How To Build a Distinctive Stable One Wheeler that Will Turn In Consistent Winning Flights

EVER since the days of Maxwell Bassett and Joe Kovel, gas model builders have all strived towards a common goal—a gas job that would be perfectly stable, climb like a sky rocket, and have a sinking speed so low that it would make a sailplane pilot turn "green with envy." Although this month's gas model is not the ultimate in perfection, it nevertheless incorporates many features that the author feels are necessary in a high-performance gas job.

First and most important is the wing. A moderate aspect ratio (0.7 or 7:1) is used for strength. Although a higher aspect ratio increases efficiency, it also makes the wing more susceptible to "folding in two" in violent, and sometimes accidental maneuvers. Elliptical tips are used to lessen tip vortices. Little area is used in the center section, as it is not very efficient due to its proximity to the turbulence around the fuselage and wing root. The Grant X-10 airfoil is used in the wing where the chord and efficiency are greatest, modified Clark Y sections being used at the center and tips for least drag.

Since the fuselage is planked, it is light and strong. The clean design, plus the one-wheel landing gear, minimizes drag to a great extent. A large stabilizer is used in conjunction with a moderately long moment arm. To decrease tip vortices, and for general simplicity, twin rudders are used. The twin rudders give the needed ground stability, since the new rudders require that gas models land without nosing over or falling off on one wing tip.

A high thrust line, bellied-down fuselage and slightly parasol wing make this model complete. The long fuselage and slightly forward-canted motor makes it almost impossible. Construction of the model is simple, due to the fact that full-size ribs, bulkheads, and other parts are given. If you contemplate building a "C.C." read through this article and study the plans to familiarize yourself with all the parts before beginning construction.

Fuselage construction begins with the cutting out of all necessary bulkheads from 1/8" sheet stock. Do not forget to mark off horizontal and vertical centerlines on each bulkhead, because each one has to be sliced along the horizontal centerline before actual construction begins. Bulkhead 14 is 1/8" plywood, with only two holes (for motor-bearing) cut into it. Bulkheads 1 and 2 are cut out as shown in sketch to make room for the rear end of the motor unit.

Draw a centerline on a board about 30" long and space off bulkheads 1 to 8. All the bottom halves of bulkheads 1 to 8 are now pinned to the board, followed by the cementing of the two 1/8" x 1" main planking strips on each side. Bulkheads 9 and 10 can now be cemented in place past the end of the board, since they project downwards past the bottom of the main planks. Their horizontal centerlines should be flush with the bottom edges of the main planks.

The pins holding the (Continued on page 70)
which have balked helicopter designers for years has been successfully solved.

**General Dimensions of the Vought-Sikorsky VS-300 Helicopter**

1. Diameter of the main rotor......28 ft.
2. R.P.M. of the main rotor......255 r.p.m.
3. Diameter of the auxiliary rotors......6' 8"
4. R.P.M. of auxiliary rotors......710 r.p.m.
5. Gross Weight......1150 lbs.
6. Engine—4 cylinder Lycoming......75 HP.
7. Power Loading......15.3 lbs. ft.
8. Main rotor blade loading......average 51 lbs./sq.ft.
9. Disc loading......186 lbs./sq.ft.

The Engineering and Research Corporation of Riverdale, Maryland, announces that after three years of intensive research and development, their ERCOUPES airplane has reached the production stage.

**ERCOUPES alleron, rudder and nose wheel are all mechanically coordinated so that turning is accomplished in the air, as it is on the ground, by turning the control wheel right or left—just the same as driving an automobile. ERCOUPES tricycle landing gear eliminates the hazard of ground breathing of nose over.**

Operation of the ERCOUPES is so simple that it is believed that four hours training will represent maximum instruction requirements for solo.

**Building the Falcon**

(Continued from page 31)

bulkheads down should now be removed and transferred to the main planks, as they can not be removed later when the fuselage has been entirely planed. A triangle should be used now to make sure that all bulkheads are at right angles to the board, especially bulkhead 2. The fuselage planing may be started now. The planing strips should be very soft and light for best results. Pin each strip to every bulkhead and use slightly thinned out cement to join the planks to each other and to the bulkheads. Plank alternate sides, not one side first and then the other. It will be necessary to taper the planks at the rear, since the fuselage is narrower there. Accuracy is not very important here as a hole can be plugged up with scrap wood and sanded down later. The fuselage should be left aside now to allow the cement to dry properly.

After removing the bottom half of the fuselage from the workbench, cement the top parts of each bulkhead in place. The top part of the fuselage should now be planed. Trim away the planing behind the top part of bulkhead 8 to allow mounting of the stabilizer mounting block. All the planing behind bulkhead 10 is now trimmed away and the tail flatter cemented in place. After the cement has dried, these blocks can be cut and shaped as required for the present, lay the work aside and allow it to dry.

