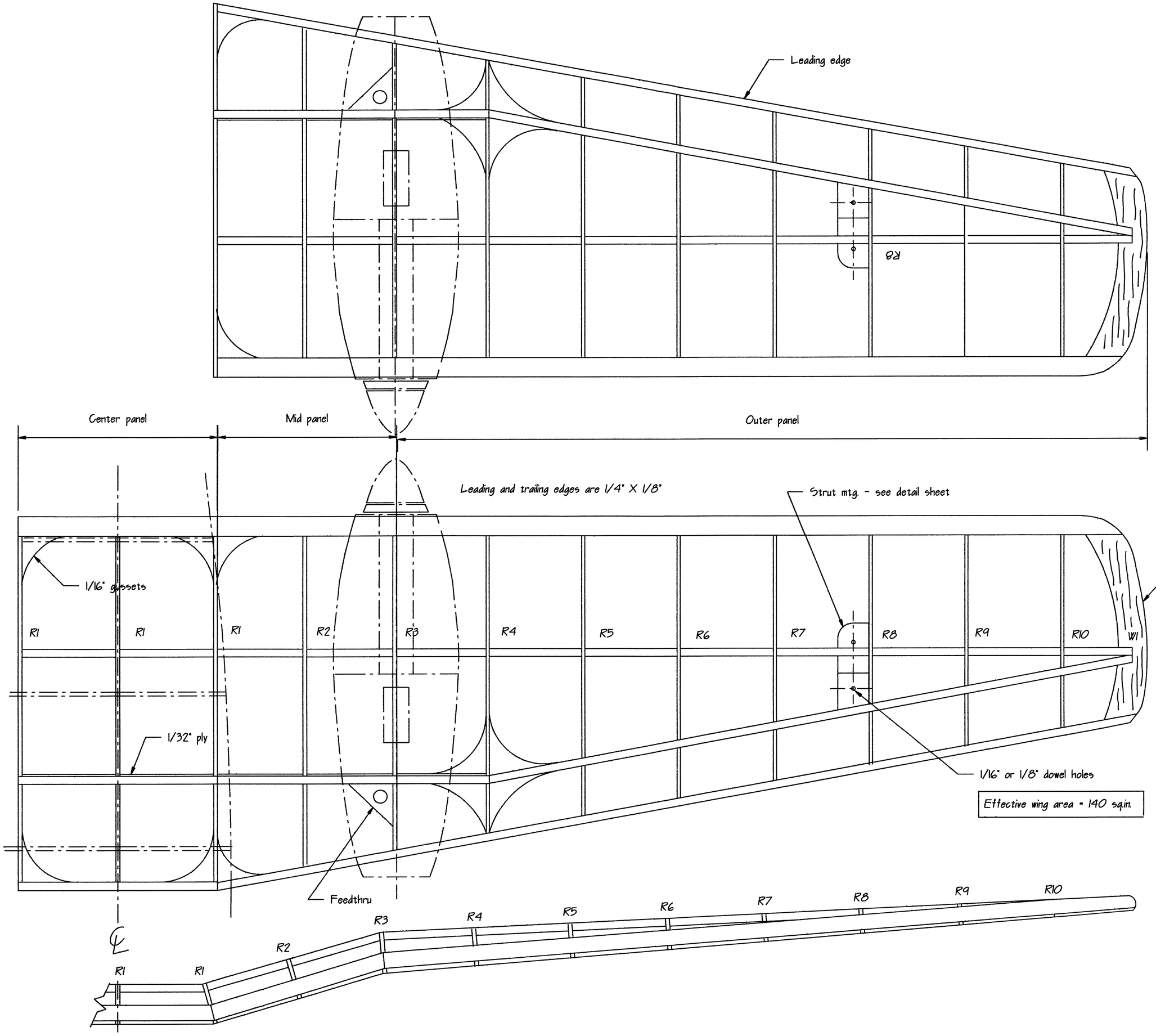
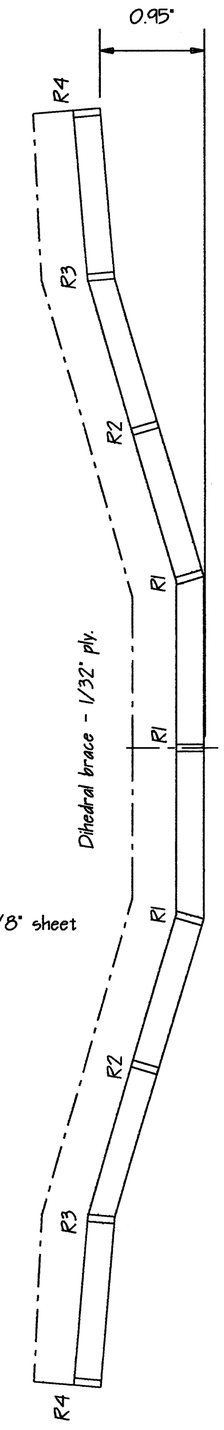
Spinner optional
ST-2 motor
WS2
F6A
1/8" sq.
WS1
F3A
F2A
Battery hatch
K2
R3
Root rib
K1
K2
K3
K4
K5
K6
K7
K8
P.136-L
PIAGGIO
3/32" side keel
1/16" sheet
Tail block 1/4" sheet
1/8" sq.
1/8" sheet
Fin block
Crack, bend up
La Gazza Ladra
I-PIAG
Baseline
F1
F2
F3
F4
F5
F6
F7
F8
F9
F10
K9
K10
1/8" dowel
4 1/2" prop arc
Scale outline
Baseline

