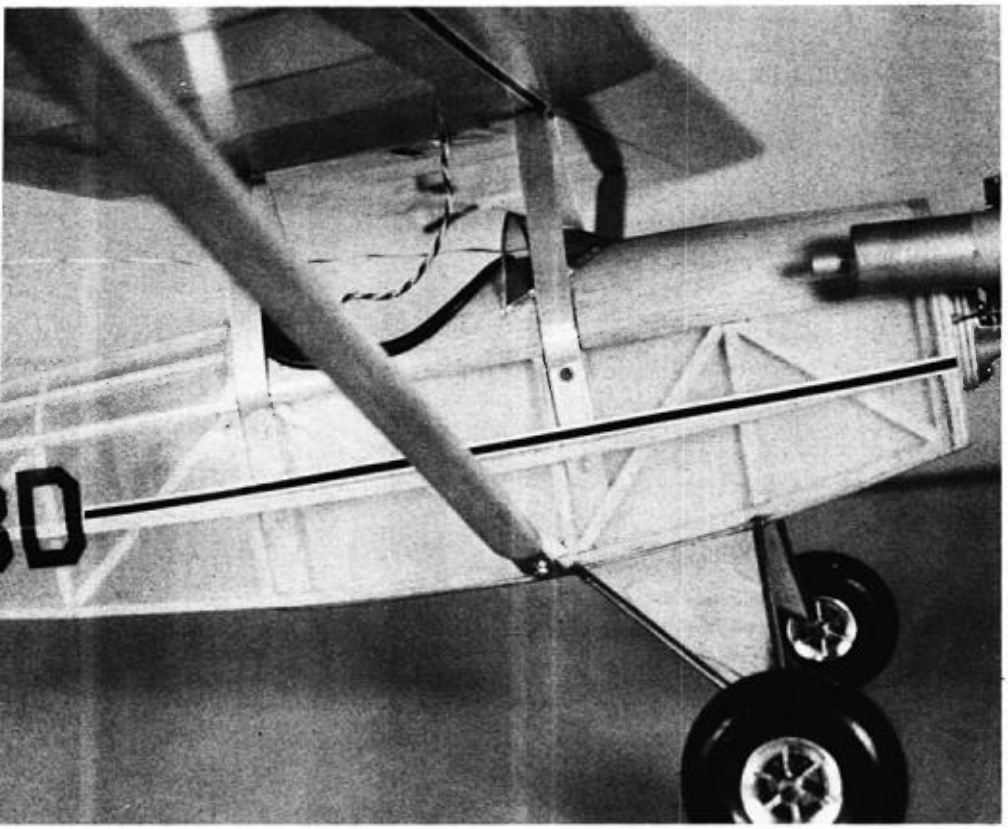
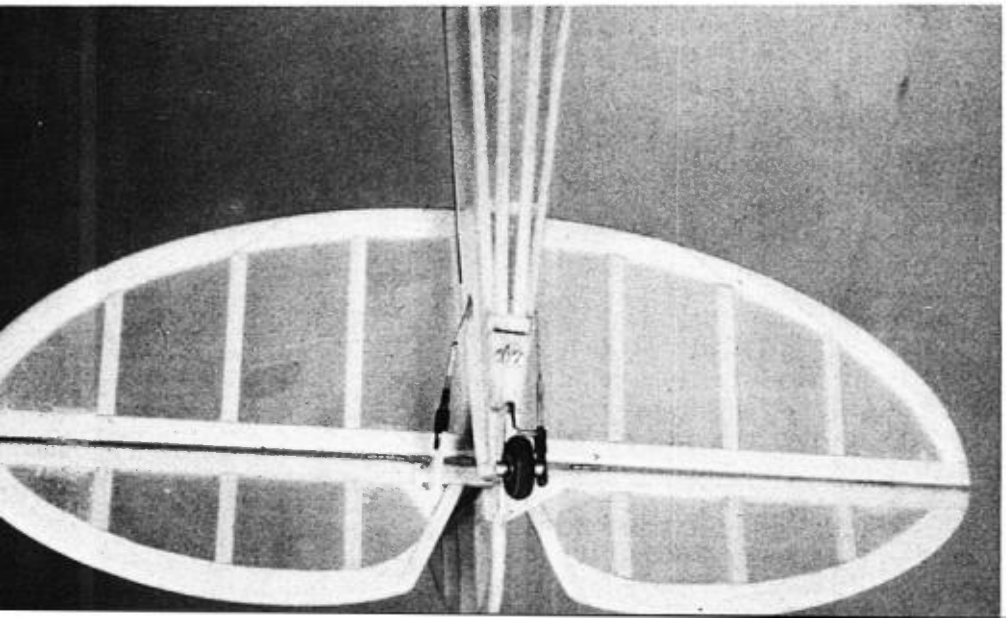
P. D. PARASOL

REMINISCENT OF AN EARLIER DAY IN AVIATION, THIS .15 TO .19 POWERED PARASOL WING MODEL IS ONE OF THE FINEST SMALL-FIELD SPORT AIRCRAFT YOU'LL EVER FLY.





