

PHOTOS BY AUTHOR

• The combination of the very powerful Cox TD .020 and modern lightweight radio gear makes it possible to fly all maneuvers in the FAI program except start (no wheels), spin, inverted spin (no throttle), and landing (no wheels). Perhaps a rule cheater would argue that it is "scalelike performance" to catapult (hand launch) and land on a belly sled like the Me-163?

It is more difficult to do the maneuvers with a small plane. A 5-second slow roll feels like 15 seconds, and it is hard to keep it in stable knife-edge flight. The "full size" .60 engine is 30 times as big as the TD .020, but the big planes' weight is only 15 times that of the small plane. That makes all climbing maneuvers more difficult, as the power-to-weight ratio is only half that of the .60's.

But think back 10-15 years and remember that the .60 engines of that time had only half the power of the modern OPS and similar .60's. That is the same power-to-weight relation as with this .020 model (if we forget about propeller efficiencies). We had world championships in the 60's with old Vecos and Super Tigres of that time, and all were impressed by the performance. Nowadays people grumble about too high speed, safety, cost, noise, field shortage, transportation problems, and so on and so forth.

Then why not fly Pattern .020, which we can do today? It is not suitable for beginners or old fumble fingers. And we can let Grandpa play with his ridiculous mammoth planes. He needs the size and slow movements because of slightly dimmy eyes, fumbly fingers and not-so-quick reactions. Let's all other go .020 (is anyone left?).

**BUILDING THE MODEL**

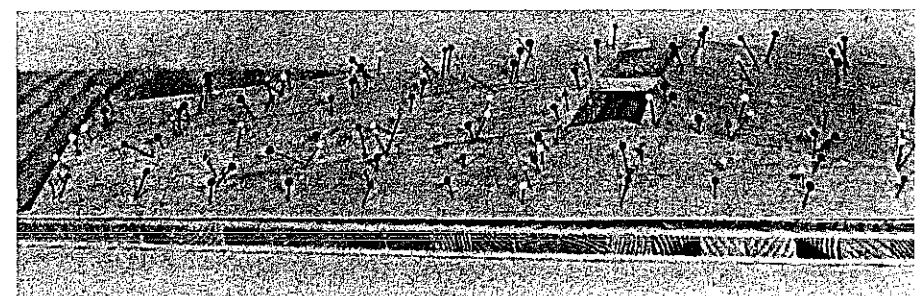
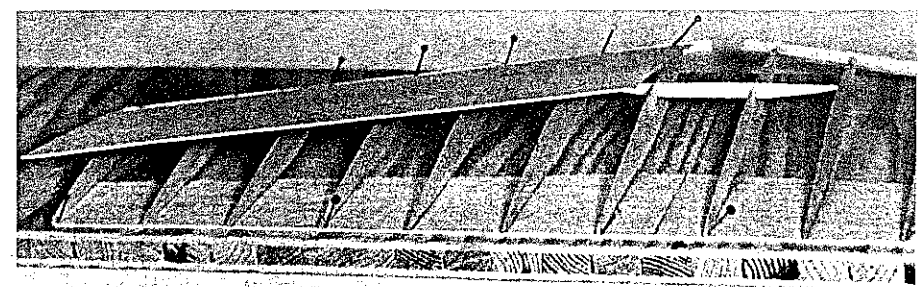
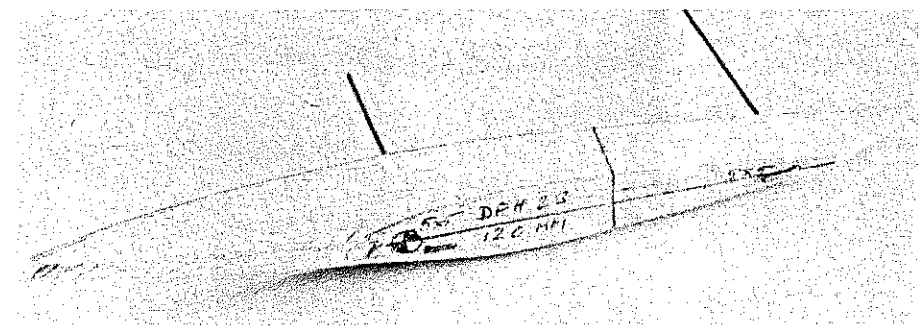
You must be a real weight watcher when you build it. First, always use lightweight balsa, then as little epoxy or white glue as possible. Use old-fashioned model glue or modern cyanoacrylate glue (Zap, Hot Stuff, etc.). Finish it with

