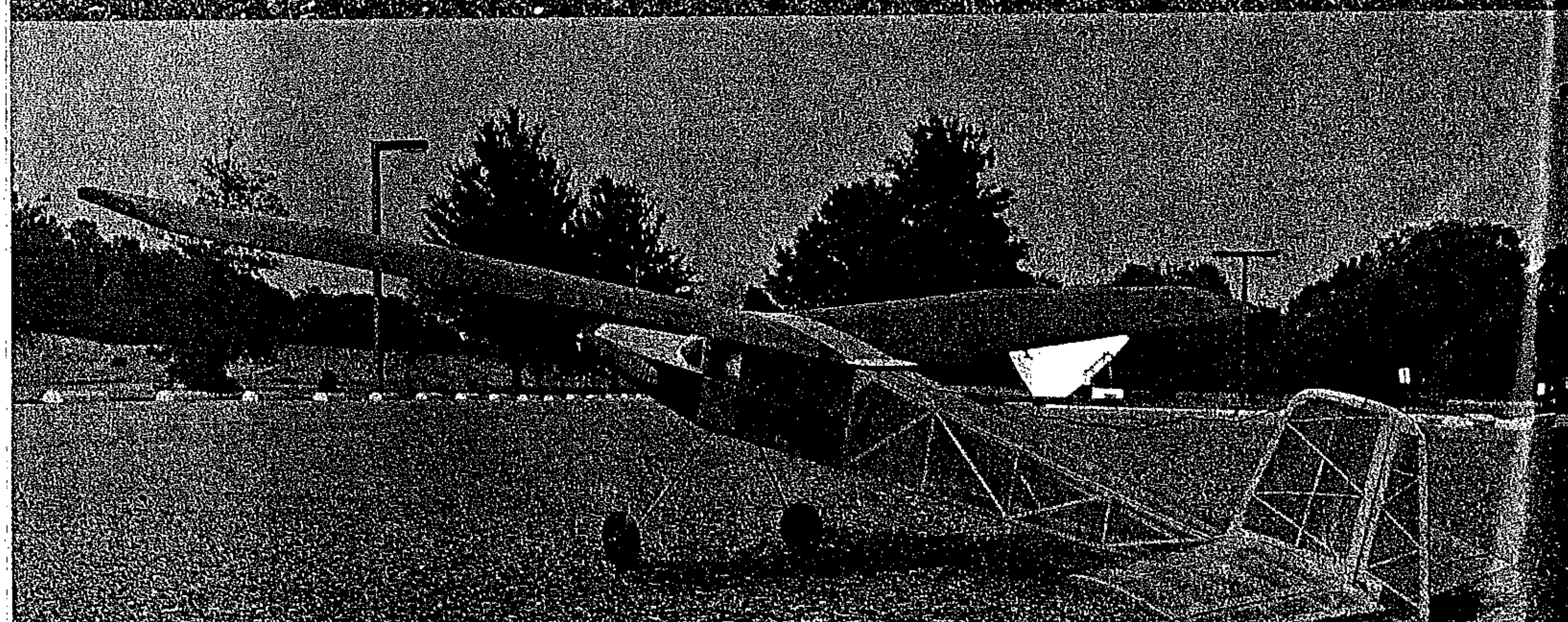
Heron



Realistic cabin and landing gear typify this model's sport features, but it provides near-competition performance. A slim, clean fuselage and airfoil of 10% thickness (with an elongated Phillips entry allowing 4° incidence for high L/D) provide low drag to make possible a good climb-out rate and minimum glide sink at a wing loading of 12 ounces per square foot. Handling is positive and smooth both under power and in the glide. This is the kind of flight the author enjoys. Takeoffs and touch-and-goes are exceptionally easy to execute, Winter says.

Lord only knows how many designs the author has had in practically all the modeling magazines from the Thirties until the present day. This one for electric power and RC pleases him the most, and that's saying something.

Bill Winter

If you see the Heron gliding as it looks here, it will overshoot a normal landing area. Pic was taken during a series of flybys for Tom Schmitt's camera. Bill Winter draws all his airfoils with a French curve (zip-zips, as old FFers call them). He says the Eppler 205 is quite similar to the Heron's but adds that no open-frame wing can maintain an intended airfoil.

THIS GRACEFUL BIRD significantly advances all aspects of performance far beyond the family of sport models typified by my LeCrate (which is popular because it flies nicely). The Heron blends sport and competition performance by incorporating unusual features. It definitely is not a "first attempt" aircraft. It is not recommended for anyone who does not already possess adequate piloting skills *and* prior Electric experience.

The Heron makes flights of 15+ minutes reliably (without slow floating) and sometimes breaks 20 minutes in cool, high-density evening air. It can attain extreme altitude—to the point where most fliers chicken out—two to three times in one flight.

It will go to winch-tow heights four to seven times on a flight depending on how it is flown and the variables of shutdowns and climbs. It has done 15 touch-and-goes followed by a climb to altitude—then soaring for 10 minutes—then resuming a half dozen more touch-and-goes. It is faster than typical Electric sport machines. It grooves with a solid "feel" under power or when gliding.

For peak results it must be handled smoothly with gentle tooling of the stick—and never with any heavy-handed controls. It is hands-off stable from the instant of launch.

The lift/drag ratio (L/D) is truly extraordinary. Landing approaches must be from far out and low down. If waist high across the field, it will be knee high as it goes past the far end of the landing area. On its first test flight, Don Srull needed four attempts to get it on the ground, finally landing in an extreme nose-high condition—slowed to the maximum.

When Doug Pratt tried it, he overshot on three go-rounds, then elected a slow approach into a fair head wind; he finally got it on the ground at the extreme far end of the strip (large enough, incidentally, for Pattern models). When Doug first "broke the glide" gently while short of the runway, the Heron remained head high in slow flight past the runway's end.

Temperature and air density play an obvious part in performance. Marginal, heavier Electric planes capable of 10+ minutes may not go higher than 50 to 75 feet on a 90°+ day with high humidity and a low barometer. Average models lose a minute or two, and there may be as much as a two-minute loss from the Herron's 15- to 20-minute capability. At the same time, let me add that it is unrealistic to say any Electric will do exactly this or that; geographic and atmospheric conditions are serious factors.

John Worth took the Heron to the Annual Electric Fly in Hatfield, PA, where the best pilots were invited to fly it. Keith Shaw, who did all those touch-and-goes

Climb-out is steady at this launch angle, and the model is fully hands-off stable. A good flight is anything over 15 min.—in fact, anything less is rare. Effective flight tactics sometime produce flights of 20 min. with six to seven descents and returns to soaring height.