The motor unit is next on the program. Figure 5 on the half-page drawing shows the first step. The rear ends of each of the hardwood engine bearers should be flush with the rear end of the 1/8" sheet hard balsa base. The outside edges should be flush with the sides of the 1/8" sheet. Bulkhead 1A should be cut to shape and cemented in place now, reinforced by two gussets in the rear as shown in Fig. 2A. The landing gear strut is now bent, as plans, and cemented in place. The top of the strut should be flush with the bottom edges of the engine bearers.

A new and light method of mounting landing gear struts to plywood has been evolved. Holes are drilled in the top of the strut to accommodate the wire when it has been cemented in place, and then fine copper wire is used to "sow" the wire to the plywood bulkhead. Two or three turns of cotton cable complete the landing gear mounting. The bottom ends of the struts are now pulled apart and the airwheel is mounted now. Note that an inverted "U" wire piece is mounted to the landing gear struts to keep them together in the engine. Figures 3 and 4 should clarify the cowling problem. Although an enclosed cowling may be used, the one illustrated is preferred as it is easier to service and adjustments can be made so much easier.

The timer can be located in any position on the cowl, but the original was mounted in a hole carved into the cowling to accommodate the clockwork timer that was used. A compressed air type was also mounted at a later date and worked well.

The engine is now mounted so that the length of the book-up wire may be determined. The cowl is mounted directly behind 1A, and a hole is cut into the 1/8" sheet to accommodate it. After soldering longer leads to the coil, connector is in place. The condenser should be mounted somewhere inside the cowling, so that it will be near the ignition point for better electrical efficiency. A battery box is now constructed according to the dimensions given in the plans, but it is not cemented into place between the inner rear faces of the engine bearers. This will have to wait until test hops are made, when the position of the battery box may have to be changed. The engine is now removed to allow the cowl to be sanded, covered with silk and doped enough to make it oil-proof. The stabilizer is so simple that a beginner without any experience at all could make it without trouble. All ribs are given on the full-size rib drawing. All that is necessary is to lay each line on a board and mark off 16 spaces of 1-3/8" each at right angles to this line. Pin a 1/4" x 3/8" spar to the line first.
mentioned, followed by the ribs in their proper places.

Leading and trailing edges are now cemented in place and allowed to dry before trimming and sanding to airfoil shape. A sheet 6" wide is prepared from two 3" widths of 3/16" stock, from which the rudders are cut. A graph of 1" squares is drawn with a soft pencil onto the sheet, after which the curves are copied from the drawing. Be sure to cover and dope the stabilizer before mounting the rudders, as covering is difficult with the rudders in place. Although not shown, tailskids should be fitted to the rudders to prevent wear at this point.

A true wing plan will have to be drawn in order to obtain the shape of the trailing edge parts. The drawing given is 1/4-full size, so any dimensions needed can be obtained by multiplying the dimension on the plan by four. After all the ribs, spar joiners and both spars have been cut out, they may be assembled on a flat surface. Be sure to use very soft balsa for the leading edge. If 1/2" x 3/4" is unavailable, two 1/4" x 3/4" strips may be used, one in front of the other. After propping up each wing panel about 6", the wing spar joiners should be cemented in place. The wing is now either double tissue, bamboo paper, or silk-covered. Do not forget to cement or dope the covering to the undercarriage. Spray one wing panel and lay the wing down on a flat surface so that the sprayed panel may be weighted down to prevent it from warping when drying. Ditto for the other panel. Use a wide brush in doping the wing in order not to leave streaks or brush marks.

Two wing mount pieces are cut out of 1/4" sheet as per the full size outline in the drawing. Both are cemented together on the bottom of the wing at the dihedral joint. Take care and see that they are not cemented onto the wing. With the incidence block in place, the wing must be propped to shape. Tie the wing and stabilizer in place with rubber to check the like-up. If either wingtip droops in relation to the stabilizer when viewed from the front, change the 1/4" square strips until the line-up is true. The wing mount plumbing strips are applied vertically in short lengths.

The fuselage and wing mount may be sanded now, followed by doping and application of silk or narrow strips of tissue. (Silk preferred.) In sanding, use a block better suited in order to remove ridges in the plumbing.

Notes on Finishing

The model should first be clear doped, followed by a coat of light colored dope. Carbonbroom Wet-or-Dry 331-A waterpaper should be used in conjunction with water. The second coat of colored dope is now applied, and it should be diluted with a bit of thinner. If the equipment is available, the dope should be pressured on. Use Wet-or-Dry 400-A from this coat on, and use plenty of water. Do not press hard when sanding, as the idea is not to wear away all the dope you have put on, but to brush off all minute ridges and to fill up the pores of the wood or silk. A third coat is brushed or sprayed on now, without being sanded. Allow this coat to dry well, then mask off the desired areas with Scotch Masking Tape. A small three-view with a suggested color scheme and outline is given in this article, but many will prefer to use their own ideas as to striping, scalping, etc. Apply two or three coats of the dark colored dope with intermediate sanding, the model should be left to dry overnight so that the dope will really harden. Simimize or some other polishing compound is then used according to the directions on the can.