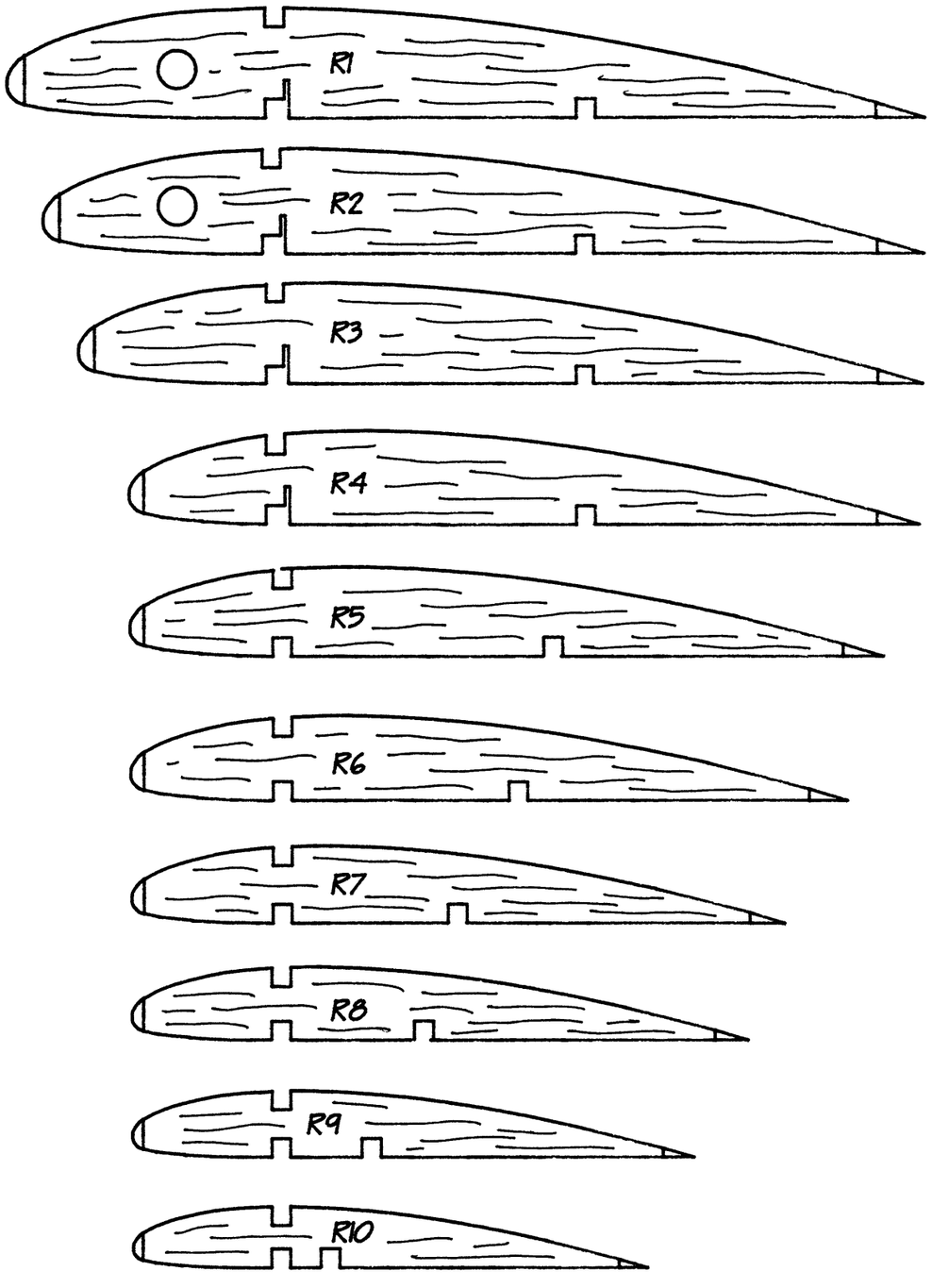
PIAGGIO P.136-L
33" Span Free-flight for Twin Electric Motors - Sheet 1

