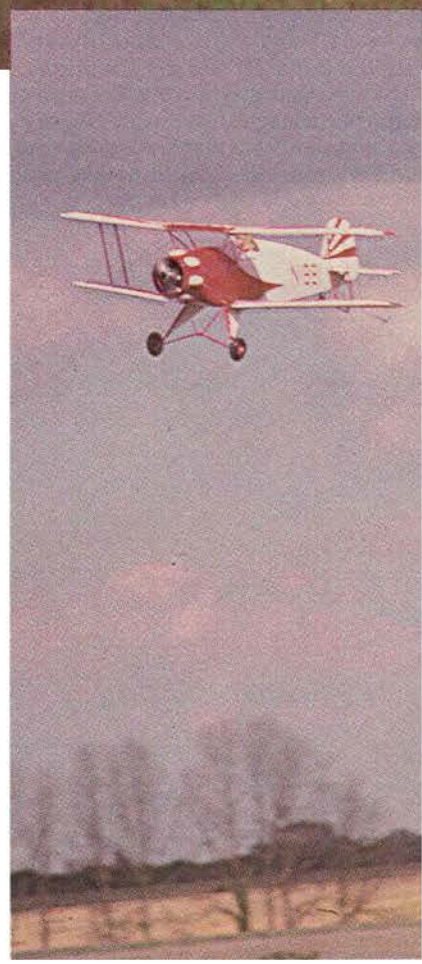
BUCKER JUNGMEISTER

By Gorden E. Whitehead



Ask any pilot of any of the modern full size machines such as Zlins, Pitts, Caps, Akrostars: "Which is the nicest flying aeroplane of them all?" The answer will be: "A Bucker."

In most aviation magazine articles featuring the Jungmeister, one tends to find that the only photos showing the ship upright are those where it's parked on the ground. The rest depict somebody holding his machine in some incredible attitude, such as 3' from the runway in knife-edge flight or passing inverted under a 20' high limbo ribbon! So you might draw the conclusion that here is a machine with promise. And you wouldn't be mistaken!

The model featured here is the 6th in my line of small size classic bipes. With her I've expanded, by aerobatic repertoire, to include such evil sounding maneuvers as the Lomcovak, Chinese Loop, and Avalanche, and the "bestest" snap-roll you ever did see. She'll snap-roll upwards, downwards, upright and inverted and, in this respect, she is very much like the full-size — only she rotates so quickly I have difficulty in stopping her with exact precision. Powered by a .25, she has the usual Whitehead design characteristic of unimpressive vertical climb performance (a feature of the full-size ship, I might add). However, she'll knife-edge with .20 or .25 power.

As with most of my chosen subjects, the Jungmeister has been on my list for years — 20 in fact! What delayed proceedings, apart from radio technology, was a fear of making special radial cowls. The method used produces a composite balsa/fiberglass affair which you can make and finish in a couple of evenings. The model started life with a fully castoring tail wheel, and with that device she became a fully castoring model airplane! I always say that whenever you build a fresh scale model, you learn something new, and the message here is to forget about using castoring tail wheels, unless you love worn wing tips and viscious ground loops. After learning this the hard

way, I read an article in the British "Pilot" magazine by the late Neil Williams, who described Jungmeister ground handling technique; although the tail wheel was of the castoring type, it was lockable for take-off and landing. I had previously thought that only carrier fighters needed this safeguard.

I relocated the front L.G. leg top mounting further forward than scale, to enable it to pivot in the fuselage. The lower wing bands support the rear leg and, because of the forward rake of the L.G., provide a fair amount of shock absorbtion; when you push down on the ship, the wheels swing forward and upward, stretching the bands. Though seemingly crude, this arrangement works well, but you need one wing band either side which doesn't overlap the L.G. leg, in case all the L.G. bands break. I faired the L.G. legs with Solarfilm, employing the solvent for adhesion. I believe that, as with the Pitts S1, the L.G. fairing helps with lift in the knife-edge position.

The nicest feature of the ship, apart from the range of flamboyant colour schemes available, is her docile, smooth and slowish performance. You can trim her to fly free-flight, and no matter what she is doing autorotatively, like snaps or Lomcovaks, as soon as you release the sticks (yes, just let go!) she'll immediately stop rotating, or at least not go more than an extra half-turn. Then if you have the height, you can rescue her! Also, because of her low maximum speed, you can perform all kinds of combination maneuvers and sequences in a small space. A favorite sequence of mine is a half upward roll with stall turn, followed by a 1½ outside snap roll on the way down, leading at full power into a reverse Cuban 8, another stall turn, followed by a slow roll, a climbing 180° turn with a dive into a long, low, knife-edge, then a half-Cuban and a Lomcovak . . . and so on. Phew! Mind you, I'm used to her now, and I find that, compared with my other designs, I tend to keep full power on for a far higher proportion of the flight. This isn't because she's underpowered. In fact, with the HB .25 or Webra Speed .20, she has the same power/weight ratio as the full-size ship. No, it is entirely due to the style of flying, in that you need to keep storing energy in the form of speed or height. As usual, I'll describe trimming and aerobatic performance (with examples) at the end, and will now get to the constructional details.

