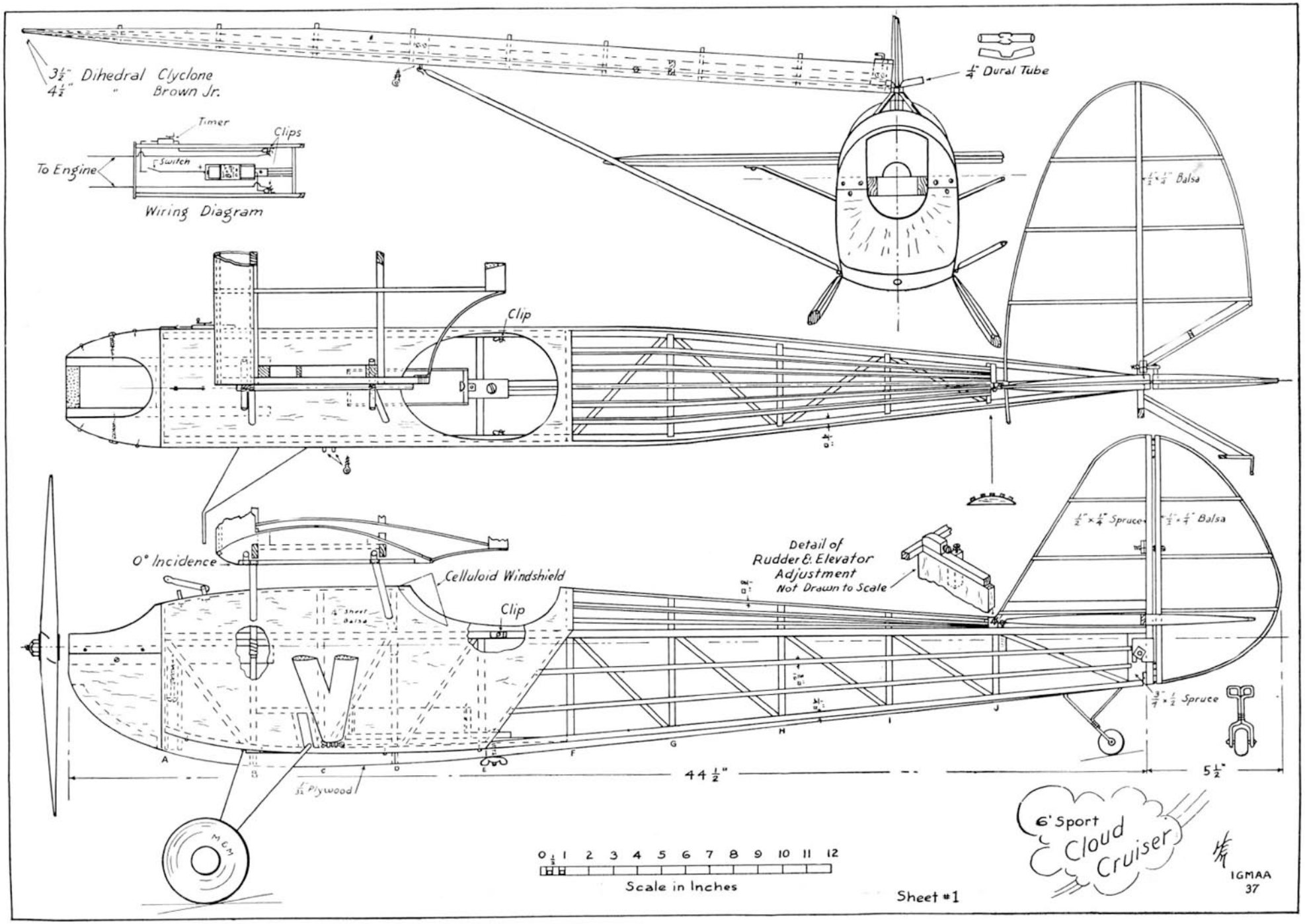

3½" Dihedral Clyclone
4½" " Brown Jr.
¼" Dural Tube
Timer
Clips
To Engine
Switch
Wiring Diagram
Clip
½" × ¼" Balsa
0° Incidence
Celluloid Windshield
Clip
Detail of Rudder & Elevator Adjustment
Not Drawn to Scale
½" × ¼" Spruce
½" × ¼" Balsa
¾" × ½" Spruce
44½"
5½"
⅛" Plywood
0 ½ 1 2 3 4 5 6 7 8 9 10 11 12
Scale in Inches
6' Sport
Cloud Cruiser
IGMAA
37
Sheet #1

The six foot cloud chaser warming up. Note the trim landing gear and realistic lines

How to Build a Cloud Cruising Gas Model

Complete Instructions for You to Build the "Perfect" Gas Model—Very Stable—Not Too Large—Fine Performer

By HARRY EDWARD MOYER

THE CLOUD CRUISER is a consistent flier, very stable and easily adjusted for flight. It has a quick take-off (R.O.G.), rapid climb, a good glide and slow landing speed.

