GLOSTER GAMECOCK I

By
Flt. Lt. Gordon E. Whitehead

The Gloster Gamecock is one of the finest sport scale aircraft ever presented by R/C Modeler Magazine. Combine that fact with two wings for the biplane fan and you have a .60 to .80 powered machine that is hard to resist. The author's prototype, pictured here, was a real crowd pleaser at the 1974 and 1975 British Nationals.

I built my first Gloster Gamecock model back in 1967. It was my first attempt at R/C Scale, was Elfin 1.49 powered, 36" span and steered by single channel radio. Once trimmed out, she was a great fun flyer and made me thereafter want to build a full-house job. Well, it took me until 1973 to screw up the courage to design her, and early in 1974, I commenced construction, to finish just in time for the British Nats. The ship was a great crowd-puller at both the 1974 and 1975 Nats, where she finished 6th in Class II (Stand-Off) Scale on each occasion. In 1975, she was 2nd on static points behind Pete Neate's DH2, and attained the highest flying points of all biplanes in the event, despite strong, blustery winds.

Harry Folland, Gloster's chief designer of the 20's, certainly had an eye for style — he was responsible for the SE5a and Gladiator designs, and his name is perpetuated in the Folland Gnat, as flown by the RAF Red Arrows Aerobatic team. The stocky, purposeful lines of the ship, combined with the brilliant and colorful squadron markings of the period, produce an air of extrovert gaiety equalled by very few other aircraft. Developed from the "Grebe", the Gamecock served with numbers 3, 17, 23, 32 and 43 squadrons, and saw front line RAF service from 1926 to 1931. Profile No. 33 shows the wide choice of markings, my ship representing that of the then Sqn. Ldr. R. Collishaw, C.O. of 23 Sqn. The shape of the ship is the result of much effort, and I re-drew all the outlines twice before I was satisfied with them — photos often display significant differences from published 3-views!

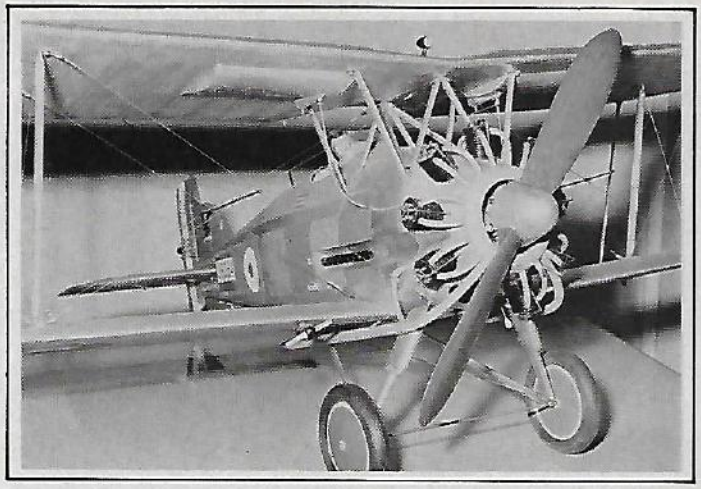
Most written accounts of the Gamecock highlight the handling characteristics of the ship; she was highly aerobatic, tricky in a spin, and she suffered from wing flutter at high speed! The latter two characteristics are enough to put anyone off making a model Gamecock, but no problems have been encountered. First, model structures are inherently stronger than the full-size, so minimizing the flutter problem. Second, the model displays a marked reluctance to spin; even so, I've never let one develop just to be on the safe side! The Gamecock represented a turning point in fighter design. She was the last all-wood RAF fighter, and the first with sufficient power to do a 360° upward roll and still have enough steam left to be pushed over the top. In her time, she was the RAF's premier aerobatic ship, and featured at many air pageants and shows, piloted by such men as the then Plt. Off. Douglas Bader (who was in 23 Sqn. at the time, incidentally).

However, that's enough about the full-size. I hope that I've whetted your appetite. I found that reading about the Gamecock is habit-forming, so unless you really want a 5' span, highly colored, crowd-pulling, excitingly aerobatic scale biplane, turn to another article quickly!

CONSTRUCTION

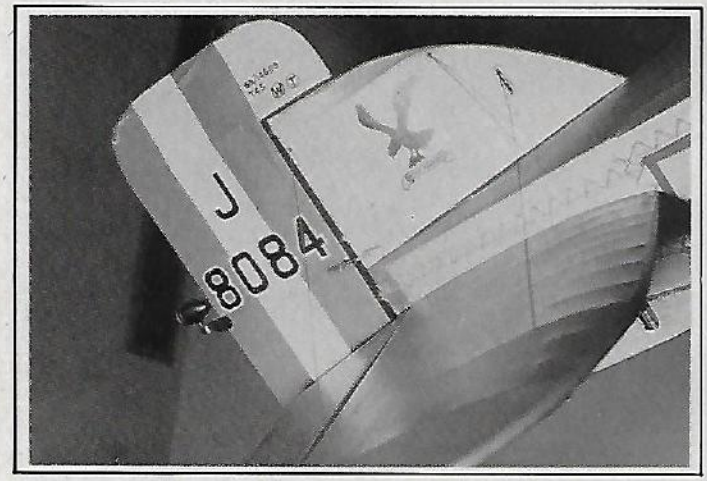
General: The structure is quite straight-forward, and most of the finer points are detailed on the drawings. Although the model is only recommended for the more experienced builder and flier, any scale fan will want to start building the relatively more complex subjects eventually, so I intend to cover the subject pretty comprehensively. The majority of the woodwork was stuck together with PVA white glue, but 5-minute and 24-hour epoxy were used, as was contact glue.