CONSTRUCTION

Fuselage:

The basic sides are 3/16" sheet back to F4, continuing with a box girder. After adding ply doublers, join the sides with F3, and F5, and the rear cabane supports. Join the rear posts, and add cross braces. Then add F1 and the front cabane support. When dry, add the front 1/4" sheet fairing pieces, clamping as shown in the photos. Bind on the cabane struts, solder them up measuring wing rail angle from the plan to get the correct incidence. Then epoxy the binding. Install the nylon engine mount, and organize the tank position, with tank neck poking through the hole in F1, to one side of the engine. You can seal the gaps round the neck with silicone sealer when ready. Epoxy the front L.G. leg assembly in place. Add the remaining sheet formers, stringers, etc., carving and sanding to shape. Add the tail wheel assembly. The 1/32" ply plate aids covering and can be drilled for antenna exit.

Cowling:

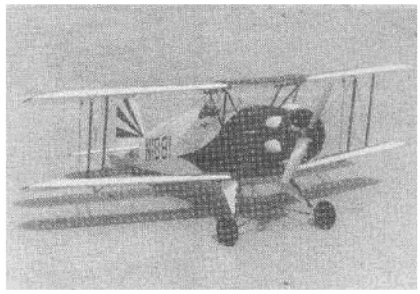
The engine cowling assembly sequence is detailed on the plan. When sheeting, cut four pieces of 4" wide sheet, space them equally round the former, and cut four trapezoidal sections to fill the gaps. Glue well, hold with pins and bands and put in a warm place to dry hard. Repeat the procedure, gluing the second layer in place. I used P.V.A. When sanding the concavity on the blister bottoms, wrap the sandpaper round a curved former, e.g., a soda pop bottle. When fitting brackets, after marking their approximate positions, stand the cowl on its rear face, support the brackets on a 13/16" thick block, and epoxy them in place, reinforcing generously with glass cloth. You will need to make hollows inside the cowl to clear the cylinder head and muffler and drill for plug and needle valve access. The slightly "higher than scale" thrustline helps minimize cut-outs in the cowling. If you regularly fly from a paved runway, fit a 1½" spinner to prevent grazing the cowl following a nose-over. On turf there is no problem. The engine angle aids its concealment within the cowl blisters.

Tail Group:

Because of wing sweep and the fairly long nose, the C.G. is a good distance back and an all-sheet tail group is in order. Watch the weight nevertheless.

Wings:

All four wings are identical. I chose a flat bottomed section because the full-size ship was similarly endowed. Note particularly the various strut hook shapes, needed to retain the struts in their various positions. The center sections differ. The bottom center section is all sheet covered, with a 1/16" ply servo plate, and servo access hole. The 1/8" ply doubler prevents the L.G. cross bar from rebounding through the bottom. The upper center section is sheeted

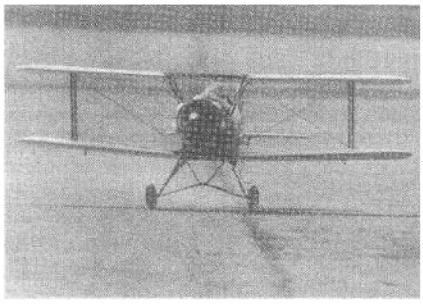


ABOUT THE AUTHOR

Gordon Whitehead is 36 years old, married, with two young daughters who don't mind his aeromodeling so much now that they have found that modeling tools can be used to make doll house furniture, and that all our plethora of glues can repair anything. Gordon is now serving as an Electrical Engineering Officer in the Royal Air Force.

Gordon started modeling at the age of 11, and since then has always been primarily an O/D (own design) scratch builder. He began with FF and C/L, and started R/C in 1963 with homemade single channel tube radios. He went to full proportional in 1969, flying .40 and .60 powered pattern ships for 3 years, then began to concentrate on his first love which is Stand-Off Scale. Gordon's first O/D scale model appeared in 1961 — a C/L B25 Mitchell which is still flying. After the initial .60 sized scale excursion, he concentrated on .20-.25 size models. This enabled a wide experience on different scale model configurations that could be achieved cheaply and quickly via a dozen different designs, some of which have been published in British model magazines and RCM.

