CAP 231

With a .90-1.20 for power, this one is sure to please.

By Mark Sirianni

The French Mudry CAP 231 is the hottest new plane on the competition aerobatic circuit. The 231 is a modified CAP 230. It has a section added to the inboard part of the wing at the leading edge and fuselage joint. Unlike the Sukhoi and the Extra 300 that are made of composite materials like carbon fiber, the CAP is basically an old fashioned plywood airplane. It uses a standard 300 hp Lycoming engine. Pilots like the plane because it is easy to maintain and has excellent flight characteristics.

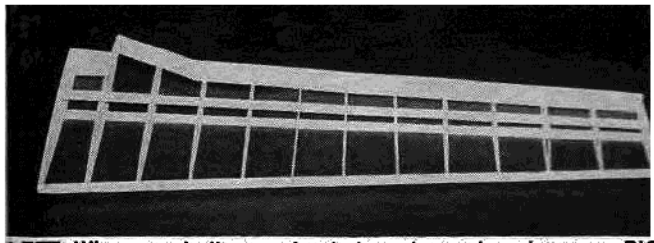
At the 15th World Aerobatic Championships in Yverdon-Les-Bains, Switzerland, the French pilot Claude Bessiere won first place in his CAP 231 and teammate Patrick Paris took second. This plane is definitely a match for the Sukhoi!

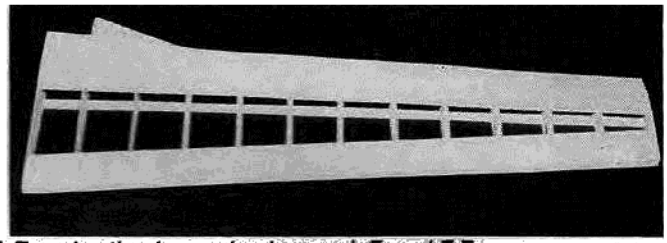
The model came about because of its good looks and simple design since I had already designed a model of the Extra 300 (May 1992, RCM Plan #1117) and a Russian Sukhoi, with the CAP 231, I will have models of the three best aerobatic planes in the world. I originally saw the CAP fly on a TV program about the world of Aerobatic Pilots. After watching the 231 on TV I knew it would make a great model.

The 231 is very similar to the well known CAP 21. The CAP 21 has been around for years and has long been a favorite subject of model builders. The 231 has a few major changes over the CAP 21. The wing L.E. is swept forward near the root, it has a very large wing fillet, and the rudder area is larger. The flight performance is also improved and the color schemes for the 231 are much nicer.

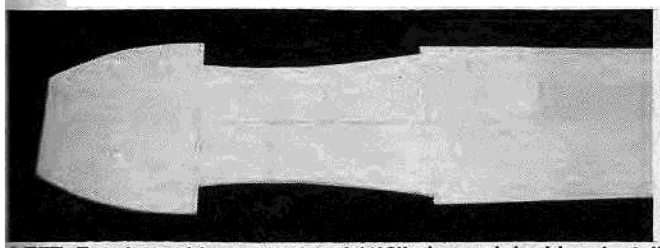
After getting some information and a 3-view from Bob Banka at Scale Model Research, I got started on my new design.

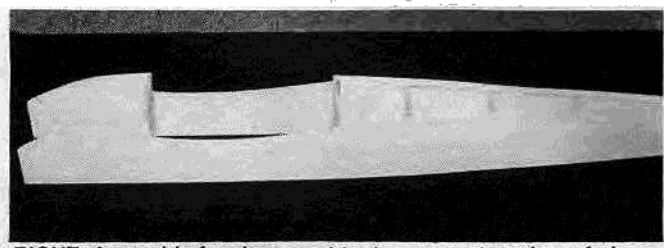
This plane is an excellent flier but is intended for the more experienced pilot. The 231 has a very short nose and a long tail. This can cause some problems with a tail heavy situation, so when building the





LEFT: Wings are built-up using balsa, plywood, and spruce. RIGHT: Top sheeting is now in place on L.E. and T.E.





LEFT: Fuselage sides cut out and 1/16" plywood doublers installed. RIGHT: Assemble fuselage upside down over top view of plans.

ail use the lightest wood possible. Do not dd any unnecessary weight to the tail, and **do not** fly this plane **tail heavy**!