Wings: Build both sets of wings first, as they will be needed to aid fuselage building. Study the drawings and cut out all the parts first — construction is much less of a chore when you make yourself a pre-cut kit. Pre-assemble all the laminated parts at this stage. The lower spars are pinned down with 1/8" packing underneath, together with the T.E. Ribs are glued in place, followed by L.E., riblets, top spars, aileron spars, aileron ribs and tips. The 1/32" ply spar webs and the Warren-type bracing are important

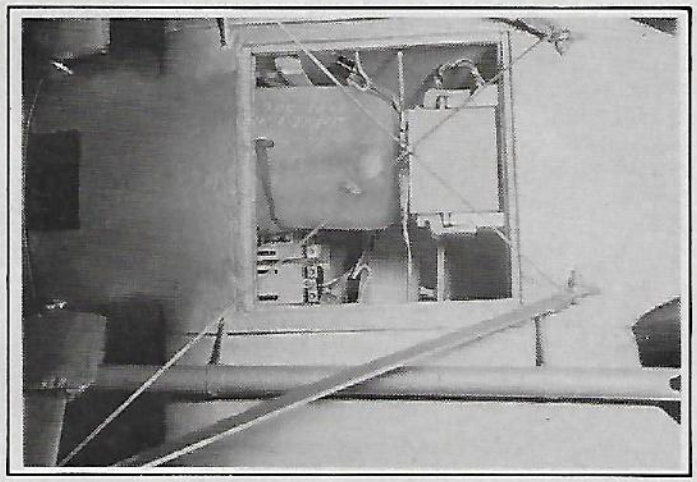


Front view of the Gloster Gamecock II. Dummy cylinders add to overall appeal.

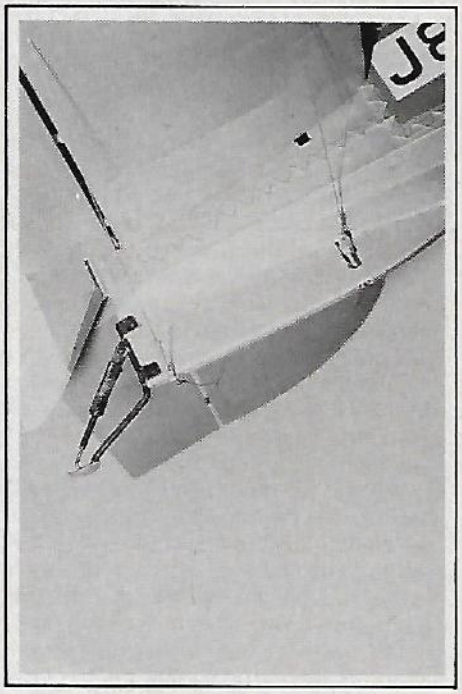
Close attention to details, such as fabric stitching, lends realism to the finished model.



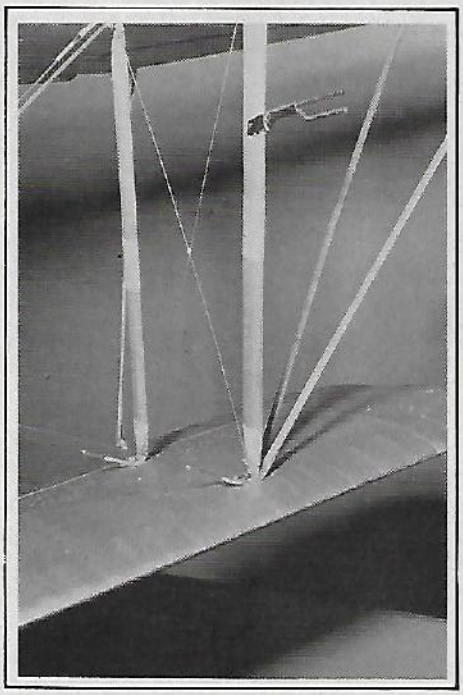
Close-up view of the vertical and horizontal tail surfaces. Note author's detailing.



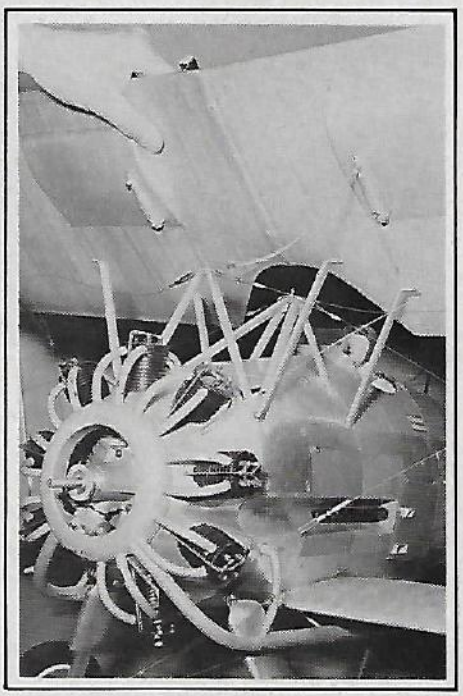
The hatch is removed in this photo to show fuel tank and servo installation.