Gordon is now returning to bigger models via ducted fan and Quadras. The reason for the choice of Quadra is that he has a predilection to performing intricate maneuvers, and his ultimate aim is to make a scale ship which will be efficient enough and have powerful, yet slow enough, control responses to execute an inverted falling leaf, besides everything else. (So, if any of you out there have a model which will already perform this maneuver accurately and repeatedly, he wants you to write an article for RCM about it.)



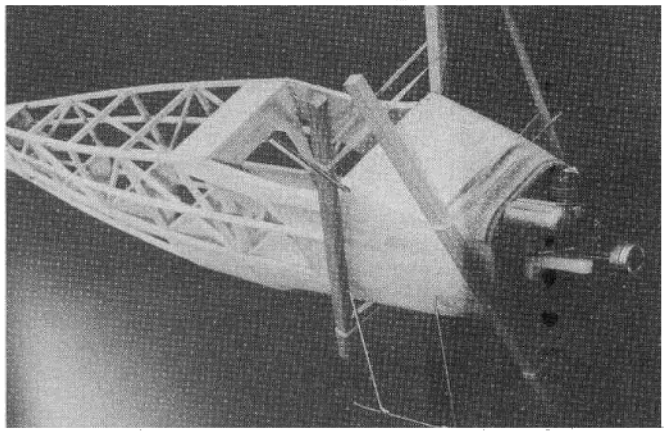
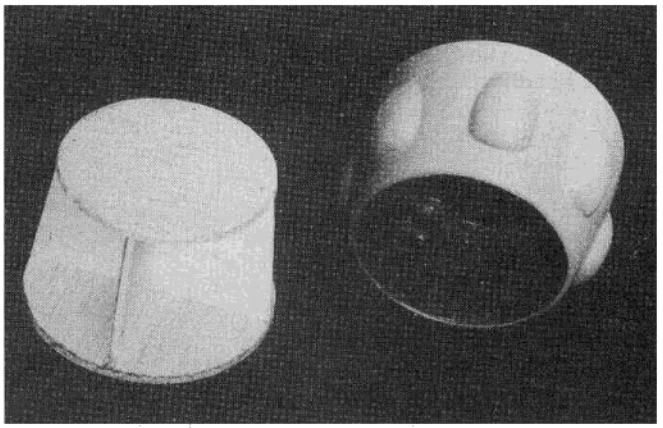
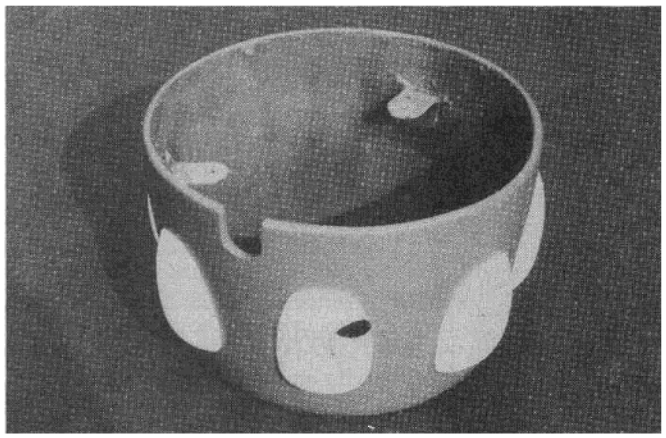


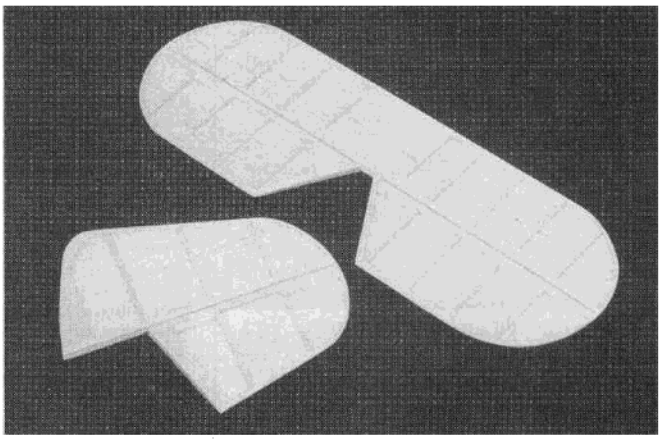
Photo illustrates how 1/4" sheet front doublers are clamped before sanding.



