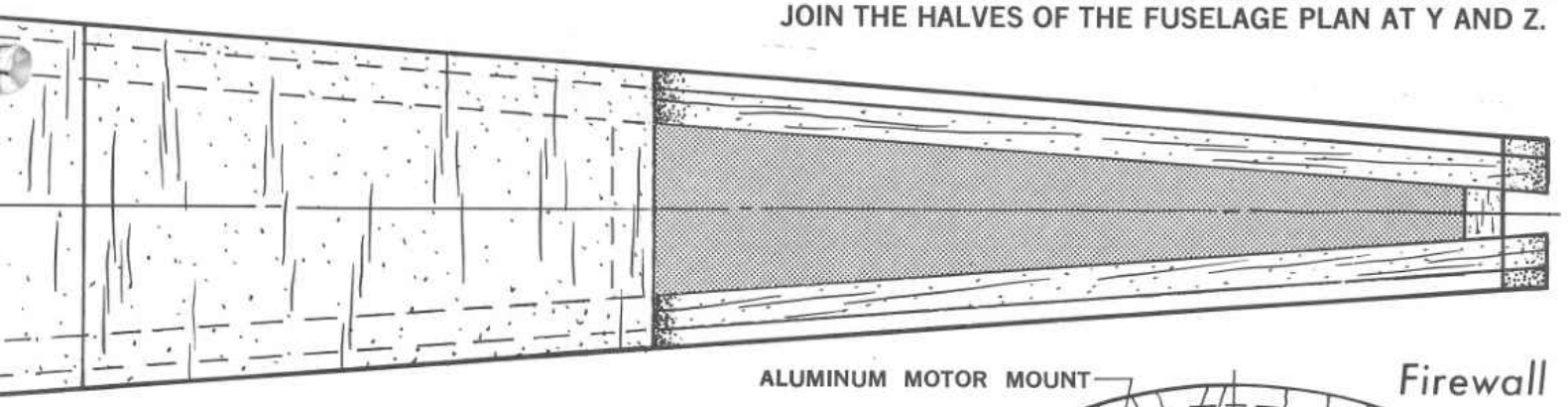
Throttle Pushrod with Nylon R/C Link
(See Landing Gear Section (10.), Page 14, for recommendations on pushrods for nose gear and throttle.)

Basic Modeling Tools - Pins, Modeling Knife, Drill, Sandpaper, etc.



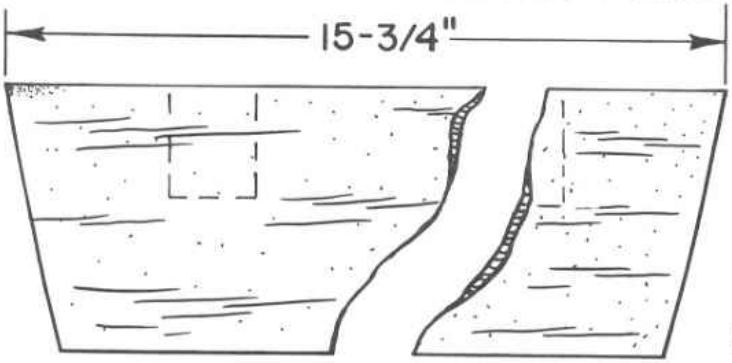
SHOWN WITHOUT WOOD GRAIN

THIS TOP VIEW IS THE ONLY FULL-SIZE PLAN REQUIRED TO BUILD THE KLIPPER. REMOVE FROM THE BOOK AND JOIN THE HALVES OF THE FUSELAGE PLAN AT Y AND Z.



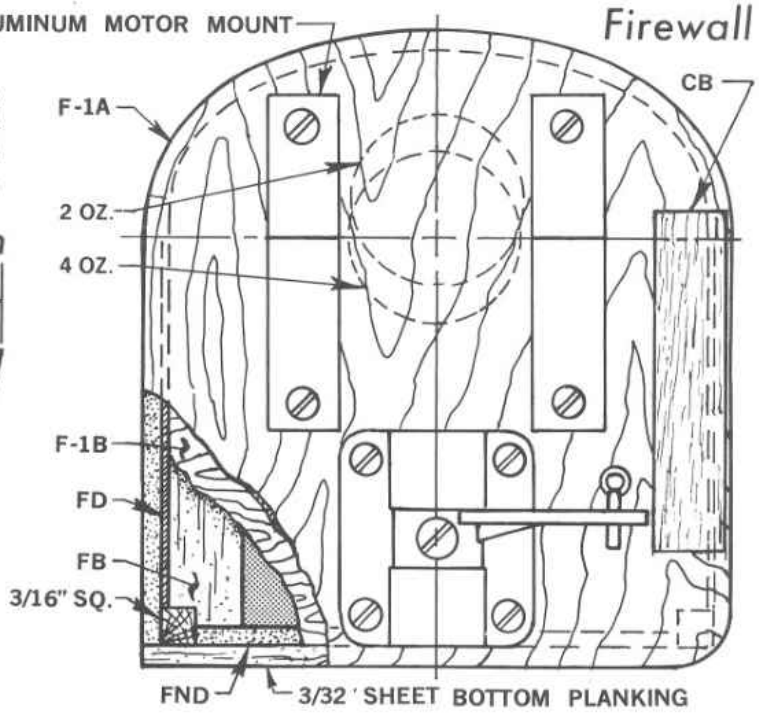
For good adhesion, use epoxy paint on the landing gear. Fine sand the aluminum gear before painting. Dope will go over the epoxy paint for exact color match with the rest of the model, but sand the gloss from the epoxy paint first.