It has a wing span of seventy-two inches, a length of fifty-one inches and weighs three pounds, twelve ounces. The construction is balsa except in a few places where stresses require harder wood.

The landing gear is full cantilever. It has a 1¼" shock travel, and can take very rough landings.

A Brown Jr. furnishes the power, but a Baby Cyclone or any other "popper" in that power class can be used. The engine, tank, coil and condenser are mounted on a base which is removable by loosening one screw and two wires.

This model is so constructed that it may be knocked down or assembled in a few minutes. The wing, rudder and elevator can be removed or replaced without disturbing their settings. This feature makes the model easy to carry for it can be packed in an automobile trunk.

Equipment includes mechanical timing; a shock-proof wing with drag adjustments on the "V" struts; fin and rudder with independent torque and direction settings; and a movable elevator. Balance is obtained by sliding the battery box.

Construction

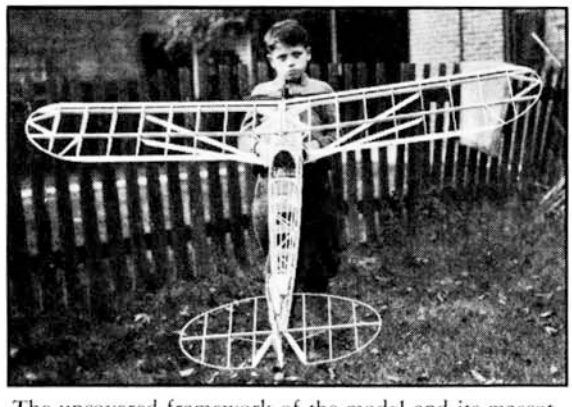
Building the Cloud Cruiser is not very difficult, but it is advisable to study the plans carefully and make full scale layouts on stiff paper or cardboard. Read the instructions thoroughly and compare them with the drawings.

It is advisable to make the fuselage first. Medium weight balsa, spruce, ash and aircraft plywood were used, but white pine may be substituted.

Spruce is used for the longerons, uprights and cross-pieces between bulkheads "A" and "D"; balsa from "D" to the tail post. Cement and pin all joints. To prevent splitting it is advisable to drill small holes in hardwood first before pinning or tacking.

Bulkhead "A" is plywood with an opening just large enough for the engine mount to slide through. It has a sheet aluminum oil wall, cut the same shape and fastened to the front with small wood screws. On the back, cement and tack a block. Bore a ⅛" hole lengthwise and counter-bore one half this length with a ¼" bit. Into this hole place a number 6 wood screw, two inches long, to lock the engine mount in the fuselage.

The engine mount extends through station "B". These uprights should be cut out so that the line of thrust is zero. The landing gear bearing should come below



The uncovered framework of the model and its mascot, the author's young brother

the bottom cross-bar. Cement and bind thoroughly. Cut out the lower former to fit over this binding. The front cabane struts are fastened to the uprights at this station. Pass the binding through the holes drilled for this purpose.

A dowel forms the lower cross-bar at "C". Place this dowel ¼" forward and brace with triangular hardwood blocks. No lower former is used here. The rear part of the landing gear must come directly above this dowel. Bind with rubber—a yard of ¼" narrow fabric elastic makes very good shock cord. Bind the rear cabane struts to the uprights at "D".

The center of the cockpit is located at station "E". Omit the top cross-piece. Remove and replace battery box through this opening. Place the wire clips on the top longerons at this station. Stations "F" to "I" are typical.

Station "J" is sheet balsa. The elevator and fin adjusting blocks are cemented to this station. Refer to sketch on sheet number 1. These blocks are hardwood, bored and tapped for 6-32 screws. Cover the top and sides with sheet balsa, from the cockpit forward, as shown on sheet number 1. The bottom covering from "A" to "E" is plywood. This is removable and is held in place by small wood screws.

The engine mount should have just enough clearance to slide in and out of the fuselage without binding, and should be rigid when locking screw is tightened.

The nose was carved from solid balsa. If carving facilities are not available, this block can be made up from sheet balsa stock, cut to shape and joined with cement.