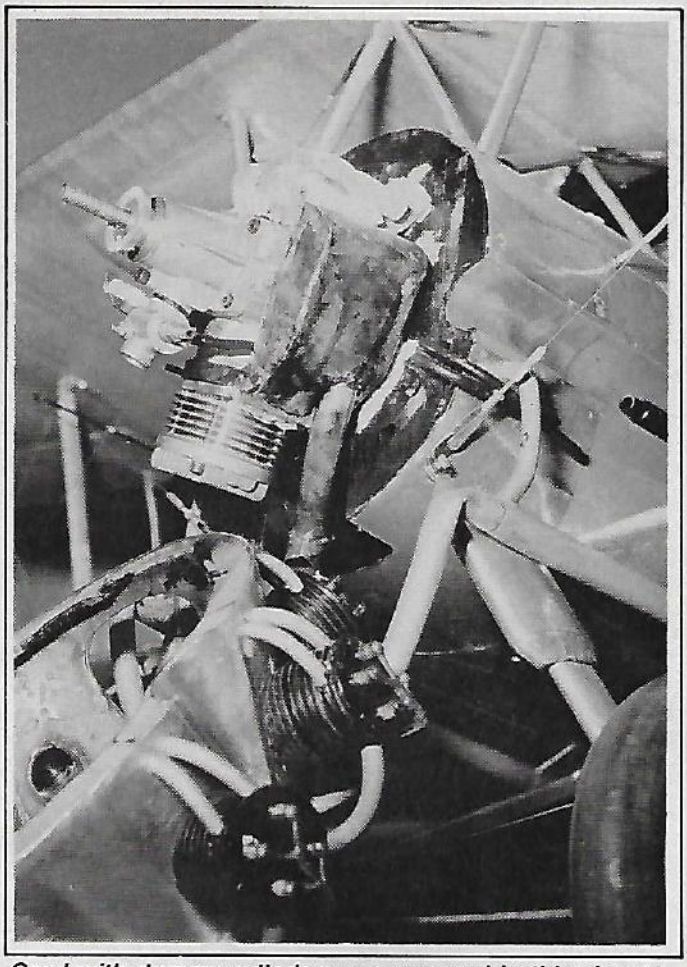
View of functional tail skid and horizontal stabilizer wire brace attachments.



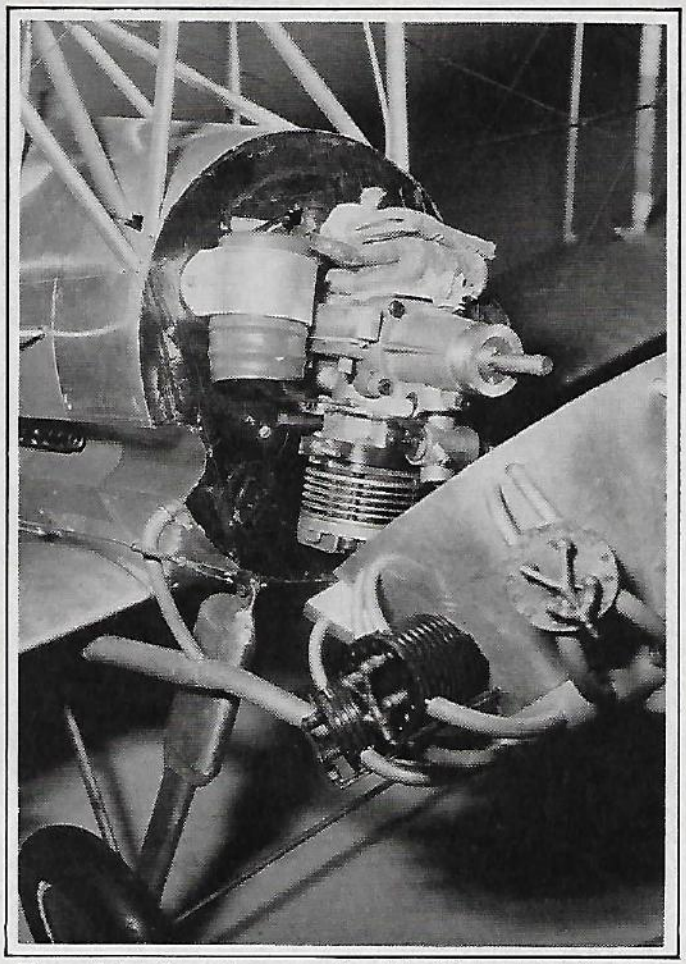
An up-close view of the wing struts and wire bracing.



The author holds the upper wing to illustrate details on the underside.