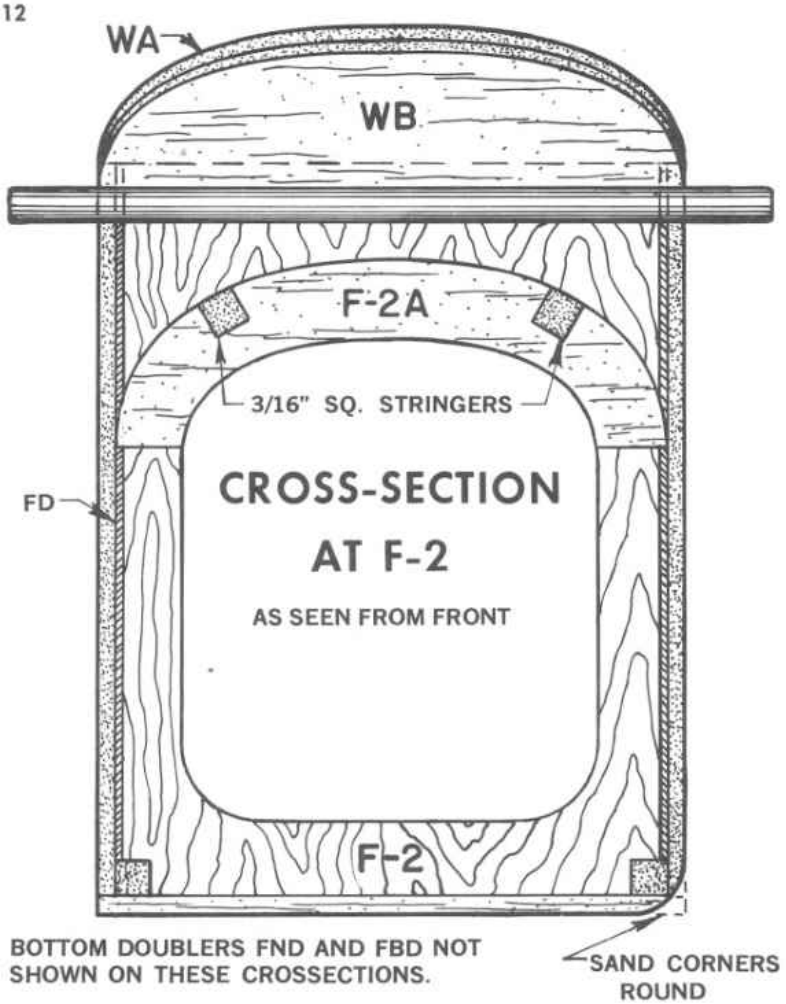
Elevator Pattern

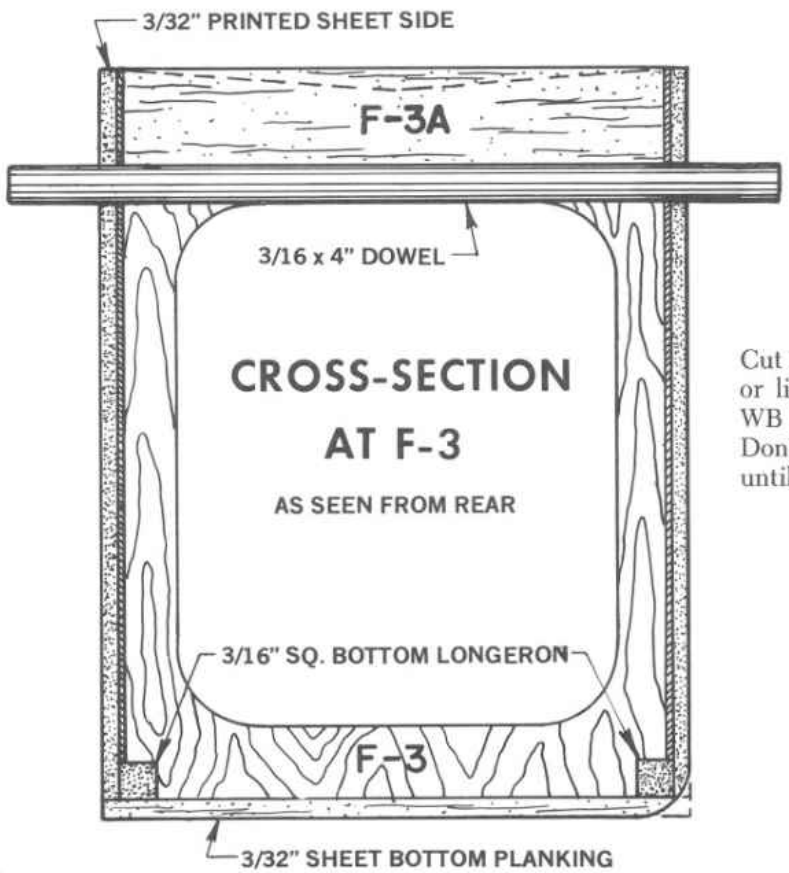


ELEVATOR IS CUT FROM 3/16" x 1-3/8" USING THIS PATTERN FOR THE TIPS.

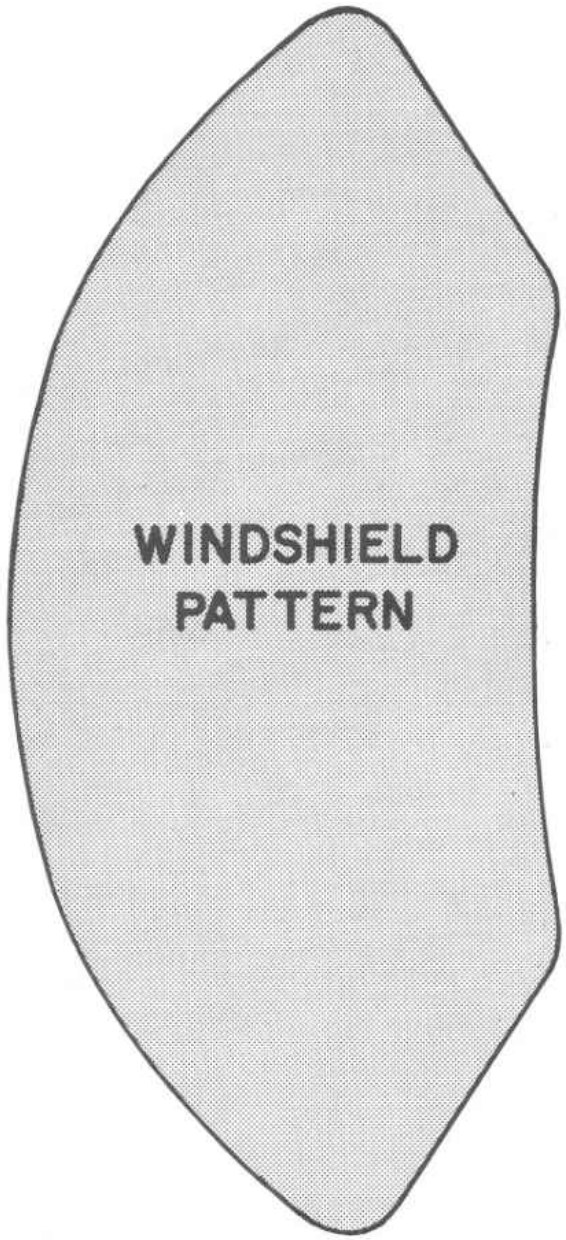
PUSH-
G ARM.







Fuselage Cross-Sections

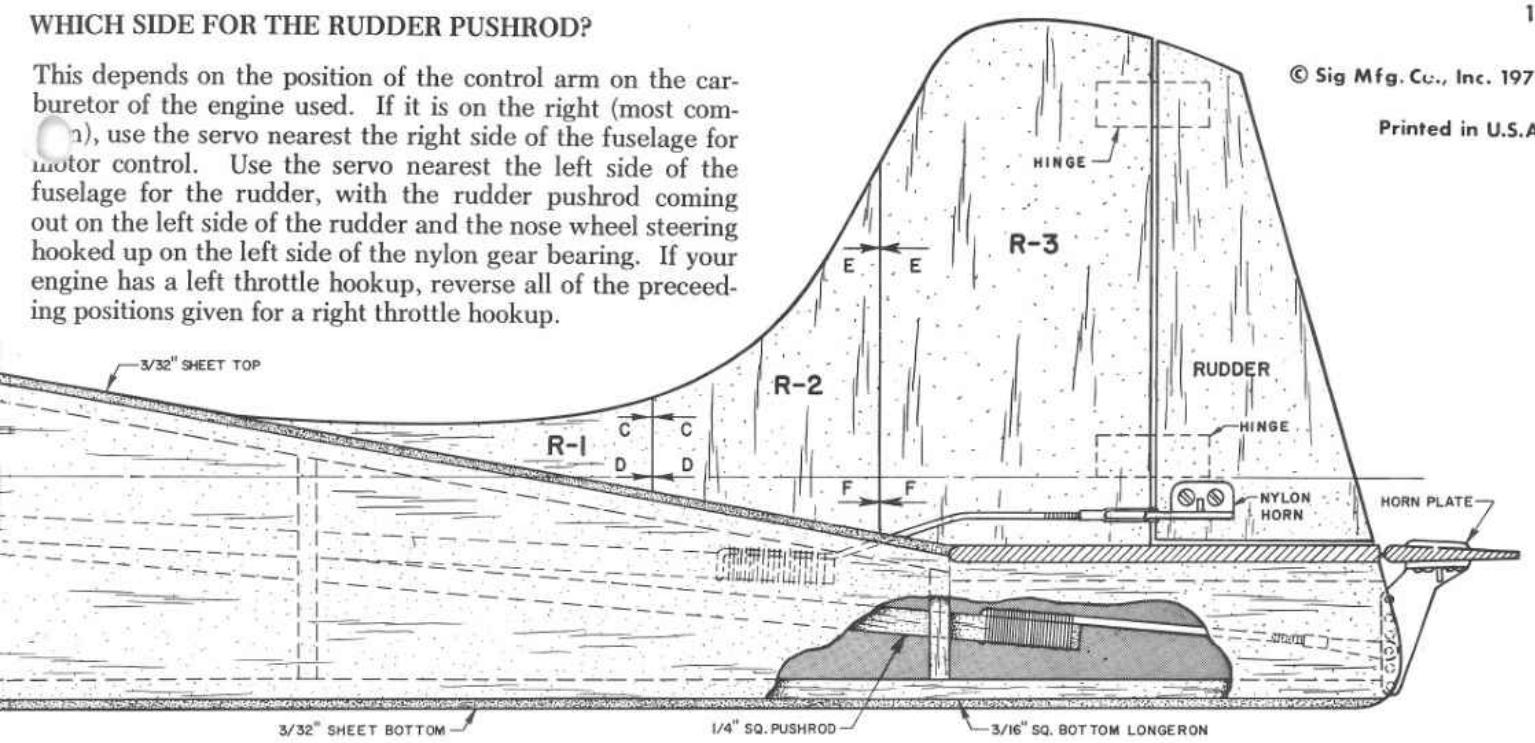


Windshield

Cut out a duplicate of the paper pattern from heavy paper or light weight cardboard. Use it while shaping WA and WB to match the streamlined center section of the wing. Don't cut out the windshield from the clear plastic sheet until you are satisfied with the fit.