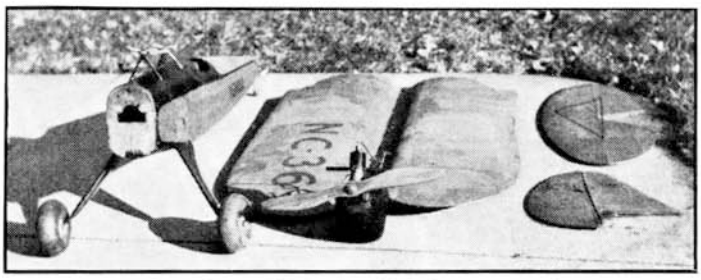
Landing Gear

The landing gear is hinged at the front. The shock travels back and upward. Bind the joints with fine wire and use plenty of solder. The fairing outline is spruce and the center, balsa. Dope and cover with cotton fabric. Airwheels are held on with dabs of solder. The tail wheel fork is shaped from a bicycle spoke. Cement and bind to the lower longerons.

Battery Box

The battery box is made of plywood and holds two batteries. Brass clips form the terminals. The wires are soldered to these terminals. The positive wire leads to the switch, then the timer, and is finally soldered to the clip on the right side of the fuselage. The negative wire is soldered directly to the clip on the left side. Allow a little slack in the wires so the box can be lifted from the fuselage when replacing batteries.

This box is moved fore and aft for balance and is locked in place by a screw which travels through a slot in the fuselage floor.