When properly balanced, the plane is a ery good flier. I hope you enjoy this project s much as I did. Let's get started with the onstruction.

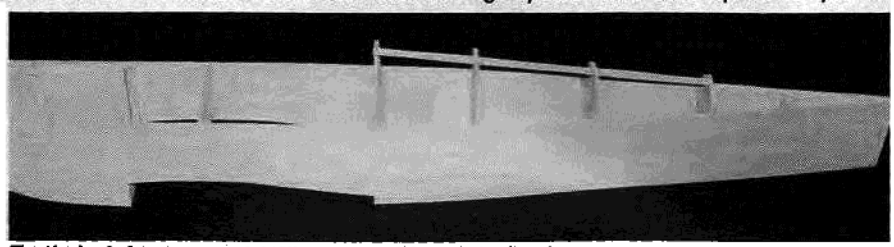
CONSTRUCTION

Wing:

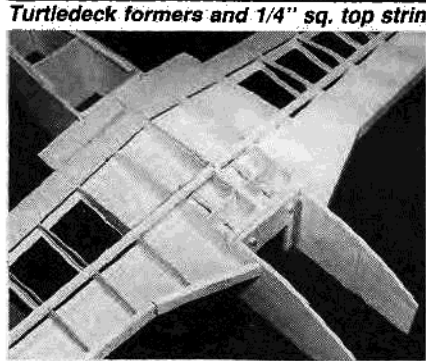
Pin the 3/8" spruce bottom spar over lan. Pin 1/4" sq. balsa jig to plan. Glue ibs 1-13 to bottom spar, then add top spruce par. Keep ribs pinned to jig and add 4" x 1/2" trailing edge (T.E.) and the 8" x 1⅛" leading edge (L.E.). Glue 32" T.E. sheeting in place. Glue 3/32" .E. sheeting in place. Keep wing pinned to uilding surface until completely dry. Turn ing over and add bottom T.E. sheeting. dd 1/8" lite ply dowel doublers. Turn the lans over and build the left wing panel over lans up to this point.

Join Wing Panels:

Cut the dihedral brace from 1/8" aircraft lywood. Cut a slot on the back of rib 1, so at the brace will slide through. Epoxy the race to the left wing panel and let dry oroughly. Place left wing panel firmly on

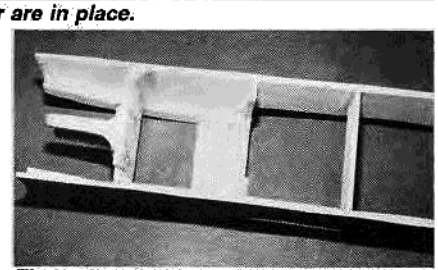


Turtledeck formers and 1/4" sq. top stringer are in place.



Wing dowel holes are drilled from front, using F2 as a guide.

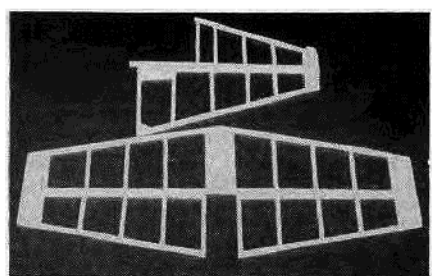
work surface and slide right panel into place. Make sure dihedral brace is epoxied in place on the back of the **spars**. Raise right wing panel 3" at the tip and epoxy brace in place. Let dry before removing from workbench. Add tapered T.E. to center of the wing. Add top wing center sheeting. **Do not** add bottom center sheeting or bottom L.E. sheeting at this time. You will need the wing assembled up to this point to build the fuselage. Set wing aside and start fuselage construction.



Fire wall, engine mount, and landing gear plate are all installed.