WHICH SIDE FOR THE RUDDER PUSHROD?

This depends on the position of the control arm on the carburetor of the engine used. If it is on the right (most common), use the servo nearest the right side of the fuselage for motor control. Use the servo nearest the left side of the fuselage for the rudder, with the rudder pushrod coming out on the left side of the rudder and the nose wheel steering hooked up on the left side of the nylon gear bearing. If your engine has a left throttle hookup, reverse all of the preceeding positions given for a right throttle hookup.



USE SCRAP WOOD FROM THE PRINTED FUSELAGE SIDES FOR TOP AND BOTTOM PLANKING.

ABOUT BALSA WOOD:

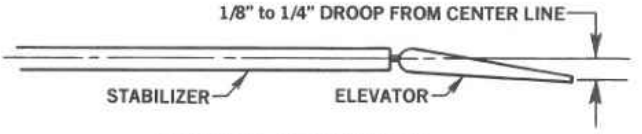
We do our best to put as good a grade of balsa in our kits as the supply situation permits. The world-wide increase in demand for balsa has made it impossible to obtain as high an average quality as used to be the case.

Every piece of balsa supplied cannot be 100% perfect or kit prices would have to be greatly increased. Mineral stains or small knots do not affect wood strength. Even with the very best grades of balsa, there is a natural tendency for some sticks or sheets to immediately bow upon being cut off from a perfectly square block because of built-in stresses. In most cases, these can be bowed back into alignment during building. True up the edges of bowed sheets by trimming, using a metal straightedge to cut along.

IMPORTANT: ELEVATOR SETTING

On most Klippers, the "neutral" or fly-level position of the elevator is with 1/8" to 1/4" of down elevator droop. To test fly, adjust the elevator pushrod link so that when the transmitter elevator trim lever is in full up position, the elevator is zero-zero or level with the stabilizer. Takeoff in this full up trim position. The model will climb steeply, so feed in down trim with the transmitter trim lever until the model flies level. Land and observe this position of the elevator. Adjust the elevator pushrod as required to keep this flight-checked "neutral" position when the transmitter elevator trim lever is centered.

TYPICAL "NEUTRAL" ELEVATOR SETTING



CONTROL MOVEMENTS.

For test flying, the following are suggested:
Rudder - 1/2" each way from neutral
Elevator - 5/16" each way from neutral
Approximate Horn holes to use are shown. Different holes may be required for some servos to obtain desired movement. After test flying, movement may be increased, if desired, for aerobatics.

ose Detail

Stabilizer Assembly

SCALE: 1/2 ACTUAL SIZE

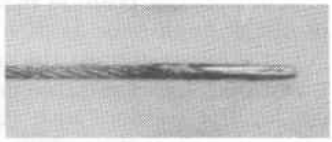
PREPARING CABLE PUSHRODS

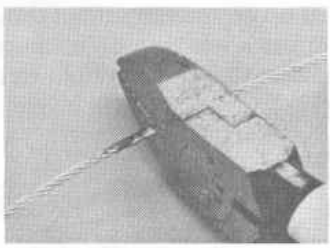
To keep ends of the cable from unraveling during handling, tin the end with solder. Use a non-corrosive paste flux (shown here is Kester, available at hardware stores) and rosin core solder. Have a hot iron and flow the solder completely through the cable.

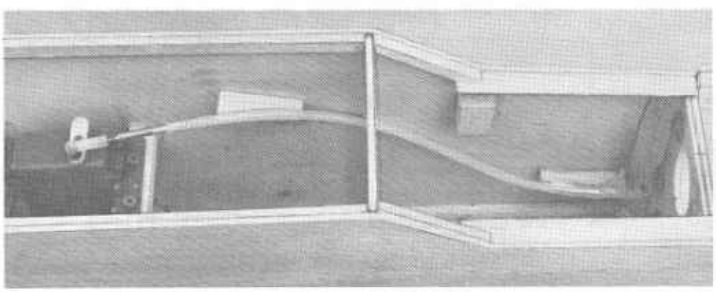
Grind or file the end smooth. Bring it to a point so that it will easily insert into the pushrod fittings.

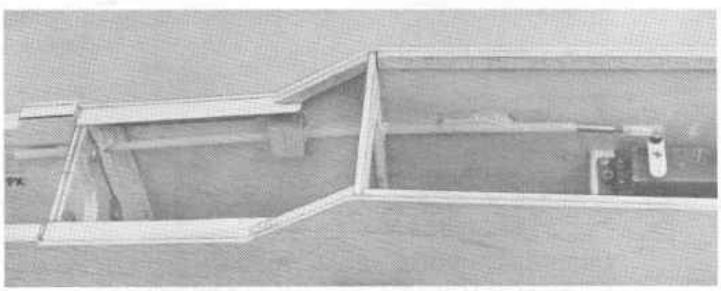
After the proper length is arrived at, sweat solder the area to be cut so that it will not fray and unravel while being cut. It can be cut with a good pair of side-cutting pliers, filed in two, ground through on the edge of a grinding tool, or cut with a silicon cutting wheel on a motor tool.

TUBING-CABLE PUSHRODS NOT FURNISHED IN KIT







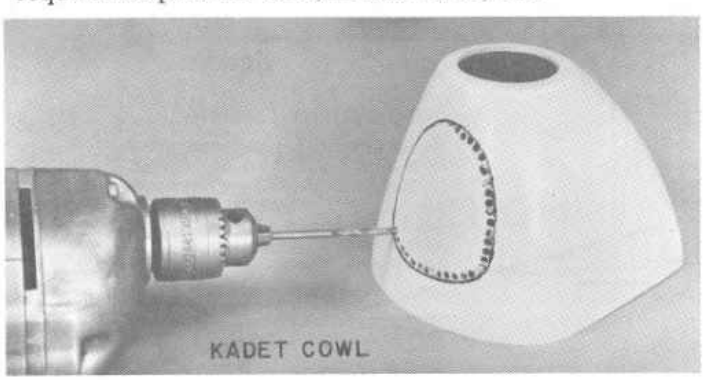


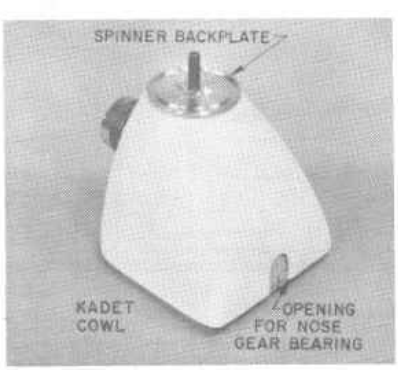
Typical tubing cable pushrod installations use scrap standoff blocks to hold the rods in the desired position.

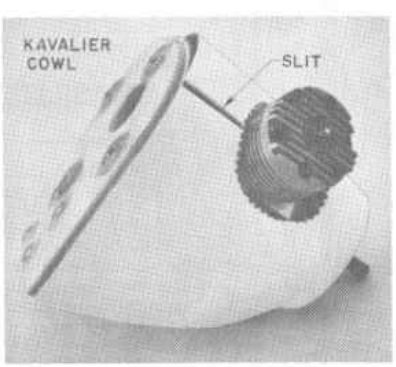
CUTTING HOLES IN THE COWL

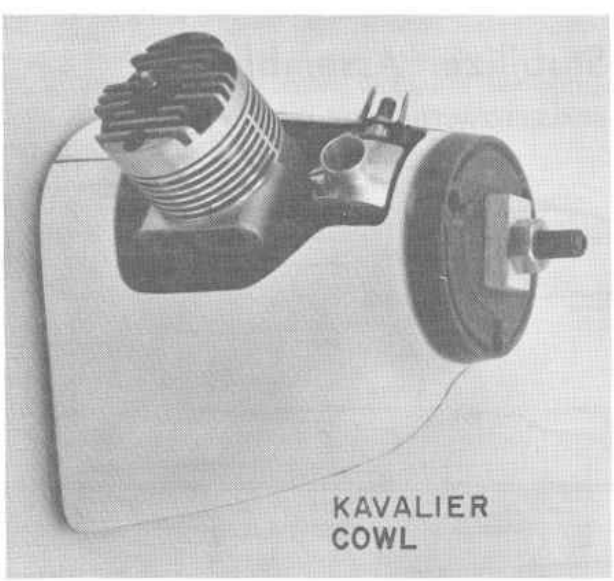
These pictures show other cowlings but the same principles apply to the Klipper cowl. Drill a series of 1/8" holes nearly touching each other. Cut through the wall remaining with a knife. A slit through the back behind the motor will aid removal. Cut the hole for the head with the carburetor off of the motor so it will be out of the way and then enlarge as required to pass the carb, needle valve, etc.

