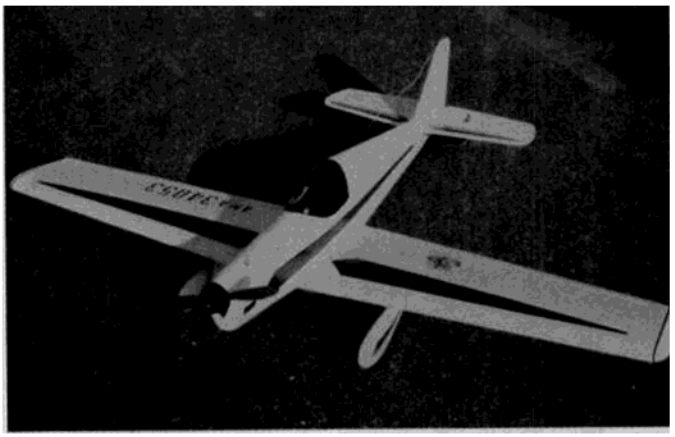
by h. l. stroup

RCM CLASSIC



I strongly suspect that most model airplane designers lie awake nights trying to think of 'catchy' or appropriate names for their new creations. In this case the name RCM CLASSIC came first, as a result of the proportional radio construction series presented in this magazine. The model was designed to conform to my conception of the word - "CLASSIC". In music and art the Classical Period was characterized by **clearly articulated form,** with few superficial embellishments. The lines of the RCM CLASSIC are intended to be esthetically pleasing as well as functional. Its overall appearance is, hopefully, classical in much the same way as a Lincoln Continental.

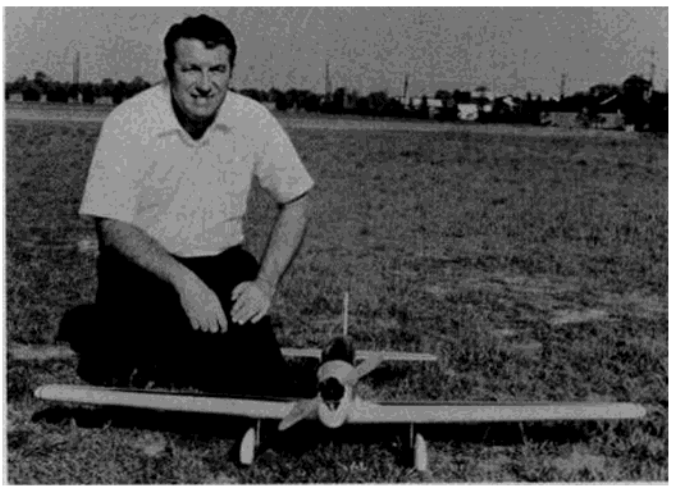
In addition, the RCM CLASSIC is intended to **look like an airplane!** Most of our competition aircraft could not be termed "models" in a strict sense. A model is, "a miniature representation of something". Very, very few of our aerobatic planes bear any resemblance to full-sized aircraft beyond having wings, fuselage, and a tail. These planes would be more properly designated as "Remotely controlled, miniature aerobatic aircraft". Can't you just imagine someone on the flight line saying, "bring me my red and white, remotely controlled miniature aerobatic airplane"? I must say though, when I am asked what my hobby is, it does sound a little better than saying, "I fly model (toy) airplanes."

Now that we have established what a **MODEL** is, I believe we can safely conclude that the RCM CLASSIC **is** a model and - a remotely controlled miniature aerobatic aircraft. Before theorizing any further (which could even cause the name of the AMA to be changed to ARCMAA & FF) let me describe the design parameters and objectives which were established before the work began:

1. Realistic appearance without being a scale model of a particular airplane.
2. Classical lines, esthetically pleasing.
3. Medium size, capable of satisfactory performance with a .45.
4. Conform to RCM's, Herman/Capehart aerodynamic principles as closely as possible.
5. Fully aerobatic, capable of Class C and FAI maneuvers.
6. Easy to build considering objectives No. 1 and No. 2.