# DFH-23

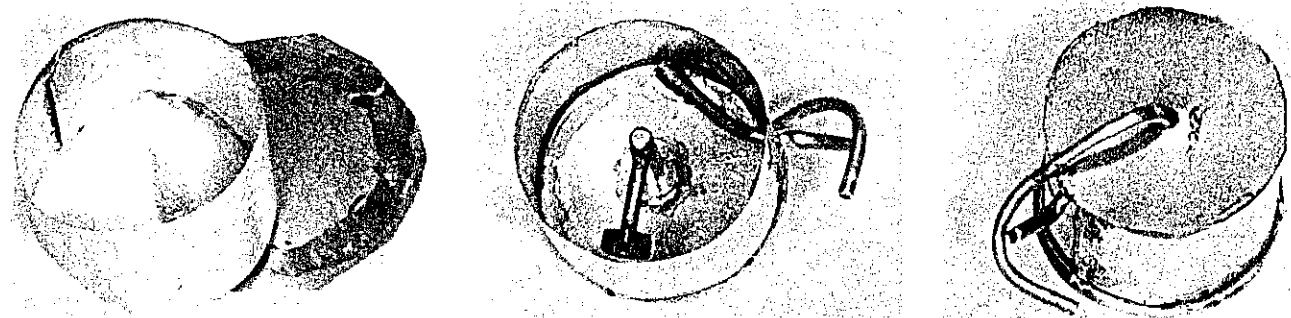
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## PATTERN

By **BENGT LUNDSTROM** . . . A mini Pattern model from Sweden that is capable of amazing performance. Definitely not for beginners!



Sheeting the wing. Use lots of pins to make sure the balsa sheeting is fastened to the entire length of each rib.



Fuel tank space is limited, so a special tank is needed. This one is reminiscent of the old deBolt "clank" tank. The fuel pickup tube is weighted (see middle photo) and can swivel a full 360°, ensuring good fuel draw regardless of the model's attitude.

dope and only use an epoxy fuel-proof coating at the tank area back to the wing. The foam rubber around the R/C gear weighs a lot; use strips of Ace "Sticky Foam" instead. The R/C gear connecting wires can be shortened and even the servo connectors can be taken away.

**THE WING**

The rear part of the airfoil is flat, and as there is no dihedral, the whole rear part of the wing is flat. Therefore, if you have a flat building board, you just pin down the rear sheets and the wing will be straight and warp-free.

A) Make one wing rib pack as shown in the photo and use every second rib to the right and to the left (you won't feel the different thickness in flight). Mark where the flat part starts.

B) Cut one sheet covering the flat area.

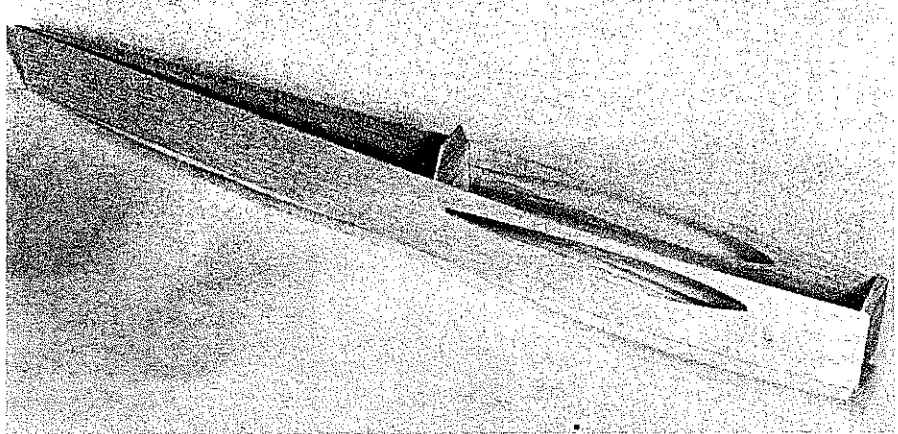
C) Pin it to the building board with the ribs on it. Fit the front spar and the short connecting center spars. Put on the top sheeting starting from the leading edge. Note that the wing is open in the front center except for the short center spars.