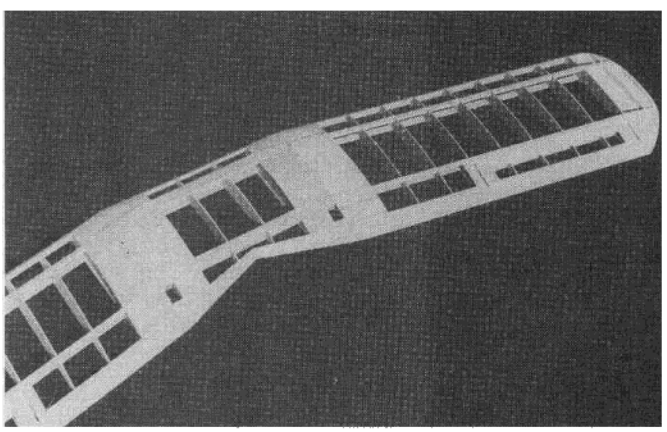
Formers used to construct cowl alongside a completed cowl.



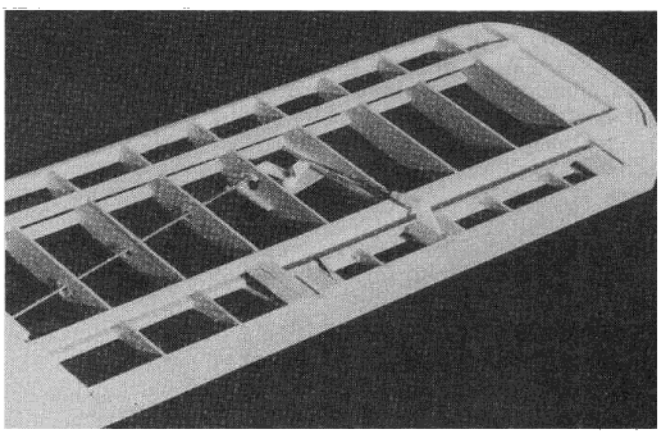
Completed cowl showing brackets for attaching.



Tail surfaces in photo differ from plans. Prototype used center sheet with frame on both sides.



Top wing center section sheeting. Note ailerons not yet cut out but with webs in place.



Lower wing aileron linkage detail. Aileron hasn't been cut free.

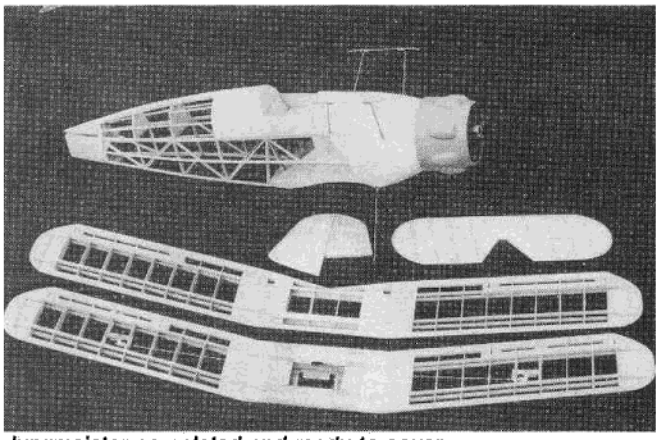
underneath for finger-proofing whilst you're carrying the ship. Neoprene fuel tubing, split and slid onto the cabane runners stops the soldered joints from biting into the underside of the top center section. Build each wing as if without ailerons, then cut the aileron sections off and add the various webs and stiffening sheeting. The spruce struts are easy to adjust to length with the wings banded in place. Also the aileron links can be made slightly too long, and adjusted for length by kinking. The dihedral braces are best made slightly oversize and sanded to blend in with the wing sheeting. When the bottom wing is all complete, band it in place and add the rear L.G. leg, with its associated braces. The middle brace helps to prevent the rear legs from buckling when you taxi at high speeds into rocks!