The best way to open up the hole is to go around the edges with an "apple-peeling" motion, paring off a small amount of plastic with each stroke.



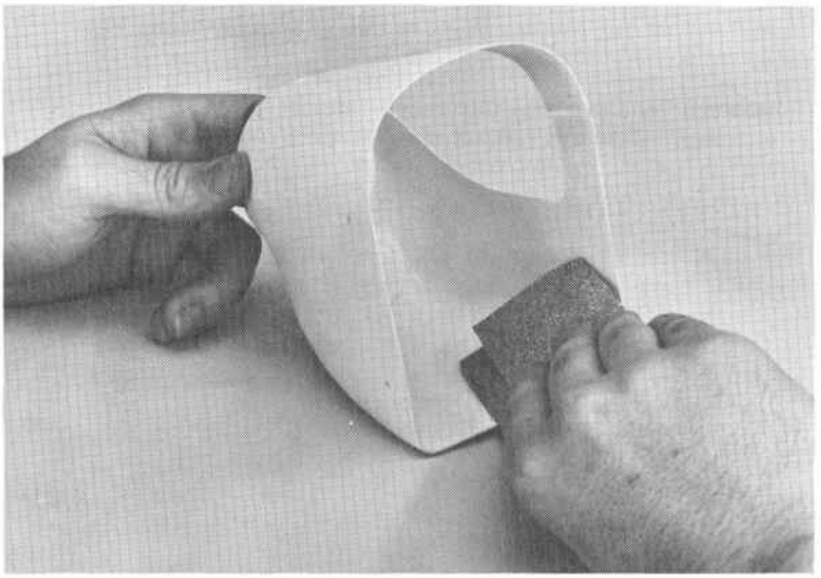






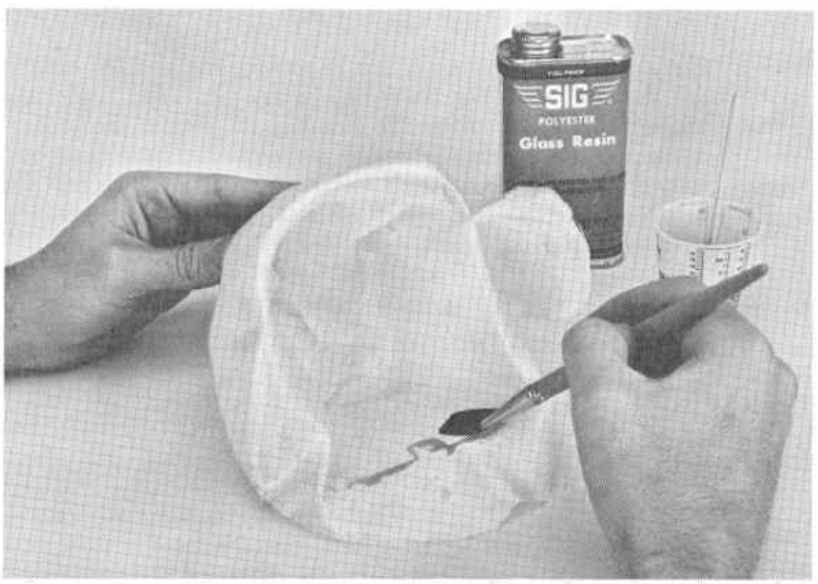
OPTIONAL COWL REINFORCEMENT METHOD

(Materials not supplied)



The strength of the cowling may be increased by lining the inside with fiberglass cloth and resin. This leaves the outside surface smooth and easy to paint. The photos show a Sig Komander cowl, but the same method applies to any Sig plastic cowl. If the cowl is not a one piece cowl, completely assemble it (directions are given in the booklet or on the plan) before lining the inside with glass cloth.

1.) Sand the entire inner surface of the cowl with 80 grit garnet sandpaper or similar coarse grained paper. (Photo 1.) Remove all of the gloss from the plastic with the sandpaper or the resin will not adhere properly. Don't worry about scratches from the paper, a rough surface will help the cloth and resin stick down.



IMPORTANT: Do not sand the outside of the cowl with this coarse paper. Use only 220 and 360 Tri-M-Ite paper or equivalent on the outside and avoid scratching.

2.) Cut a piece of Sig Regular Weight Glass Cloth that will fit into the cowl and cover the entire inside surface. The cloth is stretchy and can be formed to the contours. If you have had no experience in handling glass cloth, it may be easier to use two pieces of cloth, covering half of the inside at a time.

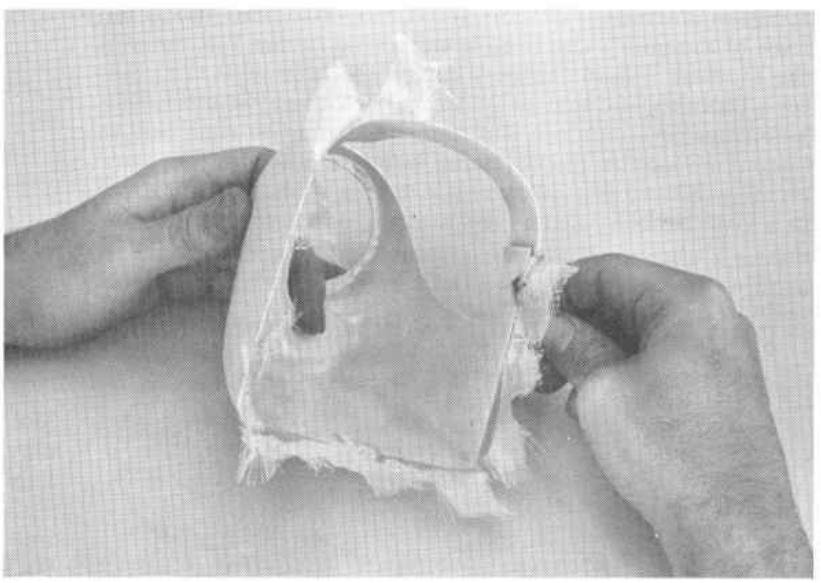
3.) Mix only about 1 to 1-1/2 oz. of Sig Glass Resin at a time. Add 4 or 5 extra drops of hardener over the amount called for in the directions on the can. The cowl area to be coated is small and will not take much time so the extra hardener will speed up the set up time. Paint the cloth onto the inside surface of the cowl with the resin mix. (Photo 2.) Pat out any wrinkles in the cloth while painting. A few cuts into the cloth around the trim area helps to make the cloth easier to handle. Apply resin to about 1/8" of the waste cloth sticking out from the cowl all around the edges. This resined area makes it easier to trim off the excess without the cloth threads unraveling and makes for a smoother edge.

4.) Do not flex or handle the cowl excessively while the resin is setting up. This may damage adhesion of the resin to the cowl. When the resin has set up hard, the waste glass cloth can be trimmed from the edges with a single edge razor blade or a modeling knife. (See Photo 3.)

5.) If there are any uneven spots or ridges in the first 1/4" of cloth inside the back edge of the cowl, sand them down smooth. Plastic screw hole reinforcement strips (supplied with some kits) will not be necessary if this glass cloth reinforcing method is used.