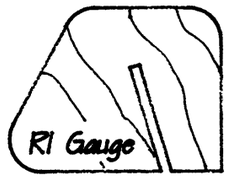


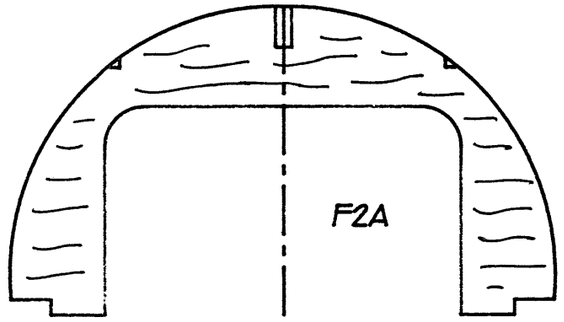


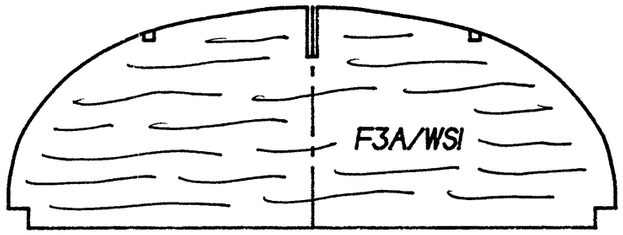
PIAGGIO P.136-L

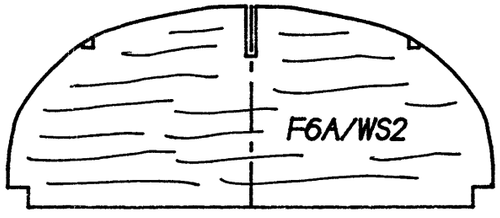
33" Span Free-flight for Twin Electric Motors - Sheet 2

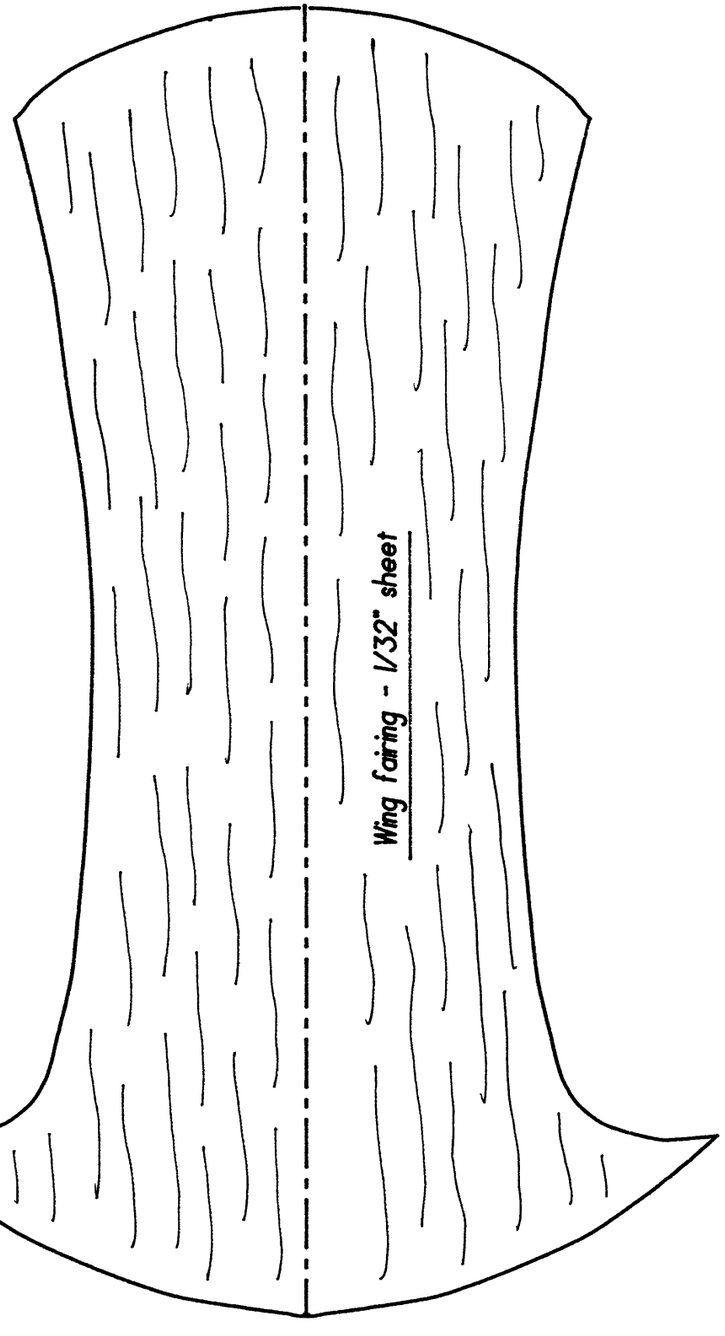












PIAGGIO P.136-L

33" Span Free-flight for Twin Electric Motors - Sheet 3

PIAGGIO P.136-L

33" Span Free-flight for Twin Electric Motors - Sheet 4

1/4" X 1/8" spruce (rear)

All formers are 1/16"

