



Don Carey, the Author's flying buddy and member of the Fort Worth Thunderbirds, and his Mai-Tai.

MAI-TAI

By **CHUCK CUNNINGHAM**

Although usually associated with Polynesian maidens and romantic settings, the Mai-Tai is, literally translated, a "water chestnut." Designed by another variety of nut, our Mai-Tai is your ticket to the winner's circle in the new attern competition.



Dan Carey's bird in rear. In foreground is Helmer Johnson's prototype. Both models resting on genuine Texas soil. Thunderbirds sell the Texas dirt to Californians, and other less fortunate modelers, for five dollars per ounce. It's good for planting water chestnuts.

The Mai Tai has been designed to fly the AMA pattern as set up under the 1968 rules. This year, a lot of emphasis has been placed on knife edge flight and rudder use. One of the best ways to accomplish this is to design a ship with an abundance of side area, and a large flipper. Actually the Mai Tai is similar in appearance to the models flown by the German team in the 1967 internats. These aircraft have lots of side area, but have a large drawback by American standards; they are too large and too heavy. Most of the "Super Delphins" sport a maximum of wing area and a weight of $9\frac{1}{2}$ pounds to 11 pounds. The Mai Tai carries a weight of 690 square inches total and a weight of 6.5 pounds. The airfoil is a 15% symmetrical and the total sweepback of the wing is twenty degrees. Ample fin and rudder area allow a great deal of control during rudder maneuvers.

The name of the Mai Tai was suggested by Helmer Johnson as being the name of a very potent Polynesian drink—one with a lot of kick, and, an orchid in it. Seemed like a pretty good name at that. Then Dan Carey was flying a slightly modified Mai Tai in the Phoenix contest and one of the judges, who happened to be Chinese, asked Dan if he knew what Mai Tai meant. Dan figured he must have a dirty word painted on the side of his ship, and was all set to settle for a low score when the judge came back with "Water Chestnut". So take your pick, a potent drink, or a wet nut.

The Mai Tai can fly knife-edged from horizon to horizon (if you could see that far), and will actually climb in knife-edge flight, very much unlike any of the other current crop of pattern ships that fall through the air in this maneuver. Eight point rolls are a snap. You really don't need to use much rudder here as the large side area keeps the nose up in almost any position. The symmetrical airfoil seems to be better for all-around flying, although a couple of Mai Tai's have been built using a clipped (600 sq. inch total area) Taurus wing. Another very large plus of the design is the fact that it is extremely stable. Even more so than most shoulder or high wing models. It tracks through maneuvers as though it were on rails. In a stiff wind it is hard to taxi due to the large side area, but the new rules make this a minor problem.

One word on knife-edge flight, before we get into the construction. When flying most pattern ships, knife-edge flight is done by rolling into a 90° bank and then holding rudder to try and keep the nose up. With older style ships this is an almost impossibility. With a more modern ship such as the Kwik-Fli III it can be held, but the ship is falling through the sky rather than flying. Many so-called knife-edge flights are really not rolled to a 90° position but are about 45° to 60° with the ground. With the Mai Tai, due to the large rudder and ample side area, you roll into a 90° position and hold in a little top rudder. You don't need to use