IMPORTANT: Since this procedure will make the inside dimensions of the cowl slightly smaller, it will probably be necessary to sand down the firewall and/or nose of the model for best fit. Look ahead to this probability during the building of the model. You may want to begin to take down the firewall before it is assembled into the fuselage. And, of course, do not cover or paint the fuselage until the cowl is fitted

(OVER)

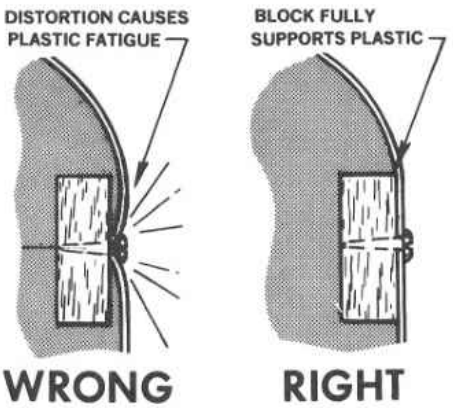


on to it so that any sanding down of the nose required can be easily done.

Whether or not you use the above reinforcement method, be sure and follow this caution about screw mounting:

TO PREVENT COWL CRACKS:

The most common cause of plastic cowls cracking is distortion of the plastic from improper installation of the mounting blocks and screws. If the plastic is fully supported by the block underneath, no strain will occur when the screws are tightened down.



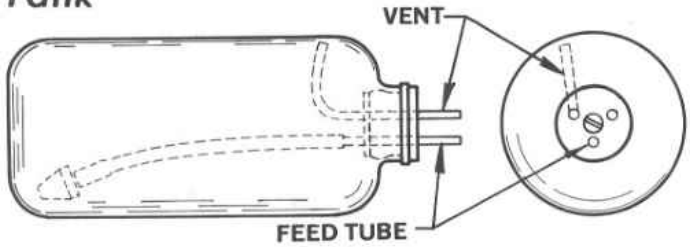
Don't try to cover any of the plastic parts or the foam wing with monokote or other iron-or types of covering material. The heat will damage the plastic parts and foam.

ABOUT THE FUEL TANK INSTALLATION

We occasionally receive suggestions from builders that a removable hatch be designed into a model for access to the gas tank. Our opinion is this is not the best method. The hatch opening makes the nose weaker and there is no good way to keep oil from leaking in around the hatch. Fasteners must be built in to hold a hatch in place.

Modern plastic tanks are virtually indestructable under normal use and bursting or cracking is almost unknown. If you use Sig Heat Proof Silicone tubing (which will not harden or deteriorate in fuel) in the plastic tank, the tank will seldom have to be removed. We have models in which the tank has been installed for three or four years without ever needing removal. So it is quite practical to put the tank in semipermanently. Put scrap wood supports under and at the back of the tank. The front is supported by the 7/8" hole in the Firewall. Seal the tank cap in the hole with G.E. Silicone Bathtub Seal (hardware stores) or Devcon Seal-It (available from Sig). You can stuff paper toweling on each side to keep it wedged in place. Some builders, after putting their receiver battery in a plastic sack, taping it shut, wrapping it in a foam rubber package and stuffing it into the nose under the tank, then stuff more paper toweling or foam rubber in to fill the nose compartment and keep everything in place.

Tank

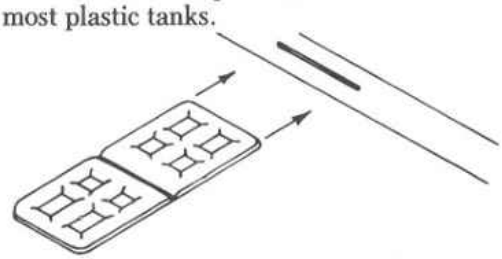


SPECIAL TIP: Test install the tank and check for ease of placement and replacement before closing up access to the interior of the nose of the model. The vent tubes, for example, must not be too long.

After installation put fuel tubing on the vent tubes and run it to the outside of the cowling for easy tank filling. The best way to fill the tank is to take off the fuel line to the needle valve and pump the fuel in there until it runs out the vent. Or, if access to the needle valve is not convenient, a third line may be added in the extra hole provided in the rubber tank top of Sig and most plastic tanks.

Hinges

It is not necessary to sand the foam wing before painting with Plastinamel.

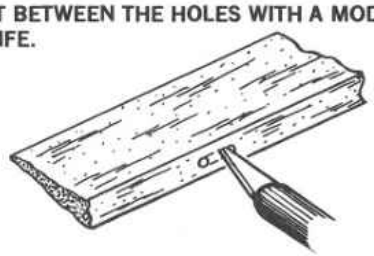


Cut slots in the control surface to receive the molded hinges. Fill the slots with Sig Kwik-Set Epoxy Glue and insert the hinge into the slot. After the glue has set, repeat the process to attach the control surface to the model. Note: For best control response, keep the gap between the surface and the model as narrow as possible without causing the surface to bind when moved.

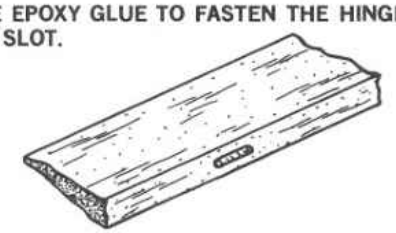
MAKING A HINGE SLOT

1.) DRILL TWO 1/16" DIA. HOLES INTO THE WOOD.

2.) CUT BETWEEN THE HOLES WITH A MODELING KNIFE.



3.) USE EPOXY GLUE TO FASTEN THE HINGE IN THE SLOT.



NOTE: AN X-ACTO KEYHOLE SAW BLADE NO. 15 IS ALSO HANDY FOR CUTTING HINGE SLOTS.

SPECIAL NOTE: If you are a beginner in RC flying, you may find the "Sig Factory Fliers Pre-Flight Check List" of help. Although it is intended for the Kadet, most of the material in the booklet also applies to the Klipper. For a free copy send a large, stamped, self-addressed envelope to Sig Mfg. Co., Montezuma, Iowa 50171.

(c.) Next, glue former WB against WA. These formers are intentionally slightly oversize so that there will be enough wood for shaping them to line up with the windshield and the fairing on the foam wing.

(d.) When WA and WB are dry, carve and shape them to match the contours of the center section fairing on the foam wing. Hold the paper windshield pattern in place from time to time while shaping WA and WB to make certain the lines of these blocks blend smoothly from the center section fairing of the foam wing to the windshield angle. The fairing on the wing may be altered slightly, if necessary, by sanding at the same time as the blocks.

(e.) If the paper windshield pattern does not fit your particular model exactly, modify the pattern as may be required before using it to cut the windshield out of the clear plastic provided.

(f.) Glue the front 3/16" dowel in place on the front of F-2 just below WA and WB.

(g.) Do not mount the windshield permanently until after the model is covered and at least partially painted. It may be glued on with a small amount of Sig-Ment. The new cyanocrylate "super" instant glues are also very handy for attaching the windshield quickly.

(h.) Protect the looks of the windshield by not allowing raw fuel to discharge upon it. Vent the fuel tank out the bottom of the cowl with Sig Heat Proof Tubing. Fuel residue coming from the exhaust is not as harmful to the windshield, since the nitro has been burned.

(i.) The black outline on the windshield of the prototype mdoel was made with Pelikan TN drawing ink, drawn on with a pen. This is a special ink for drawing on plastic. It is not fuel proof, so paint over the ink edge, using a small brush and clear dope, to protect it from damage.

(6.) TAIL SURFACES

(a.) The parts of the tail surfaces are printed on 3/16" balsa sheet. Cut them out with a sharp modeling knife or saw out on a jig saw. Dress down the mating edges with a sanding block so that a neat fitting seam is achieved. Pin down the sections of the tail surfaces on a flat surface and glue them together. Connecting key letters appear on the patterns to aid alignment of the mating parts.

(b.) When dry, sand the tail surfaces smooth and shape as shown in the side view.

(c.) The nylon control horn for the elevator is located in the exact center of the bottom of the elevator and with the holes in the horn for the pushrod in line with the elevator hinging line. Install after covering, using the nylon screw plate fastened to each horn.

(d.) The nylon control horn for the rudder is located as shown on the pattern for the rudder.

(e.) Cut slots in the control surface to receive the molded hinges. Fill the slots with Sig Kwik-Set epoxy glue and insert the hinge into the slot. After the glue has set, repeat the process to attach the control surface to the model.

(7.) GLUING ON THE TAIL

(a.) With the wing in place on the fuselage, align the stabilizer by sighting from the front of the airplane. If it doesn't sit squarely on the tail platform of the fuselage, sand the platform until it does.