Photos by author and Tom Schmitt

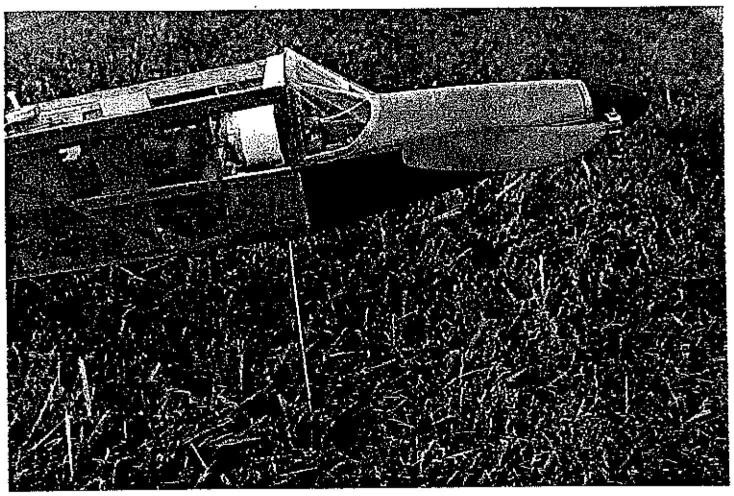
For an eight-cell (1.2 Ah) Electric machine weighing 43 oz., the craft looks surprisingly large for a so-called 05 motor (span is 5½ ft.). The tapered outer wing panels are also thickness-tapered down from the top. The visual effect is of a gull wing in some attitudes.

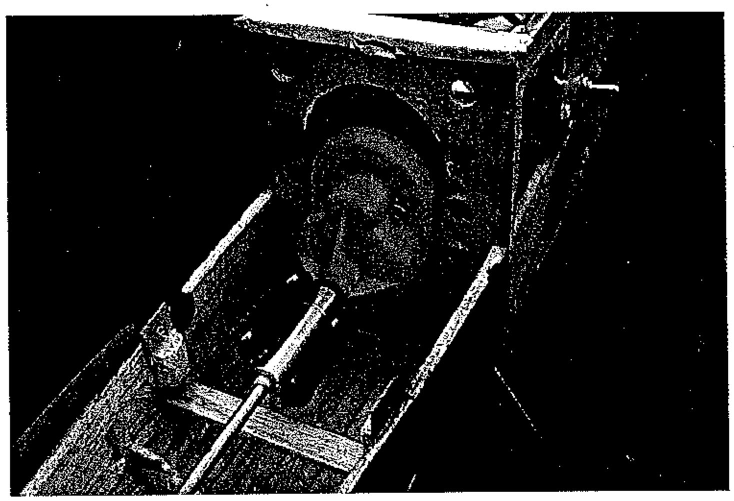
plus soaring, thought its secret had to be the wing—and that this was the first time he had seen an extension shaft arrangement perform so effectively. Bob Kopski did touch-and-goes, and after an interval of flying, he did another series of touch-and-goes.

Woody Blanchard, once the AMA National Champion, turned teary-eyed at altitude and had to hand over the controls to Worth to bring it down. Both Blanchard and Heinz Koerner (until this year he conducted Electric clinics during the event) later contacted me to say it should have been entered in the Last Down event because they felt it would have placed. Unfortunately, Worth (who was under orders!) did not do so, as the one transmitter had been used for two other airplanes as well, and less than an hour's capacity remained.

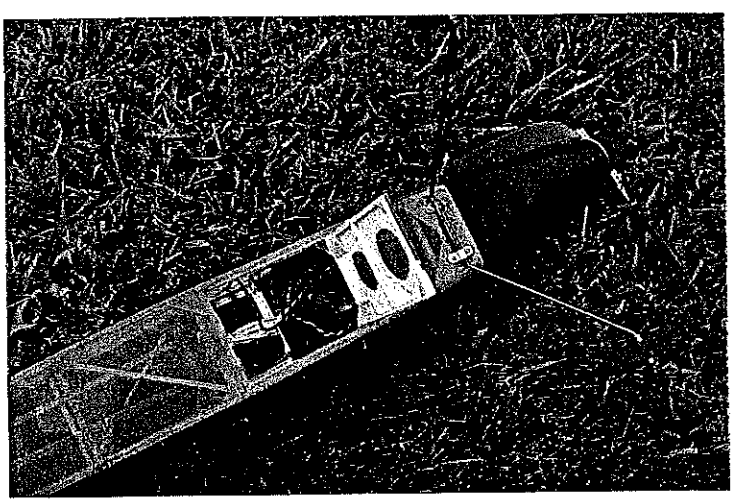
The Heron also has been flown by Hurst Bowers and Tom Schmitt; you don't have to take my word. Remember: it is not a true competition machine.

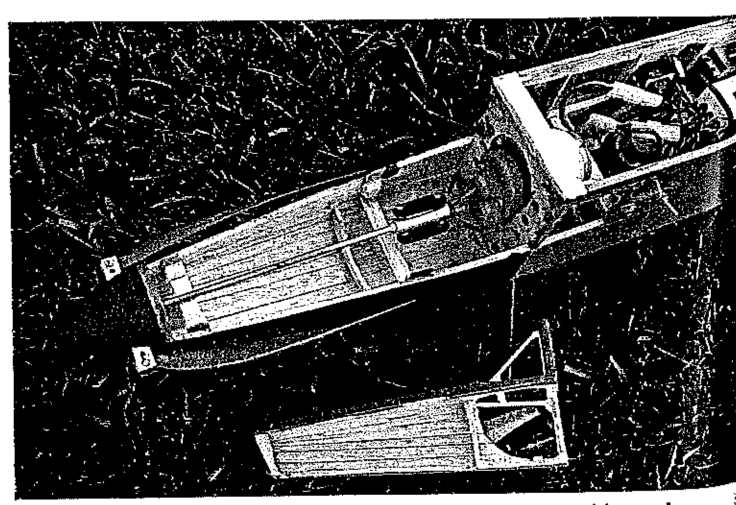
Spectator reaction at Hatfield was marked by surprise that the equipment was





Left: Long rounded-off nose allows the big Robbe 15-12 banana-bladed folder to hug the contours in any position, thus avoiding the need of a prop stop or brake. Landing gear is made for quick detachment for still greater performance, but Winter hasn't bothered. With gear off, assuming a high-climbing, shorter-run setup, it ought to push competition stuff. Right: Economical stock Robbe/Mabuchi and 3.3-to-1 gearbox draws only 16 amps with a 15-12 prop, whereas a competition 05 draws 35 amps on the same prop—and with seven cells to the Heron's eight. On/off motor switch requires use of the Robbe O-ringed universal; without it, you must use a motor speed controller with this big prop. A huge prop disc area at respectable rpm yields impressive power. Seemingly botched firewall is from other trial installations.





Left: Open hatch reveals the airborne battery pack rubberbanded to the underside of a balsa tray—which carries on its top the rudder and elevator servos and receiver. Note the strap-on gear and close fit of the folded prop blade. An arming switch is essential on all Electrics to avoid mishaps. Right: Entire upper nose lifts off as a hatch to allow motor access and removal. Again, the Robbe universal shows clearly.

entirely stock and even had a "cheapie" motor. The Robbe/Mabuchi it uses is not a run-of-the-mill Mabuchi. It has a special winding, which I suspect is true also of the Graupner/Mabuchi and a new Mabuchi which Polk's has been showing—and possibly the motor Goldberg has with their new Electric Gentle Lady combo. With the 3.1-to-1 Robbe gearbox and Robbe's 15-12 banana-bladed folder and eight 1.2 Ah cells, it draws only 16 amps on the ground and perhaps unloads to as much as only 12 amps in flight. This is roughly 60% of the drain of similar-looking Mabuchi motors.

I am not an inventor or innovator. Curious about many forms of aircraft, I don't develop a design through repetitive building with revisions along the way. I draw upon the vast fund of others' experiences through magazines. I combine many things that impress me into a recipe for an objective. The Heron is near the top of the Electric food chain.