Fuselage:

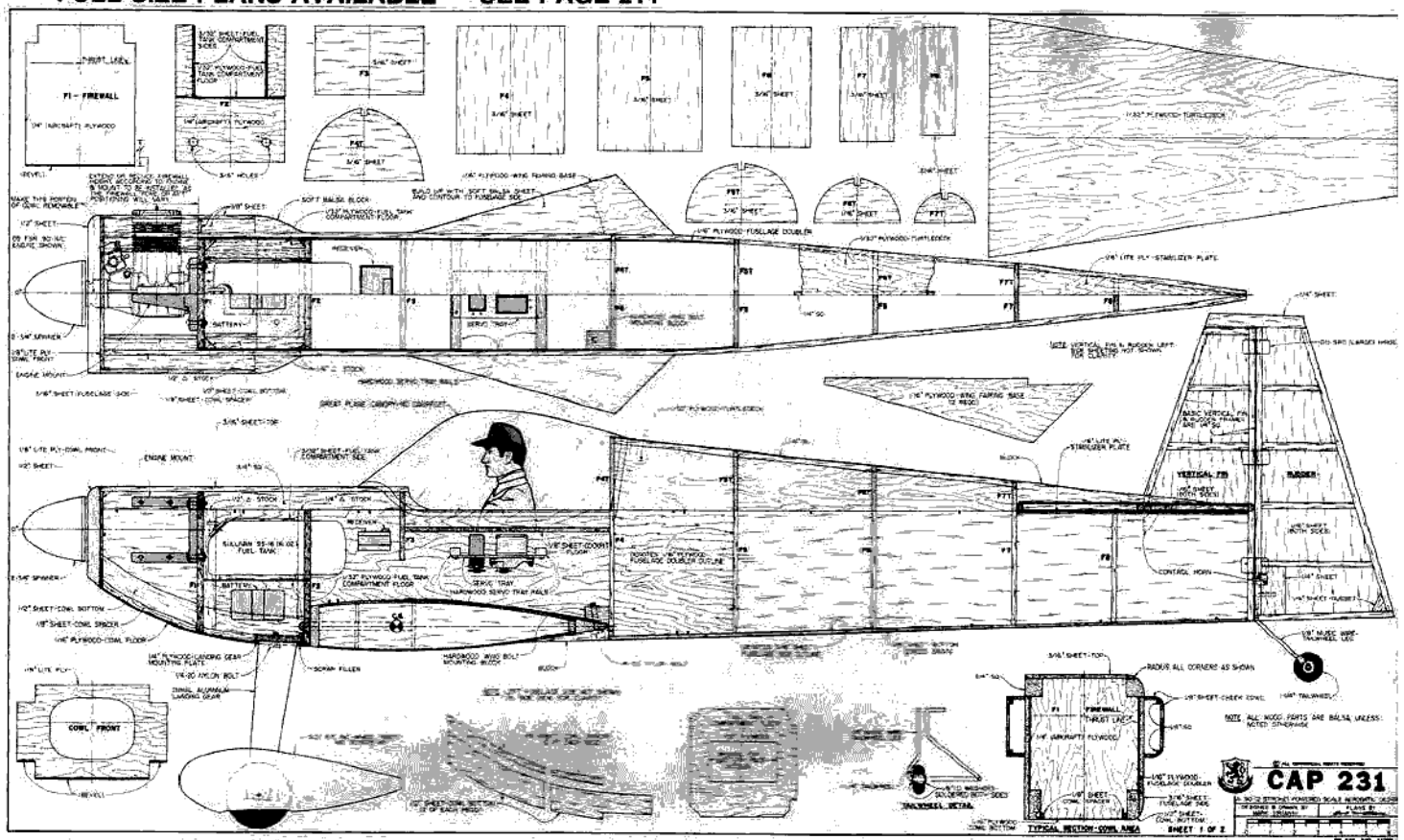
Cut fuselage sides from 3/16" x 6" x 36". Glue 1/16" plywood fuselage doubler to sides, make a right and a left side. Drill 3/8" dowel holes in F2 now. On the right side glue F2 and F4 in place. Using a 90° triangle to get them straight. Over the top view of the plans, glue the sides together making sure it is straight with no twists.



Tail pieces are all framed up with 1/4" balsa.