BY JOHNNY JOHNSON

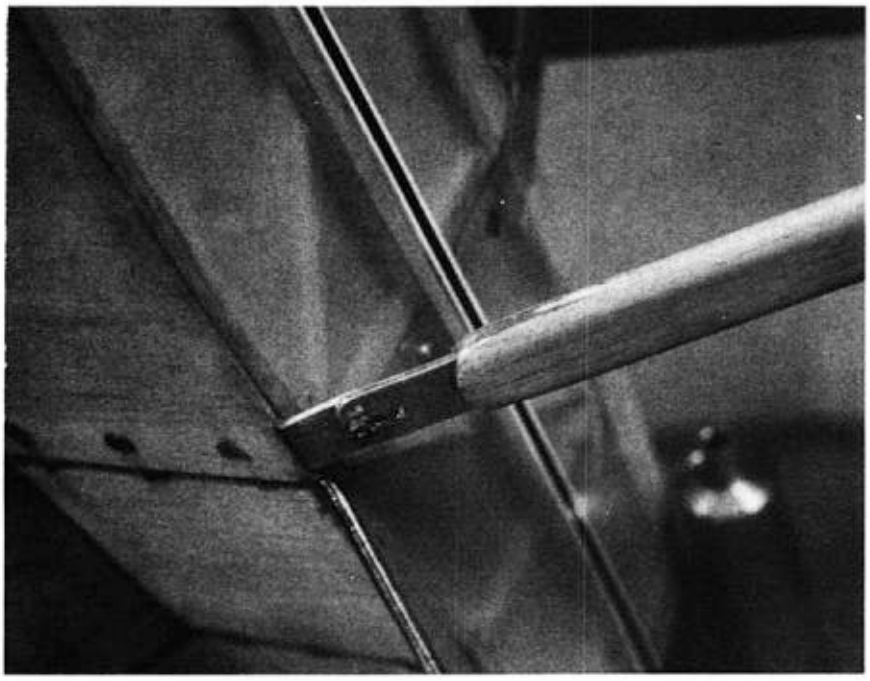
I started by writing down everything I wanted in my next model and it came out like this – it has to be lightweight, so build with sticks and cover it with silk. It has to be strong, so use some real engineering in the design. In fact, strong isn't good enough, it has to be super strong, so use external bracing. It has to look like a full scale airplane, but not a scale model of anything, so I can have any proportions and innovations I want without worrying about deviating from scale. Other items included – at least a 60" wing span - a small engine - no nose gear - steerable tail wheel - absolute minimum ten minute tank - no wing through the fuselage - and it has to be different.

Well, this airplane isn't exactly what I originally pictured in my mind, but it has met all the above objectives and my friends, who at first sight of the model were not too impressed, have since been converted, especially when they saw the strenuous flight loads the model will take.

Although the PD Parasol is not a competition or pattern model, it is definitely an aerobatic airplane. It is designed for 50G's positive and 25G's negative and it has the wing area, the light weight and strength to do the most violent aerobatic maneuvers. And yet, with restricted control movements, it is a very gentle and docile airplane. As a beginner's airplane, it is excellent at reduced power, due to the light wing loading.

For the effort it takes to build this model, here is what it will do for you in return: Short take off - good climb - very good glide - gentle stall - not too good aileron rolls (too wide) - smooth easy aileron turns - also very tight turns - snap rolls, inside and outside - slow rolls - spins - loops, inside and out and, naturally, any combination of the above, such as Immelmans - split esses - snap roll on top of a loop, etc. This plane really excels in snap maneuvers and spins, depending upon the skill of the pilot.

The first twenty or more flights with this model were made with a Super Tigre .15 diesel which proved quite satisfactory. The last thirty or so flights have been with a Super Tigre 23 Glow which is perfect. I use a 10-4 Tornado Propeller on both engines. With the .15 diesel I obtained 22 minutes of flight on the 4 oz. clank tank and very reliable idling, although it had a slightly higher idle rpm than its glow counterpart.