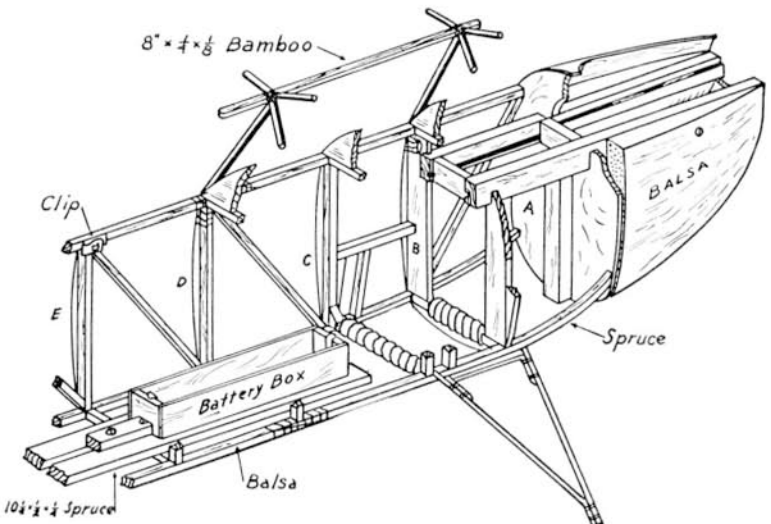


Here you see how the model is "knocked down" to make transportation easy

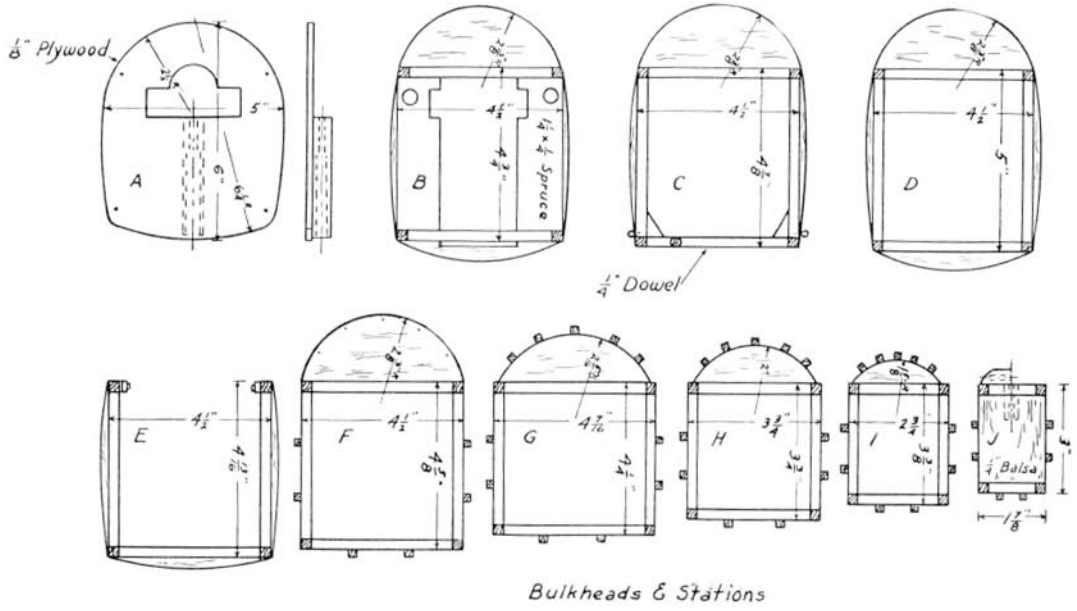
Elevator, Fin and Rudder

Although removable, the tail surfaces are of lightweight

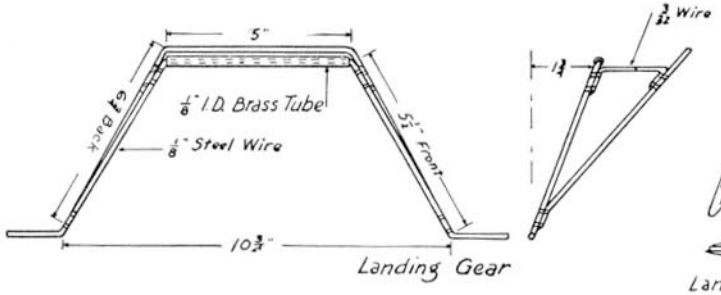
(Continued on page 48)



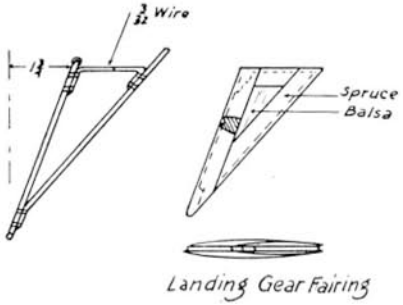
Perspective of Nose Arrangement



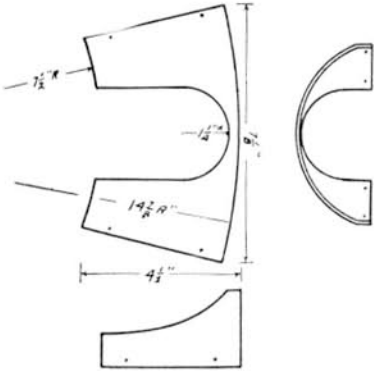
Bulkheads & Stations



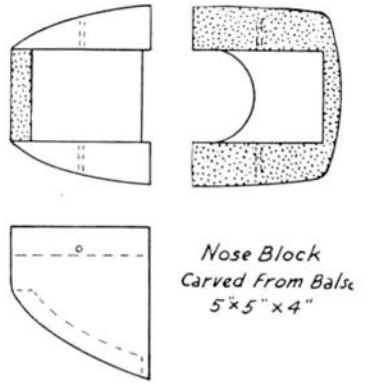
Landing Gear



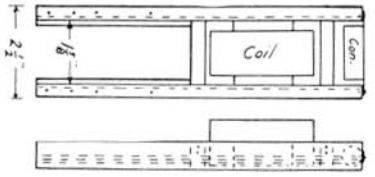
Landing Gear Fairing



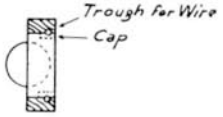
Cowling - 1/32 Plywood



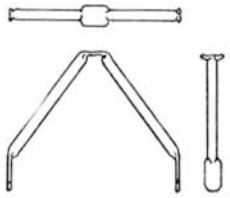
Nose Block
Carved From Balsa
5" × 5" × 4"



Motor Mount 9" × ¾ × ⅜ Ash
For Brown Jr.