Let's examine the **results:**

1. After building and flying a Goodyear (Formula I) Racer, I found that "turtle deck" construction is not too difficult; inverted-fully cowled engines are not too hard to handle; conventional landing gears do not make ground handling and landing too difficult; and wheel pants certainly add a great deal to overall appearance.
   The CLASSIC is **not** a "scaled up" Formula I Racer. The only real resemblance is in the turtle deck and cockpit. The front end looks a little like the old Ryan ST. I am convinced the overall effect is of scale appearance, because I have been asked several times what scale model I was flying.
   A well broken-in engine may be easily started inverted once you get the "hang" of it. The conventional gear makes



for realistic "take-offs" and landings and has never "ground looped". Since the "kiddie car" maneuvers have been taken out of the AMA pattern, the conventional gear no longer presents a severe handicap.

2. Whether or not "Classical, esthetically pleasing lines" were achieved is a matter of individual judgement. I can only say that every person who has seen the plane has been enthusiastic about its appearance. Look at the pictures and drawings and decide for yourself.
3. Medium size was chosen because of my conviction that it is the "way to go". Balsa continually increases in price, the cost of fuel will probably increase dramatically by the time this article is printed, and most good, large (.60) engines are now in the $50 to $100 range. A 16 cent radio component failure could destroy that big expensive airplane, big expensive engine, and the radio. In addition, it is not necessary to have 700 to 800 square inches of wing area in order to execute smooth maneuvers. The success of the New Orleanian (596 sq. inches) has pretty well proved this point even though it is usually flown with a .60 engine.
4. Most designers could develop a plane which would adhere to all the aerodynamic principles expounded in RCM by Herman & Capehart but - what would it look like? Obviously it would be desirable to have half of the rudder area above and half below the thrust line; half of the total mass and weight above and half below the wing centerline; and the thrust, wing, and stab all on a straight line. To do these things and have the results look like any full-sized plane I have seen is beyond mycapabilities. So, I must make certain compromises with the ideal. There are, however, many areas of conformity with the ideal:
   –The "moments" are conventional.
   –Vertical and horizontal stab area relationships.
   –The tapered wing plan form (tip 62% of root, 1/3 of taper at leading edge - 2/3 at trailing edge).
   –Over 25% of the rudder area is below the thrust line.

   The areas of non-conformity are:
   –The thrust line is well above the wing but on a straight line with the stab.
   –Nearly all the mass (and weight) are above the wing.
   –The airfoil exceeds 15%.

   The first two "violations" were committed in the interest of realistic appearance. As for the third violation . . my worst design failure was with a tapered wing - total destruction following tip stall. I have also observed that many tapered wing planes accelerate too rapidly in nose down attitude. I must certainly agree with Phil Kraft and Ed Kazmirski that constant flying speed characteristics are much to be desired, even if achieved with a "dirty" airfoil. The airfoil used is symmetric - slightly less than 18% at the root and semi-symmetric - slightly over 18% at the tip. This slight "hump" toward the tips does prevent tip stall. Ron Chidgey originated this idea and has found that if too much is added to the top side at the tips, they become too stable. The entire airfoil presents a fairly blunt, rounded leading edge to the wind. I believe Ed Kazmirski explained and proved the value of this con-

figuration many years ago.

5. The CLASSIC is fully aerobatic. As with most designs, it performs some maneuvers better than others. Point rolls, slow rolls, loop with 1½ snap, double stall turns, reverse spins, inverted spins are all very easy - almost automatic. The only maneuver that requires a little effort is the knife edge. It does require the use of down elevator to hold a straight flight path. If the "all up" weight is much over 5½ pounds it will land too fast. With just a little care it can be built at, or below, 5½ pounds with a 16 oz. radio, 13 oz. engine, and foam wings. At 5 to 5½ pounds, a .49 engine is plenty of power even for the Top Hat and Rolling Loop. Considering that most of the mass and weight are above the wing, I was pleasantly surprised with the axial rolls. This is done without aileron differential and requires only a slight touch of elevator.
   I don't claim that it will do all the maneuvers **better** than **any** other competition ship, but it looks a helluva lot better while it's doing them!!
6. Obviously, turtle deck construction and a fully cowled engine are not as easy to build as the sheet sided, slab-topped stereotyped "rut" we seem to be in with most of our competition ships. Keeping account of construction time, I calculate that the fuselage required 50% longer to build than the conventional "box" construction. Don't let this type construction scare you off. It was only the second time I tried it and (I believe) the results are worth the extra work.