Cowl with dummy cylinders are removed in this view to illustrate engine and muffler mounting.



Firewall details on the opposite side of the engine. See text for construction particulars.

for rigidity, so don't forget them. The top wings are joined at the center using alloy strip epoxied in place. Besides bracing this area, the metal prevents the cabane locating studs from splintering the wood in the event of a cartwheel. The central bolts only locate the wing and do not tie it down; they are vital for constant wing alignment.

Install all blind nuts and make up the interplane struts exactly as on the plan. You'll need these for cabane alignment, and I do not subscribe to the view that interplane struts should be individually tailor-made to each position. Two sets of struts of unmatched lengths will merely support the wing in a state of misalignment. The outer vee struts are not structural members on this model (although they were necessary on the full-size because of the large tip overhang) so they *can* be tailor-made.

Fuselage: The hardest part is the cabane area. Make a pre-cut kit, once again to smooth the building sequence. Assemble the basic sides from strip and 3/16" sheet. Contact glue the 1/16" ply doublers in place, followed by the 1/8" ply strut supporting doublers. Carefully position and glue the 3/32" ply root facing rib. Join the sides squarely with F1, F3, F3B, F5a and a cross-brace at F5. Join the sternpost and add the remaining cross-braces. Epoxy the lower wing attachment tubes in place.

Now for that cabane. Bend the cabane struts to shape and drill holes. The bottom holes can be slotted to ease adjustment. Loosely bolt the inverted-vees to the basic fuselage and bolt the diagonals in place. Slide the lower wing in place, plug the top wing into the cabane studs. Bolt the interplane struts. Check to ensure that the wings are square with the fuselage by measuring from tip to sternpost. Ensure correct incidence on the top wing. Drill the fuselage bolt holes and bolt up tight. Then epoxy and screw the diagonals only in place. When set, remove the wings and cabane, carefully storing the latter on one side. Bolt and epoxy the undercarriage lugs in place, then finish the fuselage.

Engine sidethrust is built-in, but downthrust is achieved by using thrust wedges under the mounting lugs. Sorry about the tank position! It has to come out to get at the radio, but feeds okay, and there is no noticeable C.G. shift between full and empty. Inside there is plenty of radio room, but keep the gear well forward. Study the throttle linkage — I turned the carb back-to-front on the HP61 so that the throttle linkage would not snag on the silencer. Fill and vent tubes pass through F1 and emerge under the cowl.

The sprung landing gear shown is simple and strong, and preferable to a soldered-up wire job. Note, however, that the front legs are not soldered to the axle. If you incorporate the springing, and solder the bottom joint solid, the rear strut ends will fracture due to flexing — I speak from experience! The cowl is easy to make and care with the fastening and location lugs will reward you with a rigid, but quickly removable, assembly. I used Veron Hawker Tomtit cylinders, but balsa dowel wrapped with string would no doubt be as effective.

Tail Surfaces: As usual with short nosed models, the tail must be kept light, so the lightest balsa must be selected. I incorporated an adjustable leadscrew to vary the tail incidence, as I was uncertain at what angle to set the surface. The final setting, unchanged since trimming flights, is that shown on the plan. The mechanism weighed 2 ounces — equal in effect to 1 pound of lead in the cowl! Since my model carries 1 pound of lead in the cowl, I left the device off the plant to save you problems. As a matter of interest, the full-size aircraft had a +5½ to −2 degree variation in tail incidence, and if the tailplane angle worries you, just look carefully at the photo on page 3 of Profile Publications #33!