(b.) To insure that the stabilizer is solidly glued to the fuselage, cut out the covering material in the area that contacts the fuselage to expose the bare wood. Puncture a series of 1/16" holes with a pointed wire in the stab and the fuselage top where they make contact. Have the holes at a slight angle to each other. When epoxy glue is worked into these holes and sets up it will act like small nails holding the parts together.

(c.) Cut a slot in the fuselage and stabilizer top covering to expose a 1/8" wide strip in the exact center. Puncture 1/16" holes into the wood exposed. Do the same thing in the bottom of the fin. Work epoxy glue into the holes and glue the fin in place on top of the fuselage and stab. It is also suggested that a small fillet of epoxy glue be put on each side of the fin to brace it to the stabilizer.

(8.) MOUNTING THE COWLING

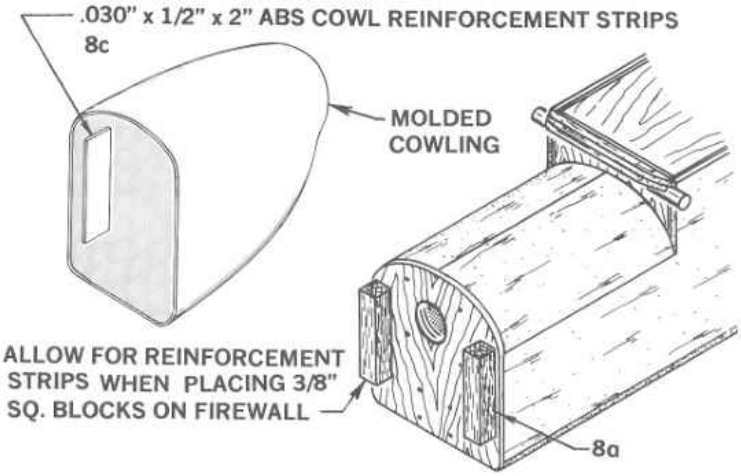
(a.) To make the opening in the cowl for the engine, first drill a series of holes about 1/8" in diameter around the cut out portion. Have the holes almost touching each other. Don't get them too close to the edge of the opening. Once the opening is made, the edges can easily be trimmed to exact shape with an X-Acto knife. Cut through the bits of plastic between each of the drilled holes with a knife and breakout the part to be removed. Don't get hasty in cutting the opening in the cowling for the engine - start undersize and open it up slowly, fitting as you go so that it doesn't end up larger than necessary.

(b.) On a side mounted engine, cut a slit from the back part of the engine opening, out through the rear edge of the cowl. This will allow flexing the cowl around the engine when putting it in place. On a vertical mounted installation, with most engines, no slit through the back of the cowl is necessary since the cowl opening can be brought down over the engine as it is guided onto the fuselage.

(c.) Glue ABS plastic strips to the inside of the plastic cowl to reinforce the area where the mounting screws will be used. Use butyrate thinner, acetone or MEK to adhere the plastic.

REINFORCEMENT NOT NEEDED IF YOU FIBERGLASS COWL INTERIOR AS SHOWN ON PAGE 15.

Mounting The Cowl



(d.) Epoxy the 3/8" square hardwood cowl mounting blocks to the firewall front. Place the cowling in position to determine the exact location of the blocks against the inside face. Drill pilot holes through the cowl into the blocks and use No. 2 screws to fasten it to the blocks.

(9.) TANK INSTALLATION

(a.) A 2 or 4 oz. size plastic tank should be used. The pattern on page 9 shows the 7/8" dia. hole for each size when used with an upright engine. A side mounted engine needs a lower tank position - center line of tank 1/4" below the thrust line.

(b.) Temporary cross pieces from scrap plywood may be glued across the fuselage to support the rear and back of the tank, or it may be kept in place by stuffing foam rubber or wadded up paper under and around it.

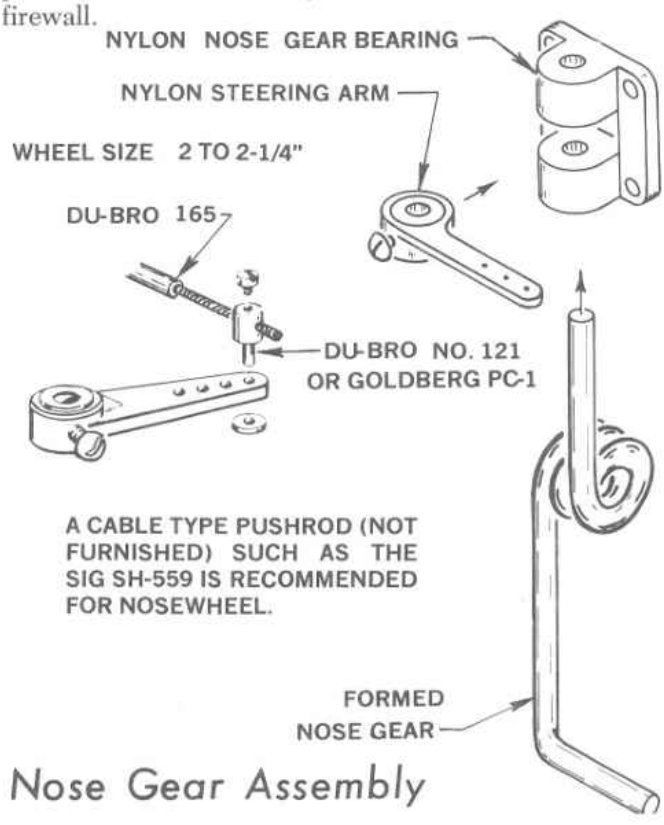
(c.) The firewall should be completely oilproofed before installation of the tank by painting it on the outside with Sig Epoxy glue (regular, not Kwik-Set). Warm the epoxy up to make it thin enough to brush, but use it up quickly, it sets up much faster when warm.

(d.) Use G.E. Silicone Seal, obtainable at most hardware stores, or Devcon Seal-It Silicone which is listed in the Sig catalog, to fill the seam around the tank cap and the hole to prevent fuel form seeping into the fuselage. Should it be necessary to remove the tank from the fuselage, the silicone can be broken loose and replaced when the tank is put back in. Sig Heat Proof Fuel Tubing will not harden in glow fuel, so if it is used for the pickup line in the tank, the tank will seldom have to be removed.

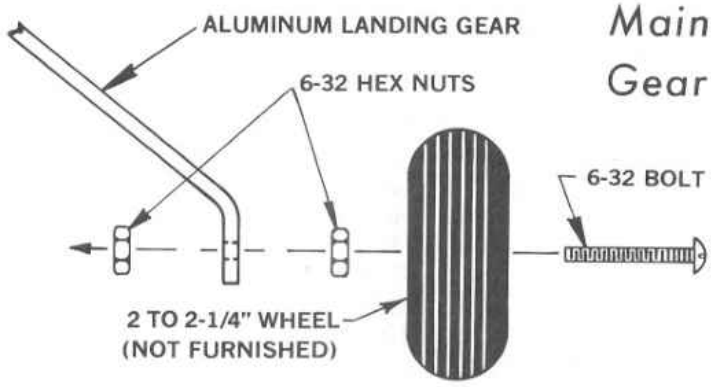
(10.) LANDING GEAR

(a.) While holding the landing gear in place, drill through the gear holes into the inside of the fuselage. Remove the gear and enlarge the holes in the fuselage to 5/32" so as to pass the shanks of the blind nuts. Glue the blind nuts in place to the inside plywood doubler after they have been tightened down. The gear can then be removed and replaced easily.

(b.) The nose gear is held in the nylon bearing by the steering arm. Angle the arm forward so that when the servo pulls it back for a left turn, the arm will clear the face of the firewall.