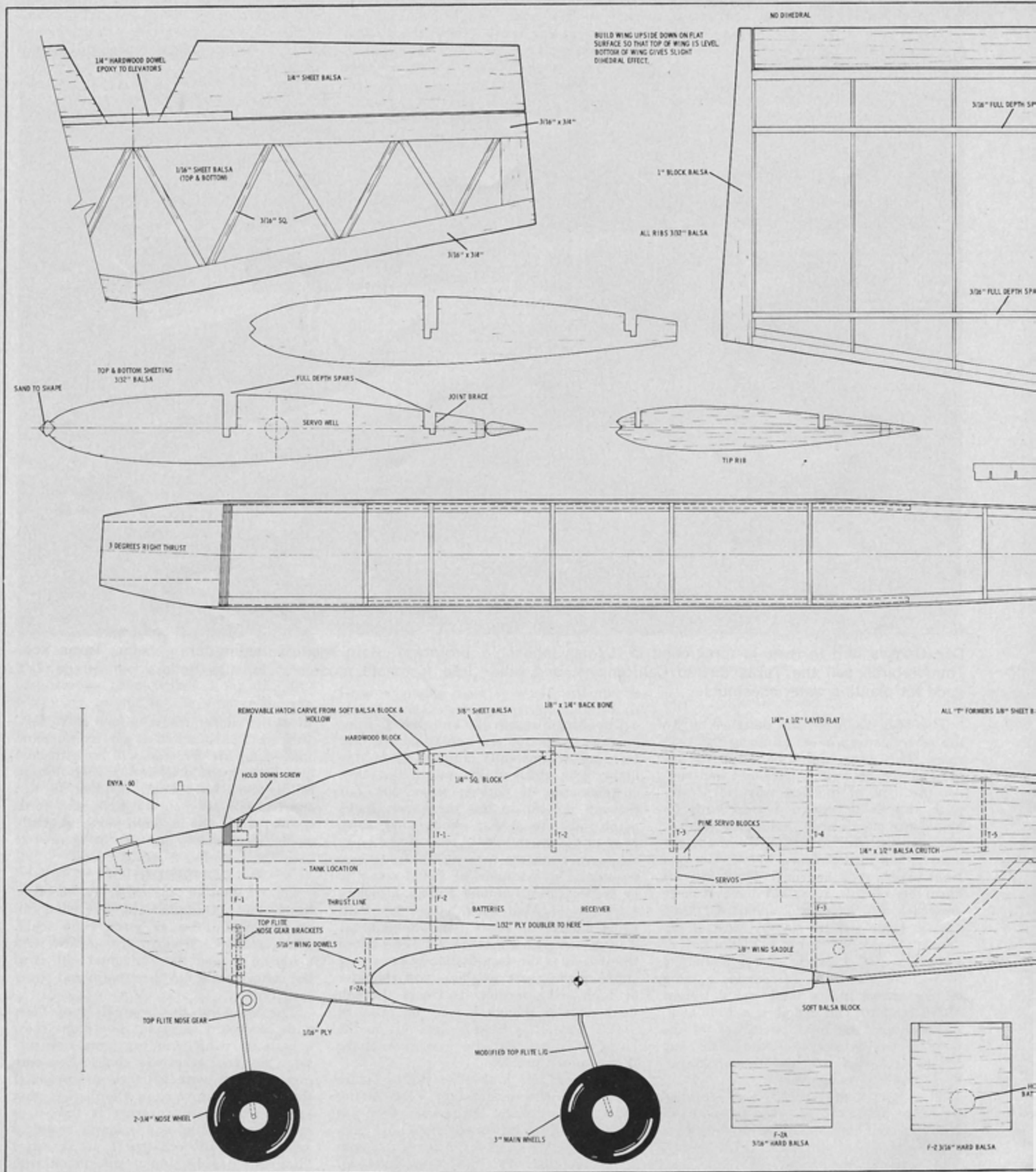
all of the rudder throw to hold it. In fact, after you have rolled it on its side and applied top rudder, you will have to hold in a little opposite aileron to keep it from rolling over on rudder. Holding in this aileron will let you fly back and forth across the field in knife-edge. A little down elevator may have to be applied to keep the flight in a straight line.

CONSTRUCTION

Construction of the Mai Tai is very simple and straightforward. The wing can be either built up or made from foam. The fuselage is a clean strong box, with a top on it, and the horizontal stab is of the conventional flat sheet balsa and structure type.

The wing on the original is of foam with cardboard covering. The plans show a built up wing with egg crate construction. You may take your choice. You may even cover it with balsa sheet instead of the cardboard if you can afford it! A plug for the cardboard covering is that it is economical, strong, and makes a beautiful wing. The cardboard that I use is called "Railroad Board," and is smooth on both sides, costing only 39 cents for a 28" x 44" sheet.