The fixed stab slides into place and is held by the bracing wires. The elevator

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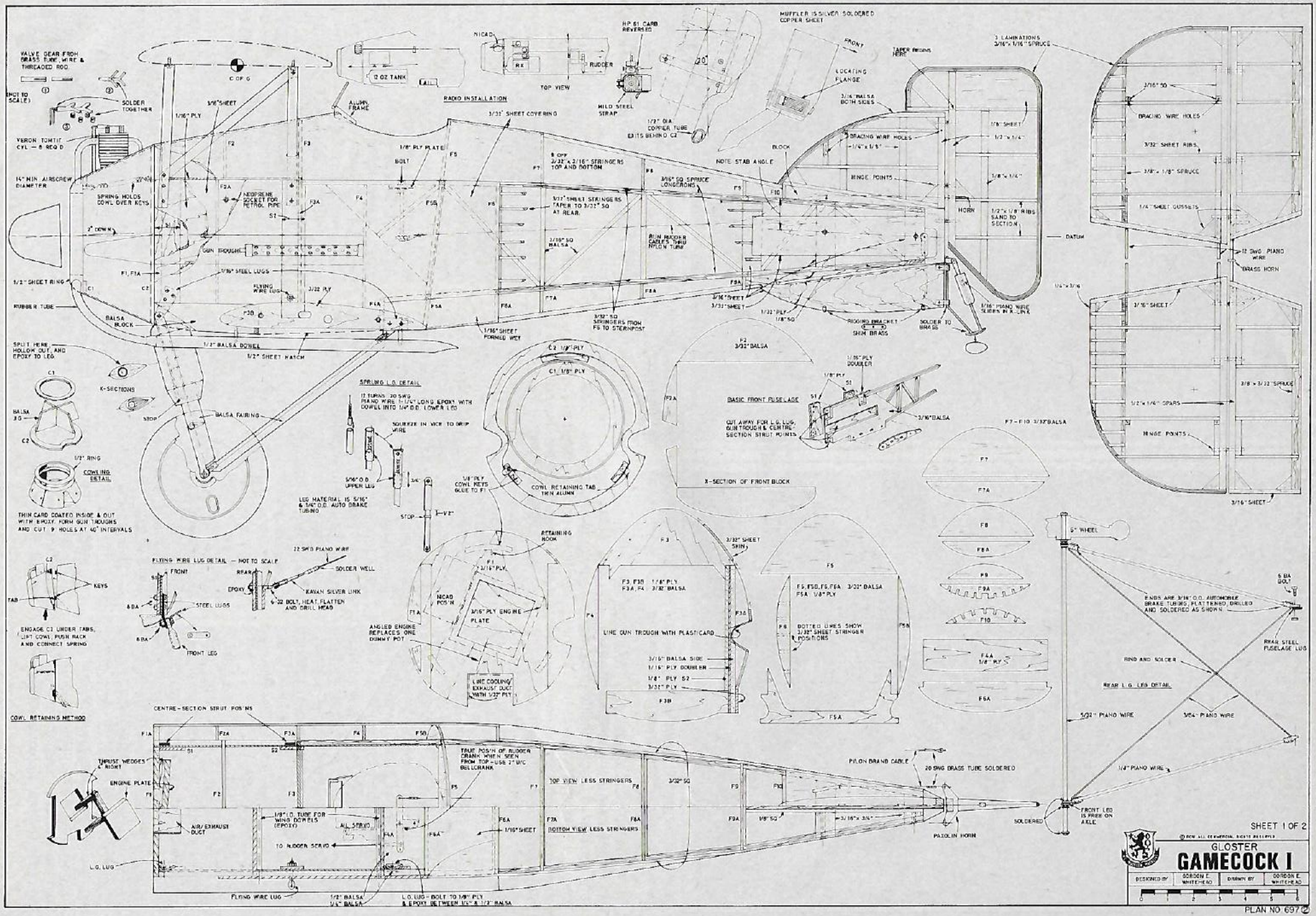
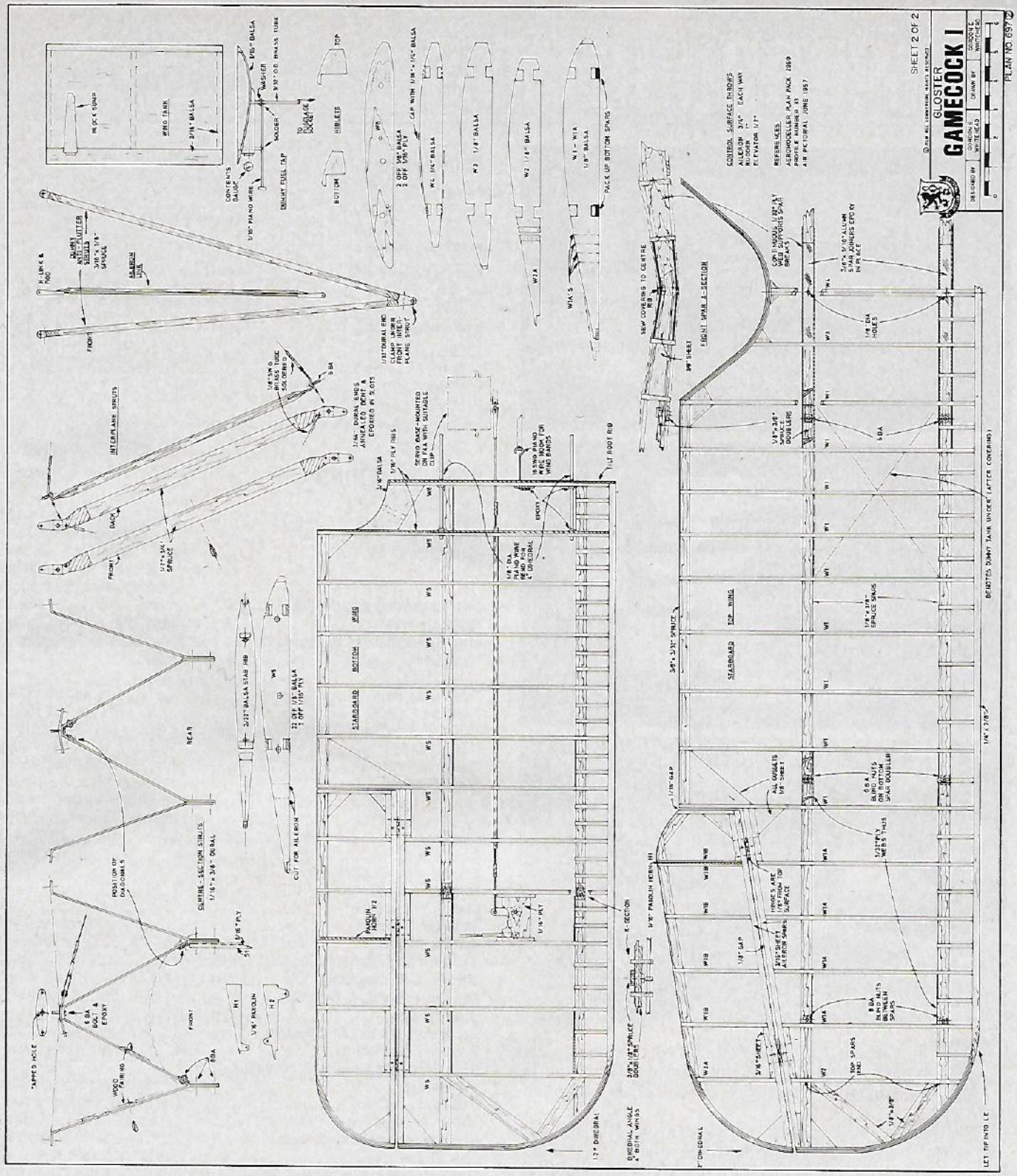
FULL SIZE PLANS AVAILABLE — SEE PAGE 189