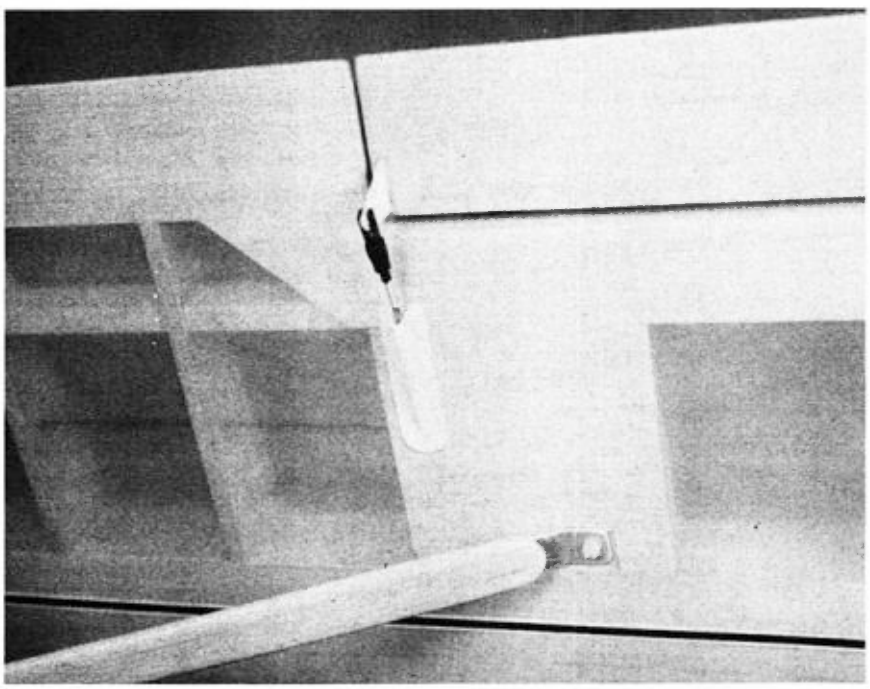
Detail of adjustable lower strut fitting.

Fuselage

Build the two sides first and cement 1/16" extra hard balsa or 1/16" plywood on the inside of the fuselage sides as shown on the plans. Draw a good straight centerline on a suitable working surface and pin the sides to the surface, upside down, as you cement in cross-section sticks numbers 3 and 4 first, then cross section numbers 2 and 1. Then cement the tail ends together and cement in cross sections number 5, number 6, number 7 and number 8 - all the time, using the centerline to keep the fuselage sides true and equally curved on both sides. Let dry over night. Always use Handi-Wrap on your working surface when cementing pinned down parts. Do not use waxed paper or other types of wraps.

Remove the fuselage and cement in the 1/16" plywood cockpit reinforcing, the 1/8" plywood cabane strut mounts, the 1/8" plywood cross member at cross section number 4, and the 1/8" plywood (landing gear and wing strut bracket) mount. Add

Upper strut fitting and aileron linkage.



the fuselage formers and aft cockpit stringers. Bind the landing gear and lower wing strut bracket to the 1/8" plywood landing gear mount, using soft copper wire, and then solder the landing gear wire and soft copper wire. Then on the opposite side of the 1/8" plywood landing gear mount, generously epoxy the soft copper wire to the plywood. Permanently install the 4 oz. clank tank and seal off the tank from the radio compartment with 1/8" sheet balsa. Fuel proof this area well and plank or cover the fuselage top with 1/8" balsa from cross section number 4, forward. Then cut out the cockpit hole. Cover the bottom of the fuselage from cross section 4, forward with 1/8" balsa with the grain running lengthwise. Cement in two equally spaced stringers from cross section number 4 aft to the plywood tail wheel mount. Use flush screws and blind nuts to fasten the cabane struts to the plywood mounts. You will have to notch the top fuselage longerons 1/16" deep so that the struts will be even with the outside of the fuselage sides. Measuring from the top of the longerons, the top of the front cabane strut must be 1/16" lower than the rear one. If it does not come out this way, then use flat washers between the wing and cabane struts to get this measurement.

The original plane has a single 3/16" x 3/16" stringer down the fuselage sides, equally spaced between the top and bottom longerons. The plane I'm building now will not have this, so it's not shown on the plans. The plywood firewall can be either 1/8" or 1/4" 5-ply plywood depending on whether you desire to use wood screws or machine screws and blind mounting nuts to fasten the firewall type engine mounts.