CAP 231

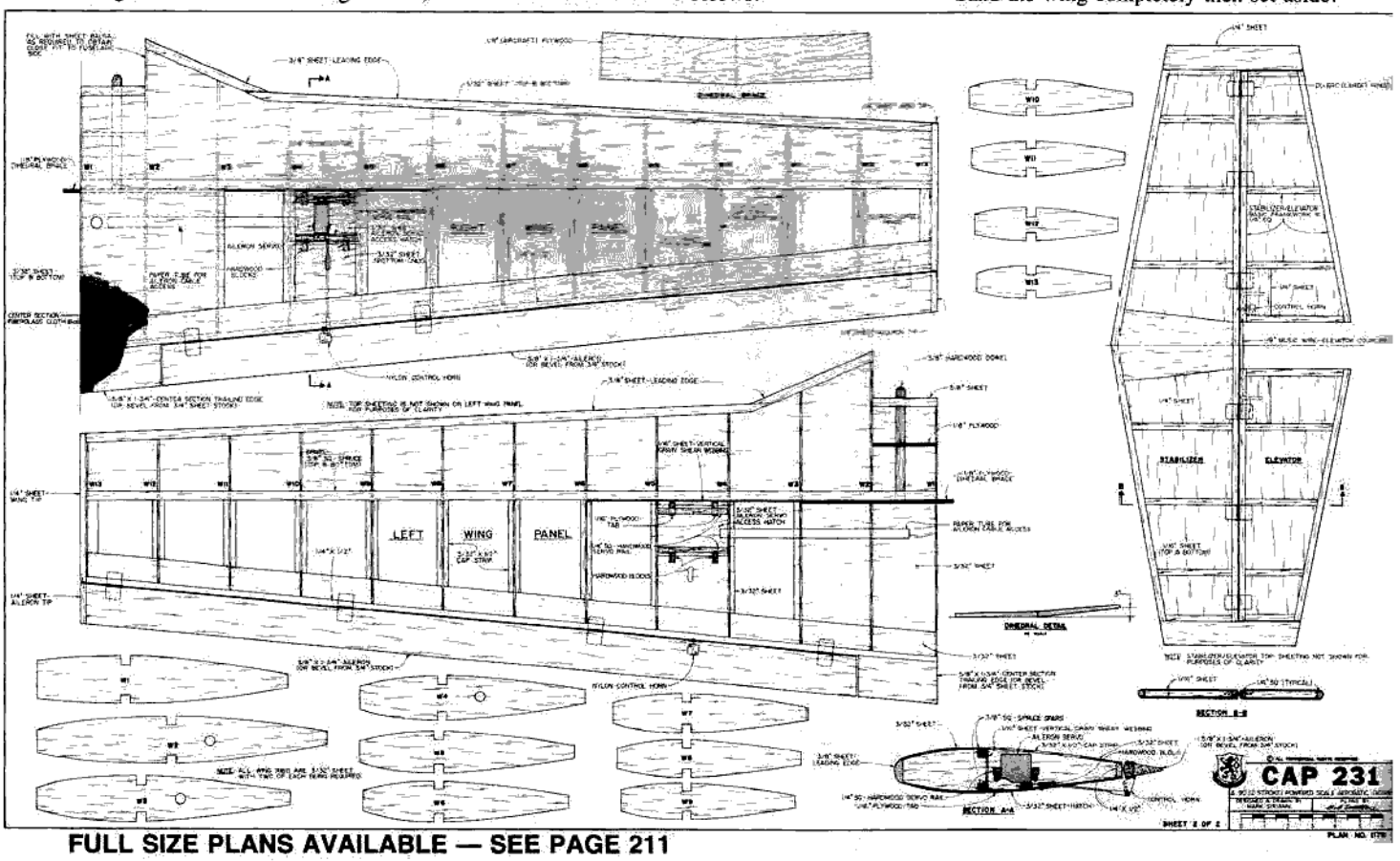
Designed By:
Mark Sirianni
TYPE AIRCRAFT
Sport Scale
WINGSPAN
72 Inches
WING CHORD
10½ Inches (Avg.)
TOTAL WING AREA
760 Sq. In.
WING LOCATION
Low Wing
AIRFOIL
Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, EACH TIP
1½ Inches
OVERALL FUSELAGE LENGTH
55 Inches
RADIO COMPARTMENT SIZE
(L) 12½" x (W) 4½" x (H) 3"
STABILIZER SPAN
25⅝ Inches
STABILIZER CHORD (incl. elev.)
7¾ Inches (Avg.)
STABILIZER AREA
196 Sq. In. (Approx.)
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
8 Inches
VERTICAL FIN WIDTH (incl. rud.)
8 Inches (Avg.)
REC. ENGINE SIZE
.90 2-stroke/1.20 4-stroke
FUEL TANK SIZE
16 Oz.
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail.
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa & Ply
Wing ..... Balsa, Ply, & Spruce
Empennage ..... Balsa
Wt. Ready To Fly ..... 136-144 Ozs.
(8 Lbs. 8 Ozs.-9 Lbs.)
Wing Loading ..... 25.9-27.3 Oz./Sq. Ft.