GLOSTER GAMECOCK I

Designed By: Flt. Lt. Gordon E. Whitehead, RAF

TYPE AIRCRAFT
Stand-Off Scale Biplane
WINGSPAN
59½ Inches
WING CHORD
10½ Inches
TOTAL WING AREA
1050 Square Inches

WING LOCATION
Biplane
AIRFOIL
Flat Bottom
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
2" top wing — 1.7" bottom wing
O.A. FUSELAGE LENGTH
39½ Inches
RADIO COMPARTMENT AREA
(L) 6" X (W) 4¾" X (H) 3"
STABILIZER SPAN
18 Inches

STABILIZER CHORD (incl. elev.)
8 Inches
STABILIZER AREA
132 Square Inches
STAB AIRFOIL SECTION
Symmetrical
STABILIZER LOCATION
Mid-Fuselage
VERTICAL FIN HEIGHT
5½ Inches
VERTICAL FIN WIDTH (incl. rudder)
8¼" (Avg.)
REC. ENGINE SIZE
.60 - .80 cu. in.

FUEL TANK SIZE
12 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Ail., & Throt.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa, Ply & Spruce
Wing	Balsa, Ply & Spruce
Empennage	Balsa and Spruce
Weight Ready-To-Fly	152 Oz.
Wing Loading	20.85 Oz./Sq. Ft.

CESSNA 150

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..... of light blue and silver, then flat black was added to this mixture and the window outlines were shaded.

After a few added details like gas caps, wing tip lights, landing light, rotating beacon; the prototype weighed in at 8¼ lbs. ready to fly.

The hardware items included in the kit were: nylon control horns, hinges, nose gear bearing, steering arm, aluminum main gear, coil spring nose gear, steel RC links, aluminum motor mounts, plastic wheel pants, decal sheet and factory 3-view drawing.

Flight performance of the Cessna 150 is excellent. The small case Super Tigre .60 had ample power to pull the Cessna through the AMA pattern. With the wing loading at 29 oz./sq. ft., the Cessna flew best in a 5 to 10 mph wind. Also at this wing loading it will snap like crazy, so keep a little speed when landing.

In conclusion, the Cessna 150 is a rewarding kit to build and fly. It's flight performance, fidelity to scale, and overall appeal are outstanding, making it an excellent kit for sport scale. One word of caution *"do not"* attempt to hand launch this airplane, unless you wish to put it back into kit form! □

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surfaces are slid onto the joiners and held by the hinges. Do not fix permanently until covering and coloring is complete.

Covering and Finishing: The prototype was nylon covered, tail included. The structure is strong enough for the use of heat-activated film. Two coats of clear dope filled the pores, then the final color dope was applied. Two thin base coats of white were sprayed on, followed by two of silver. A beautiful silky sheen results, due to the white undercoat reflecting the transmitted light back through the silver. Don't just spray silver straight on to the nylon or you will never get it opaque. The roundels were sprayed by successively masking off the various colors, and the squared done likewise. The metal paneling was added after all spray work as follows:

Metal Panels: The metal is thin alloy sheet — I used litho plate, but I believe it is possible to buy adhesive-backed alloy sheet. Before cutting the metal, make paper templates of all panels to be simulated. Now take the inverted vee cabane structure made previously, together with the outer cabane struts. Cut away the top decking to allow the insertion of the cabane assembly and bolt the latter in place. Don't worry about the unsightly holes you've just hacked into your pride

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and joy — all will be well! Add the wings and interplane struts and check that you can align them up as before. Also check that you can bolt up the outer cabane struts to the wings without straining anything. All okay? Now remove the lot and take the paper template which you made for the decking. By trial and error, slot the template so that the cabane vees will pass through neatly — see photos. To check this, you'll have to engage the vee struts in the slots and lower the lot into place all at once. When satisfied, cut the metal to size and check it for fit as just described. Remove the lot again and smear contact glue around the outer edges of the metal and around the outer perimeter of the area to be covered. Lower away and press the paneling accurately into place. At this stage, you will be able to admire a fuselage with alloy-paneled front decking and slack vee struts. Now smother the cabane/fuselage joints with 24-hour epoxy and loosely bolt the complete "W" assembly in place. Add wings and interplane struts again, and bolt the cabane to the wing. Re-align the wings (you've had plenty of practice by now) and bolt the cabanes on tight. Leave to set. Don't use 5-minute epoxy here, unless you anticipate working like super-duper greased lightning. Give yourself plenty of time to align that cabane. If in doubt, add up the number of hours it's taken you to get so far and compare with 24! Nuff-said?