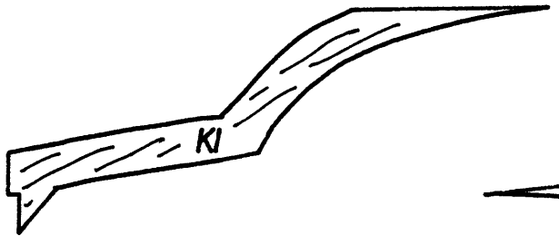
Score

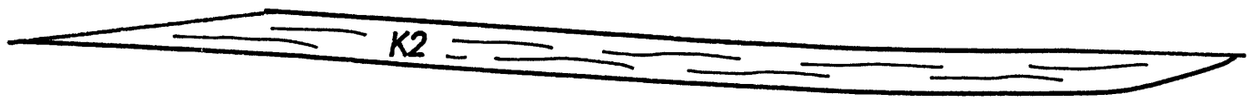
F1 F2 F3 F4

Score Score

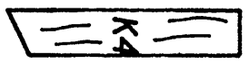
℄

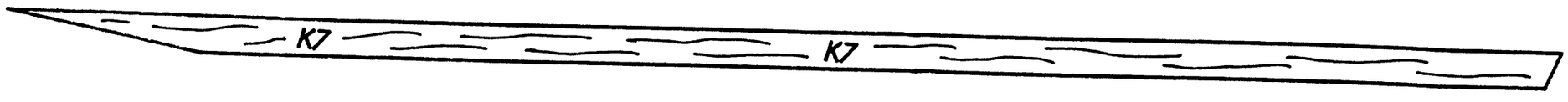
F5 F6 F7 F8 F9 F10

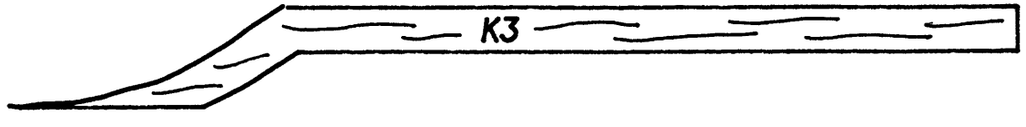




Note: Keel parts can be either 1/16" or 3/32" sheet







PIAGGIO P.136-L

33" Span Free-flight for Twin Electric Motors - Sheet 5

1/64" PLY OR CARD INLET VANES.

DRILL 4 1/8" COOLING HOLES THRU PLY AND 1/8" BALSA

FILLET (TYP)

B C D E F

1/32" PLY

℄

LE WING REF

INBOARD TRIM

.14 .10 TYP WALL THICKNESS

TE WING REF

R3 REF

OUTBOARD TRIM

1/8" BALSA

C D E F G

B

A

H

A B C D E F G H

X X

1/4 x 1/2 x 1/2 BALSA

1/16" BIRCH DOWEL (TYP) GLUE TO STRUT ONLY.

SCALE: 1/1

1/8" BALSA STRUT

FLOAT FROM 1 1/2" x 1 1/2" x 4 1/4 SOFT BALSA OR FOAM.

R8 (REF)

