THE JESTER

This Class II contest biplane is capable of out-pointing the one wingers, yet is an excellent sport job. It flies easily inverted and does perfect axial rolls. Ken suggests 'Try a bipe, the change of pace airplane.'

By KEN BONNEMA

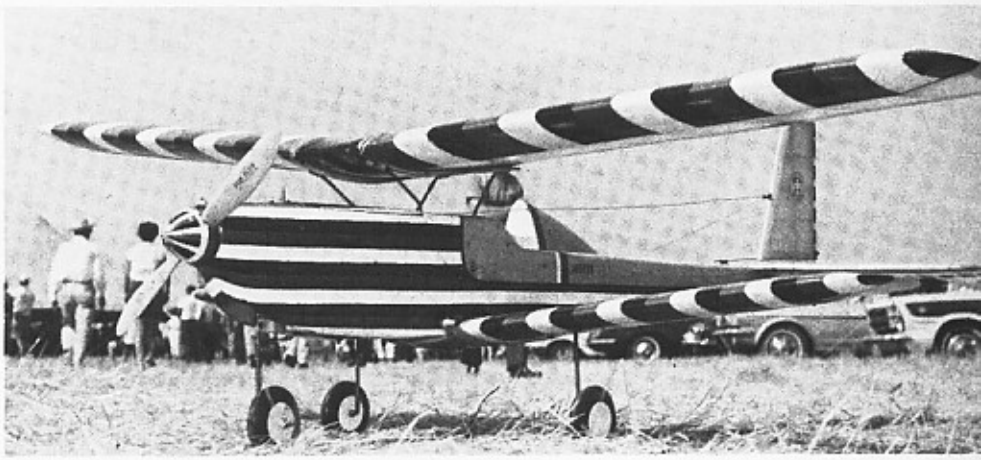
It never fails that whenever I finish a flight, somene comes up to me and says, "Boy, the bipe is really something, have you got the ailerons in the top wing or the bottom wing?" Even after I've told them and they've examined both wings carefully, they still find it hard to believe that there are no ailerons. But I really can't blame them, for I sometimes wonder myself.

Obviously, the outstanding characteristic of the Jester is its rolls. With full rudder and properly timed up and down elevator, it will do continuous axial rolls for as long as you like. With half rudder and only up elevator, it will do the most realistic barrel-rolls you've ever seen. Yet, bring it down to low speed on the landing approach and it will turn just as gently as you please.

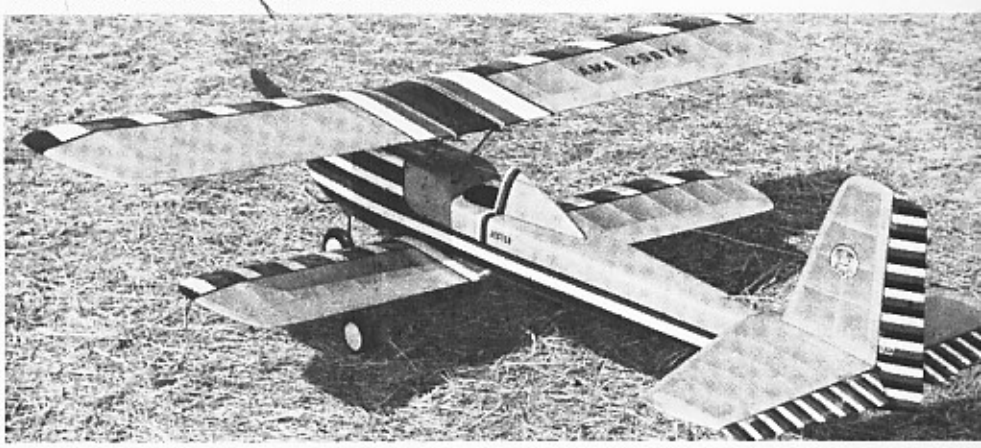
Unlike most new airplanes you see today, the Jester doesn't have a long ancestry of Jester I's and Jester II's and so on. The airplane pictured in this article is the one and only. It's only forerunner was a rudder-only, .049 biplane with a tricycle gear. I called it Tripe, which is a shortened form of Tri-Bipe.



Chip off the old block, Ken did it all without suggestions from Vince, his dad.