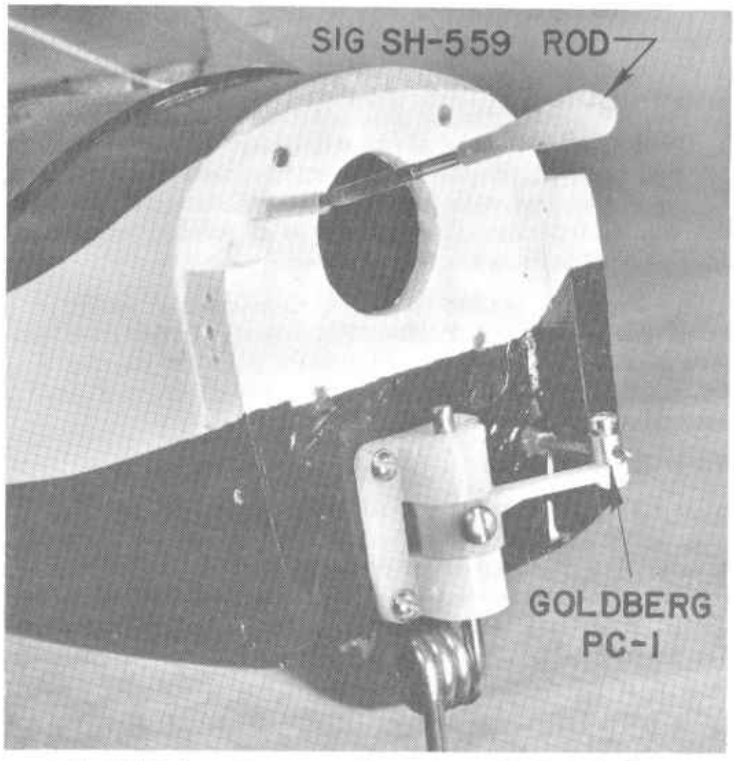


Nose Gear Assembly



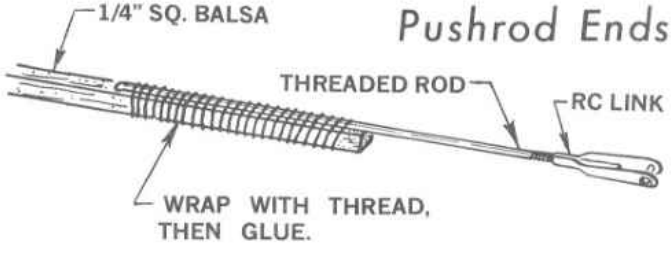
Main Gear

(c.) The Sig SH-559 flexible cable pushrod is recommended for the nose gear steering. Run the nylon outer tubing through the firewall at the right spot to connect with the nylon steering arm. Epoxy around the tubing so the hole is oilproof. One SH-559 is enough for both the nose gear and the engine throttle. An extra threaded coupler (SH-556) and a solder clevis (SH-527) will be needed to make the ends on the other half of the cable.

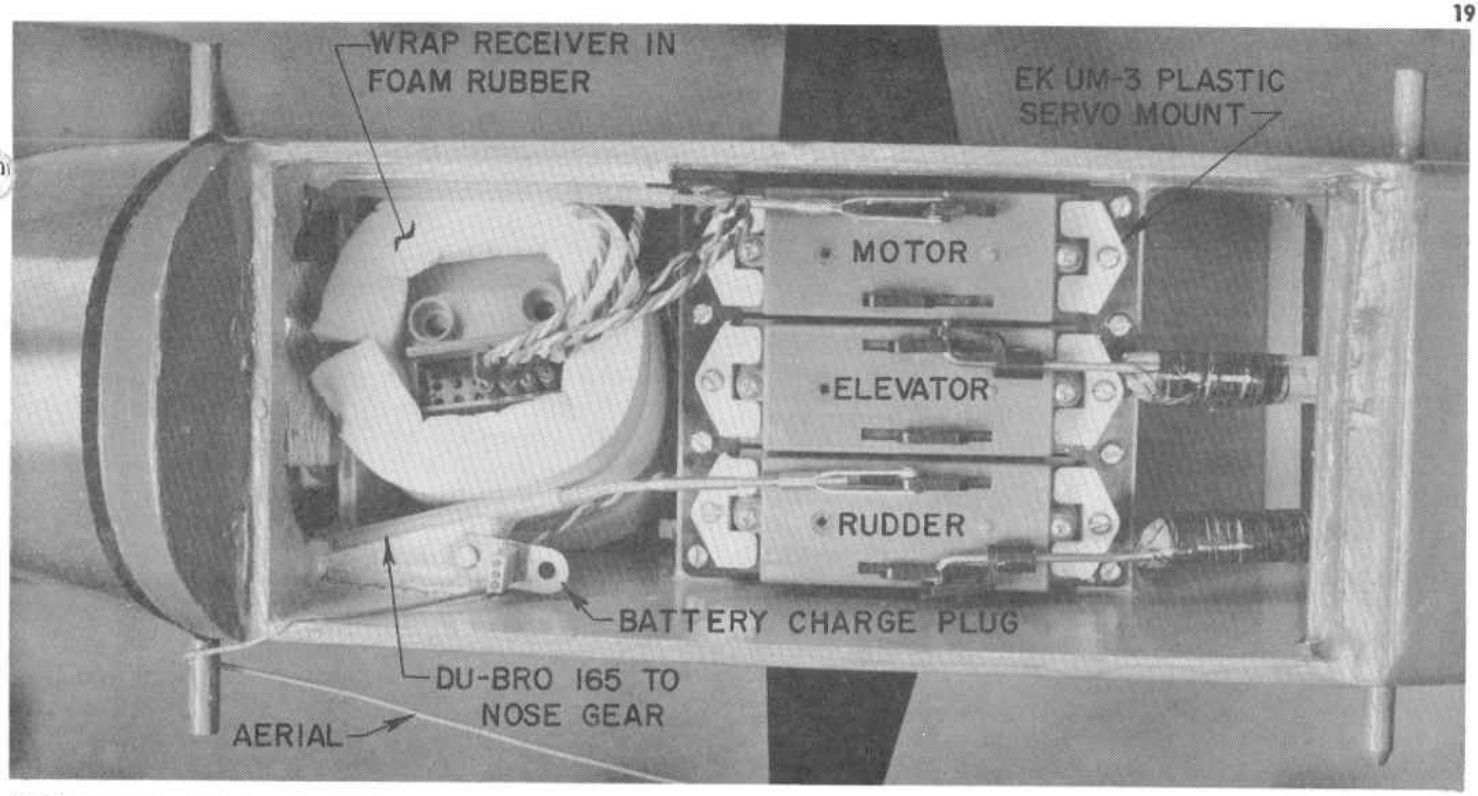


(d.) Hold the wheels on the axles with 5/32" diameter wheel collars such as the Du-Bro 140 or equivalent. Or you can solder a washer on the end of the axle. Protect the wheel with a shim of light cardboard that can be torn and removed after the soldering operation.

MAKE CONTROL SURFACE ENDS OF PUSHROD FIRST, FEED THROUGH FUSELAGE, HOOK RC LINK TO SURFACE, CUT SERVO END OF BALSA TO EXACT LENGTH NEEDED, MEASURE AND INSTALL SERVO CONNECTING WIRE END.