1/16" I D ALUM TUBING

1/16" BALSA STRUT

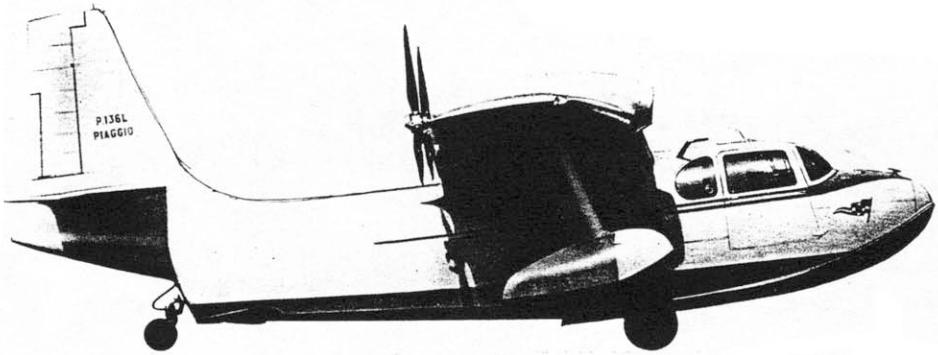
1/16" DIA KEYHOLE

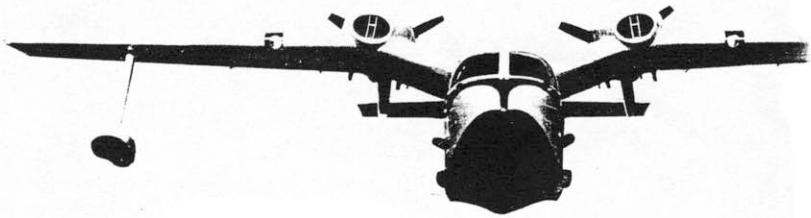
PIAGGIO P.136-L

34" Span Free-Flight for Twin Electric Motors

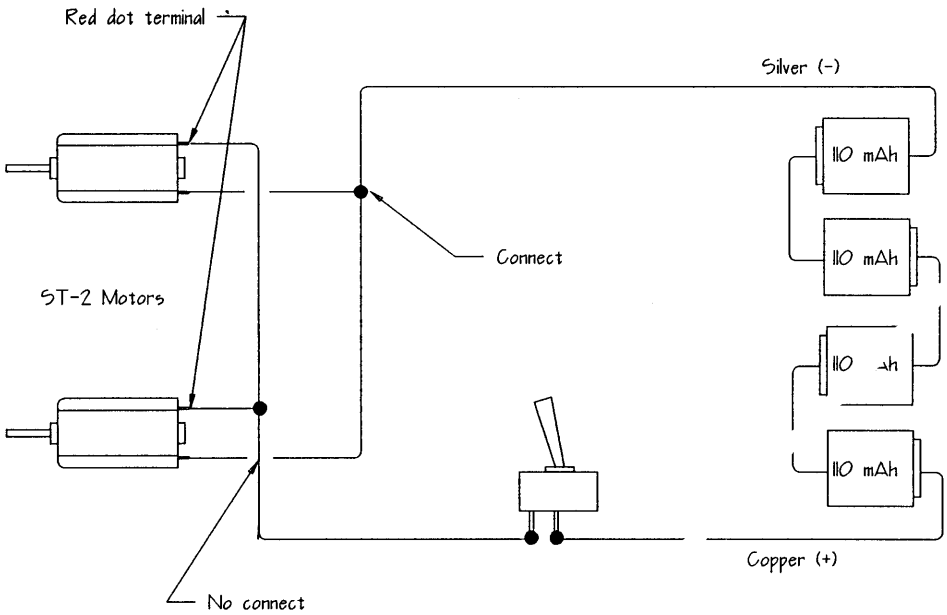
P.136-L

SCIENTEXT
48 WHITNEY STREET
WESTPORT, CT 06880





PIAGGIO



Wiring Diagram P.136-L

PIAGGIO P.136-L "LA GAZZA LADRA"
CONSTRUCTION MANUAL

Designer's Notes:

Although I had been aware of the Piaggio P.136-L, it wasn't until I received photographs and three-views from Jack Parry (Aiken, SC), that I realized what an interesting project this might be. I've always liked the gull-wing geometry, and the twin-pusher configuration looked like a real challenge.

The five-place Piaggio amphibian is, of course, of Italian manufacture, and flew for the first time on August 29, 1948. Twenty were imported into the US, and sold as the Trecker "*Gull*" (or "*Super Gull*", depending on powerplant). It used various Franklin or Lycoming engines, had a span of 44' 4½", a max. speed of 183 mph, and a range of 1,056 miles. I have no information on color schemes or trim.

In a pusher, as you're probably aware, the engines are located far aft of the C.G., and require that the counterbalancing NiCad pack be placed far forward. Accordingly, the removable wing, and associated angled saddle, are for crash resistance only, and not for battery access. If you like, you can "hard mount" the wing to the hull, and take your chances in a bad landing. The spinners shown do not appear on the photos of the real Piaggio; they were added because they sort of look like they belonged there.

As with our Grumman G44a *Widgeon*, the hull is completely planked, with tissue covering for the rest. The windscreen of the prototype came from a "*L'Eggs*" panty hose container, so you might inquire of your wife, girl friend, or daughter as to the availability of such items.

Finally, "La Gazza Ladra", in Italian, means The Thieving Magpie, and is the title of a seldom-performed Gioacchino Rossini opera.

Materials Required:

You'll need about three sheets each, 3" wide X 36" long, of 1/16", 3/32", and 1/8", plus a couple of 1/32" for the hull planking. In addition, the nacelles are formed from 1" thick blocks or planks, with the scraps used to fill in some difficult hull areas. The prototype used Hallmark wrapping tissue for the wing and the tail group, but feel free to use any covering you like.

All of the gluing used CyA+, except for some Elmer's White Glue, which is used where objects must be taken apart later for further working. Rather than clear dope over the tissue, I like Borden's Krylon Clear Acrylic Spray, #1301; it goes on evenly, shrinks the right amount, and doesn't blush in humid weather.

We are furnishing the motors, props, and hookup wire, so all you have to buy are the NiCads, and the switch.

Fuselage:

The pattern sheet for the hull formers indicates 3/32" material for the keel notches (top, bottom, and sides). The prototype seemed to do very well with only 1/16" sheet for the keels, and you may wish to go this route. If so, in cutting the keel notches in the formers, make them a bit narrower. Also, make the keel parts (K1 through K10) from 1/16" sheet.

Make 1:1 photocopies of Sheets 3, 4, and 5 so that you don't destroy the originals in cutting out the patterns. You should also copy the tip float sheet, and the nacelle sheet. Cut out either the left or the right half of each hull former pattern F1 through F10. The grain for all of these formers runs vertically. Glue-stick together two sheets of 1/16" sheet, and glue-stick the former patterns to the doubled-up sheets. Cut the formers out in pairs, including all notches, and soak them in warm water till they separate (discard the used patterns). From Sheet 3, cut out F2A,

and two each of F3A and F6A (the extras are used in the wing as WS1 and WS2). F1 and F2 have no notches on the top part.

Assemble the halves over your spare Sheet 4, being careful in alignment. Add short strips (½" long) of 1/16" sheet over the joints, and add ¼" wide strips of 1/16" sheet across the assembled formers to provide some strength. Before removing from Sheet 4, score the lines indicated on F4, F5, and F6; this will make it easier to cut away these areas later. Also, add 1/8" sq. strips just below the score lines. Add the 1/4" X 1/8" spruce to the rear of F2 as part of the battery compartment.