To begin with, Don Srull's development of the popular Sparky (scaled up from an old Lidgard Rubber model kitted by Comet) fascinated me, and I "bent" his thinking to the concept of the slow-gliding LeCrate. After several years of watching his inspiring work with giant folding props and high reduction ratios which produced phenomenal climbs and durations, I could see an exciting flier capable of 15 minutes or more.

Don arrived one night with copies of *MAN* and *Model Builder* (containing, respectively, Bob Boucher's Astro Challenger and Larry Jolly's Electricus, both the epitome of competition craft). Using a formula he had developed (it predicts the duration of Rubber models and Electrics with spooky precision), he had a two-sheet prospectus which pinpointed all specs for this performance goal—weight, area, prop, motor, and batteries. There was an "innocent" remark made that it could be fun to locate the motor on the front cabin bulkhead with a longer extension than I had considered.

I decided I would combine the features of these ultra-performance competition models with what passes for a sport model—my LeCrate, for instance. Jolly states his model goes up out of sight on a direct-drive 05 (Astro 05XL or Leisure racing type with Rev-Up 7-4—or 7-6 with seven cells) with six 1.2 Ah cells in 4½ minutes of run. Boucher uses seven 800 mAh cells with his geared Astro Cobalt and the small Geist folder (still a big prop); his model can climb straight up. Both use the Eppler 205 airfoil, which is flat-bottomed but with a long Phillips entry extending back roughly to the spar. My own "zip-zip" airfoil used on the glow-engined Krackerjac in about 1960 is a close relative, and the Herron's airfoil is somewhat similar. The Astro Challenger is built like a feather—essential for its climb.

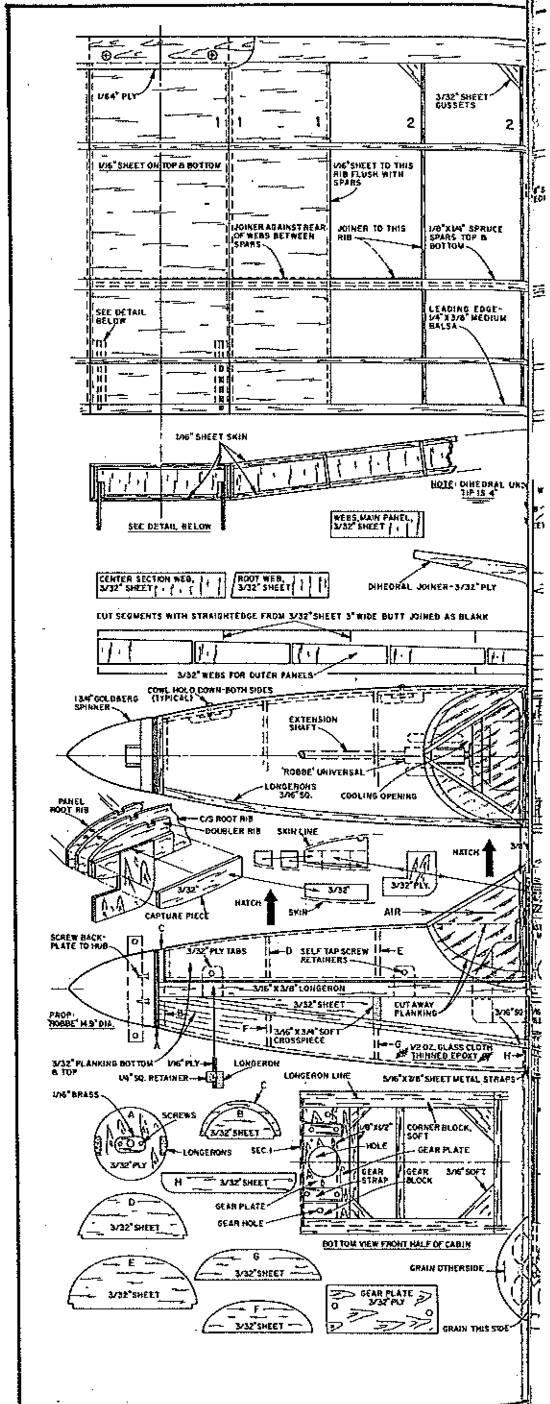
On a scale of one to 10, one being sport and 10 "explosive," I shot for five to seven. I kept a low cabin profile for realism, as well as a full-fledged landing gear. Though exciting, my climb rate and angle would be somewhat less but with comparable duration by virtue of repeated climbs and glides. This requires a still different propulsion system combination. My final system weighed five ounces more than Jolly's (his gross was 35 to 40 oz.) with fixed gear (it detaches if you wish, which considerably boosts performance), so its gross is 43 to 46 oz. Jolly's Electricus spans 74 in., and the area is 582 sq. in.

Srull's figures recommended a maximum of 600 sq. in. for 42 oz., a loading in the 10- to 12-oz. range, payload of 30 oz., and structure a mere 12 oz. This was based on seven cells and an Astro belt drive for my 15-in. folder. Span would be 70 in. When I started the outlines, I then decided to go down to 65 in. span and 545 sq. in. of area (I wanted a bit faster flight for pleasure). I settled on eight 1.2 Ah cells with a 3.1:1 geared Robbe/Mabuchi 075—more gross and a higher loading. My results speak for themselves, but no doubt it is possible for an experienced Electric flier to get more from my machine with different motor/battery/prop combinations.

The iron band "confines" and enhances the magnetic field of the Robbe/Mabuchi for optimum results with Robbe's 15-12 prop, as I understand it. Sold by Robbe for direct drive, the same motor does not have the band. Another manufacturer tells me that all production-run motors have a variation in performance of 10% to 15%. Like cars, one could get a relative lemon. By careful selection, one can find a "blazer." Mine, however, is merely off the shelf.

