



Hope our author was kidding with that gallon of fuel for his .049 Golden Bee! Looks like a lot of plane for engine that size, but its ceiling has not been reached as yet according to Jess.

AERMACCHI-LOCKHEED "SANTA MARIA"

HERE WE HAVE A GOOD LOOKING SINGLE-CHANNEL RC SCALE. HAS FLYING QUALITIES FOUND ONLY IN CONTEST TYPES WITH DURABILITY ADDED TO GIVE THE SUNDAY FLIER MAXIMUM FLIGHT TIME.



Flies equally on single channel pulse or escape-ment. Min-X Pulsemite rig worked extremely well for designer. Combination of Adams magnetic actuator and pulse gave reliable operation.



Quite a handfull Scale appearance with scale trim details, paint and striping enhance its general good looks. Nose gear has double bend knee action for absorption landing shock.

► It was a case of love at first sight. The very first time I saw a colored photo of the Aermacchi-Lockheed "Santa Maria" in a foreign aviation journal, I wanted to build a model of it. I don't know whether it was the naturally graceful lines of the ship, or its unique ivory, orange, and blue color scheme that intrigued me, but intrigued I was, and I knew that sooner or later I would have a model of it in the air.

As it turned out, it was later, for this project suffered innumerable interruptions before it reached fruition. At the time of my first acquaintance with the ship, I was developing my semi-scale 1/2-A Cessna Skylane (MAN, July '64), with a few other projects in various stages of design and construction. For nearly two years, all work on the Aermacchi consisted of merely looking longingly at photos of it, thinking what a great model it would make.

However, the delay in starting the project had its advantages, for it gave me some time to accumulate background information on the ship. In this, I received substantial help from Mr. A. W. Mooney, of Lockheed-Georgia, and Messrs. H. H. Britten and Patrick L. DeYoung, both of Lockheed Aircraft International.

The design was the result of Lockheed having been approached in 1958 by General Juan F. Azcarate, of Mexico, to promote his conviction that a large market existed in Central and South America for a light utility cargo airplane, one that would be designed specifically to match the requirements peculiar to flying in this region. He envisioned a bush-type airplane that could serve as sort of a rugged flying station wagon, and operate with very low maintenance costs to make it suitable for use in lesser developed countries.

Lockheed Aircraft Corporation, in California, analyzed several preliminary designs, and recommended a version very similar to the final design. A decision was made to go ahead, and the entire program was administered by Lockheed Aircraft International. Lockheed-Georgia was selected to perform the detailed design, manufacture of two prototype aircraft, and provide initial production planning for use in Mexico.

The Georgia effort was placed under the direction of Mr. A. W. Mooney, as Project Manager. While work was proceeding in Georgia, Lockheed International got together with General Azcarate and other Mexican interests, to form Lockheed Azcarate S. A. Originally designated as Lockheed Model CL-402, the prototype was later changed to LASA 60, and the first flight was made on (Continued on page 59)

PLANS FOR "SANTA MARIA" ON FOLLOWING PAGE

the fly-off—barring mistakes or mechanical failure, all appeared capable of "qualifying" with 15:00 in the first 5 rounds. This situation might well bring about a change in regulations to the required use of "straight" fuel.

The standard of construction of Wakefield models continues to improve. This combined with more efficient propellers and/or better rubber resulted in higher altitude being gained by the ships over past World Championship performances. Many designs of stretched-out configuration, tube fuselages and machined front-end hardware were to be seen. The fine 3rd place team finish certainly shows that the U.S. flyers and their equipment are of Championship calibre.

"Santa Maria"

(Continued from page 32)

Mexican Independence Day, September 15, 1959.

Flight tests showed it to be a remarkable airplane. Powered with a 250 hp Continental engine, it seats up to 8 people. By simply removing the rear seats, it can carry up to 1,000 lbs. of cargo. Top speed at sea level is 153 mph, with a maximum of 168 at 12,000 feet. At 75% power, it cruises at 141 at 9,850 feet. Stalling speed is 55, with a rate of climb of 840 feet per minute at sea level. Take-off run is only 655 feet, and landing roll is 570 feet. It will clear a 50-foot obstacle on take-off in only 1105 feet, and land over a 50-foot obstacle in 1215 feet. Range is 550 miles, and ceiling is 22,000 feet. This version was designated the AL60-B1.