D) Turn the wing over and put on the front sheeting.

E) Mount the aileron torque rods and tubing.

**THE TANK**

The standard Cox tank is only used as a spacer because it is too small and won't work during inverted flying. The standard clunk tank won't work in this size. Therefore, a special homemade tank is needed.



First step in building the fuselage is to glue the firewall and main bulkhead in place, and glue the sides together at the tail.

- A) Start by soldering an open cylinder.
- B) Solder the front end.
- C) Make the plumbing and solder it to the open tank. The moving part must rotate easily.
- D) When satisfied, put on the back end.
- E) Leak test under water.

**THE FUSELAGE**

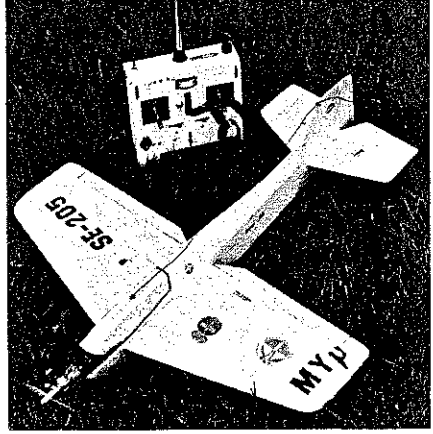
A) Make the fuselage sides and bulkheads. Glue the sides to the big wing bulkhead and the front bulkhead and at the tail.

B) Put in the tank and all bulkheads.

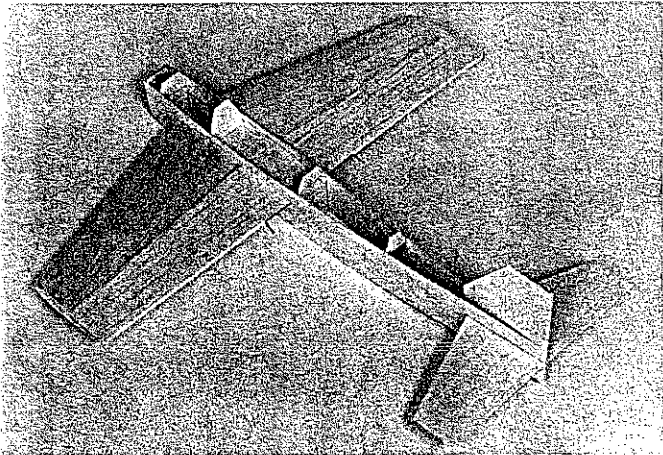
C) Push in the wing and mount all details.

D) Mount the stabilizer and fin.

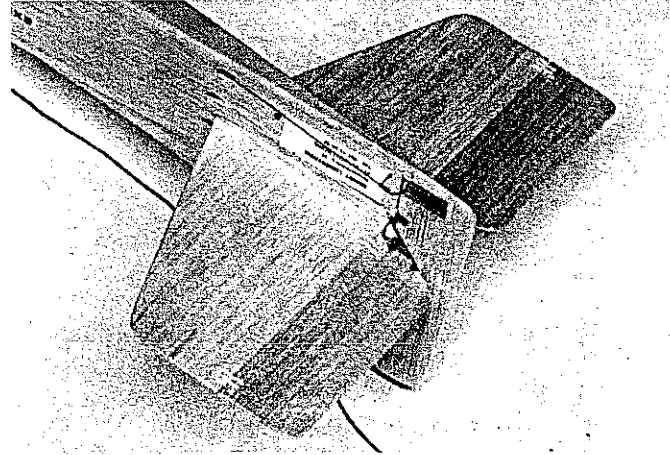
E) Put on the top angled sides and then the top sheet.