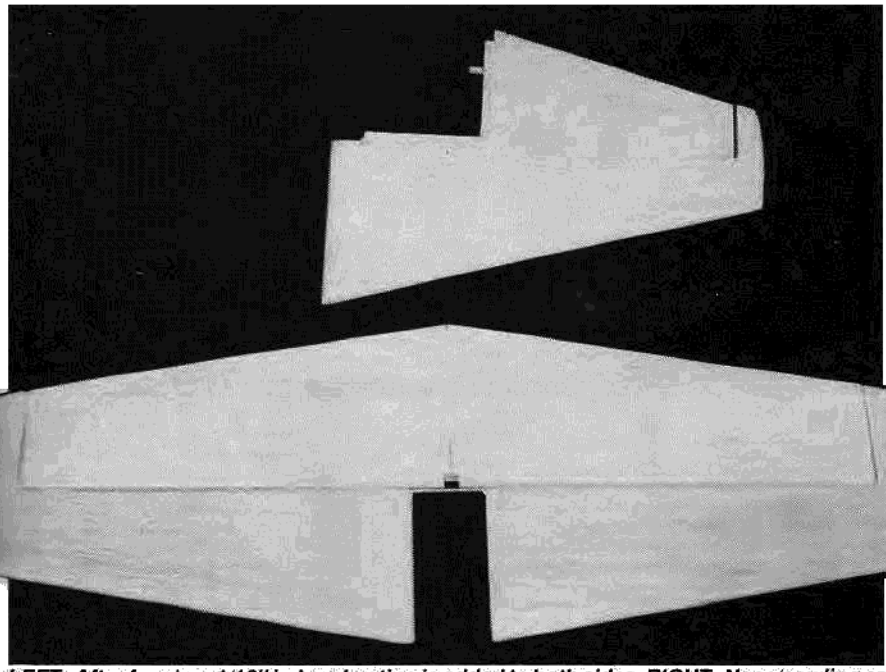


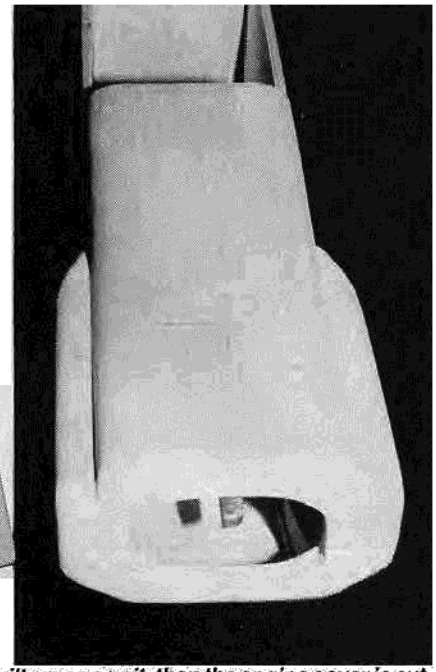
Add F3, F5, F6, F7, F8. Let it dry before removing from workbench. It is now time to drill the holes in the wing for the 3/8'' dowels. Set fuselage upside down on flat workbench and put the wing in the wing saddle. Carefully measure to see that it is straight and level. With a long drill bit, drill through the holes in F2, through the L.E. and the plywood doublers to the dihedral brace. This makes for very secure dowels. Add hardwood mounts for the wing bolts. Place the wing on the fuselage, carefully align it then drill and tap the hardwood mounts for 1/4-20 screws.

Finish the Wing:

Add bottom L.E. sheeting. Add all capstrips, paper tube for servo wires, and two aileron servos. Add bottom center section sheeting and glass the center section with 6 oz. glass cloth 6'' wide and epoxy. Sand the wing completely then set aside.







LEFT: After framing, 1/16" balsa sheeting is added to both sides. RIGHT: Nose/cowling are built-up as a unit, then the engine cover is cut away to form a removable cowl.