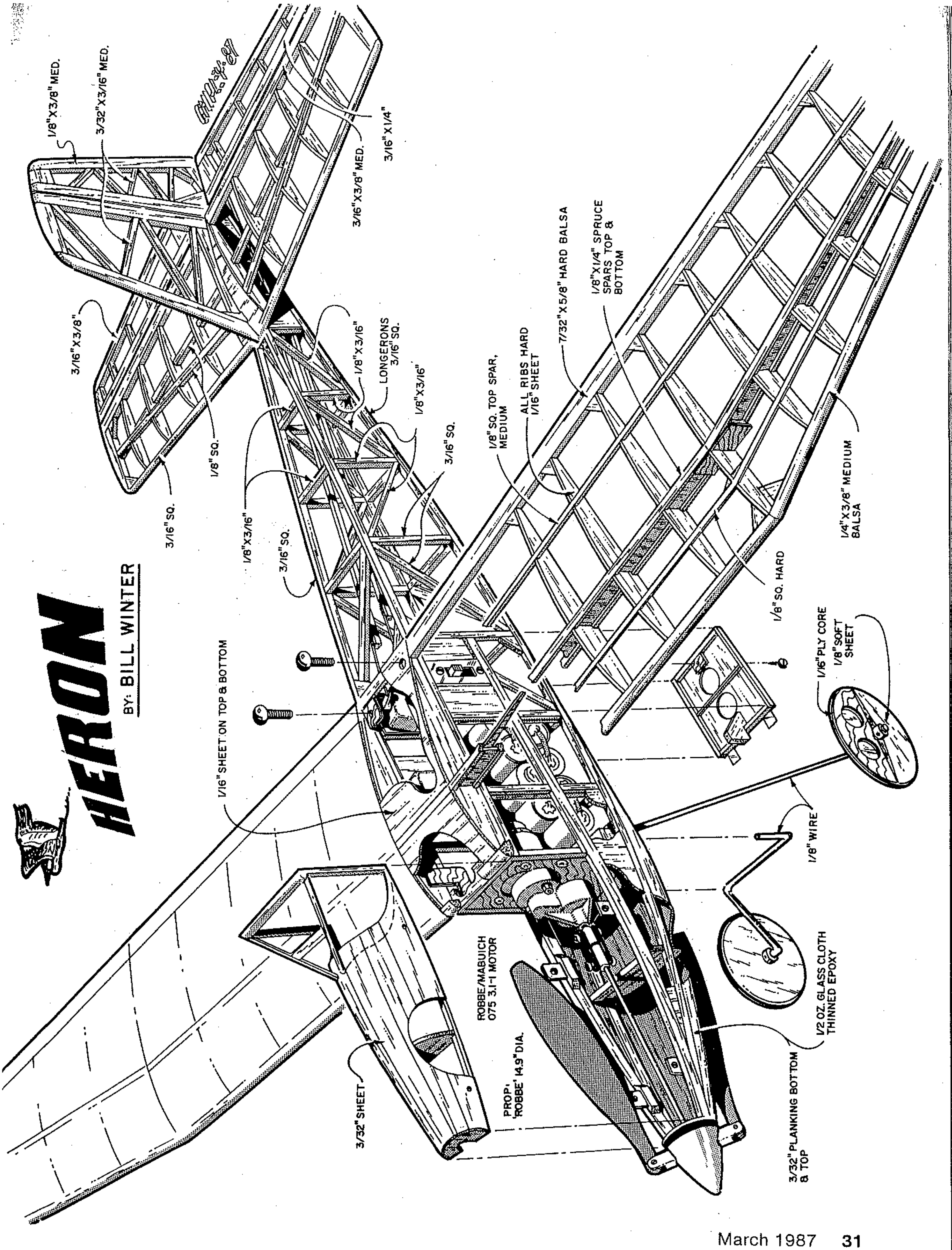
(Author's note: The explanation of the iron band is vague. The motor had been passed around among several modelers before it was installed in the Heron, and only now have I seen the Robbe directions. We know there are special winds. I assumed the band enhanced the motor's performance in my installation at 16 amps with eight cells; I recommend you do so, too. For a nominal 05 size (what size is it really?), the Robbe/Mabuchi's ability to take up to 10 cells is phenomenal. Obviously this motor's rating is higher than "standard." Robbe says to remove the band when using eight cells and less. With more cells, the band reduces drain to avoid overheating. Good air cooling seems necessary; note the triangular opening in the windscreen immediately forward of the motor. Good exit venting is recommended by Robbe. I prefer to keep the band on with eight cells for my motor run time at 16 amps. The anti-suppression capacitors are a Robbe accessory and don't come with the motor. I think Robbe would do well to include them because they are absolutely essential.)

Gear ratios make a tremendous difference in current drain. A certain 05 with only an 11-6 prop and ratios of 2:1, 2½:1, turns 5,500 at 2:1 at 24 amps, but with 3:1 only 12 amps at 5,000+; the 2½:1 drew 17 amps at 5,200. The Heron's performance is superb. You may do better, and you may do worse. That's the nature of the Electric beast.

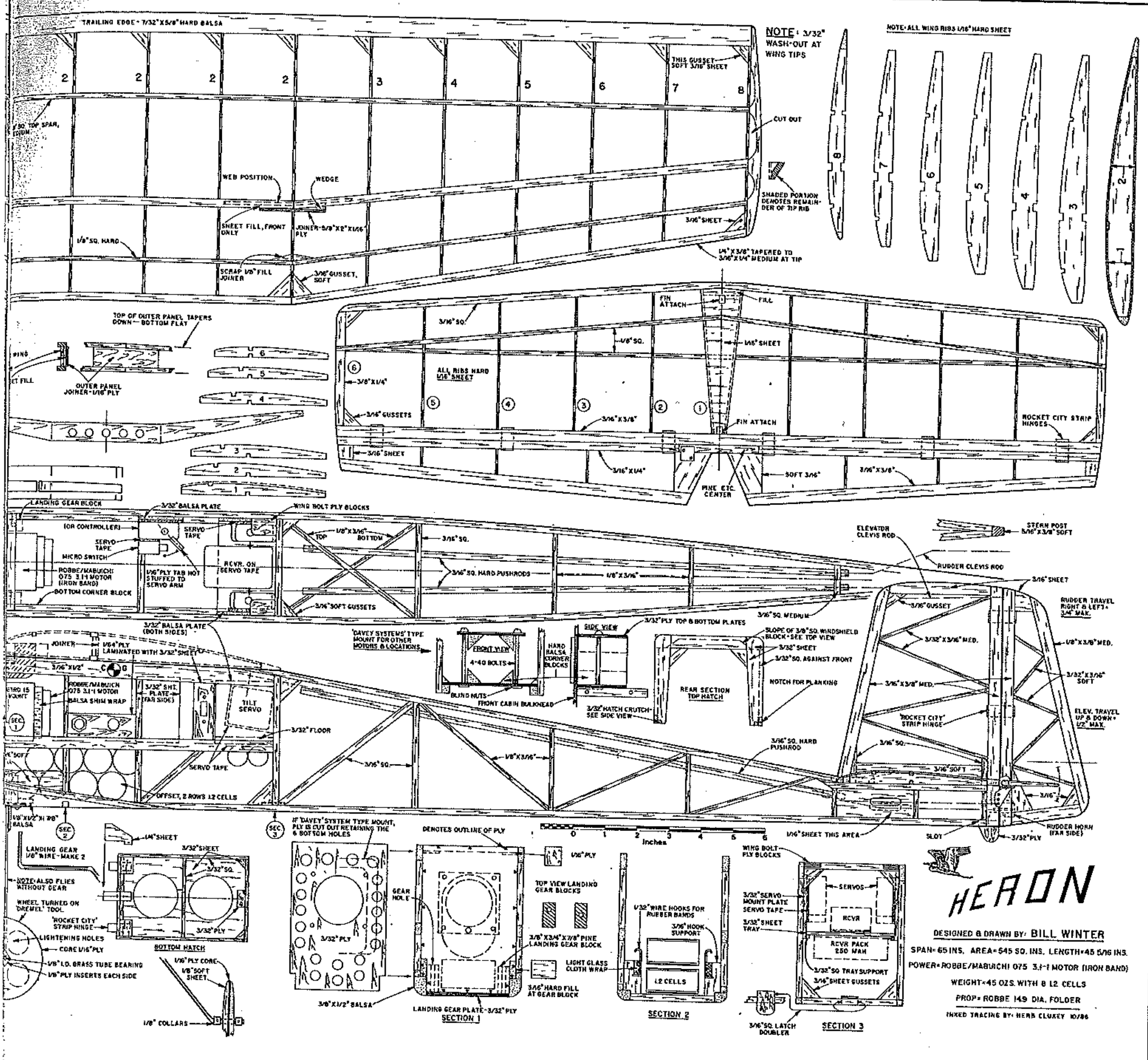


Why a Mabuchi motor? For years Astro continued to carry a Mabuchi type designated as an 05 with six cells, an 075 with seven cells. It seems to be an efficient, though not hot, motor in an extremely wide variation of aircraft types. We consider it an 075. The Robbe unit I use is with the 3.1:1 Reduction gear box. The motor battery pack has eight cells (1.2 Ah), and the prop is a 14.9-in.-dia. Robbe folder with a "banana" blade configuration.