The FAA type certificate was granted in April, 1960, and Lockheed-Georgia completed their part of the program with the completion and delivery of a second prototype. This was identical to the first, except for power plant, which was a turbo-charged Continental, rated at 260 hp at sea level, which provided improved performance.

In September, 1959, Lockheed-Azcarate S. A. started building a factory near San Luis Potosi, and the new plant was ready for operation in April, 1960. Thirty-six airplanes were manufactured in this plant before production was stopped in April, 1962. Eighteen of these were sold to the Mexican Air Force, and the other eighteen were sold to air taxi companies in Mexico, and to private operators in the U.S.

Early in 1960, a joint Lockheed-Kaiser company was formed in Argentina, to manufacture the design under license. The new firm, Aviones Lockheed Kaiser S. A., built seventeen aircraft in a factory near Cordoba, Argentina, until production was halted early in 1962.

To take advantage of the European market, it was also decided to manufacture the aircraft on the continent, and since Lockheed had a financial interest in Aeronautica-Macchi S. p. A., Milan, Italy, it was decided to produce it at their works. In the spring of 1962, Aeronautica-Macchi was granted the sole production rights for the aircraft, and to date has manufactured more than 50 of them. These include the AL60-B1, the AL60-B2 with the Turbo-charged Continental, and another, more powerful version, the AL60-C4. The latter features a two-wheel landing gear with tail wheel, a special cargo door arrangement, and some other minor changes. It's powered with a 340 s.h.p. Lycoming turbo-prop engine, and can be quickly recognized by its longer nose and two-wheel gear.

By the time I had the decks finally cleared for action, and was ready to develop something, I had already mentally designed a number of versions of it, ranging from a simple, single-channel ship to a complex, exact-scale version complete with flaps, and utilizing full-house pro-

portional. However, I didn't let some of my wilder dreams on the ship's design influence my actual course of action, and I chose a simple version. Perhaps I was influenced in this direction by my good luck with the Skylane, for the more I studied the AerMacchi, the more I began to notice similarities to the Skylane.

Both had wings of constant chord throughout most of their span, with tip panels tapering from both leading and trailing edges. Both had tapered stabilizers, although the angle of taper was different. Both had their wings in about the same relationship to the stabilizer and to the thrust line. And finally, both had basic dimensions that were quite close to each other, and both had tricycle landing gears.

Since I knew how the Skylane performed, I thought "why not simply alter its lines to make it look like the AerMacchi?" I then would have my new ship, but

(Continued on page 62)

"Santa Maria"

(Continued from page 59)

still have the Skylane's performance characteristics. This became my approach, and I simply placed a piece of drafting vellum over the Skylane drawings, and changed the lines to get a visual resemblance to the Santa Maria. The wing was not changed at all, and I used the complete Skylane wing, with the simple addition of a cabin fairing at the center section. I changed the taper of the stabilizer slightly, but kept its span and area similar. Most changes were in the fuselage, for the entire profile had to be changed, and the nose lengthened slightly to gain the proper visual balance. I also widened the fuselage slightly, to provide a little more room for getting at equipment.

The final touch was added by finishing the ship in colored dope, following the color scheme of the prototype. The result was a good looking, realistic appearing airplane, and the approach to its design proved to be very sound, for the ship flew off the board, with no trim changes at all. (Now, if Bill Northrop were writing this article, he'd say at this point that next time he'd leave the window to his workshop open.) It flies just like the Skylane! With this kind of luck, I might just decide to turn out a whole string of semi-scale airplanes, following the Skylane configuration.