Radio Installation:

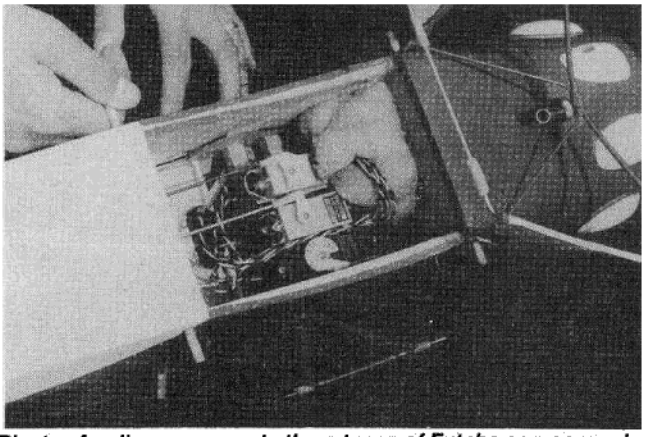
I mounted my servos abreast on mounting clips, employing dowel pushrods. The aileron pushrod is 1/16" music wire. The receiver goes alongside the 4 oz. tank, the battery just in front of the servos. Arrange initial control throws for the trimming values. These were the initial throws I used, by default really, as my new rotary servos have less throw than my old linears.

Covering:

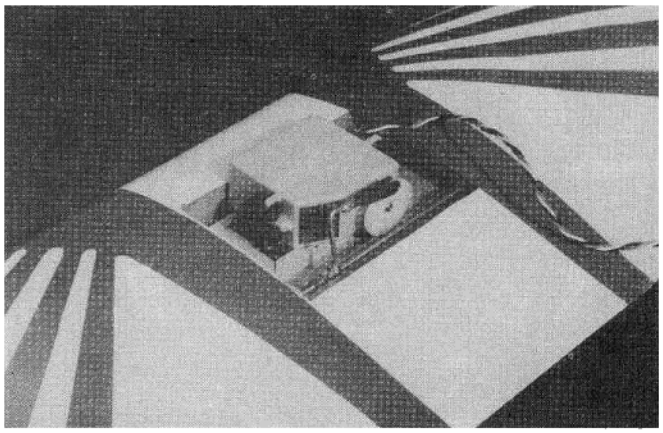
My ship is entirely film covered, except for the cowling which I painted to match. I tinted red enamel with orange to get the correct shade. The top wing sunburst was cut out in one piece as follows: Draw half of the



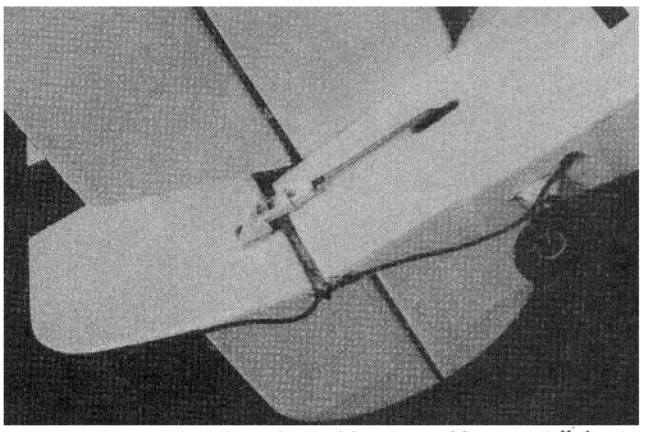
Jungmeister completed and ready to cover.



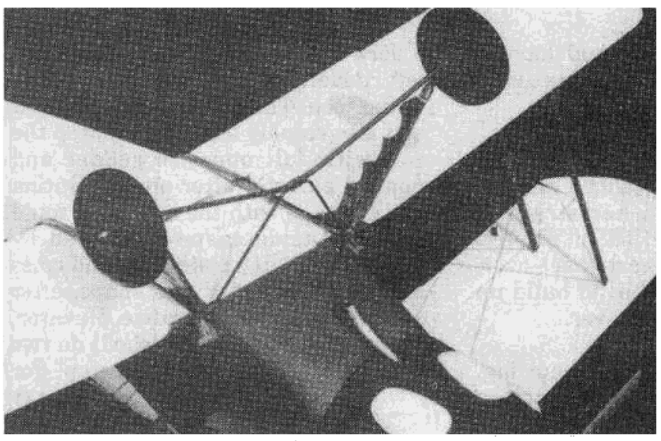
Plenty of radio room — note three types of Futaba servos used.



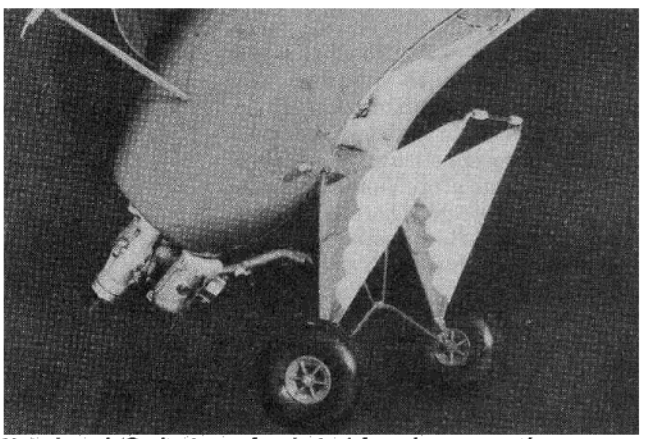
Aileron servo mounting in lower wing.