Back to the Fuselage:

Add top turtledeck formers F4T, F5T, F6T, F7T, the 1/4" sq. top stringer and the 1/32" plywood turtledeck. It is helpful to soak the plywood in warm water to help it bend around formers. Add the 1/2" balsa bottom cowl sides. Epoxy the fire wall in place. Attach your engine mount to fire wall. Epoxy balsa triangles to back of fire wall for support. When mounting engine it will be necessary to cut out part of the right fuselage side to let the engine head stick through. Epoxy 1/4" plywood landing plate in place. Add 3/4" sq. balsa top pieces from fuselage front back to F3. Make tank compartment to suit your tank. Add tank floor and sides. Install throttle pushrod now. Add 3/16" fuselage top. Glue 1/8" cockpit floor in place. Adjust height to suit your pilot figure. Add 1/8" lite ply cowl front and 1/2" balsa cowl front. Sand the front of fuselage to shape. Build the cheek cowls from 1/8" balsa and soft balsa blocks. Make any necessary cut outs in the cheek cowl to clear the engine cylinder head. Sand cheek cowls to shape. Turn fuselage over and glue 1/8" balsa cowl spacer in place, then glue 1/16" ply cowl bottom in place. Sand and fill as required. When the front of the fuselage is completely sanded, carefully cut right half of cowl away. Refer to the construction photos for this step. Add your engine and muffler, and trim the cowl to fit. *Note: Be sure to allow for the cooling air exit.*

Put the stabilizer, fin, and rudder in position and determine the location of your pushrod exits on the fuselage sides. When your pushrods are installed, sheet the bottom of the fuselage with 1/8" balsa cross-grained. Add 1/8" lite ply stab plate. Carve and install the soft balsa fillet block to the top of the stab. Install your tail wheel and finish the tail area. Remember, keep the tail as light as possible!

Final sand the entire fuselage, fill any dents with Model Magic filler and get ready to cover. Trim canopy to fit. I tinted my canopy with Rit Dye for a more realistic scale appearance.

Tail Surfaces:

The stab, elevators, fin, and rudder were constructed from 1/4" sq. balsa and then sheeted with 1/16" balsa. This makes for a light and strong surface. The two elevator halves were joined with 1/8" music wire.

Attach the stabilizer to the fuselage and add the balsa rear fairing. Sand to a smooth contour.

Wing Fillets:

Cover wing saddle area with plastic wrap. Build the wing fillets. Carefully epoxy the wing fillets to the fuselage side and bolt the wing in place. After the glue has dried, remove wing from fuselage. Fill in bottom of fillet with another piece of plywood. Fill and sand to shape.

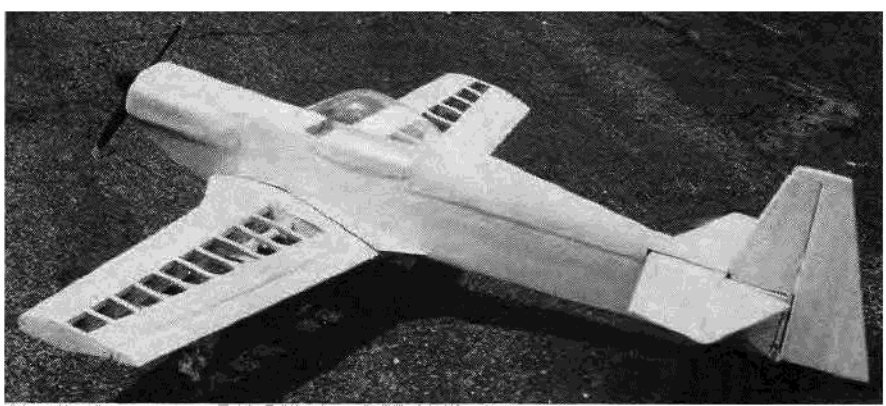
Covering:

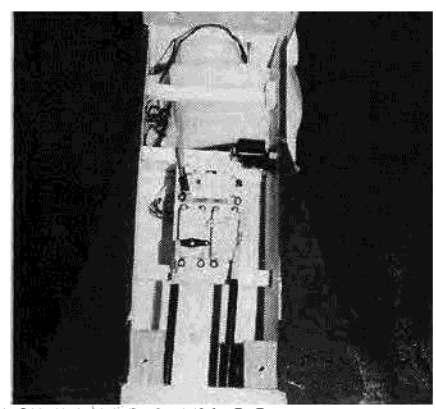
I used dark blue and bright yellow Goldberg UltraCote on my model. All lettering and stripes were cut from UltraCote. This covering gives you an excellent quality job in a minimum amount of time.