Cut out the keel parts, noting that you'll need two each of K9 and K10, and one each of all the rest. You can leave the paper patterns attached to the balsa. Cut all of these parts slightly oversize to allow for later fitting.

Assemble the keel parts over Sheet 1, and mark the position of each former on the keels. Add temporary strips of 1/16" square between top and bottom keels at about 3"-4" intervals to provide some stiffness. You'll cut these away later as you install the formers. Remove the keels from the plan, and, working from front to rear, install formers F1 through F10, being very careful in alignment.

Add the side keel parts, K9 and K10. Sighting down the hull, all of the side keel notches must be in a straight line - adjust as needed since this also sets the notches for the 1/8" sq. wing support stringer above it, and this stringer, in turn, defines the wing incidence angle. Add F2A.

Add the 1/8" square stringers at the chine line, and at the wing support line. I suggest that you wait till just before planking to install the 1/16" stringers; it'll save a lot of annoying repair work. Add F3A and F6A at approximately 45° to the upper stringer. The exact angle isn't important since they'll be matched when building the wing.

The hull bottom can now be planked with medium 1/32" sheet.

With a razor saw, cut away F4, F5, and F6 at the scored lines, and K1 between F3A and F6A. Discard the cut-away pieces; they have no further use. The remainder of the hull, except for the battery hatch area (between F1 and F2), can now be planked. I found that two pieces would cover most of the sides of the hull, leaving little pieces to be cut, trimmed, and fitted in the cockpit area. The space between F8 and F9, below the side keels, has ferocious compound curvature, and is best finished using foam or blocks of soft balsa to fill in. Any voids or gaps are easily filled with the lightweight Red Devil "One Time Spackle", and then sanded to shape.

The four, 110 mAh batteries are located between F1 and F2, and an access hatch must be provided for recharging them. Make duplicates of F1 and F2, above the side keels, and fitted between the existing F1 and F2. Add a couple of 1/8" X 1/4" short stringers, notched into the duplicate F1 and F2, remove the hatch assembly, and plank it.

The noseblock for the prototype was made from urethane foam, but soft balsa works well, too. Leave the block solid, in case you have to drill holes for the addition of weight. The noseblock is best added after all planking is completed, so that it may be sanded to the final contours.

The windscreen or canopy came from the top half of a "L'Eggs" pantyhose container. If you use a clear one, you can detail the cockpit, but whichever you use, try to have a few spares on hand - they are very brittle and crack easily. With a marker pen, estimate the final contour, and scribe the lines on the plastic, cracking away the unwanted portion carefully. Sand down to the final shape, and back up with 1/32" sheet glued to rear and bottom. I suspect that the top part of a 2-liter soft-drink bottle may also work, and the plastic is easier to handle. If you don't intend to detail the cockpit, make F2A as a solid piece, without the interior cutout.

The on-off switch mounts to a piece of 1/32" ply, glued underneath the planking. The hole in the ply is ¼" dia. and should be drilled before gluing in the switch panel. Since I am

a left-handed launcher, I located the switch on the right side, just below the wings. Pick any location that suits you, but beware of the spinning pusher props!

If you anticipate off-water operations, this is a good time to check the hull for water-tightness.

Wings:

From medium 1/16" sheet cut all wing ribs, noting that three of R1 are required, and two of all the rest. Cut the pattern for the R1 Gauge, and glue it to cross-grained 1/32" sheet. This needn't be fancy; it will be used only twice. Note the narrow slots in R1-R4 at the bottom front spar; these are for the 1/32" ply dihedral brace. With a paper punch, make the wire clearance holes in R1-R2.

Comparison of the top and front views of the wing would seem to indicate that they do not correspond. The reason for this is that both views are true length to allow cutting and building. Build the wing sections directly over the plan, and cut the dihedral brace as shown.

Cut the paper pattern for the dihedral brace, and permanently glue it to 1/32" ply. Cut out the brace, and carefully pin it down in its appointed position on Sheet 2, in the center panel of the wing. Pin down the rear spar, and add the middle R1 rib. Add the 1/4" X 1/8" trailing edge, and the other two R1 ribs, using the R1 Gauge to tilt the tops of the ribs inward. Add the 1/4" X 1/8" leading edge (blocked up about 3/32"), the rear gussets, and the top spar. When the glue is cured, lift from the plan, and add the front gussets and the bottom front spar. With a sanding block, true up all edges and corners, and sand in the airfoil shape. The dihedral brace is easily broken at this stage, so be careful.

(For later reference, the dihedral at rib R3 is 0.81", and is 2.0" at the wingtip).

Fold the plan down along R3, and place on the building board such that R3 is at the edge. Carefully pin in place the center panel, aligning R1 to the plan, and pinning down the dihedral brace to the board. Add the T.E. and the bottom spars. Add R2 and R3, and the L.E. of the mid panel, blocking up the L.E. by 3/32". Add the 1/16" gussets as shown, and remove the assembly from the board. Add the top spar, and true up all edges and corners, as well as sanding down the L.E. and T.E. to airfoil shape. Repeat the above steps for the other side of the wing.