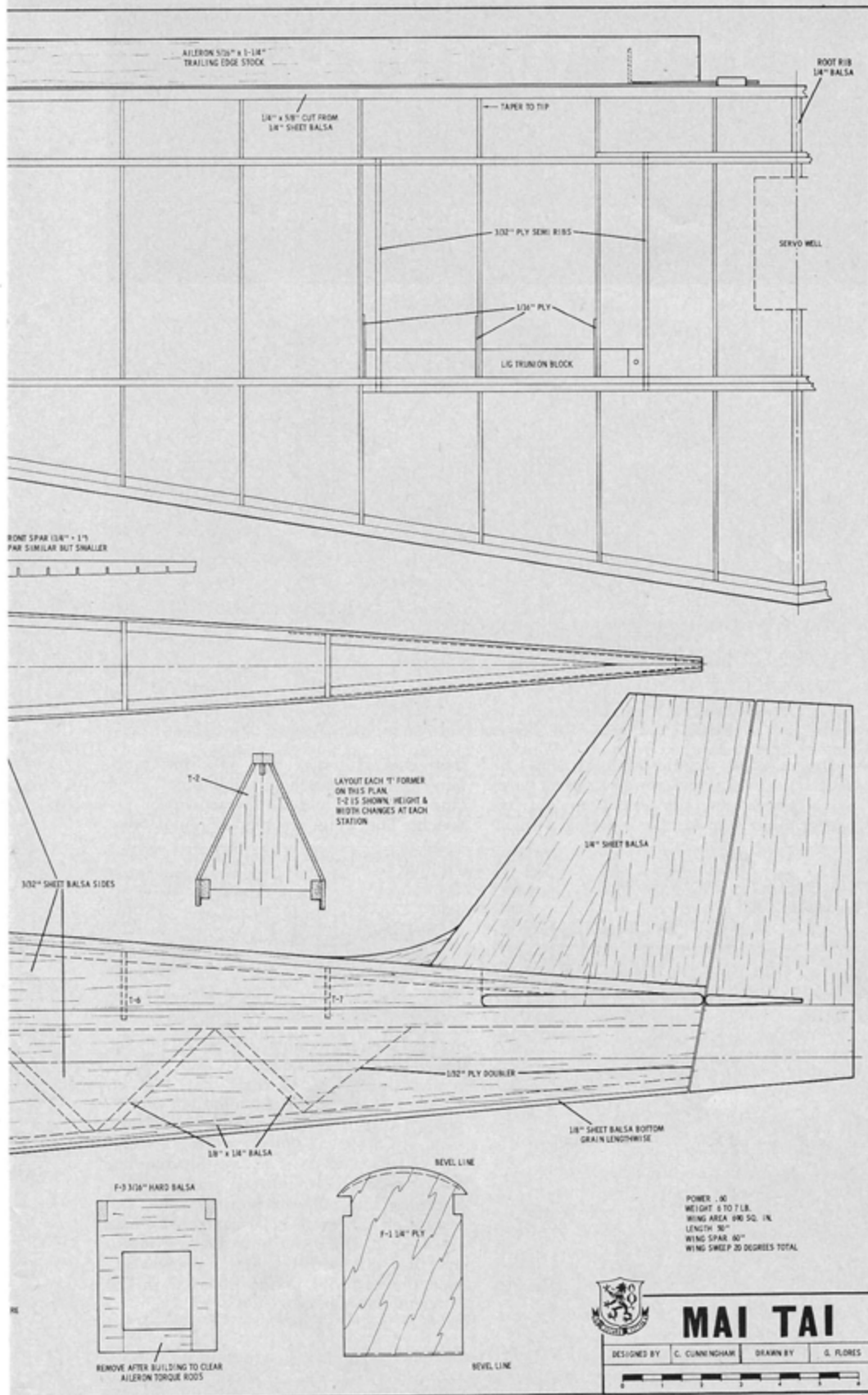
If you choose to make the built up wing, then make the tapered ribs by cutting out a sufficient number of pieces of $3/32$ " balsa sheet to make all of the ribs. Cut out a root template and a tip template from $1/16$ " plywood. Stack the rib blanks between the templates, one half of a wing at a time, and sand to shape. After they



are rough sanded to shape, separate, and lightly sand off the beveled edge. For built up wing construction I like to use the simple wing jig RCM presented in a past issue, the one that utilizes two $\frac{1}{4}$ " aluminum rods. If you don't wish to use this method, then pin the main spar to the plan with the slots up. Slip the ribs onto the main spar and then slide the rear spar