For some months I have been corresponding with Bill Anderson, in California, who started to write me as a result of having built the Skylane. I sent him a set of plans for the Aermacchi, before I started to build mine. Bill built one too, and has had exceptionally good luck with it. He used a Royal Products single-channel servo, with a Controlaire Mule and SH-100 superhet receiver. He reports that his flies just like the Skylane, and is a very stable, yet acrobatic airplane. His flew off the board, and he put in six flights in a row, with no trim changes or adjustments. He ran into only one problem, which was weight. His came out a bit heavy, at over thirty ounces, and the Golden Bee he is using is not quite enough power. This can be cured quite readily by other builders who wind up on the heavy side by simply using the Cox RR-1, which I find to be vastly superior to the Golden Bee in power output. While I also used colored dope to finish mine, it came out to 28 ounces, complete with receiver and proportional actuator. I used the new Min-X Pulsmite 1200S transmitter and receiver, with an Adams actuator. The Min-X system has proved to be very reliable in all phases of operation, and it sure is fun to steer with a stick, instead of pushing buttons, and remembering to pulse twice for left turns.

Enough, now of the armchair flight reports; let's get to work building!

Wing. Select medium soft stock for the leading and trailing edges. Use pre-shaped trailing edge stock if you wish, and save a lot of work in carving. Notch trailing edge for ribs and pin it to building board. Then shape a piece of $\frac{1}{2}$ " soft sheet stock to the wedge shapes shown to help form tapered trailing edge, and glue it to trailing edge. Next, pin leading edge in place, and cement $\frac{1}{8}$ x $\frac{1}{4}$ " back-up strip to it as shown. Now fit and glue all full length ribs in place. When you get to the last three ribs, cut necessary length from trailing edge of ribs to fit them in place. Finally, add spruce spar and tip gussets. Build wing in two panels, to be joined later.

When dry, remove from building board, block up tips to form necessary dihedral angle, and join at center. Add plywood dihedral braces as shown, and spruce spar joiner. When dry, remove, and pin one panel flat to building board. Block up other tip so it remains flat. Cut leading

edge sheeting to size and glue it in place on pinned down panel. Cut and glue all cap strips in place at the same time. When dry, remove from board, and pin other side down flat, sheet it, add cap strips and center section sheeting. By following this procedure, you can help assure a warp-free wing.

When entire structure is dry, carve and sand $\frac{1}{2}$ " sheet angle blocks at tips to conform to upper curve of ribs and trailing edge. Now trim trailing edge off as shown to provide correct taper to each panel. Turn wing upside down and carve bottom of trailing edge to shape at the tips, sweeping it upward gradually toward the tips. Check it with a straight edge as you do so, to make sure it is straight and true. Then cut some off bottom of each of tip ribs so that they are flat-bottomed from leading edge to very tip of trailing edge. When you are finished, you will have a built-in wash-out in each wing tip. Adding the soft balsa blocks for tips, and carving them to shape and sanding completes the wing for now.

Stabilizer. This part is very simple, and needs little explanation. The tabs on the bottom of the ribs at the front enable you to build the stab with the trailing edge pinned flat to your building board. They also help line-up the leading edge and hold it in position while the glue dries. Allow glue to set thoroughly on leading and trailing edge rib joints before sliding spar in place. Add sheet tips, top and bottom sheet at center section, and sand the final assembly to shape.

Fuselage. Select two 6-inch wide pieces of medium soft $\frac{1}{16}$ " sheet stock for the sides, matching them if possible. Cut sides to shape, then cut $\frac{1}{16}$ " sheet doublers, the $\frac{1}{4}$ " sheet triplers, the $\frac{1}{4}$ " sheet nose pieces, and the $\frac{1}{16}$ " stabilizer doublers. Cement all these pieces in place as shown. Use of contact bond cement for this operation will speed things up quite a bit. Add $\frac{3}{32}$ " plywood landing gear retaining plates, cementing them in place as shown, using white glue. Add the soft $\frac{1}{4}$ " square longerons, and the $\frac{1}{16}$ " x $\frac{3}{16}$ " uprights and diagonals. While these assemblies are drying, cut all formers to shape. Make "B" and "C" from $\frac{1}{8}$ " medium hard sheet, and "D" from $\frac{1}{16}$ " sheet. "A" is made from $\frac{1}{8}$ " plywood. Drill "A" for the J-bolts, and for threading the nose gear strut in place. Drill it for the engine mounting bolts, too, and put blind mounting nuts in place on the back of it. Bend nose strut from $\frac{3}{32}$ " wire, using a $\frac{1}{4}$ " diameter mandrel to form coil. Bolt it to "A" with a J-bolt, and cut off remaining end of bolt. Then bind top of strut with thread or fine wire to the former, sewing it through holes. Place some epoxy on nut at the back of J-bolt and on the blind mounting nuts to hold them firmly in place.