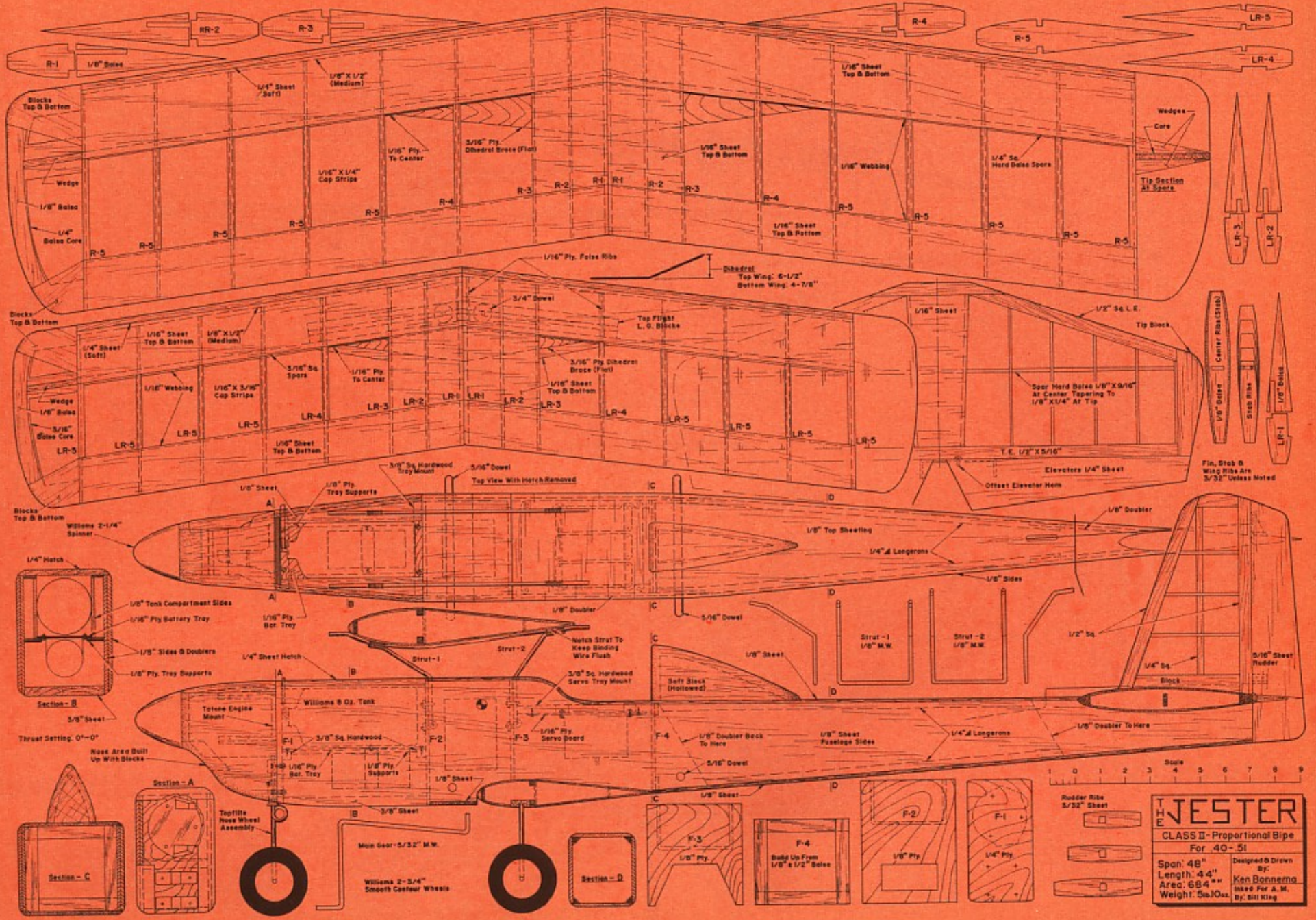
A happy-go-lucky airplane that turned out to be a contest winner! "Flat-backed" airfoil for easy building. Super-Tigre 51, but takes .40 up.



From this angle are seen the three important ingredients: short, stubby wings, 15 degrees sweepback, long tail moment, and the tall highly effective rudder.

One night in August, 1964, I had nothing to do, so I sketched a little biplane on a paper napkin. I looked at it for a little while and decided it was worth building, so I took it downstairs to a drafting table and drew it up full size. I built it in four days and had it ready to go that weekend. After waiting for calm, I fired it up and it was hand launched. It took off in a gentle climb slightly to the left. I corrected with some right stick, the actuator responded, and the plane almost rolled right into the ground.