I've been told by everyone (except Srull) that big folders are not the way to go. High drain on the battery is the big reason. Ted Davey duplicated my arrangement to assist me and reported a 28-amp drain. (Incidentally, Graupner's big Sailplane—at Hobby Lobby—uses 10 cells with this motor and a big folder.) We cannot com-


HERON
BY: BILL WINTER
1/16" SHEET ON TOP & BOTTOM
3/32" SHEET
PROP: 'ROBBE' 14.9" DIA.
ROBBE/MABUICH 075 3.1-1 MOTOR
3/32" PLANKING BOTTOM & TOP
1/2 OZ. GLASS CLOTH THINNED EPOXY
1/8" WIRE
1/16" PLY CORE
1/8" SOFT SHEET
1/8" SQ. HARD
1/4"X3/8" MEDIUM BALSA
1/8"X1/4" SPRUCE SPARS TOP & BOTTOM
7/32"X5/8" HARD BALSA
ALL RIBS HARD 1/16" SHEET
1/8" SQ. TOP SPAR, MEDIUM
3/16" SQ.
1/8"X3/16"
LONGERONS 3/16" SQ.
1/8"X3/16"
3/16" SQ.
1/8"X3/16"
3/16"X3/8"
1/8" SQ.
3/16" SQ.
1/8"X3/8" MED.
3/32"X3/16" MED.
3/16"X3/8" MED.
3/16"X1/4"

Full-Size Plans Available . . . See Page 170



pare an 05 geared cobalt on seven cells (apples and oranges), but Bob Sliff mentions he did not try the same Robbe prop in his tests because the drain was an impossible 35 amps. My drain is 16 amps. Robbe's catalog claims 16 amps—peak. The motor or battery does not overheat. I cannot flight-test a continuous run because my plane would reach roughly 4,000+ feet, judging by adding six to seven climbs to 700-ft. winch tow height.

Why this inconsistency? Srull points out that Robbe designed that prop specifically for their version of the Mabuchi. My motor came with the iron band the same as all Robbe/Mabuchi geared motors. This time I don't have a fuse in my setup; I don't know if the loss from a fuse is significant, but I doubt it. And the winding is special.

Mabuchi makes an enormous number of motors (of all types, including industrial ones). One cannot procure a relatively small run of motors modified to a small company's requirements, but perhaps folks like Graupner and Robbe may be able to order sufficient quantities to obtain variations. However, I only speculate. When I purchased the Robbe/Mabuchi with gear box, the price was about $36.00.

Motor location. The motor-in-cabin placement paid unanticipated dividends. The location of all equipment so close to the center of gravity (CG) resulted in superior handling characteristics. There are no masses acting through long moment arms.

With the mass concentrated, for example, rudder response is so effective that accidentally putting the trim to an extreme, then applying right rudder, convinced me that I had a catastrophic radio failure; it resulted in a terminal-velocity dive (which did prove the thin wing will stand up to most anything).

On/off and speed controller. A motor speed controller is highly desirable. With a big folder and eight cells, a simple on/off switch will tear things to pieces. I wanted on/off, so I had to provide for it by using a Robbe Universal with two sturdy O-rings to absorb start-up shock. With a universal, I don't recommend any gear ratios less than 3.1:1 for my setup. At lower ratios, even the universal will fail. I have no problems.

A controller will allow you to slowly accelerate the prop. The way I fly the

Winter swears this was the Heron's first test flight, and it was hands-off perfect. At the controls, Hurst Bowers' face says it all. Winter (L) and Srull (R) are observing critically.

Heron does not require a controller for cruising flight. If you wish to use a motor speed controller, go ahead and install one. However, do note that the prototype Heron never requires an extended approach or a drag-in landing, so a controller would be useless to me *on this particular plane.*

Wing. For low drag, higher speeds, and climb, I used an airfoil of 10% thickness. It is my own "zip-zip" section. There's a turbulator spar and an anti-warp spar. Main spars are ⅛ x ¼-in. spruce with webs between. Webs extending to the extreme top and bottom of the spars would add a weight equivalent to four strips of wood. My webs, therefore, are *between* the spars.

I elected to sweep back the leading edge of a rather long tip panel. From my flight results, I judge this to be efficient. The outer panel thickness tapers in accord with the tapered planform of the tip panel. The entire wing panel (from the root rib on out) is built flat on the board, the sweep-back resulting in the false appearance of a gull wing. In flight, it sure looks like a gull wing. (This, plus the blue wing and stilty landing gear, led to the model's name.) Incidentally, I used Super MonoKote covering; some weight saving is possible by using Micafilm.

After covering the wing, 3/32 in. washout should be incorporated into each tip. At first I had none. Without washout, if the plane was slowed to a near stall to force a landing, the left wing tip would drop a second or so before the wheels were on. This was harmless but not pretty. Washout corrected this and increased the model's speed and climb considerably.

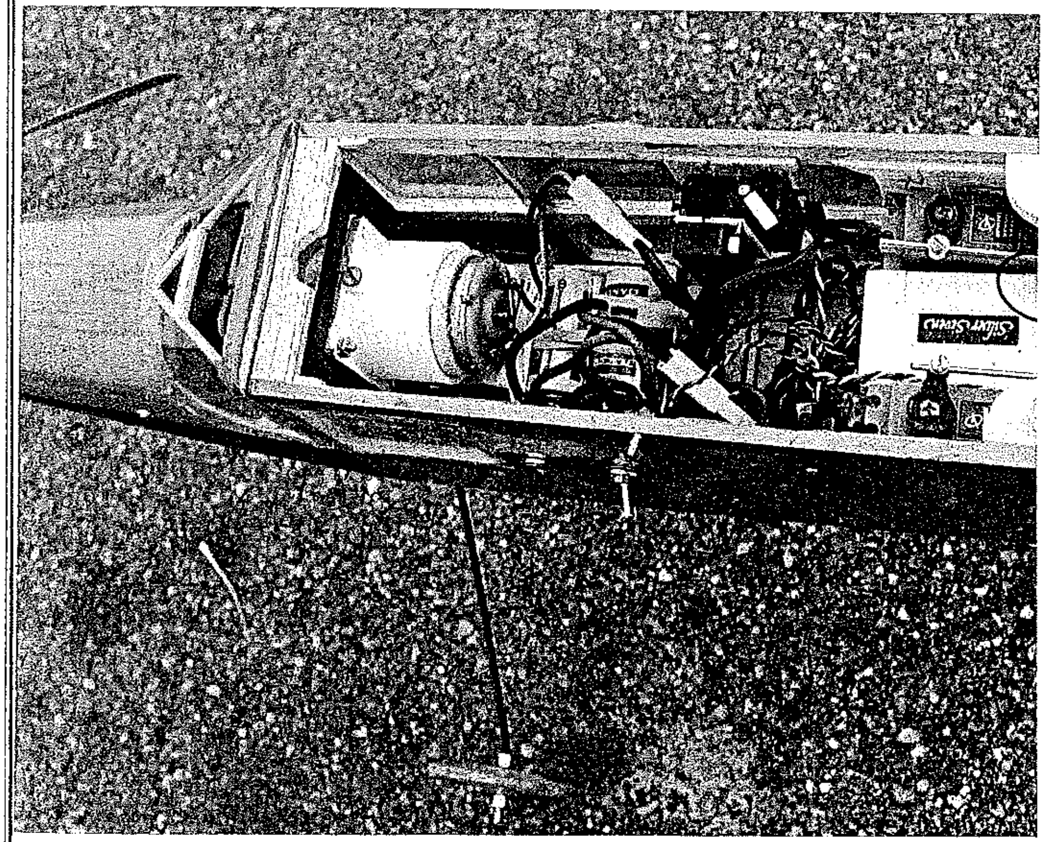
The latch-on wing mounting, with two 3/32-in. nylon bolts at the trailing edge, is extremely light. It provides a four-point support. The 3/32 ply "hooks" slide under the top cabin crosspiece. A short wing rib doubler of 3/32 balsa glues to the inside of the center section root rib. The "hook" goes against the doubler where shown on the plans with fill pieces added fore and aft—and another rectangular piece glues to the fill pieces and the hook. Details are on the plans.