Pin one of completed fuselage sides flat to building board. Cement formers "B" and "C" in position. Line up "C" so that it is flush with end of the $\frac{1}{16}$ " doubler, and line up "B" so it butts solidly against the $\frac{1}{4}$ " tripler. Check both with a small triangle to insure that they are square with the sides. Next, glue other side assembly in place, lining up everything as you go to make sure it is square and true. A little care at this stage will assure you of a well-aligned fuselage. Let assembly dry thoroughly before removing it from building board. When dry, glue firewall in place, butting it against ends of $\frac{1}{4}$ " sheet nose pieces, and reinforcing it with lengths of trailing edge stock. Be sure this assembly is solidly cemented in place, as it takes a lot of shock from nose gear.

Add uprights to inside of fuselage where you will install plywood slides for mounting receiver, and add the $\frac{1}{8}$ " x $\frac{1}{2}$ " stiff-

(Continued on page 64)

"Santa Maria"

(Continued from page 62)

eners at the wing opening. Cut three pieces of 3/32" plywood for the landing gear mount, and glue them in position on the bottom of the fuselage, slotting the sides to receive them. Drill a 7/64 clearance hole at each end to line up with the slot on the inside of the fuselage formed by the 3/32 plywood strips. Add a 1/8 sheet bulkhead between the sides to form the front of the battery compartment, then build the compartment in position. Add the 3/32 sheeting from former "A" to former "C", slotting the sheeting to provide travel for the nose gear strut. A piece of 1/16 plywood laminated to the forward part of the bottom sheeting before installation helps strengthen this area against impacts from the nose wheel when it gets bent rearward under sharp impacts. This is not essential, but does help safeguard against denting or cracking of this bottom sheeting later on.

At this point, before the top cowl block is added, coat the landing gear area in the fuselage, on the sides and bottom sheeting, with fibreglass resin to fuelproof it. If you prefer, a few good coats of clear butyrate dope will also serve the purpose. Just be sure it is fuelproofed on the inside to safeguard against fuel seepage through the landing gear clearance slot.

Cut tail post block to shape and cement it in position, drawing sides together at the rear as you do so. Install former "D" at the same time. Add the cross pieces to top and bottom, install angled top pieces of former C, and you are ready to sheet the rear of the fuselage. Install a torque rod at this time if you plan to use an escapement, before adding sheeting. Top and bottom sheeting is 1/16 stock, grain crosswise.

Cut nose block, cowl and windshield blocks from medium hard balsa and cement. When entire assembly is dry, carve cowl and windshield blocks to shape, and sand the 3/32 bottom sheeting to taper into the 1/16 bottom sheeting. Then, carve and sand all fuselage corners to a 1/4 radius. Finish sanding entire fuselage with very fine paper.

Fin and rudder. Cut fin and rudder parts from very light 3/32 quarter-grained sheet. Use of quarter-grained sheet here assures a warp-free assembly after it is silked and doped. Hinge rudder to fin with small pieces of nylon or linen. Cut two pieces of soft 1/4 square to shape shown for fin fillets, and carve to a triangular cross-section. Cement them to sides of fin before installing fin. When dry, cement fin to top of fuselage, but when doing so, be sure it is lined up straight ahead. Proper alignment here is important! Apply several coats of glue to the fin-fuselage joint, to strengthen it and to form a slight fillet.