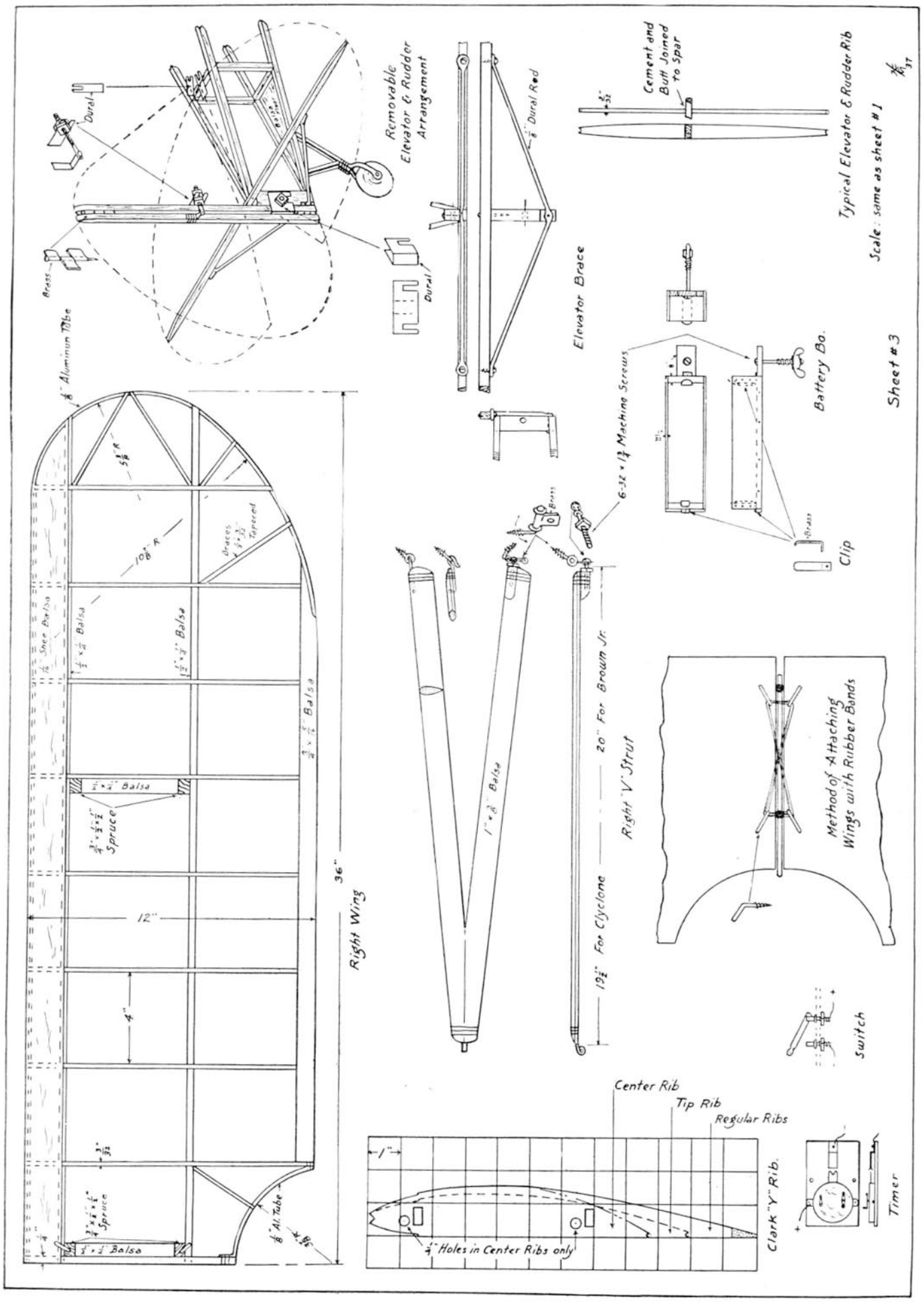
For Baby Clyclone
Motor Mount 9" × ¾ × 1/16"



Cabane Strut
10" × ¼ Dural Tube

Scale: same as sheet #1

Sheet #2


Removable Elevator & Rudder Arrangement
Dural
Brass
Dural
Dural Rod
Elevator Brace
Cement and Butt Joined to Spar
Typical Elevator & Rudder Rib
Scale: same as sheet #1
Sheet #3
Battery Bo.
6-32 x 1/4 Machine Screws
Brass
Clip
Method of Attaching Wings with Rubber Bands
Switch
Timer
Right "V" Strut
20" For Brown Jr
19 1/2" For Cyclone
1" x 3/8" Balsa
Right Wing
36"
12"
4"
10 3/8" R
5 1/8" R
Braces 3/8" Tapered
1/16" Sheet Balsa
1/4" x 1/4" Balsa
1 1/2" x 1/4" Balsa
3/4" x 1/4" Balsa
1/4" x 1/4" Balsa
3/4" x 1/4" x 1/2" Spruce
1/4" x 1/4" x 1/4" Spruce
1/2" x 1/2" Balsa
3/8" Al Tube
1/4" Aluminum Tube
Center Rib
Tip Rib
Regular Ribs
1/4" Holes in Center Ribs only
Clark "Y" Rib