Looking under the stab at the rudder control horn and linkage. Note receiver antenna.



Lower wing bands also tie down rear L/G strut.



Note how L/G pivots on front strut for wing removal.

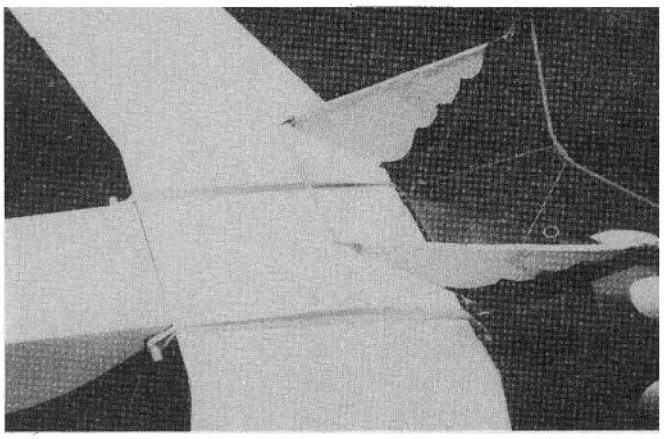
pattern on a sheet of paper, and pin this over the film which is folded double at its center. Using a sharp knife, cut out the pattern, open out the film and there is your sunburst! I ironed the sunburst into place. The lower wing pattern was made using the leftovers from the top wing. I drew the fuselage letters individually on squared paper, pinned each drawing over sufficient layers of film and knife cut them out. I stuck them in place with solvent as I did with the tail decor.

Muffler:

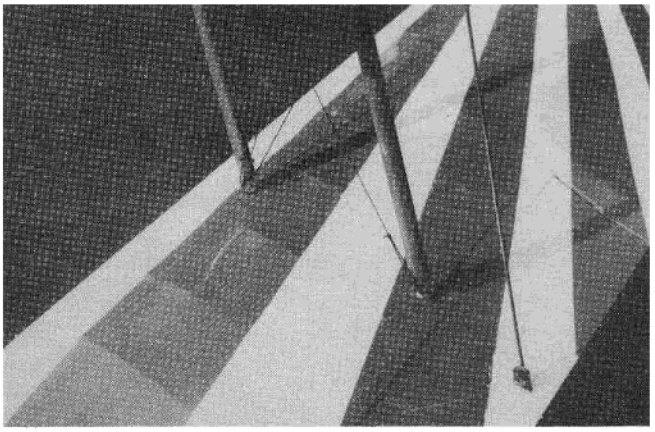
I modified an HB/Veco muffler by cutting off its mounting stub and filed a bevel on the inside of the aperture to seat on the engine exhaust stub. I cut off the back of the expansion chamber, and plugged it with a thick aluminum disk held with P.K. screws and sealed with silicone seal. The exhaust pipe is thin-walled 1/4" I.D. aluminum tube, and is effective in shooting the sludge well away from the ship. About one hours work with a junior hacksaw and needle files did the job.

Flying:

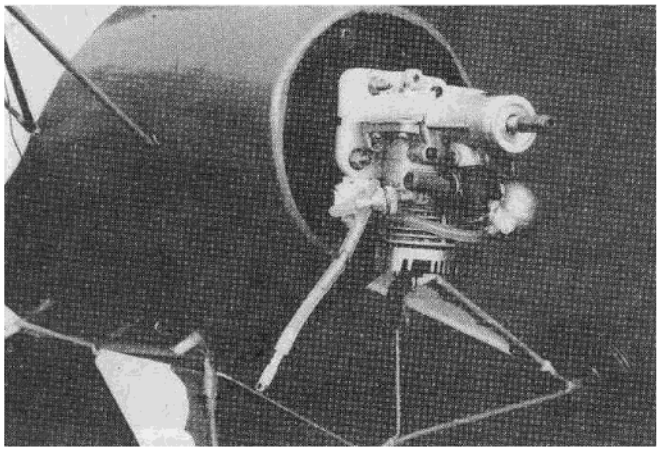
With the tank empty, get the C.G. correct. The first flights were made using H.B. .20, 9/4 Tornado nylon, 5% juice at an all-up weight of 3 lbs. 12 ozs. She needed 3/32" up on the right ailerons. She takes off well in a satisfyingly short distance with no ground looping tendency. A good .20 is required and even then climb rate is slow. She would do all the maneuvers detailed below but needed a dive for speed. The cowl undoubtedly reduces engine thrust and I, therefore,