Plank the top of the center panel with 1/32" sheet, grain spanwise. Carefully position the center panel on the fuselage, and add WS1 and WS2. Add a 1/8" sheet brace or "strong-back" between WS1 and WS2 to act as a support for the 1/32" sheet fairing. Cut the wing fairing, using the pattern on Sheet 3, a little oversize. The fairing should be attached in left and right pieces, not one large piece. (Note: Although the planking of the center panel isn't really necessary, it does add some stiffness. If you choose not to plank the center section, you'll have to do a more careful fitting job in cutting the wing fairing to fit the tops of the R1 ribs).

Note that the bottom notches on WS1 and WS2 are intended to engage the 1/8" wing support stringer, to provide a form of alignment and "locking" of the wing to the hull.

As you've noticed by now, this is a fairly complex wing; it tapers from front to rear, from top to bottom, and there are four dihedral breaks. Build both outer panels over the plans, noting that the L.E., T.E., and rear, bottom spar sort of hang in thin air, and that the front spars are at an odd angle. Wingtips are 1/8" sheet. Cut the front spars flush with R4, leaving L.E. and T.E. as shown.

Weight down, and pin in place, the center panel. Attach the outer panel to the mid panel at R3, blocking up the tip by 2.0", and sanding the outer panel spars back as needed such that the dihedral brace notches into R4. Glue everything up, and add the front spars between R3 and R4. Add the 1/16" sheet gussets as indicated. Add a 1/16" sheet feed-thru at R3 to prevent tissue damage when installing motor wiring. The bottom of the center panel is not tissue covered.

Nacelles:

The nacelles are made from four soft balsa planks, 1" thick. Cut one blank to approximate size, and glue on the side pattern of the nacelle. Jigsaw out the blank to the pattern contour, paying special attention to the airfoil; the outer edges are easily cleaned up later. Sand this down to the pattern, and make copies on three other blanks. With Elmer's white glue, cement together two pairs of nacelles.

Trim up all the blanks so they match each other, and glue the top pattern onto one pair. Cut this pair to the top pattern, and trace the outline onto the other pair. Using whatever woodforming tools you like, form the outsides to Bob Breckur's templates, and sand smooth.

Soak the nacelle pairs in warm water till they separate, and dry them in the microwave (you should mark them in matching pairs when dry). Hollow out the insides to a maximum wall thickness of 1/8"; less is better. A drum sander on a Dremel Moto-Tool does this very quickly (less than a half-hour for the prototype). The bottom of the nacelles are cut completely away, since they are covered by the wing. Re-glue the matching halves back together, complete the sanding, and apply a coat of sanding sealer.

Cut two pieces of 1/32" ply for the motor mounts. These should be made oversize, with a 3/16" hole for the motor bushing, and four 1/8" dia. holes for cooling. Trial-fit these to the nacelles, with motor temporarily mounted, and CyA+ in place when fitted. Contour the bottoms of the nacelles to conform to the dihedral break at R3.

Tail Group:

Build the rudder and fin directly over the plans from hard 1/8" balsa. The fin block, which is 1/4" thick medium balsa, is attached after the fin and rudder are lifted from the plans.

The stabilizer and elevators are built directly over the plans as well. Round the leading edges, and taper the trailing edges. The bottom of the fin block is notched to accept the central portion of the stabilizer, which needn't be rounded. Hinges are soft iron or copper wire, placed at about the positions indicated by the dashed lines, and held in with CyA.

Landing Gear and Tip Floats:

From foam or soft balsa, make two wheels: the main gear is 1.00" dia., and the tail wheel is 0.75" dia. Slice the main wheel at 45° to the axis, paint, and affix one-half to each side of the hull as shown. The strut is 1.75" long, and can be either 1/16" or 1/8" sheet. The tail wheel strut is a fork arrangement, but I have no detailed information on its design.

From all available documentation, there is no indication that the tip floats were retractable, so they are shown in the extended position. The tip floats add a lot to scale realism, but they also add weight and drag. Hence, if you plan off-water operations, make the floats lightweight. Otherwise, I suggest that you make them removable for land flying, since they can easily trip up in a landing, doing some damage to the wings. The detail sheet, by Bob Breckur, included in this Manual, gives all the necessary data for tip float construction and installation, although 1/8" dowels may be a better choice than the 1/16".

Motors and Batteries:

The motors and battery pack are wired according to the attached Wiring Diagram. The #24 AWG hookup wire included with the kit is very flexible, and should provide easy snaking through the wing and hull. In this aircraft, the positive (+) battery pole goes to the motor terminal with the red dot. The SPST switch is Radio Shack #275-634, at about $2.69. The battery pack consists of four 110 mAh NiCads, available from (for example), E.H. Yost, 7344 Tetiva Rd., Sauk City, WI 53583 (608 643-3194) at about $2.25 each, with solder tabs.

Note that the Nicad pack is permanently wired into the system, and is recharged by removing the battery access hatch. Note also that the props are tractors, not pushers, and that they are mounted to the prop shaft with the lettering on the blades facing forward.