Covering and finishing. I covered the original ship with light weight silk, and finished it in colored dope. I felt this was necessary to achieve the color scheme of the original ship. Apply silk to first wing, after giving it two coats of clear dope, sanding between coats. Apply three thin coats of clear dope to silked wing, and when thoroughly dry, fasten it to fuselage with rubber bands, and align it in proper position. At this point, cut and cement cabin fairing pieces to top of wing, to blend into fuselage. Sand them to shape, so that the lines blend smoothly, then apply a piece of silk to fairing, and several coats of dope. Now, sand the remainder of ship, except for the silked wing, with very fine paper, and apply two coats of clear butyrate dope, sanding between coats. Then silk the rest of ship, and when dry, apply three coats of thinned out clear dope.

When last coat has thoroughly dried, wet sand entire airplane, but be very careful not to go through the silk. Idea here is simply to level the fuzz and get a slick surface.

Next, add two coats of clear dope with talcum powder added, as a filler. Let dry for about three days, then wet sand to a slick surface, and you are ready to apply colored dope. About three coats will suffice, if you use colored dope thinned out with retarder thinner, and spray it on. Follow color scheme shown, if you want the trim of original. Base color for the entire ship is Ivory. To get this color, make your Ivory by mixing equal parts of Aero Gloss Taylorcraft Cream and Swift White. If you have access to Glidden "Glidair" aircraft butyrate dope, the Daytona White for 1960 or a later year, is close to the right shade. Trim colors are international Orange and Bahama Blue. When colored dope is dry, I topped it by spraying on two thinned out coats of clear Aero-Gloss, thinned with retarder thinner. Use of retarder brings out a higher gloss, and these two top coats help add final fuelproofing qualities, and gives a good, overall sheen to finish. Installation of engine and equipment completes the ship, except for landing gear.

Main landing gear is bent to shape from 3/32 wire and installed in place. Each shank slips through one of the holes in bottom plywood plate, and vertical part of it is retained by the plywood strips on the inside of fuselage. A pair of small metal plates attached across bottom of struts with self-tapping screws holds them in position. This gives you a two-piece landing gear with torsion bar-springing, which I have found to be very effective.

When you install equipment in model, pack batteries in foam rubber, and stuff them into the battery compartment. Use a 6-3 prop, and install engine with about 2 degrees of right thrust. A washer behind radial mounting lugs on one side of engine will be just about right. Install a 1-1/4 diameter Merco blue spinner, and check to see CG's position. If necessary, add ballast to bring it to right position.

Check wing and stabilizer, for proper alignment, and mark these alignments with a ball point pen. Always check alignment prior to a flight. Decalage should be two degrees, as shown. I prefer not to fly with less than this, as windy or gusty weather often requires reductions in decalage, and if decalage gets too close to zero, pull-outs aren't as good in windy weather. If model ship checks out properly, but still has a tendency toward stalling in the glide in normal, calm weather, move C.G. forward. Under power, ship should climb steadily, but not hang on its prop. If hanging tendencies are encountered, take them out by adding more down thrust.

When you are certain all is ready, try a number of test glides in tall grass, to be sure everything seems pretty safe. If all looks okay, you are ready for first power hops. Be sure escapement is wound, if using one, and let engine run until you have only 30 to 45 seconds of power left. Hand-launch it with a short run and a gentle heave, and it should climb right out of your hand. I like to adjust my planes so that they turn very gently to the left under power, and require only an occasional rudder command to keep them going in a straight line. When adjusted this way, plane will climb out of your hand, make a wide climbing turn to the left, and by the time it has completed one circle, it should be nearly overhead, with about 200 feet altitude. Usually it will do this without a single-rudder command being sent. By this time, you have enough alti-

(Continued on page 66)

tude to start flying whatever pattern you wish. When power cuts, ship should glide nearly straight, with only a slight tendency to turn left. I set them up this way so that if anything fails, aircraft will tend to circle instead of heading straight across country. Much easier to get them back this way!