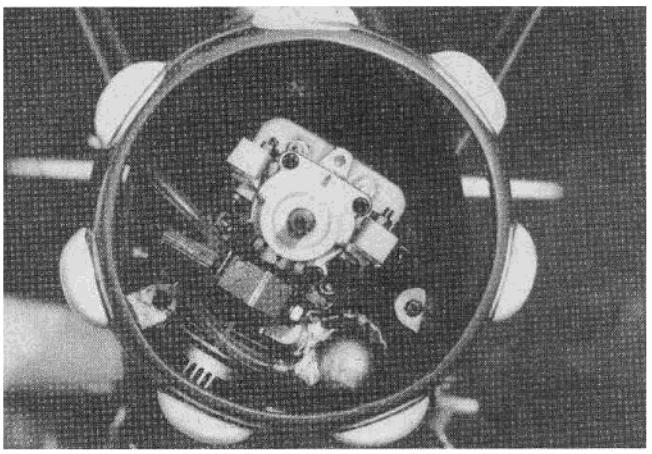
Safety bands on wing before addition of L/G hold-down bands.



Interplane struts showing elastic thread for simulated wires. Note wire linkage to lower aileron.



H.B. .25 mounted in front does a superb job.



Angled engine — note thrust wedges. The modified muffler is described in text.

substituted an H.B. .25 with 10/4 Taipan. Performance was fine, but then the H.B. .25 began breaking little ends and I went through two rods and pistons before substituting a Webra Speed .20. Same prop. Wow! With the H.B. .20 she was a good aerobatic sport job; with the H.B. .25 she became a good aerobatic ship; with the Webra Speed .20 (same muffler as before, with a mild-steel strap to retain it on the engine) she's in the 'hot' aerobatic class.

After familiarization flights, increase control throws and have a ball with some of the maneuvers outlined below.

Stall Turn:

This is easier to the left. Keep full power on all the way up with a touch of right rudder to hold her straight. When the ship stops, flick on full left rudder and she will cartwheel over. Keep power on down hill to build up speed for the next maneuver.

Avalanche:

Practice loops — make them big. Then commence a loop and at ten o'clock apply full up elevator and full left rudder. She'll snap roll at the top of the loop. The snap is more axial if you also employ left aileron. Stop the roll with full opposite rudder and neutral elevator after one revolution and carry on with the loop. You could try an outside snap-roll instead by applying full down elevator and cross aileron rudder! For two snaps, after 1/4 of the roll, neutralize elevator, keeping rudder on, and she'll do two rolls easily. So be ready to stop! For

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BUCKER JUNGMEISTER
Designed By: Gordon E. Whitehead

TYPE AIRCRAFT
Sport Scale (5/32")
WINGSPAN
40½ Inches
WING CHORD
6 Inches
TOTAL WING AREA
450 Sq. In.
WING LOCATION
Biplane
AIRFOIL
Clark Y
WING PLANFORM
Swept Constant Chord

DIHEDRAL EACH TIP
7/8" Upper — 3/8" Lower
O.A. FUSELAGE LENGTH
36¼ Inches
RADIO COMPARTMENT AREA
(L) 8" x (W) 3½" x (H) 3½"
STABILIZER SPAN
13¼ Inches
STABILIZER CHORD (incl. elev.)
5¼ Inches
STABILIZER AREA
63 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Mid Fuselage
VERTICAL FIN HEIGHT
7½ Inches

VERTICAL FIN WIDTH (incl. rudder)
7 Inches
REC. ENGINE SIZE
.20-.30 Cu. In.
FUEL TANK SIZE
4-6 Oz.
LANDING GEAR
Conventonal
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt. & Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa & Ply
Empennage ..... Balsa
Wt. Ready To Fly ..... 60 Oz.
Wing Loading ..... 19.2 Oz./Sq. Ft.

three snaps, don't just neutralize elevator — push in full down!

Snap-Roll:

Perhaps you'd better practice this one before trying the Avalanche! Throttle back to a cruise at 1/4 power, then open up and simultaneously apply full up and full left rudder, keeping ailerons neutral. As soon as she snaps, neutralize elevator to reduce drag — she'll still autorotate — and when 3/4 of the way round, commence recovery using opposite rudder. She snaps faster to the left than to the right. You can get two or three snaps as described above.