The color scheme I chose is from the plane of French pilot Patrick Paris. Patrick's airplane is sponsored by the Swiss Watch Co. Breitling. As a watchmaker and a jeweler the combination of a great looking plane sponsored by a fine watch company was one of the main reasons I chose this plane.

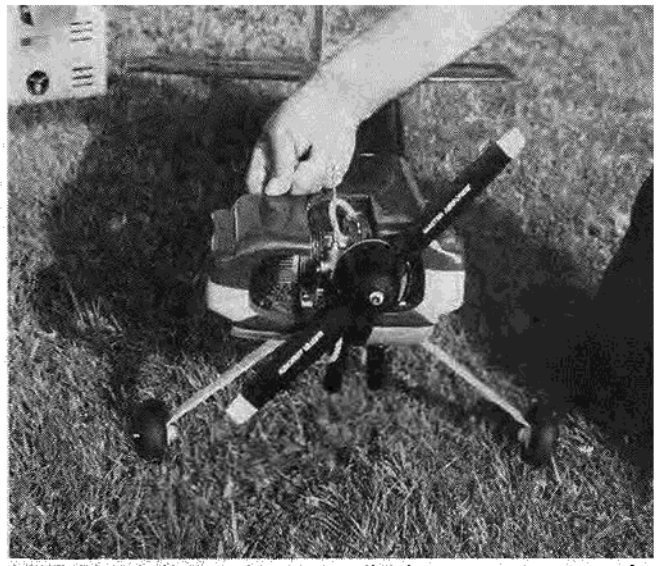
Engine:

To power my aircraft, I used my reliable





LEFT: Framed up, ready to cover. RIGHT: Ample room for mounting radio gear. Keep gear forward to help with C.G.



LEFT: Right half of cowl removes, allowing easy access to engine. RIGHT: S.T. 90 with a Pitts style muffler was used on author's model.

Super Tigre 90 2-stroke with a J'TEC Pitts muffler. Master Airscrew 14 x 6 prop and a 2¾'' C.B. spinner.

Radio:

I used my new Ace R/C MicroPro single stick transmitter and a Pro 810 receiver with Atlas servos.

Flight Tests:

I flew the plane for the first time on a Sunday evening. I knew that the weather was going to be bad for the rest of the week so I was anxious to get the flight in that night. I started the engine and made some practice take-off runs. The plane was tracking perfectly on the ground, so I decided to give it a try. I was determined to test fly today.

The take-off roll was nice and straight and the 231 climbed easily to a safe altitude. It didn't need any aileron or rudder trim. I added a little down elevator trim and she was flying fine. I tried a few loops and rolls and it tracked straight and level through all the maneuvers. The longer I flew the more sensitive the elevator control became, so I decided to get her down in one piece if possible. I kicked in a little more down trim and kept the power up for final approach and she came in pretty easily.

We decided to add some additional nose weight and check the balance again before another flight. With the addition of a couple of ounces of lead to the nose things were much better. The elevator control was not so sensitive and the landings were much better. Properly set up this plane is an excellent flier.

The Cap 231 turned out to be a very enjoyable project and is a very realistic scale model, both on the ground and in the air. If you are interested in some scale aerobatics, the new CAP 231 may be for you.

Material List

Spruce — 3/8'' sq. x 36'' (4 pieces)
1/16'' ply and 1/32'' ply 12'' x 24'' (1 piece each)
3/16'' x 6'' x 36'' balsa (3 pieces)
1/4'' sq. balsa (10)
1/16'' x 3'' x 36'' (8)
3/32'' x 4'' x 36'' (10)
1/2'' x 4'' x 36'' (1)
1/8'' x 3'' x 36'' (1)

About The Author

Mark Sirianni is married and has three children, and this is his second article for RCM. Mark also designed an Extra 300 featured in the May 1992 issue of the magazine (Plan #1117). The CAP 231 has been one of his most enjoyable projects to date. Mark is 34 years old and has been building and flying model airplanes for almost 20 years.

Mark would like to give special thanks to his father Joe Sirianni for his help in covering the model and to his wife Jan for all her support over the last eight years.

If you have any questions, you may write Mark at: 133 Bayard Street, Kane, Pennsylvania 16735. Please send a self-addressed stamped envelope for replies.

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