panels; on both the leading and trailing edges. Plane or shave away the surplus toward the tips. After the bottom is found square to the other sides, mark off the location of rib No. 22 on both the top and bottom sides of the top wing (refer to bottom view drawing on page 2 to find the location of this rib No. 22). Use a template of this rib's cross section to check the shaving and shaping of this section to its exact shape. When finished, mark off the location of rib No. 36 on both sides of the top and bottom, the upper wing and shape this section to fit the template of rib No. 36. When the spaces between rib No. 22 and rib No. 36 are smoothly shaped, finish up the tips by using the same method employed in shaping the fuselage. Do the same on the small ribs in the center of the upper wing. Use the same procedure used in shaping the upper wing to shape the two separate lower wings. Start off with using rib No. 16 and work this section into rib No. 6. The ailerons on the upper wing may be cut out and made into two separate hinged sections. On the top wing and lower wing mark off the location of all strut and wire attachments. Insert the fittings of your own design into their correct places, making sure that the attachments are secure and strong. Now add all extra wing details, such as thread for imitation ribs, the imitation turnbuckles and so on.

Now rig up a jig that will permit the attachment of the wings to the fuselage with the greatest accuracy. It is best to attach the cabane struts to the upper wing first; then connect the wing to the fuselage; add the "N" struts and attach the two lower panels separately. When the wings are strongly mounted, add the flying wires and separators. Now make up the entire tail section and attach to the tailpost in the same manner as the wings are attached. After all other details are worked out, you may make the chassis into a movable unit or make the wheel fixed in its wheel well or retracted position.

After all details are finished and the model is ready for the paint, shellac the entire model. Make the shellac thinner by adding alcohol; give the model several coats, sandpaper between coats to give the foundation a smooth surface. Now paint or spray the model with your chosen color; if you spray the model, the appearance is more apt to be better than a hand-painted finish.

Official color scheme of the export Hawks:

Country	Color of Airplane	Colors of Insigne
Argentina	All Silver	Sky Blue and Gold
Canton, China	All Cream	Red, White and Blue Tan and White Stripes on the Rudder
Shanghai, China	All Dark Khaki	Blue and White Cocade Blue and White Stripes on the Rudder
Siam	All Silver	Red, White and Blue

Explanations of the figures on the drawings:

Fig. 1—This shows the view of the cockpit looking backward from the instrument panel's vertical line. (All details of the controls are shown in Fig. 4.)

Fig. 2—This shows the left side of the fuselage with all its controls and partitions.

Fig. 3—This shows the right side of the fuselage with all its controls and partitions.

Fig. 4—This shows the view looking forward from the pilot's seat (the joystick is missing for clearness.)

Fig. 5—This is the top view of the floorboard, showing all its joints and removable panels.

Fig. 6—This is side view of the fuselage showing the entire control hook-ups, the pilot seat, the fuel tanks and the instrument boards.

Fig. 7—This is the right and left side view of the fuselage's skeleton.

Figs. 8 & 9—This is the bottom and top views of the fuselage's skeleton.

Fig. 10—This group shows all internal braces of the fuselage skeleton (the circles on the corners are the exact centers of the center-lines.)

How to Build a Cloud Cruising Gas Model

(Continued from page 35)

construction, outlined with aluminum tubing and cemented to the spars and ribs. This tubing is shaped by drawing it through the palms of the hands.

The elevator is held horizontally by a permanent pin centered in the spar and a dural fitting at the leading edge. The pin in the tail post, passing through a hole in the center of the brace, holds it laterally. See details and sketches.

The rudder is hinged to the fin and is adjustable by moving two nuts on the screw fittings. Cement and bind these fittings securely to posts.

The fin has two fittings, one at the front which hooks over the torque adjusting screw. The other is a "U" fitting which is located near the bottom of the post. This fitting is notched to fit over a bolt that passes through the tail post.

Tightening the nut on this bolt locks the entire tail assembly in a rigid position.

Wing

The wing is made in two sections. All the ribs, spars and edges are balsa. The tips are shaped aluminum tubing.

The center ribs are ¼" thick. Note the position of the pin mount holes. To prevent these holes from wearing, you should cement sheet aluminum or brass washers around them.

The wings are held in place by rubber bands and streamlined balsa "V" struts. The rear fittings on these struts are adjustable. To prevent moving, place a lock nut on each drag adjustment screw.

Covering

The covering material can be cotton (nainsook) or China silk. Paper is not recommended. Cotton, though a trifle heavier, will not snag as quickly as silk.

Use the same methods to attach the fabric as you would in tissue covering, but use clear acetate dope instead of banana oil.

Give the covering three coats of clear and two coats of colored dope.