Leave to set overnight. Then panel the rest of the cowlings. You'll find it easier and strong enough only to use adhesive around the outer edges of the panels.

Well, that took some explaining, but the hints will apply to oodles of other bipes, so if you've always wanted to metal panel a bipe, go to it!

Rigging: The wing bracing is functional on this model, and the anchoring method is strong and effective. Do not use nylon clevises. Do ensure that the metal clevises used for the flying wires are of the Kavan silver link type — the pin passes through both sides of the clevis. The cheaper single-sided metal clevis may be used for the landing wires where the side loads on the pin are not so critical. Although the wires are functional, their job is only to support the wing in flight — not to hold incidences or hold the model together (the nuts, bolts and elastic bands do this). With the model at rest, only the slightest tension is required — sufficient to remove any excessive droop. Do not try to take warps out with the rigging — too much tension coupled with flight loads might pull the pins from even the best quality clevises. Are clevises strong enough? Well, it was a glorious day for the 1974 Grantham and D.M.F.C. Scale competition. I landed the model after its competition flight, had it judged, and set about dismantling it for transport. I then discovered (having flown the model through three rolls, two loops, one split S, one flick roll, an Immelman and two stall turns) that both bolts were missing from the left-hand side of the cabane. In the pre-flight rush, I had forgotten to put them in. At least I proved the worth of the rigging attachments! I also won the competition!

When dismantling for transport, merely unclip the clevises, unclip the aileron links, unscrew the cabane bolts

and the lower wing interplane strut bolts. The top wing will then lift off complete with bracing wires. Assembling or dismantling takes less than ten minutes, and provided you don't shift the radio gear, you'll find that the trim will never vary from week to week. One tip — keep the 8 bolts you use to assemble the plane in a little plastic box all to themselves. Then you'll *know* whether you've ommitted any bolts during assembly!

FLYING

Dig out your favorite piece of lead and use some of it to coax the C.G. to the required position. Then double check. There is a story relating to the C.G. of this model. I calculated (probably erroneously) the C.G. location and the position so evaluated was 3/4" behind the present one. Great! No lead was necessary at this stage. At the field, I cranked her up and off she went — just like a lift. Within three seconds she was higher than a house and bucking like a wild bronco! Besides having the C.G. too far to the rear, the tail did not have enough positive incidence. Laterally, she was stable, which is a great feature of the ship. Cutting the motor, I guided the ship down a switchback path and ended the flight with a glorious cartwheel due to "landing" about 5' too high at long range. Only minor damage resulted - - - broken prop, dented wing tip and a sprained joint at the top right aileron root. 1½ pounds of lead moved the C.G. forward just over an inch, and further flights were like sweet music. Landings, though, were pretty awful — the model usually ending the landing run with a nose-over, sometimes onto its back. Obviously, the forward limit of the C.G. was decided by the wheel position, so I had to change tail incidence. On succeeding flights, I removed lead and increased tail incidence. There is now 1 pound of lead up front and I can usually keep her on her feet with the scale U/C as detailed. However, for first flights, make an extra long pair of rear U/C legs, say an inch longer than scale, maybe even more. I haven't done this, but it should solve landing problems. The Gamecock cost the RAF a lot of money in busted props, so if you enter a competition, make the flight judges aware of this! Since you shouldn't need that noseweight, you shouldn't have any real problems. Strangely enough, I don't go through many props at all — I've only broken four in 2½ years!

Now to your first flights. Use maximum power for take-off; this shortens ground roll and lengthens model life. The elevators are fully effective with the engine at full blast, so you can let the tail rise quickly and fly her off easily. Slight right rudder will keep her straight. Once airborne, perform a wide *left* hand circuit to gain height, then trim her for straight and level flight. Cruising power is about 1/2 throttle. Now practice turning. Left turns are easy - - - just like any pattern ship, but right turns require the use of a little co-ordinated right rudder. The torque, slipstream and adverse yaw effect of the ailerons seem to gang up to make the ship reluctant to turn right, and at first the effect "feels" queer. I do mean feel. Putting on about 10 degrees of right bank and pulling a little up elevator just doesn't turn her. Feed in some rudder and around she goes nice as you please. Perhaps she'd be better turning on rudder-elevator? The adverse yaw effect is well-known in full-size flying circles, but I've never met it on a model

before. Any inherent turn either way should be trimmed out with aileron, not rudder.

Aerobatics with the Gamecock are a joy to behold. The sun glistens on the silver dope — the squadron markings are gaily flaunted like banners, the wires sing as she performs almost any evolution you wish.