Inverted Performance:

This is only fair, but you can fly the tank out inverted. Beware of holding two much top elevator, or she'll lose speed and wallow all over the place. Outside loops are impossible to do because of the low power and lifting section. Inverted pull-outs from a vertical dive are scary.

Chinese Loop:

This is a loop the top half of which is occupied by a roll. An interesting exercise in coordination! Try two rolls!

Knife Edge Flight:

Take her up to about 50', dive at about 10-15° to 25' and you'll have enough speed. Raise the nose slightly above horizontal, roll left, say, and hold her with wings vertical using aileron. At the same time apply about 3/4 right rudder — not too quickly or she will stall! Once she is stabilized, slowly feed in the rest of the rudder throw as needed to maintain height as speed falls off. Control heading by rolling the wings over or under vertical as the elevator seems ineffective as a rudder. Roll out and neutralize the rudder simultaneously. After flying a short distance level in knife edge flight, she gradually loses height. However, she is genuinely flying all the time, not just hurtling ballistically. The engine starts to labor towards the end.

Lomcovak:

This isn't always a success, but I will describe the entry conditions as you may like to try this maneuver with your existing model. What happens after entry depends upon speed, attitude, sequence of control application, and your lucky star. The ship's reaction can be anything from a torque roll to a tumble about all three axes at once, perhaps finishing by going backwards upwards, before falling into an inverted spin.

Dive at about 30° to a good speed, pull up to a 45° climb, then snap in full left aileron and, as she rolls inverted, add full down elevator followed by full right rudder. Then watch! If you don't see anything impressive develop during the next three or four seconds, pull her out of the inverted spin she will now be doing, climb back up and try again with a different entry speed — slower perhaps, but still greater than maximum horizontal speed. What you are really aiming for is an outside snap roll, followed by a forward loop on the spot while the ship slowly rolls through 90°, followed by a snap into an inverted spin. Experiment with the throttle, e.g., chop the throttle just before the elevator/aileron application and open up when applying rudder. It's fun trying this one! Another nice Lomcovak is to dive to maximum speed, pull her up vertical. Roll left one revolution and, while still rolling, add down elevator, whereupon the tail will kick out. Add right rudder and she'll do a 'conic' with the engine at the apex of a cone, the tail describing a circle at the base of the cone. Lomcovaks need stacks of roll input, and I have a dual rate switcher on aileron to increase throw to 1/2" for this maneuver.

Landings:

Approach fast and flat, then when almost touching, ease back the stick and she'll manage a three-pointer. Don't ease back too high or she'll drop like a stone. In strong winds, lay her on in a wheeler. She runs nice and true, the "springing" absorbs bumps nicely, but be ready with the rudder at the end of the run since the forward wheel position can initiate a ground loop once air flow over the tail surface is low.

General:

If set up as described, she will appear a trifle nose-heavy; the power of the controls overcome this feel in maneuvers. For instance, when spinning to the left she will continue to autorotate even if you neutralize the elevator. In fact . . . no! I shouldn't . . . er . . . or well, okay, I'll tell you! Enter a left spin on low throttle. Slowly feed in right aileron followed by full throttle, then feed in **down** elevator! She will wind up in that spin like a Catherine Wheel! If you throttle back and neutralize controls she will exit all by herself but can take up to four turns, the last two pointing vertically downwards (in a normal spin she stops like now!). So remember, the most useless commodity in aerobatics is the amount of sky above you, and we don't want lots of Jungmeisters denting the landscape. Using the above technique, I've achieved over 100 consecutive spins in one vertical drop without crashing.

Remember, also, that this is a Bucker, not a Pitts. The spectacular Pitts has over twice the power/weight ratio of the Bucker and, therefore, has a fantastic vertical performance. I reckon that a .25 powered Pitts would need to be about 30" span so as to reduce drag and weight to an acceptable figure — you'd be carrying at least 1½ lbs. of engine and radio and you could not afford more than 16 oz. for the airframe. Such a ship would be too small to see and control comfortably.

The Jungmeister handles very much like a trainer and she has no vicious habits at all. She'll fly acceptably well on a 'normal' .20, but a .25 gives that edge needed for maintaining height during aerobatic sequences. She may even handle a .35 wearing an 11/4. The best props to date are the Tornado 9/4, on the H.B. .20 and a Taipan 10/4 on the H.B. .25 or Webra Speed .20. Under-powering will lead to disappointment.

Conclusion:

If your current model will not do all of the above mentioned maneuvers and you can still resist this super ship, then . . . I'm speechless! □

From RCModeler Jan. 1982