Should you wish to add wing incidence (no more than 1/64 in.—possibly 1/32 in.—if the CG and rigging are accurate), file the edge of the hook that goes under the cabin crosspiece and add the shim to the top of the cabin crosspiece. Don't overlook the 1/64 ply tabs which are glued to the bottom of that crosspiece at each end to provide a non-wear surface for the hook to press against.

(Author's note: Everywhere this plane has been flown, I have subsequently found that experienced kibitzers hold a bull session to analyze the wing. They invariably agree that the wing is what makes this model fly so well (it is more than that). Of the wing, however, I must point out that there are two sharp-edged spars on top (main and turbulator), and without sheeting, numerous relatively flat panels result instead of the usual sag. Also, even with this structure, I find that each of these tiny MonoKoted panels sags about 1/16 in. Some of the kibitzers feel that the extra-long, front-tapered tip does something. Their consensus is that the Heron's wing is perfect even if they aren't sure why—and that it shouldn't be changed. I say: What is the coefficient for the Luck Factor?)

Stabilizer. A thin lifting airfoil section is used, the thickness tapering toward the tips. I like the on-the-step kind of flight that this stab helps to produce. Also, it permits a more rearward CG, as the stab carries part of the load. I felt this to be precautionary in concentrating weights close to the CG.

I used, as a consequence, a fair amount of decalage (angular difference between the wing and stab). It would be excessive with a flat-sectioned, non-lifting tail. (Note: The zero lift angle of a Clark Y airfoil is minus 4°.) One might wonder if my choice was consistent with the purpose of the thin wing.



The boiler room. Due to the iron band of the Robbe/Mabuchi, it mounts in an Astro 15 mount turned around with a balsa wrap for a snug fit. Robbe recommends the iron band when using nine or 10 cells to reduce drain; Winter uses it with eight cells because he didn't want more than his 16-amp draw with 15-12 prop (because that would reduce the motor run time).

Whatever, the most effective setting is the one shown—the plan allows for the 1/64-in. positive incidence shim I added. Climb, glide, and overall duration improved with that slight adjustment.

My combination appears to minimize the required trim range between full power and gliding. It also aligns the fuselage more closely to the angle of the glide path, improving the L/D.

I prefer to have the thrust line parallel to the fuselage centerline rather than angled at the nose. The latter tends to make the model nose-up when power is cut (as you know), especially on high-wing configurations. The Heron will continue straight ahead when the power is cut, assuming a slightly fast glide angle.

Hands off, the climb is at a relatively shallow angle. If the trim lever is moved slightly for up, the most efficient climb angle and airspeed results. The best glide then results at the same setting, or with a slight bit more up. (A typical lightplane with a speed range of 38 to 92 mph has a best climb at 60 mph.)

Weight. Covered with MonoKote and with small (but not mini) servos, largish Silver 7 (seven-channel) receiver, Astro Cobalt 05 with 2½:1 belt reduction, and eight 1.2 Ah cells, the model came out at an extremely light 43 oz. (A belt drive won't stand these start-up loads, hence the change to the Robbe/Mabuchi with 3.1:1 gear reduction.)

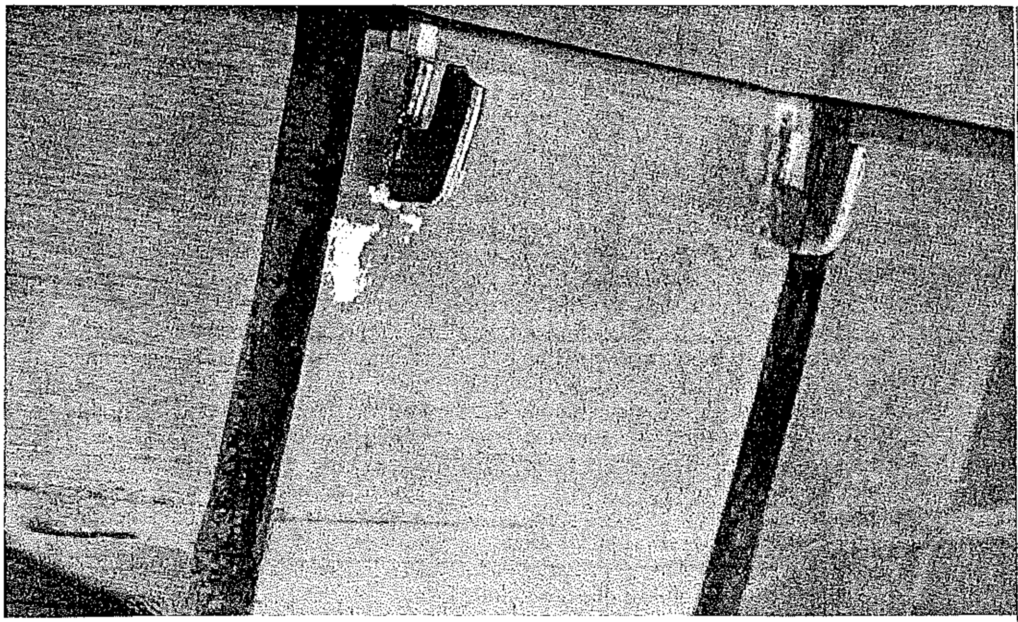
With careful wood selection, you can hold to 45-46 oz. with the Mabuchi motor. Examples: The trailing edge is medium hard, not rock hard. Longerons are a bit on the hard side of medium, crosspieces on the soft side of medium. Nose planking is soft but not ultra-soft. Auxiliary spars are medium/hard. Gussets are soft, as are tip blocks. The 1/16 wing ribs are a bit shy of rock hard; select balsa with tough, straight grain. Consider every piece of wood. Use "instant" cyanoacrylate (CyA) glues, of course, although I used Sig's yellow glue for planking (due to sanding ease) and in seating the spar webs where daylight appeared.