Luckily, it barely cleared the ground and started back up. By this time I had learned that breathing on the stick was quite sufficient, I took it up and decided to see what it would really do. I pointed it into the wind and gave full "on" signal. It did one tight barrel-roll then, as it lost a little speed, it tightened into axial rolls. After two or three of these and more loss of speed, it went into a true spin. Well, I had learned what it would do, and from then on it was a real pleasure to stunt that little ship all over the sky. (*Continued on page* 52)


RR-2
R-3
R-4
R-5
LR-5
LR-4
R-1
1/16" Balsa
1/4" Sheet (Soft)
1/8" X 1/2" (Medium)
Blocks Top & Bottom
1/16" Sheet Top & Bottom
Wedges
Core
Wedge
1/8" Balsa
1/4" Balsa Core
1/16" Ply. To Center
3/16" Ply Dihedral Brace (Flat)
1/16" X 1/4" Cap Strips
1/16" Webbing
1/4" Sq. Hard Balsa Spars
Tip Section At Spars
LR-3
LR-2
1/16" Ply. False Ribs
Dihedral
Top Wing: 6-1/2"
Bottom Wing: 4-7/8"
3/4" Dowel
Top Flight L.G. Blocks
1/2" Sq. L.E.
Tip Block
Spar Hard Balsa 1/8" X 9/16" At Center Tapering To 1/8" X 1/4" At Tip
Center Ribs (Slab)
Slab Ribs
1/8" Balsa
LR-1
T.E. 1/8" X 5/16"
Elevators 1/4" Sheet
Offset Elevator Horn
Fin, Stab & Wing Ribs Are 3/32" Unless Noted
3/8" Sq. Hardwood Tray Mount
5/16" Dowel
Top View With Hatch Removed
1/8" Sheet
1/8" Ply. Tray Supports
Williams 2-1/4" Spinner
1/8" Top Sheeting
1/8" Doubler
1/4" Longerons
1/8" Sides
1/4" Hatch
1/8" Tank Compartment Sides
1/16" Ply Battery Tray
1/16" Ply Bot. Tray
1/8" Sides & Doublers
1/8" Ply. Tray Supports
Section - B
3/8" Sheet
Strut - 1
Strut - 2
Notch Strut To Keep Binding Wire Flush
1/4" Sheet Hatch
Strut - 1 1/8" M.W.
Strut - 2 1/8" M.W.
1/2" Sq.
1/4" Sq.
Soft Block (Hollowed)
Block
5/16" Sheet Rudder
Thrust Setting: 0°-0°
Williams 8 Oz. Tank
Totoise Engine Mount
3/8" Sq. Hardwood
1/16" Ply Servo Board
F-1
F-2
F-3
F-4
1/8" Doubler Back To Here
1/8" Sheet Fuselage Sides
1/4" Longerons
1/8" Doubler To Here
Nose Area Built Up With Blocks
1/16" Ply Bot. Tray
1/8" Ply Supports
1/8" Sheet
5/16" Dowel
Scale
0 1 2 3 4 5 6 7 8 9
Section - A
Tootsie Nose Wheel Assembly
Main Gear - 5/32" M.W.
Williams 2-3/4" Smooth Contour Wheels
Section - C
Section - D
F-3
1/8" Ply.
F-4
Build Up From 1/8" & 1/2" Balsa
F-2
1/8" Ply.
F-1
1/4" Ply.
Rudder Ribs 3/32" Sheet
THE TESTER
CLASS II - Proportional Bipe
For .40 - .51
Span: 48"
Length: 44"
Area: 684 sq in
Weight: 5a.10oz.
Designed & Drawn By: Ken Bonnema
Inked For A. M. By: Bill King

The Jester

(*Continued from page* 15)

The Tripe lasted for a year and a half before interference put an end to it. But somewhere in that airplane I had hit upon something unique that gave a rudder-only airplane an aileron type of roll. It could have been one of, or a combination of, or all of three things: 1) short, stubby wings; 2) sweep back, 15 degrees overall; or 3) extreme dihedral, 14 degrees in each panel of the wing. Which one of these it was I didn't know, so I put them all in the Jester. The only difference is the dihedral, which I reduced by one-half. The Jester, except for airfoil and dihedral, is an exact duplicate of the Tripe, scaled up to twice its original size, with elevator and motor control added.