I will not detail laborious, step-by-step construction notes because a rank beginner should not try to build **or** fly the CLASSIC. I will merely include a few pointers which should make it a little easier to build - especially if this is your first attempt at turtle deck construction.

Fuselage

After cutting out the lower fuselage sides from 3/16" x 48" x 4", and matching them, cut out all bulkheads, formers, and 3/8" turtle deck **before** assembly. Mark the location of all bulkheads and formers on the lower fuselage sides **accurately** with a thin line ballpoint pen. Glue the tail first and clamp. The next step is the accurate installation of the firewall with epoxy. I use no built-in right thrust.

After the firewall has dried, install all formers and bulkheads making sure that the turtle deck former tops are in a straight line. The turtle deck top should be installed **before** the sides. In this way you will be able to keep the sides from bulging out from each former.

Make sure that the 3/16" sides are medium grade but all 1/8" sheets are the softest, lightest stock you can obtain.

The 1½" x 3" top nose block should be epoxied to the firewall with pieces of wax paper inserted between it and the 3/16" fuselage sides. Mark a straight line on the fuselage sides at the front of the firewall as a guide to sawing out the entire cowling after shaping.

The top sheeting may be 1/8" x 1/2" planks or two sheets of 1/8" soft balsa. If two sheets are used, paint a thin coat of epoxy on the inside and allow to dry before trying to bend over the forward formers.

The inside of the bottom nose block should be carved to accept the fuel tank before installation. Make sure the entire tank/battery compartment is fuel-proofed with epoxy before the bottom is glued in place.

The wing fillets should be glued in place with Ambroid or modeler's glue. If white glue or Titebond is used, a glue line may show through the finish after the fillets are carved.

After the stab and fin have been cut out, assembled, and installed, cut the turtle deck extension blocks to the correct height and width and glue between the stab and fin. No other fillet or saddle is necessary for the stab.

The entire outside of the fuselage should be carved and sanded before the cowling is sawed off. Make sure you have a flat spot on the front of the cowling for the 2¼" plywood nose ring.

After carefully sawing out the cowling, carve to a thickness of approximately 3/16" and coat with epoxy before cutting holes. This will avoid breaking the cowling while working with it. Epoxy the 1/8" ply nose ring on the top nose block, allow to dry, mount the Tatone and engine, then carve holes in the cowl for needle valve, exhaust, access to engine head, cooling, and access to the carburetor.

You will need two vent tubes **and** a fuel feed line with the tank. Both vents may be pointed toward the top of the tank. Attach a short length of fuel tubing to one of the vents so you can fill the tank without removing the cowl.

Shape the wing fillets with a round X-Acto knife and sand to a concave shape. You may fill cracks, holes, and low spots on the fuselage with DAP Vinyl Paste Spackling Compound. This material is not soluble in dope of HobbyPoxy, and sands easily.

Wing

The wing is of conventional foam construction without spars or a dihedral brace. If you are making your own templates for cutting the wing, make sure you mark and number both sides of both templates because you must make sure the panels are not reversed.

I used the technique described for the New Orleanian for the aileron horn bearings. Slot the trailing edge stock slightly larger than the aileron horn (made from coat hanger wire), coat the wire with grease, then epoxy the whole assembly to the trailing edge (after the wing panels are joined).

If you epoxy a 4" wide strip of glass cloth around the entire center section of the wing, it will make the center trailing edge stronger and provide a good base for the wing hold-down screws.

The ailerons are Midwest trailing edge stock (3/8" x 1½") cut to the shape shown on the plans (3/8" x 1" tapered to 3/4" at tip). The leading edge should be rounded and hinged as closely as possible to the wing trailing edge without binding. Too large a gap will reduce aileron effectiveness.

Covering

Use your favorite method but MAKE IT LIGHT. Because of the need for lightness, I prefer Super MonoKote for this model over silk and dope.

Equipment Installation

Because the engine is inverted, you must keep your tank as low as possible. The battery pack will be **above** the tank. Three servos may be mounted side by side at the floor location of the cockpit. You shouldn't have any trouble with tail heaviness . . . in fact, mine came out a little nose heavy.

Before flying, make sure everything is lined up and all surfaces are working freely. First flights should be made with small control movement gradually increasing until performance on all maneuvers is satisfactory.