Now for the landing. Throttle back and note how slowly she loses height. The square circuit needs to be surprisingly large and the final turn onto the glide path will be quite a long distance away. At touch-down, flare out, and as she touches, give a blip on the throttle to force the tail down. Keep a small amount of power on to maintain airflow over the tail, keep up elevator to force the skid onto the deck and she'll soon slow up.

The procedure just outlined is not really complicated, but don't tangle your fingers up with the sticks! The model is very forgiving at all flight regimes. At the 1975 Nats, there was a 15-20 kt. wind blowing. When coming in to land, I got her to the edge of the circle and the wind gusted and stopped her in mid-air! She was hovering 4' up! I opened the throttle and up she went — vertically. I closed the throttle and she remained there. Gradually, by co-ordinating throttle and elevator, I coaxed her down, vertically, but missed the circle. Yep! She sure is stable. The whole evolution lasted less than 15 seconds, but seemed like a lifetime. It please the crowds, though!

Just one more hint. Ever had difficulties starting inverted engines? While waiting for my competition flight, this is what I do. I remove the plug and squirt neat fuel up into the head and up through the carb. I then crank the engine to free her and clean out all the accumulated oil and juice. I sometimes even poke a rolled tissue up the plug hole to soak up the liquid. Then I squirt the plug, and get all the oil off that, finally connecting the battery to "burn" it clean. Just before my flight, I tank up and screw the plug in.

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1977 NRCHA NATIONALS

PLACE
Greenville Municipal Airport
Rt. 58W., 3 mi. from Greenville

DATE
August 20,21, 1977

TIME:
8 A.M. Saturday, 9 A.M. Sunday
Pre-registration Appreciated

CONTEST DIRECTOR
William Curtis
R.D. #2, Greenville, Pennsylvania 16125
Phone Day — (412) 588-4120 — Phone Night — (412) 588-8720

ENTRY FEE: $15.00

PRIZES
Trophies and entry fee will be divided among top three in both classes.

CLASSES:
Sportsman, Masters: Both classes will be run outdoors.

Qualifying Round
Saturday AM, all contestants will be required to fly the three Sportsman maneuvers. The top thirty contestants of which ten will be Masters will continue through the remainder of the contest. A special award for the highest score in the qualifying round.

All manuevers are precision hovering. There will be no aerobatics. Let's give something new a try. This contest will be the first ever run where there will be no judging or racing the clock. All maneuvers will be set up in progressively harder tasks. Either you do the required tasks or no points, no in-betweens.

This years's contest has been designed by some of the most experienced helicopter pilots in the world. All of the maneuvers will be available before the contest on request. Why not plan now to attend the world's most prestigious R.C. Helicopter Contest.

Gyros: As in the past these will **NOT** be permitted. I found out recently that a few of these devices have, in the past, secretly made it into this contest. This year there will be people watching during all flying. If one is observed working in a model, that model will be barred from the rest of the contest.

MEMBERSHIP APPLICATION

NATIONAL RC HELICOPTER ASSOCIATION
R / C MODELER MAGAZINE
P.O. Box 487
Sierra Madre, California 91024

Date _____

NAME _____ **AMA #** _____

ADDRESS _____

CITY _____

STATE _____ **ZIP** _____

PLEASE FILL OUT THE ABOVE AND ENCLOSE $4.00 FOR ANNUAL DUES —

FOREIGN DUES $5.00

☐ **Renew My Membership** ☐ **New Member**

GLOSTER GAMECOCK I

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When called, I get to the starting point, turn the prop to open the shaft valve and squirt a jet of fuel up the carb and flick six times to distribute the fuel. I connect up the battery and one flick starts her. This never fails and always impresses, since the judges only see one prime, seven flicks and the model the right way up all the time! With a warm engine, just prime and flick, connect up and she'll fire. Full-size engine mechanics used to "drain the bottom cylinder" of radials before starting up, so I do the same.

CONCLUSION

I hope you've enjoyed the foregoing, and I hope I've covered everything which will enable the reader to make a successful model of one of the most appealing aircraft ever to be flown by the Royal Air Force. If I seem to have dwelt on bad points, that's because I've done a lot of flying with the model, and I want to give you the benefit of my experiences. It might even help you when designing your own scale bipe. (How about a Schuckert DIV? That's even more stubby than the Gamecock!)

I'm not a masochist, but if the model was devoid of idiosyncrasies, it just wouldn't be as interesting! Don't you agree? □

QUICKER 500

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. . . . smaller engine. We were very surprised and pleased with the ground handling and take-off characteristics, even with this arrangement.

Once off the ground, after about a 40 foot roll, we were very pleased with the flight characteristics. All controls were positive and reacted rapidly without any jitters. In fact, on the first flight, even though slightly out of trim, loops, Immelmans, slow rolls and inverted flight, were attempted and accomplished. We even tried pylon turns and found no tendency to mush, slide or come untracked. Slow flight characteristics were excellent, with no marked tendency to drop a wing from a stall. We enjoyed the responsiveness and ease of control so much that we forgot about the need for fuel and wound up with a dead stick land-

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