Covering and Finishing:

For the record, the weight of the completely planked fuselage, wings, tail group, and nacelles was 4.2 oz. Fully covered, painted, and ready for motor and battery installation, the weight was 5.2 oz., including tip floats. The RTF weight, with a 4-cell, 110 mAh pack, was 8.3 oz. The prototype was done with yellow Hallmark wrapping tissue, yellow acrylic paint, and red acrylic on hull and float bottoms. The spinners had not yet been installed at this stage.

Give all sheeted and solid surfaces one coat of sanding sealer. Resist the urge to superfinish the 136; it can add weight very quickly. Paint or dope the hull, and add the windscreen, door, and window trim (1/32" black striping tape was used in the prototype). Peel off the mylar hull markings, and apply them to the hull in the positions shown. There is no evidence of de-icer boots, so they aren't shown.

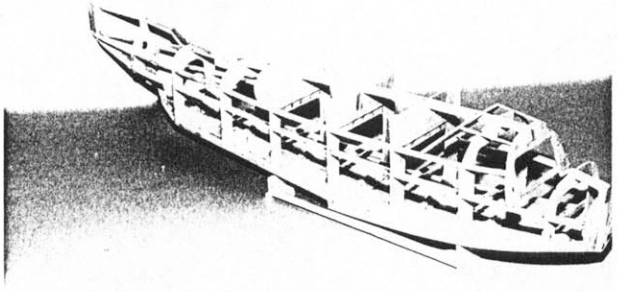
Lead motor wires from the battery compartment back into the midsection. Cover and assemble the tail group, and assemble it to the hull, after completing all hull painting and detailing. Add the landing gear, including the tail wheel.

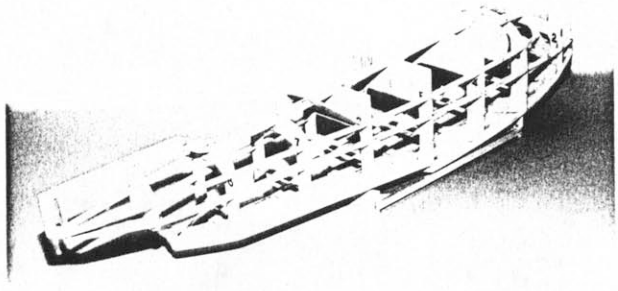
Tissue cover the top of the wing, and the bottom from R3 to the tip (don't cover the bottom of the center panel). Install the wiring into the wing, from the R3 feed-thru, and exiting down into the center section. Leave plenty of spare length at both ends.

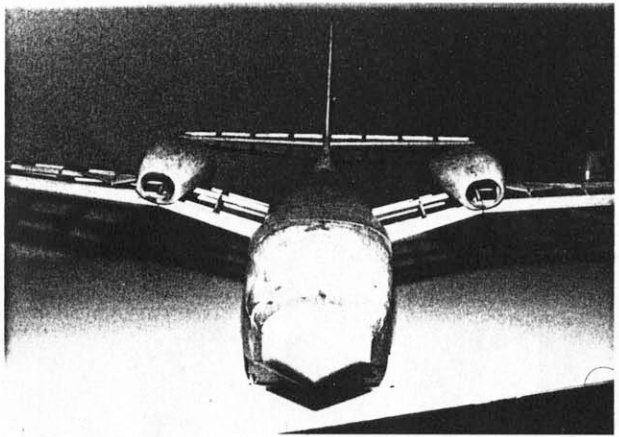
Cover the bottom of the inner panels, still leaving the center open. Solder the motor wires to the leads coming out the top of the wing, and install the motors into the nacelles. You can either CyA+ the motors to the 1/32" ply, or use the M2 metric tapped holes in the motor, and very short M2 bolts (the method used for the prototype). Confirm that the MOTORS TURN IN THE RIGHT DIRECTION, and glue the nacelles to the wing. Connect the wires to the switch, and to the battery pack per the Wiring Diagram. Install the switch such that the "ON" position is either up or forward. Since I hate the look of rubber bands, the battery access hatch is secured with masking tape for flight.

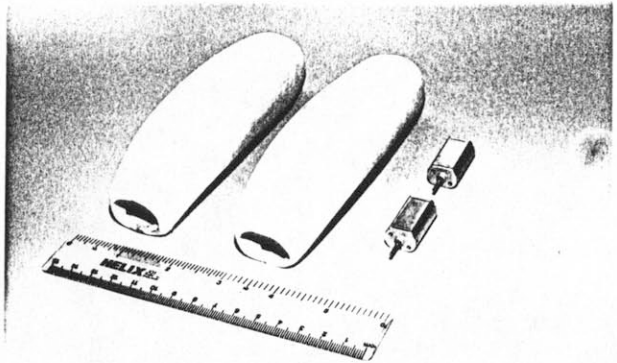
With a waterproofed hull, the Piaggio should be capable of off-water operation. Since this is early May in Connecticut, Long Island Sound is still too damn cold for water testing, but I intend to try later in the year, if I can find a chase boat.

WE WISH YOU THE BEST OF LUCK WITH THIS LITTLE RASCAL, AND WOULD LIKE TO HEAR YOUR COMMENTS!








MELIXE