Fuselage. In laying out the sides, note that the primary longerons, from the cabin bulkhead forward, come to a virtual point at the nose. The entire top of the nose, including the windshield construction, is part of a liftoff hatch held in place by four small self-tapping screws. These screws run into 3/32 ply tabs anchored inside the top longerons. Drill a small hole before engaging the screws the first time so that undue pressure is not applied in driving home the screws.

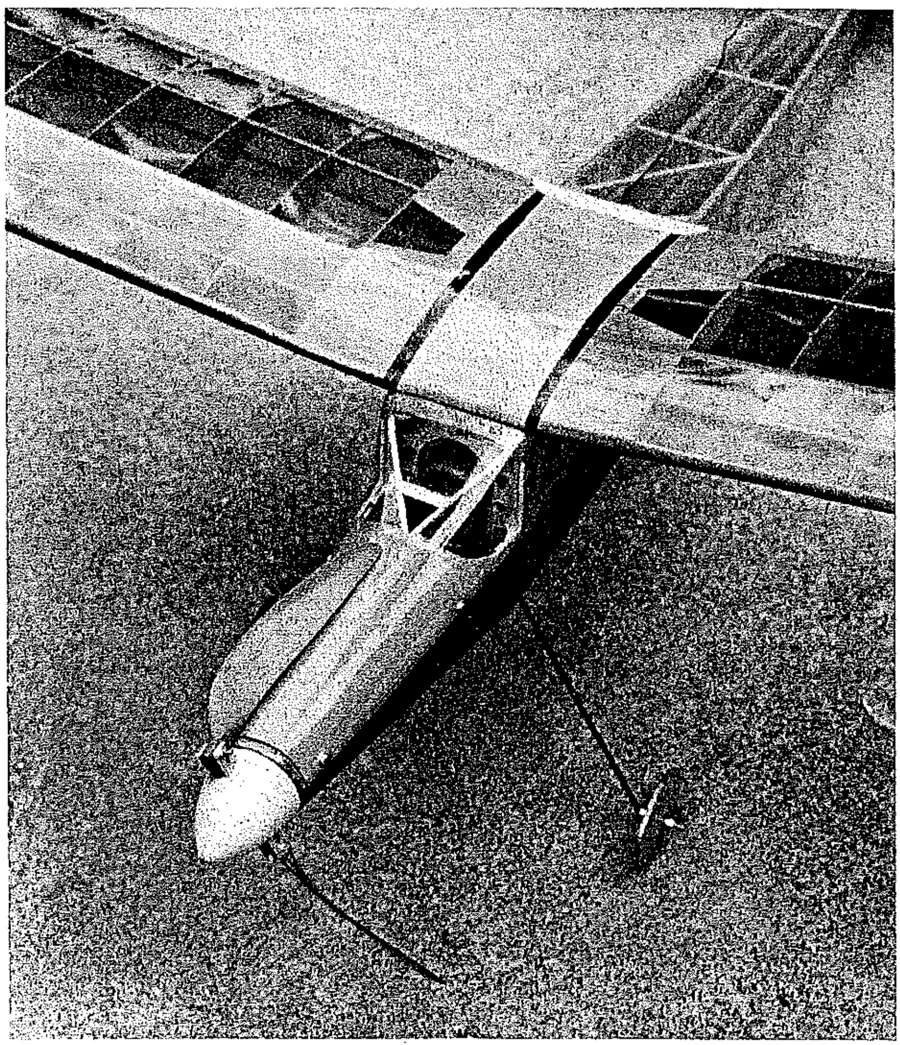
The top and bottom of the nose is planked with 3/32 strips (3/8 in. and 1/4 in. wide), tapered and beveled as necessary to fit. Begin at the center and both edges, then fill in each side one planking strip at a time. Some strips may have to be cut to a point—use a straightedge to pre-cut them.

The hatch portion is MonoKoted. It is built in place with wax paper used for easy separation. The bottom of the nose is covered with ½-oz. glass cloth and well-thinned K&B Satin Brushing Epoxy. Apply with one coat; the material lies loosely, but the brush strokes smooth it quickly as you work. Finish with a second thinned coat. This material sands well with a fine grit. I painted the bottom of the nose with thinned epoxy. Small gaps between the planking strips are filled easily, then sanded, before covering.

When planking, use jury strips to ac-



Plywood hooks on the underside and two thin nylon bolts at the trailing edge provide four-point attachment of the wing center section and avoid exterior dowels and rubberbands.



Clean, wouldn't you say? Turbulator spar is at 15% of chord. Top and bottom spars are flat spruce with center webbing—has withstood vertical dives and pullouts. Rear top spar helps to control warps. Folding prop blades shouldn't swing forward of the normal path; if your hub allows a more forward pivot, always launch with the nose slightly up (you'd better!).

curately hold the frame. The formers for the hatch are erected on 3/32 sq. edge strips that follow the top outline of the nose shape. Recess them from the side by 3/32 in. to allow for the planking thickness.

This bears repeating. There are small 1/16 ply tabs cemented to the underside of the forward cabin crosspieces which anchor the two wing hold-on latches. Also, the triangular opening in the windshield, at the hatch centerline, provides cooling through the holes in the 3/32 ply cabin motor/bulkhead. (A detail shows a Davey Systems motor mount which you can use if you alter the motor or location in either the horizontal or vertical planes—as for direct drive, or even in front of the bulkhead. In that case, compensate by moving the motor battery pack to correct the CG location. As shown, my motor cells are concentrated in two staggered rows of four each to reduce the height of the pack. A motor mounted in front of the ply bulkhead (or through it) will enable you to remove the battery from the fuselage top, thus eliminating the bottom hinged hatch. (Leave a large air vent opening.)

My motor mount is behind the bulkhead because it is necessary to insert this motor from the rear (brushes at rear). Because the Robbe/Mabuchi has an iron band, it requires the 15-size Astro mount I used—with a balsa shim wrapping for a tight fit.

Don't change the ply bulkhead outline to extend over the upright crosspieces. The flush inside mounting used is not weak, because the bulkhead is firmly anchored both at the top and bottom (saves equivalent weight of a 3/32 x 8-in. ply strip.

It is essential (because of this model's performance) that the rudder post be exactly on the centerline and exactly at 90° to your workbench. A tip: You can de-warp a fuselage! Heat the MonoKote and twist the rear section until alignment is perfect.

Tail surfaces. The stab center section is covered, top only, with 1/16 sheet. Two extension pieces from the fin insert downward through this sheeting as shown; these pieces glue to the stab spar and wood front. I use Rocket City strip hinges sliced to width from a long strip. These hinges fit precisely into a cut by an X-Acto No. 11 blade. One drop of Hot Stuff carefully applied on each side where the material meets the wood locks them solidly. Hold the work vertically. Fold the other half of each hinge out of the way when doing this, and deflect the control surfaces when working them into place. The wood destructs before these hinges let go; no other kind that I know of is any lighter.

Surface movements. Due to effectiveness, use a long horn on the rudder in conjunction with the inner hole of the servo arms. Use the outer horn holes on both the elevator and rudder.

Miscellaneous. Since this is not a beginner's airplane, step-by-step construction details will not be provided. What you need is drawn on the plan—which looks "busy." Don't use "fat" wheels. Such wheels seriously reduce all aspects of performance. I hate making wheels with a purple passion. Unless you can find thin, lightweight wheels, bite the bullet and duplicate mine.