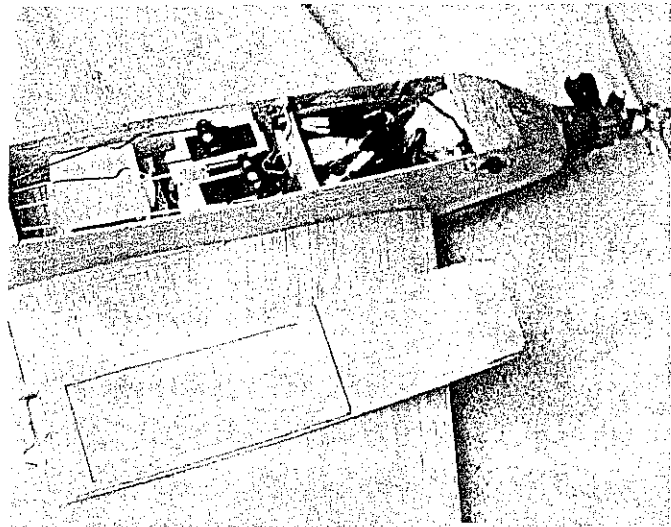
The DFH-23 with Proline transmitter to give an idea of the size of this wee beast.



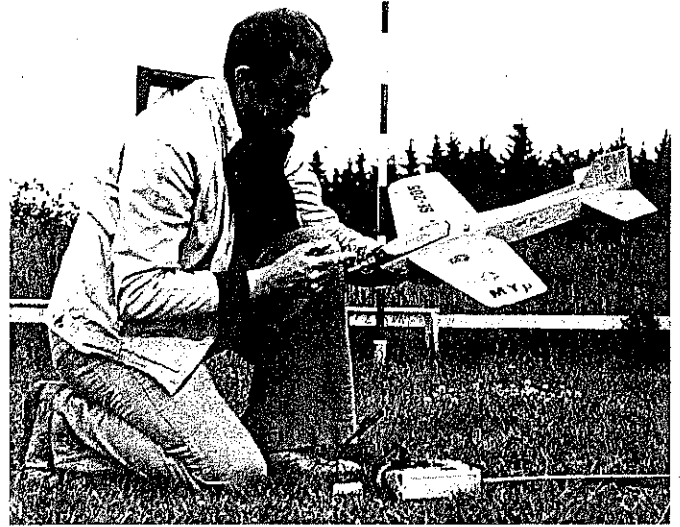
The assembled basic framework. Note that the wing i.e. inside the fuselage is cut away to make room for the R/C gear.



The rudder and elevators are actuated by thread push/pull lines... a good weight-saving idea.



Radio installation. It's tight, but there is enough room for three Ace Micro servos, receiver, and 100 mah battery pack.



The author getting ready for a flight. With this size airplane, you can fly at fields you wouldn't have dreamed of flying at before!

- F) Make the nose part of scrap balsa.
- G) Put on the bottom sheeting and make the hatch.
- H) Mount the front ply bulkhead.
- I) Make all movable control surfaces.

**FINISHING**

- A) Fiberglass the nose as shown on the plan.
- B) Dope the entire model, only 2 or 3 coats are needed.
- C) Epoxy fuel proofer is needed on the fuselage in front of the wing.

**RADIO INSTALLATION**

- A) Mount all movable surfaces. Put on the piano wire horns.
- B) Use Ace hinge thread to move the elevator and rudder. For safety, use double threads to the elevator. This way there will be no looseness from servo to elevator and rudder.
- C) With the threads put in and mounted to the servo, put servo tape on the servo and stretch the threads by moving the servo forwards. Mount the servo. To adjust flight trim, just bend the piano wire horns.
- D) The aileron uses piano wire push-rods.
- E) If you feel embarrassed by flying with a carb needle out of tune, mount an engine cut-out. It is actuated by applying full left rudder trim and full left

rudder.