Notes on Testing

For testing try to do the work in a large grass field. Also try to have someone else along to catch the model if you launch it too hard and in glide testing it. The first thing to do is to check the center of gravity. The model should balance in a level position when supported 1/2" behind the spar near the wing mount. In other words, the C.G. should be about 3/4" behind the leading edge of the wing. From a cruising position, have the model away in a horizontal path. You will probably launch the model too slowly the first time, so do it again.

Make sure that the model attains flying speed this time. If it "mushes," remove the engine unit and move the battery box forward. If it dives, move the battery forward.

Model Airplane News - September 1940
Contest Notes

If the “Falcon” is flown at a contest under N.A.A. rules, the following weights will have to be exceeded.

Since the wing area of the “Falcon” is 4 sq. ft., the minimum weight for contest flying should be 2 lbs., plus, in order to exceed the 8 oz. per sq. ft. minimum ruling.

With a Baby Cyclone (.360 cc. in. disp.) the minimum weight is 20 oz., but since the above wing loading has to be met, a 2 lbs. plus total weight will be required.

With a Gwinn Aero or Midget Mady (.45 cc. in. disp.) the minimum weight will have to be 2 lbs. 4 oz.

With a Hackemann (.488 cc. in. disp.) or K. O. K. 49 (.49 cc in.) the minimum weight will have to be 2 lbs. 8 oz.

All of the above mentioned motors are ideally suited to power the “Falcon” for sport or contest flying.

Flash News

(Continued from page 35)

mittee, composed of the heads of the various branches of the nations flying force, cited the talk, when Texan for “his skillful use of high-speed long-range aircraft and advanced methods of aerial navigation.”

Republic Aviation will close their entire plant at Farmingdale, L.I., for 10 days, from Aug. 24th to Sept. 3rd in order to give their employees simultaneous vacation days this year. More than 1,700 employees are utilized to run the single- and two-place flying ships, formerly known as Seversky.

One hundred horsepower per cylinder is the achievement of the new Lycoming 0-1250 twelve cylinder “int” engine. With a maximum output of 1,200 horse power, the entire engine weighs only 1,325 pounds. It will be used by the army air corps for “in-a-wing” experimental installations.

An additional $527,317 contract has been awarded the Stoner Aircraft Division of Aviation Manufacturing Corporation covering changes in the construction of the model XO-39 observation monoplanes. The original contract called for an expenditure of $1,250,000 and work is nearing completion on the group of three ships.

Latest addition to the Aviation Manufacturing Corporation’s family is the Barkley-Grove concern which has just been purchased.

Additions which will add 75% more floor space to the already huge plant of the Boeing Aircraft Co. of Seattle, Washington, have been contracted for. This new space and equipment will be used to manufacture under license the $23,000,-

00 worth of Douglas DH-7 attack bombers for the British Purchasing Mission and the United States Army Air Corps.

Some figures on the Canadian part in wartime aviation have been released by the British Air Ministry: Canada will produce 1028 airplanes in 1940; 1853 in 1941, and will be of two types: Haverc Hurricanes and United Blenheims. There are at present 1389 air crew, and 10,929 en-listed men in the Royal Canadian Air Force.

Information that you may have use for: Vought has just brought out their new X4U-1 low-gull-wing fighter. Powered by a PW 1800 h.p. engine it is said that she can do 400 m.p.h. Resembles the Brewster F2A-1 greatly excepting for the wings which are unusual. The engines are not ready for delivery. The trimtab on the elevator broke loose twice due to vibrations. Now is back in the shop for “bent-hunting.”

Pan American Airways announced daily plane service to Argentina and weekly service over the eight thousand mile route from San Francisco to Australia. The huge Boeing Clipper and Martin Clipper will alternate over the distant route. Main factor in the inauguration of the Argen-
tina schedule was the President’s policy to bring together the 21 republics of the Pan-
American Union.

Major James H. Doelittle, former speed record holder, manager of Shell Oil Com-
pany’s Aviation Department and present President of the Institute of Aeronautical Sciences, was recently ordered back to a full-time duty with the United States Army Air Corps.

Final dismissal of negotiations between Henry Ford and the British Purchasing Mission in which Ford was to manufacture Rolls-Royce 150 h.p. motors daily, has been concluded with the final announcement by the motor tycoon that he “will build no motors for other than this nation’s defense.” Many had expected that Ford could attain that production figure.

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