Choose your own color scheme. Yellow with black trimming is used on the Cloud Cruiser.

Adjusting and Flying

Before free flights are attempted, it is advisable to put the model through a series of gliding tests by hand-casting from vari-

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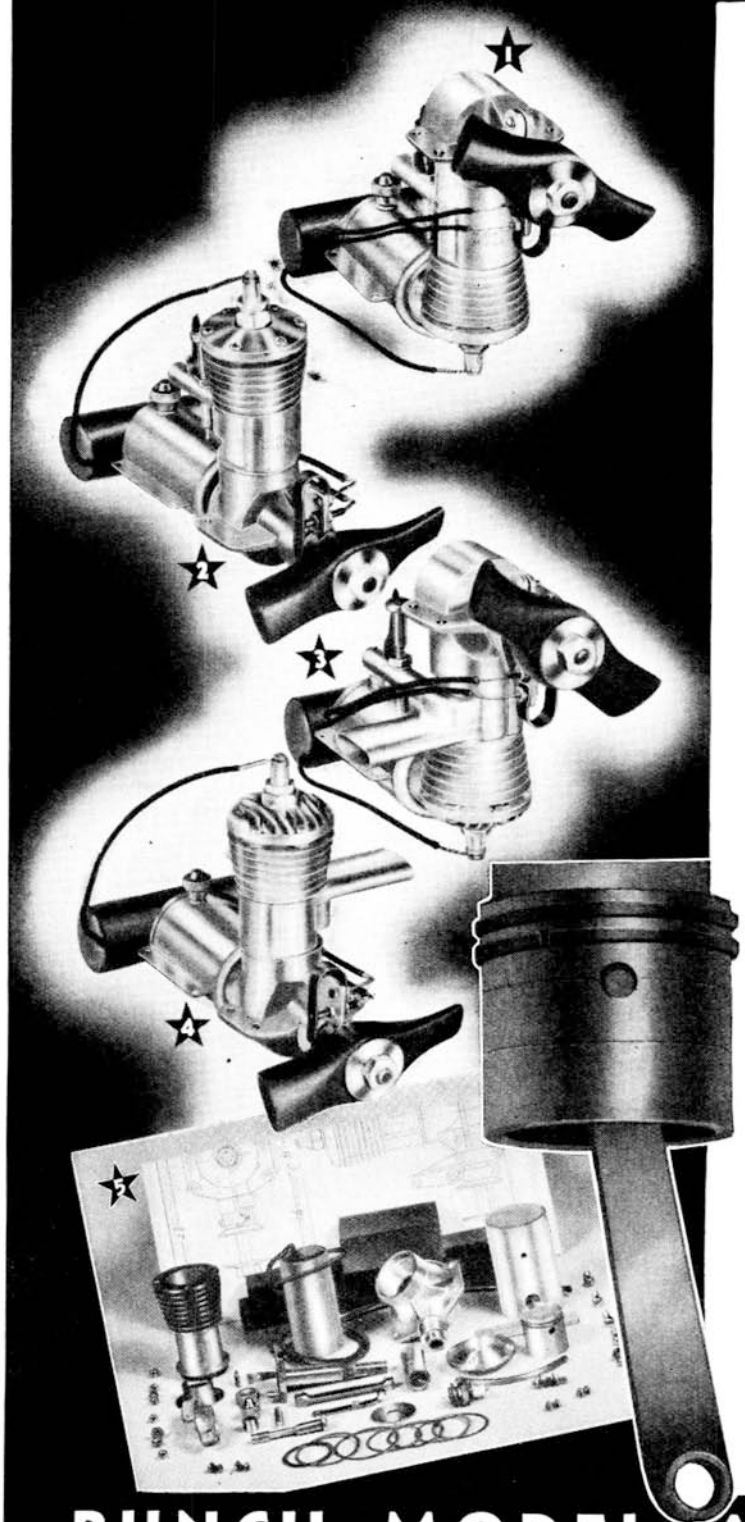

TODAY Douglas, Boeing and Ryan are high-ranking names in aviation, the nation's youngest industry, yet only a few years ago these men, fellows like yourself, were planning, building, testing and flying model airplanes that today are blazing new sky trails to the far-flung corners of the earth.

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ous heights. The reaction of the model can be observed, and adjustments made accordingly.

The settings on the original model are; left wing, 1/8" drag; right wing, zero; elevator, zero; fin set 1/4" to the left; rudder, straight.

With these adjustments the model flies to the left and glides to the right in large circles.