**FLYING**

- A) Adjust the CG by adding lead to nose or tail.
- B) Adjust all movable surface deflection as indicated on the drawing. Always try to use as low sensitivity as possible.
- C) Fly.
- D) The aileron throw should give 3 rolls in 5-6 seconds.
- E) Adjust inside and outside loop radii to be the same and as big as you dare to have them. Always test the outside loop radius upwards from inverted flying.
- F) Check the wing tips to make sure they weigh the same. This is very important. First, make a ground check. The left wing is usually a little too light because of the engine tilt. Now fly upright with straight trim. Roll to inverted and see which wing goes up. This tip needs 1-3 grams.
- Now apply heavy G-loads. This is best done by doing outside loops downwards flying away from you. If the model has rolled to the left on top of the loop, the right wing is too light and needs .2-1 grams. This method works because the G-forces are added to the gravity at the bottom but vice-versa at the top.
- G) The TD .020 has a noise level without muffler which should be lower

than the FAI level. Use 30-50% nitro.

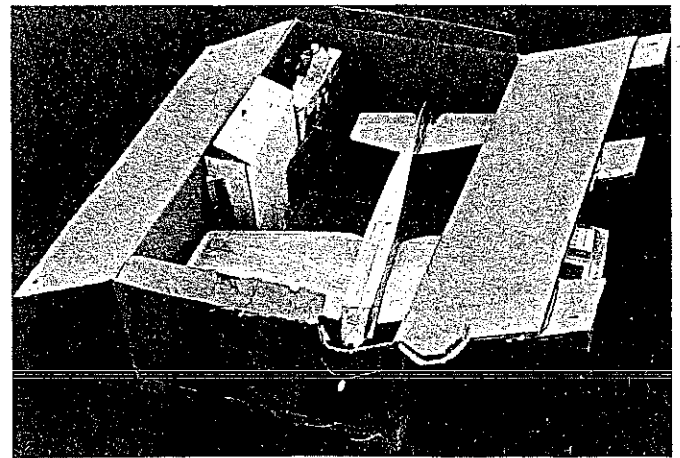
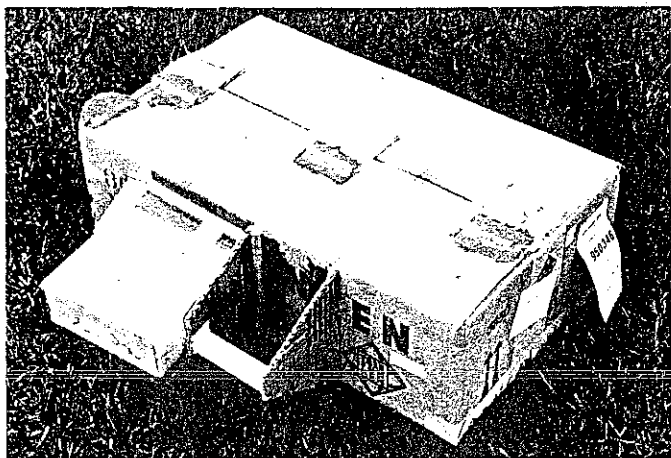
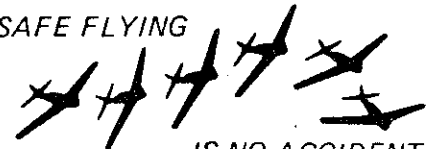
H) I am using an Ace "Micro Flite Pack" with a Proline transmitter, which works fine. If you want to improve climbing maneuvers you should install dual sensitivity at least on the ailerons. That extra aileron throw helps when you lack in power.

I) With an Ace 100 mah ni-cd battery you cannot make more than two safe 7-minute flights. The third flight is a borderline case. If needed, you can have a spare 100 mah ni-cd.

You can also field charge the battery from your car or starter 12-volt battery. Use a series connected dropping resistor of 200-220 ohms and 1/4-1/2 watts, which gives a 30 ma charging current. After 1-1/2 or 2 hours you can make another 2 flights.

J) One most pleasing feature of models of this size is that you easily can make a transportation box. Then it is a real joy to walk to your small nearby field and fly.

**SAFE FLYING**



One of the nice things about small models is that you can pack them up in a box and take them with you on trips. The one here is certainly not the best example of such a box, but it gets the job done. Carries the model, Tx, and all ground equipment needed.