Wing

This is the conventional 'D' spar and 1/16" balsa trailing edge and cap-stripped ribs. Build right and left side separately. Pin down the bottom piece of 1/16" trailing edge, then the bottom 1/4" x 1/4" front spar, only support this 1/4" above your working surface to allow rib clearance. Note – Do not cut the trailing edge for ailerons, yet. Cement in all the main wing ribs, the top rear 1/8" x 1/4" spar, the top piece trailing edge and the top front spar. Cement in the 1/16" sheet spar webs as shown on the plans, with the grain going span-wise.

At this time install the tip rib and bend the top and bottom spar tips together and cement well. Cement in

the two outermost front spar webs with the grain vertical. Cut out the wing tip, taper it and cement in place. Cut the top leading edge to approximate size, wet the outside with water and cement it in place while still wet. Add the top capstrips. Remove the wing panel and cement in the bottom rear spar, rear spar webs, and cement in the 1/16" sheet balsa reinforcing in front of the aileron, leaving a 3/16" gap between the top piece and the trailing edge which will become the aileron. Leave a 5/16" gap on the bottom side. Cut out and trim the aileron, cement in the 3/16" hinge reinforcing blocks. Epoxy in the control horn and cap off the front with 1/16" sheet balsa and likewise do the wing in front of the aileron. Cement on the 1/4" x 1/2" leading edge balsa and cement in all the 1/8" plywood reinforcings, joining the two wing halves as you cement in the center spar splices. Install all the aluminum wing attach fittings and cover the bottom wing leading edge with 1/16" sheet balsa with the outside wet as before.

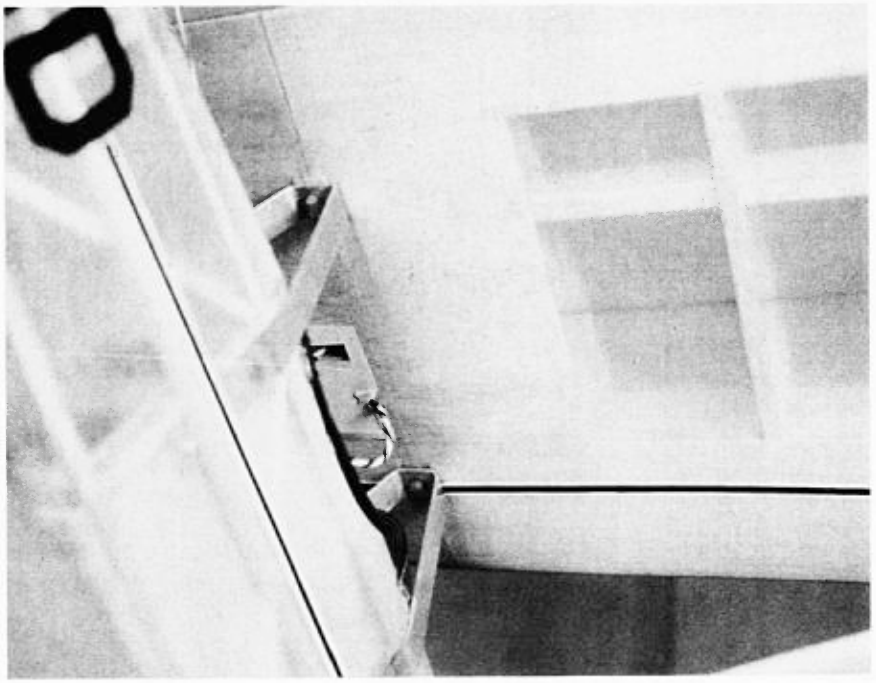
Empennage

The vertical fin, rudder, stabilizer and elevators are built right on the plans. (With Handi-Wrap, that is.) The vertical fin and rudder spars are extra hard 1/4" x 1/4" balsa and the stabilizer and elevator spars are 1/4" x 5/16" extra hard balsa. If extra hard balsa is not available to you, I would suggest 1/8" x 1/4" pine or spruce external tail braces from the bottom of the fuselage up and out to about halfway on the stabilizer spar and then on top of the stabilizer to about the halfway point on the vertical fin spar.

Wing Struts

The exact length cannot be drawn on the plans so this measurement must be taken during the final assembly of the plane. The struts are 1/4" x 3/4" hard balsa. I sliced the ends on a table saw, epoxied in the aluminum fittings and filled in the openings with balsa. If you do not have a table saw available, I would suggest making the struts with three laminations of balsa, the center one being 1/16" and the outer ones being 3/32". Be sure the aluminum strut ends are really in to stay, as each of these struts actually supports about a third of the model's weight and at 50G's that's 50 pounds each. I have pull tested mine at 58 pounds each.

Note: Drill all the holes in the strut ends before cutting them out of the sheet aluminum. The eccentric washers are made from the same aluminum as the strut ends and then just drill the proper size screw hole as close to the edge as possible and be sure to use a large flat washer under the screw heads.