into the rib notches. Block this to the proper height with scrap balsa, put the $\frac{3}{8}$ " square leading edge in place and pin to the ribs. Pin in the $\frac{1}{4}$ " trailing edge piece. Now line all of this up, block in place and glue each piece to the other. When this is dry, apply the top and bottom sheeting and the cap strips. Leave off the leading edge bottom sheeting until

both wing halves have been joined and the dihedral braces installed. Actually, this is a misnomer, as this wing employs no dihedral. Let's call the braces 'wing joiners'. Ailerons are made of tapered trailing edge stock. Use Rand fittings at the torque tubes and Rand hinges to hold the ailerons to the wing. An easy, simple way of installing wing sheeting is to use



of each side. Next, draw a long centerline down your building board, or work from the top view on the plans. Slide the plans to the edge of your work board so that the portion of the top view with the firewall is hanging over the edge of your building board. Next, cut the cross braces to fit exactly and pin them in place on the top view. Now glue each side to the cross braces from just aft of the wing forward. Glue in all of the formers. Check with a drafting triangle that everything is perfectly aligned. Glue in the firewall with epoxy glue, and be sure to offset the firewall to give you right thrust in your engine. (This will appear to be left thrust when building up-side down.)

When this is dry, do not remove from the building board, leave it pinned in place and bring the tail of the two sides together and glue in position. Be sure that this joint is right over the center line. Glue in the aft cross braces both at the top and bottom of the sides. Now is also a good time to locate your servos and push-rods. After this is done glue on the bottom sheeting and plywood nose covering. Remove the fuselage from the drawing board and begin to work on the top. For ease in construction glue the horizontal stab in place with epoxy before you build the top structure.

Cut out all of the formers, glue them in place, glue on the $\frac{1}{8}$ " x $\frac{1}{4}$ " backbone and then glue on the $\frac{3}{32}$ " sides. When these are in place glue on the top $\frac{1}{4}$ " x $\frac{1}{2}$ " strip. Before sticking this in place cut a slot for the vertical stab. It's easier to do this before it is glued in place. Glue in the top block and then tack glue on the hatch block. Make this of soft balsa since you want to hollow it out quite a bit for lightness sake. Glue in the nose blocks, and when everything is dry, sand to shape.

Glue the vertical stab to the fuselage with epoxy glue, and when this is dry, you're ready to finish it off.

The original was painted with two coats of clear dope, then two coats of Sig Filler, well sanded between coats, and then contrary to most modern finishing techniques was painted with colored dope. The wings were doped only, no sanding sealer needed over the cardboard. If you use built up wings cover with silk, silkspan, MonoKote, Shrink Tite, Coverite, or what ever else is available these days for covering.

I painted my Mai Tai in bright colors: the wings, control surfaces and lower part of the fuselage are white, trim is international orange, the cockpit is painted in dark blue, and the area aft of the cockpit painted gold to minimize the visual aspect of extra depth. As you can tell from the pictures, Helmer's Mai Tai is painted in more traditional Air Force markings, while Dan's is painted with orange Hobby Poxxy with white tape for trim.

I think that you will like the Mai Tai for a competition ship as well as being an all around good flying aircraft, and it does get out of the rut of sameness. As for the name, you can call it Mai Tai if you wish, or Water Chestnut, or the names that have been banded around my flying site lately, Elephant-Fli, or Fat-Fli.

It's your choice.

contact cement rather than model cement or Titebond. The contact cement can't warp the structure as it dries out as other adhesives can.

The horizontal stab is made in the usual manner. Build the structure first, glue on the top sheeting (again use contact adhesive) remove from the building board, stick on the other side sheeting and pin

down again until everything is well dried.

The fuselage employs a crutch construction but is somewhat simplified from my earlier methods of building. First cut out each side from $\frac{3}{32}$ " balsa. Glue the $\frac{1}{4}$ " x $\frac{1}{2}$ " crutch to each side, and then glue in the $\frac{1}{32}$ " plywood doublers. Make sure you have one right and one left side. Mark the locations of the formers on the inside