The plan shows a laminated wheel with a thin center ply core and facing cores of light balsa sheet; place the grain in opposite directions on each side. The lightening holes in the ply can be opened up from 1/4-in. drilled holes with a round, coarse rat-tail wood file. Glue the small ply bearing rectangles to each side of the ply. Drill the bearing holes (for brass tubing of 1/8-in. I.D.) before completing the wheels.

I clamped my Dremel hand tool in a vise (using two protective foam blocks) and turned the wheels (as on a lathe) by lightly applying fine-grit paper as the cutting tool. The wheels can be doped and painted. The bearings are epoxied in place. To fly without the gear, simply remove the two hold-on straps.

Be sure the wheels are not out of line. The perfect alignment has slight castor and toe-in. Always check the gear before flying to ensure that the wheels remain in a minimum-drag position. Performance suffers if the wheels are splayed out; trim is upset, and takeoffs then may not be automatic in tracking.

Flying. Maximum results depend on two things. One is smooth flying techniques, avoidance of extreme climb angles which load the prop and increase battery drain. Any excess of controlling, as by overbanking or in any way departing from a continuous, smooth, flowing flight is costly. Controls are large enough to require only slight movements by smooth pressure on the control stick; control surface drag, thus, is held to a minimum.

The second factor is one you may never have heard of. Let's call it the LeMay technique. This is cruise management. In WW II the B-29 missions out of Guam, Saipan, and Tinian were dicey affairs—an agony of getting back to base. LeMay tossed out numerous "essential" weighty objects and imposed strict flying techniques to minimize fuel consumption.

In the beginning you will find your flight duration to be all over the lot. The number of times you can climb back up will vary wildly—depending on how high you go, how close to the ground you descend, the attitude of the plane when you switch power on or off, the angle of climb you use, how tight or loose you fly, circle diameters, etc. Air density and temperature come into play. Expect a few dozen flights before you can perfect your LeMay cruise management. Without lift assistance you may, at first, do anything from 12 minutes or so to 20 and beyond. Fifteen minutes (or more) is good.

Once the technique is acquired to suit your conditions and environment, time itself will slowly raise the performance. Motor brushes become seated and battery cells perform better. I find this obvious at about the 50-flight mark. I use (for my eight cells) both the Astro AC/DC and Robbe deluxe charger; the latter peak-charges automatically. If necessary with your

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At the Hatfield Electric Fly, John Worth (who took this picture) advised that groups all day wondered about the "stock" equipment in the Heron in a year of potent cobalts. For its performance envelope, the Heron requires good thrust but low battery drain. Winter says it is essential with the Robbe/Mabuchi to use all three capacitors shown in Robbe directions; otherwise, catastrophic radio interference is likely to occur once in every five to 10 flights.

charger, monitor the voltage. Anything between 1.4 and 1.6 volts per cell (measured under charge) provides a good flight. Peaking is a bit higher. It requires a digital voltmeter. If you know how to do it, fine. Otherwise, I suggest 1.5 volts per cell (measured while under charge).

Preflight. Display your name and address (a must). Make a ground check before every flying session. You'll need range, believe me. Be extremely careful of any 250 mAh flight pack. If your cycler shows a capacity loss of beyond 10%, replace the pack. Never use an old pack. If you encounter lift, you can use up the pack on one flight (at least the remaining capacity isn't enough for a second long flight). Two good flights are maximum. You may wish to use a somewhat larger pack. A field charger is insurance.

After the Hatfield experience, I have revised expectations of the flight time from a 250 mAh pack. Four flights were made, three of them with extensive use of servos. (I've been asked what servos they were. By coincidence, they happened to be Airtronics.) Three days after the event I cycled the packs and found 35 minutes remaining (with a Digipace) on the two-year-old receiver pack and 50 minutes on the Olympic transmitter. That a 250 mAh pack can stand up to an hour-plus with maneuvering amazes me—especially with such time in reserve. The time compared roughly with that of a good session with a four-channel glow model using a 450 or 500 mAh pack. Obviously a minimal use of servos would extend that duration. Moreover, cyclers provide a load which is larger than encountered in my mode of Electric flying.

You may wish to make hand-glide tests, though I don't find them necessary. If the CG is where specified and all possible warps have been checked and corrected, the plane will fly. Until you have made trim adjustments, early flights can be made with partial charges of the motor battery. Just get the ship flying nicely before you get serious about pushing it.

Check control surface trim settings (at transmitter) before every flight; a misplaced trim may give you an unwanted thrill. Set the elevators (with trim) for slight up before the first launch. The only correction that may be needed quickly would be a touch of up elevator if any nose-down tendency is revealed.

The climb is relatively shallow but at high speed. If you watch this hypnotically, you may be a quarter mile out before you wake up to establish a climbing turn. Therefore, as soon as any climb attains a good airspeed (and only then), increase the up trim very slightly until you see the climb angle that looks good. At the same time incorporate a wide shallow-banked turn that can maintain itself hands off. (Corrections are expected.) If the nose is high and the climb seems sluggish (relative on this machine, so watch for large speed differences), remove the up trim in slight differences), remove the up trim in slight

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Safety/Preston

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The sound of a running model airplane engine seems to draw children like a magnet. While it is possible to launch and fly a CL model (using a stooge) by oneself, I don't recommend it. Even with a helper it is sometimes difficult to keep people from straying into the circle.

I recall another letter I received on this subject that related an episode in which a CL modeler, flying in a public park, had a lady walk her dog straight through the circle, totally oblivious to the fact that there was a model flying overhead. I've frequently told RC modelers not to fly alone. This message applies equally to CL modelers.

Have a safe month.

John Preston, 2812 Northampton St., N.W., Washington, DC 20015.

Heron/Winter

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increments. Yes, you may need to override with the stick. A comforting thought: the Heron is capable of gliding back to you from hair-raising distances.

Approaches are difficult if you don't have large, open areas. If the area is at all confined, you may wind up making a series of wide 360s around yourself. However, the Heron can be maneuvered quickly if you abort and go-round. When I observe my last climb to be on the sluggish side, I always shut down. This leaves enough battery capacity for at least several go-rounds. Don't belabor that last climb; that's when you can get the battery too hot.

The experimentally-minded builder is encouraged to try different motor and battery combinations—including 800 mAh cells and various numbers of cells. Duration, climb, and glide will be different with each. One or the other may be better or worse, depending on what you do. The plane is in the ball park with the docile, less spectacular LeCrate, even with a geared 05 at 2½:1 and a fixed 11-7 wood prop. The 3.6:1 Leisure 05 will handle big folders; I'd start with a 12-in. Master Airscrew folder (there are other good ones). In the case of my Mabuchi, remember that it comes with an iron band from Robbe. Without the band, I expect my performance would not be what it is. With the landing gear removed, a geared Astro Cobalt with seven cells of 800 mAh capacity (and its correct prop), the Herron will come reasonably close to the competition things.

For me, I like my Heron exactly the way it is.

RC Aerobatics/Van Putte

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I won't excerpt it here. (*Editor's note: There is more information about this in the "Competition Newsletter" section of the magazine this month. RMcM*) Suffice it to say that the Nats should be much better this year.

Ron Van Putte, 111 Sleepy Oaks Rd., Ft. Walton Beach, FL 32548.