Basically, all the design techniques of the Jester were on a hit or miss basis. If they worked, good; if they didn't, better luck next time. The wings and stab were set at zero degree incidence. There was no offset in the engine at all. The moments were designed so that they looked good. The airfoil was an original full symmetrical, flat-back airfoil. That is, from the center of lift back to the trailing edge is a straight line top and bottom. The main wheels were placed as far forward as possible, thus changing jump-offs to smooth takeoffs. I used the distance of the chord of the bottom wing for the separation between the wings, and located the bottom wing so that the stagger would be one-third of the top wing chord.

Actually these hit or miss techniques are the normally accepted procedures of biplane design, but with the sweepback, the dihedral, and the symmetrical airfoil, I couldn't be sure of anything until I had flown it. My fears were unwarranted, however, for on the test flight it flew right off the board, as they say, and performed surprisingly well. This was in April, 1966. In June, I took it to the Long Island Drone Society contest where, in winning Class II, it accumulated more points than the Class III Novice winner. The Jester has drawn compliments from both spectators and fellow flyers wherever it has gone, and the high scores seem to indicate that even the judges are impressed with an airplane that's different.

The plane shown here has a Super Tigre 51. With an 11-6 propeller, this engine really pulls it around. The ship weighs in at five lbs. ten oz., and for the beginner a .40 would be ample power. For the really competitive flyer, however, I feel the .46 to .50 size engine is necessary to pull it through the vertical maneuvers. I would highly recommend that proportional equipment be used in the Jester. Because of the extreme sensitivity to rudder, reeds would result in very jerky flying. I am using Kraft-KP6 proportional which has been working very well, but any of the proportional outfits on the market today will fit in the Jester's fuselage.

The wings, which should be built first just to get them out of the way, are of the simple leading and trailing edge sheet with cap strips construction. The wings can be built almost entirely on a jig set up for the proper dihedral. With the bottom spar pinned to the jig, the ribs, top spar, leading edge, webbing, top sheeting, and cap strips can be added. Then with the wing removed from the jig, the trailing edge webbing and the bottom sheet and cap strips can be added. Then the tips and the secondary leading edge can be added and the wings can be sanded.

The rudder and stabilizer can be easily constructed on a flat surface by propping up leading and trailing edges to the proper height and then adding the ribs and spar assemblies.

The presence of struts does not make the fuselage as complicated as it might appear. After gluing the doublers and the ¼" longerons to the fuselage sides, the next step is the bending of the struts. These are formed from ⅛" piano wire. A wire bending tool might be very helpful here, but my own struts were bent with only a couple pairs of pliers. The struts are attached to formers F2 and F3 with four "J" bolts for each strut. It is very important that the struts be attached to the formers exactly where indicated in order to assure proper wind incidence and alignment.

With the struts in place, the fuselage sides can be joined with the formers, again making sure of proper placement and alignment. From here on in, the fuselage is simple. The back ends are glued together and the top and bottom sheeting can be added. At this stage the internal structures of the gas tank and battery area should be added. Then the nose blocks and head-rest are preshaped and glued in place.

Finishing: After a final sanding with #400 paper, the entire ship should be clear doped at least twice, with sanding between coats, before covering. Of course, if you intend to use Mono-Kote the doping is not necessary. After a silk covering job at least six coats of clear are necessary, even if you intend to completely cover it with a color dope. If you have open silk areas as I do, I recommend eight or nine coats of clear.

For trimming, any type of color dope may be used, but make sure it is the same brand as your clear dope, because mixing brands often result in an orange peel finish. Trim design is completely up to you. I would not recommend my design to anyone who does not have access to a masking tape factory, which, by the way, I don't. It cost me more for tape than it did for the dope I used to trim it with. I think there are many simpler designs which could accent the ship's lines as well, if not better, than the multiple stripes which I employed.

Flying: With all incidence and thrust at zero degrees, the Jester is designed for grooving and staying where you put it. On test flights, however, I feel some ability to recover by itself is desirable in an airplane. Making sure you have the correct center of gravity, trim in a little "up" and a little "right." This should give a gentle climb and eliminate any possibilities of torque causing a left turn. Once you're in the air and you have the feel of it, it's all up to you. You'll find yourself trying every maneuver in the book, but because, it's fun.

I know that many of you share with me the desire to bring back biplanes and to see them establish themselves as a stunt airplane standard. If I've brought just one more flyer over to the biplane side by showing that biplanes don't have to be boxy old crates, I feel I've accomplished something. And for any skeptics out there; a suggestion: "Try a bipe, the change of pace airplane."