Cabane detail showing nylon bolts.

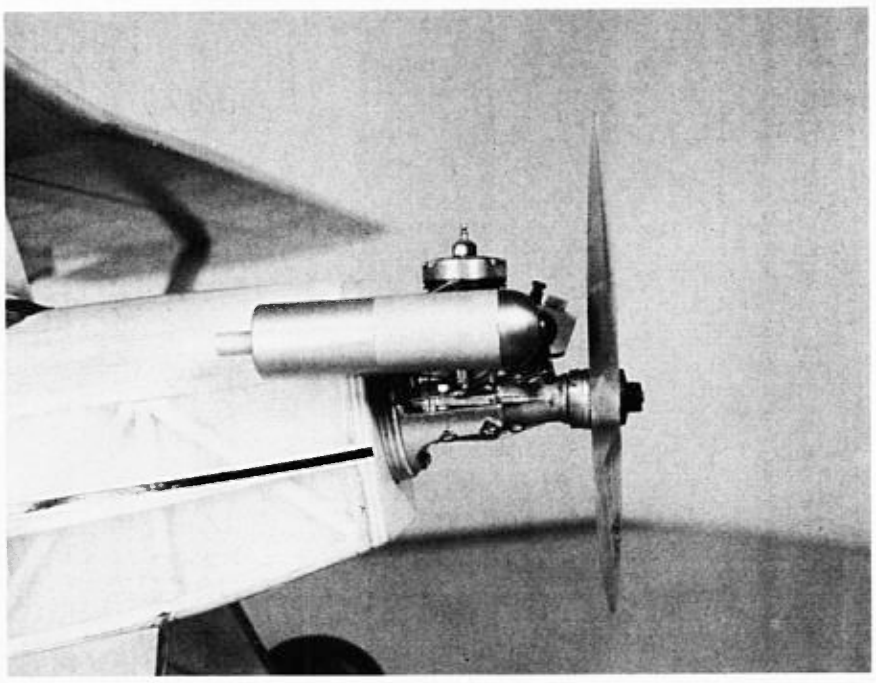
General Notes

Since two of the prime objectives of this plane were super strength and light weight, good joints and fits of the various parts are of utmost importance in order to retain these features.

As a means of communication, I have five grades of balsa: very soft, soft, medium hard, extra hard and the balsa grade not specified on the plans is meant to be medium balsa, as compared to these four grades. For sticking things together, I used epoxy, (where specified on the plans) Duco Household Cement, Ambroid Cement, and White Glue. The first model was covered with silk with three coats of clear dope on the frame and five coats clear dope on the silk, but I can't see any reason why medium silkspan or some of the newer covering materials couldn't be used. For controls I used NyRod on the

(continued on page 71)

O.S. Max .19, 9-4 prop. Muffler from Jerry Nelson.



(continued from page 19)

elevator and rudder, 1/16" steel welding rod on the ailerons, 1/32" piano wire through an inside piece of NyRod on the throttle. (My model, less 4 oz. of fuel, weighs exactly three pounds.)

The aileron control horn shown on the plans is really a Williams Bros. aileron hinge. If this isn't available to you, then cut the flange off a regular nylon control horn. The aluminum wing attach fittings were simply sliced off of an extruded 1/8" aluminum angle I got at the local hardware store. The .064-24st aluminum came from the local airport; it is a very common thickness.

The balance point shown on the plans is an absolute most rearward balance point. If your plane comes out tail heavy, add one or two 1/4" plywood spacers between the firewall and the engine mounts. I'm using a Kraft KP4S at 13.5 oz. airborne weight. A heavier system should not affect the balance noticeably. My present plane is trimmed with 1/8" down elevator and 3/16" right rudder. (Exactly where I wanted it, as it smooths out the power on-off transition.) For you less experienced pilots, use 3/8 inch up and 3/8 inch down on your elevator and 1/2 inch right and left on the rudder and 1/2 inch up and down on each aileron.

After a few flights you will be able to go to 7/8" up and 7/8" down on the elevators, one inch right and left on the rudder, and 3/4" up and down on each aileron. (This measurement is taken at the trailing edge of each control surface, from the neutral position.)

As a matter of interest, I dove this plane at full throttle from five hundred feet to one hundred feet (absolutely straight down) and then jerked in full up elevator into a loop and the recording 'G' meter registered 20G's. If anybody wants to put a .29 or .35 in this plane, I suppose it would be all right, the plane is strong enough, but boy, when it comes to flying it, you're on your own! ●