Pushrod Ends

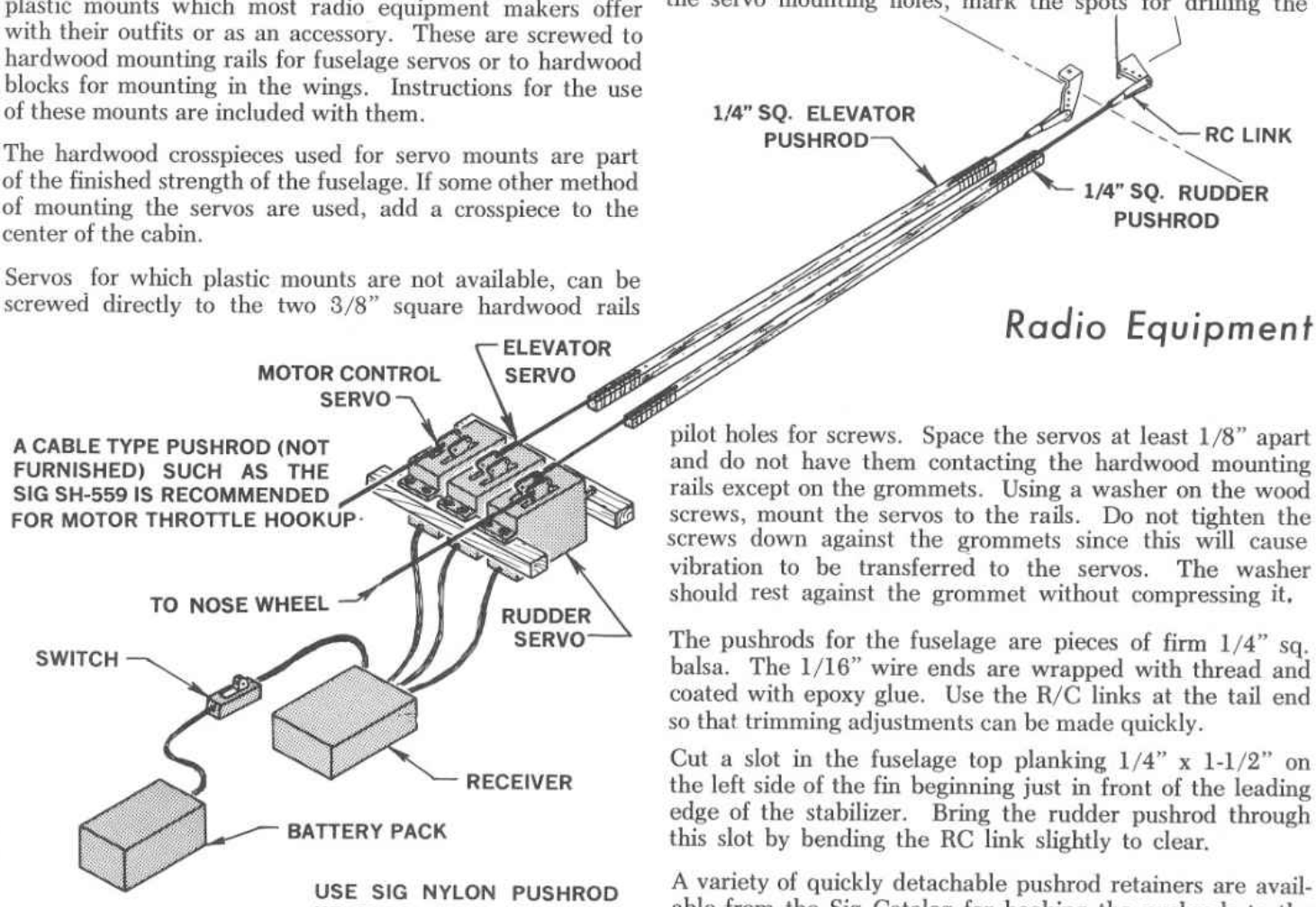


(11.) RADIO INSTALLATION

The most convenient method of installing servos is on the plastic mounts which most 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 wings. Instructions for the use of these mounts are included with them.

The hardwood crosspieces used for servo mounts are part of the finished strength of the fuselage. If some other method of mounting the servos are used, add a crosspiece to the center of the cabin.

Servos for which plastic mounts are not available, can be screwed directly to the two 3/8" square hardwood rails placed across the cabin, three abreast, as shown in the accompanying drawing. With rubber grommets installed in the servo mounting holes, mark the spots for drilling the pilot holes for screws. Space the servos at least 1/8" apart and do not have them contacting the hardwood mounting rails except on the grommets. Using a washer on the wood screws, mount the servos to the rails. Do not tighten the screws down against the grommets since this will cause vibration to be transferred to the servos. The washer should rest against the grommet without compressing it.



The pushrods for the fuselage are pieces of firm 1/4" sq. balsa. The 1/16" wire ends are wrapped with thread and coated with epoxy glue. Use the R/C links at the tail end so that trimming adjustments can be made quickly.

Cut a slot in the fuselage top planking 1/4" x 1-1/2" on the left side of the fin beginning just in front of the leading edge of the stabilizer. Bring the rudder pushrod through this slot by bending the RC link slightly to clear.

A variety of quickly detachable pushrod retainers 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.

The switch may be mounted wherever convenient on the side of the model, preferably the side away from engine oil. The receiver battery pack should be wrapped in foam rubber sheet, held on with rubber bands and placed 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 in foam rubber to protect it from engine vibration. Cover it with a plastic bag also Stow this package under, or just in front of, the servos. Make certain that the receiver will stay in place during aerobatic maneuvers.

(12.) FINISHING

The molded, high-density foam wing is fuel proof and can be left unpainted. The wing of the prototype model was painted with Sig Plastinamel. This product is ideal since it is compatible with foam and provides a glossy and fuel proof finish. The white portions of the prototype wing were also painted with Plastinamel to avoid the possibility of stains and fingerprints that can spoil the appearance of raw, unpainted foam. Plastinamel must be applied with a brush, but smooths out readily. It will go through a mechanical drawing ruling pen, so the decorations can be drawn on the model with a ruler and French curves. This provides guide lines for filling in with a brush. Because of the beaded surface of the foam, masking tape does not work and therefore drawing the color scheme on and filling in with a brush is the recommended procedure.

CAUTION: Do not use any other paint on the foam wing without careful testing of compatability first on a scrap.

The ABS plastic cowling may be finished with Sig Supercoat Dope. The cowl should be sanded to remove the gloss on the surface of the plastic before it is painted. Use a very fine sandpaper on the cowl so that it doesn't get deeply scratched. Deep scratches can open up during doping and become prominent. It isn't necessary to put any base or filler coats on the cowling. But care should be taken not to apply heavy wet coats of color dope to the plastic. Put on a very light coat and allow it to dry thoroughly before applying a second coat. Epoxy paints and DuPont Dulux can also be used on the cowl. Do not use other paints on the cowling without first testing their compatibility with the ABS plastic on a scrap piece.

All wood parts of the model should be covered with silkspan. This not only strengthens the wood but seals off the wood grain to give a better finish. It isn't necessary to have elaborate spraying equipment to put on a good finish. If you brush, be sure to thin the dope or sanding sealer until it flows out smoothly. Many paint jobs are ruined by trying to brush dope without thinning properly.

The wood parts are first prepared with two brushed on coats of Sig Lite-Coat (low shrink) clear dope. Sand each coat when dry. Cut a piece of silkspan about 1" larger than the area to be covered. Dip in water and apply. Work around the edges, pulling out all the wrinkles and stretching it smooth. Brush around the edges with clear dope and it will soak through the covering and adhere to the dope underneath. After drying, trim off the edges with a sharp razor blade. Redope any loose edges that have not completely adhered. Apply two coats of clear dope to the covered parts. Sand lightly with find sandpaper.

With thorough surface preparation, two coats of Supercoat Color Dope will usually give good coverage. When the color scheme is complete, spray two coats of clear on top to seal the finish. Don't spray the windshield.

(13.) BALANCING

The Center of Gravity position is shown on page 6. Do not balance any further back than this point even if lead must be added to the nose. Trying to fly with the C.G. too far back is much more dangerous than the slight increase in wing loading caused by adding nose weight. Balance with an empty fuel tank. When slightly nose heavy the model will be a great deal more stable and less likely to stall or snap roll. The reaction to control movements is also less sensitive with a forward C.G. so it is not as easy to overcontrol. Some aerobatic ability may be sacrificed with a forward C.G. so you may wish, after test and familiarization flights, to move it rearward. Do this gradually and check results and control response in the air.

(14.) FLYING

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 model club or ask your hobby dealer for the names of good fliers in your 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 flights without damage to the model and give instruction in proper control.

If a good, smooth take-off surface is not available, the model may be hand-launched. Holding the model just behind the landing gear with the left hand and under the tail with the right, run into the wind at a fast trot and thrust the model forward with the nose slightly down in a spear-throwing motion. It is not necessary to achieve a lot of velocity in the launch - it is more important that it be released smoothly and with wings level. The model may dip slightly and then should begin climbing at a slight angle. If it does not begin to climb after about fifty feet of flight apply a small amount of up elevator to lift the nose.

Use the rudder to keep the wings level and headed straight into the wind until about 75 feet of altitude is obtained. Keep first turns gentle and not steeply banked. Stay up wind of the transmitter. Use trim levers on your radio equipment where necessary to obtain straight and level flight with the control sticks in neutral position but don't attempt to make these adjustments until the model is at a good altitude. Throttle back at altitude to find out the model characteristics in a gliding condition so that some indication is seen of what to expect during the landing approach. It is a good idea to make several practice landing approaches at a good altitude to get the feel of the model for this approaching critical maneuver. Make your final and complete landing approach while your engine still has plenty of fuel remaining so that the engine is not liable to stop before completion of the flight. This will allow application of power if the approach is being undershot. Notice the percentage of missed landings at an R/C flying field. Those undershot greatly outnumber those missed by overshooting. So if an approach that looks a little high is maintained, chances are good that a spot-on landing can be made.