Here's a New Weight Rule Contest Plane

(Continued from page 7)

about the rear of the fuselage. The main support at the root of the gull will be three one-sixteenth inch pieces of music wire sweat soldered together. The ends of these wires extend out a ways on the center spar to which they are firmly glued. One-sixteenth inch pieces of music wire also connect the leading and trailing edges. To prevent twisting, the flat center section is cross-trussed with one thirty-second inch music wire, and the gulled part of the wing with one thirty-second inch strips of bamboo. If the builder believes the gulled section of the wing is weak it may be covered with one thirty-second sheet wood. However, it should not be necessary if careful workmanship is used.

The M-6 airfoil was chosen for the elevator because of its stable characteristics. At normal angles of attack (0° to +3°) this section supplies little lift, but at higher angles of attack (+7° or over) when the main wing is reaching the stalling angle this section is supplying more lift than it would at the lower angles. This added lift tends to bring the tail up, keeping the model out of stalling positions. Because of these characteristics it is desirable to have a true M-6 section to the very tips. The method of making these ribs is clearly shown in the plans. The elevator is made in two separate panels. They are removable and adjustable. By being removable a narrower box may be used for transporting the model. They are made adjustable in angle so that various angular differences between the wing and elevator may be tried. A one-eighth inch hardwood dowel, which is built into the fuselage, fits into a piece of three-sixteenth O. D. aluminum tubing, which is firmly glued to the root rib. This piece of aluminum has a series of holes the exact size of a pin punched in it. They form an arc the radius of which is one and three-eighth inches. A pin inserted through one of them into a piece of one-sixteenth inch aluminum tubing in the fuselage holds the elevator at the desired angle.

The propeller is a very important part of any model. Its efficiency depends entirely upon the care given to its design and the workmanship put into its construction. The wood should be straight grained and of nine or ten pound stock. Care must be given to see that a true airfoil is produced and that both blades are identical. The finished blades should be given a coat of wood filler and sanded down to ten nought. A high polish may be put on by the usual method or the blades may be covered with aluminum foil for flashing visibility. The free wheeling device is concealed under the hollow spinner. It is suggested that a feathering propeller such as is described by Marvin Setzke and Carl Goldberg in the *Model Aeronautics Year Book* by *Frank Zaio*, be used. This system has been tried by a number of members of the Chicago Aeronuts and has been proven less drag than free wheeling.

Three-sixteenths inch M.R.L. brown rubber was chosen as power for several reasons. (1) It gives slightly greater torque than does one-eighth rubber. (2) It does not break as easily. (3) Total number of strands to handle is less. However, the total number of turns available is cut slightly, but the advantages gained outweighs this loss. Forty-four inches of twelve strands will be sufficient; the slack is taken up by a rubber tensioner. The weight of the individual model will probably vary from the calculated weight. To compensate for this the length of the rubber is either increased or shortened at the rate of one inch for every .0406 oz. For example; if the model weighs .2 oz. too much, the rubber is shortened five inches. To some model builders this amount of power may seem too small, but bear in mind that the model is streamlined and the propeller pitch low. To obtain the best results use a good grade of rubber lubricant.

As yet few models builders have built and flown models of the new weight rule; therefore, each individual must discover and work out any new problems that will arise. The wise person is going to begin soon so that when the Nationals come rolling around he will be in trim, with plenty of flying experience to help him carry the trophies home. When flying a model of this type, remember it is going to be powerful and fast. Take plenty of time glide testing it, be sure everything is okey before trusting it with power. If possible do not use any offset thrust. There will in all probability be a few bugs in adjustment to be worked out. If so, go about the problem sensibly, think it out carefully, because a moment's rashness may cause a hopeless crackup.

All comments, corrections or criticisms of this design will be greatly appreciated.

Bill of Materials

2 Fuselage blocks—2½"x3½"x32"—(6 lb.)
1 Propeller block—1⅛"x1¾"x16"
3 Sheets 1/16"x2"x24"—Ribs, etc.
1 Sheet 3/32"x3"x24"—Spars and rudder
1 Sheet ⅛"x2"x24"—Wheels, leading edge, etc.
1 Sheet ¼"x2"x24"—Trailing edges, etc.
3 Feet 1/32" music wire
3 Feet No. 54 music wire—Landing gear, etc.
Jasco BB washer
3/16" Aluminum tubing
⅛" Hardwood dowel
1/32" Aluminum sheet
1 sq. ft. 1/32" Jasco birch plywood
Japanese tissue
Glue
Banana oil
3/16" M.R.L. Brown rubber