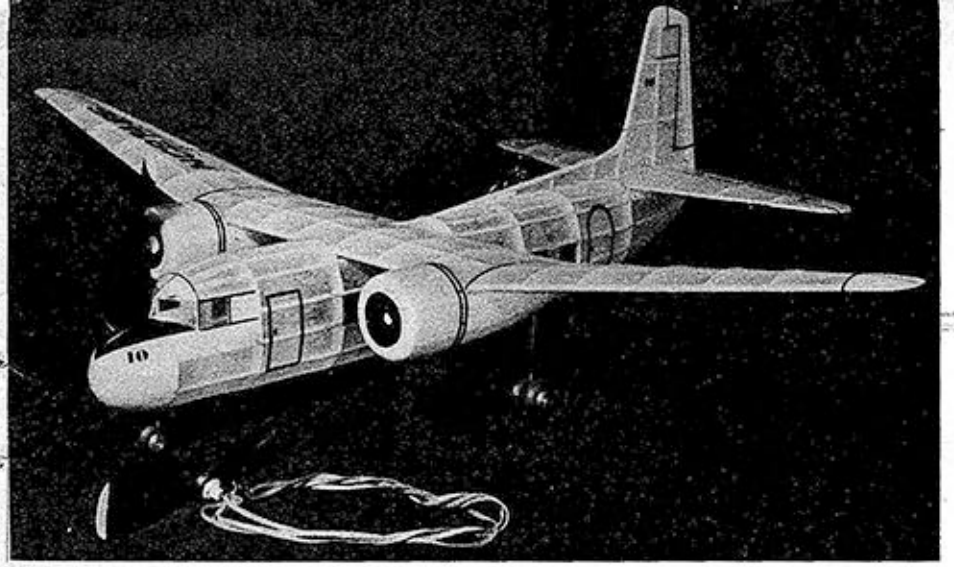

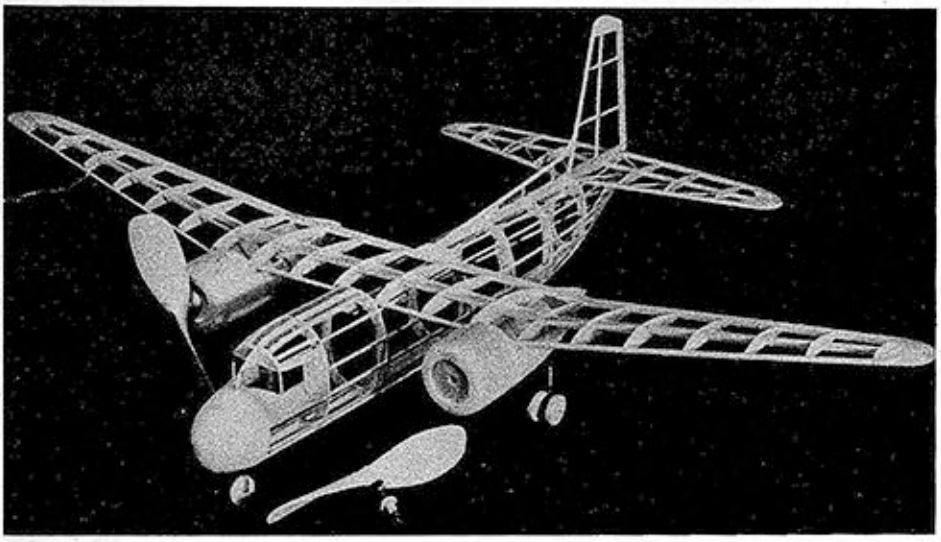

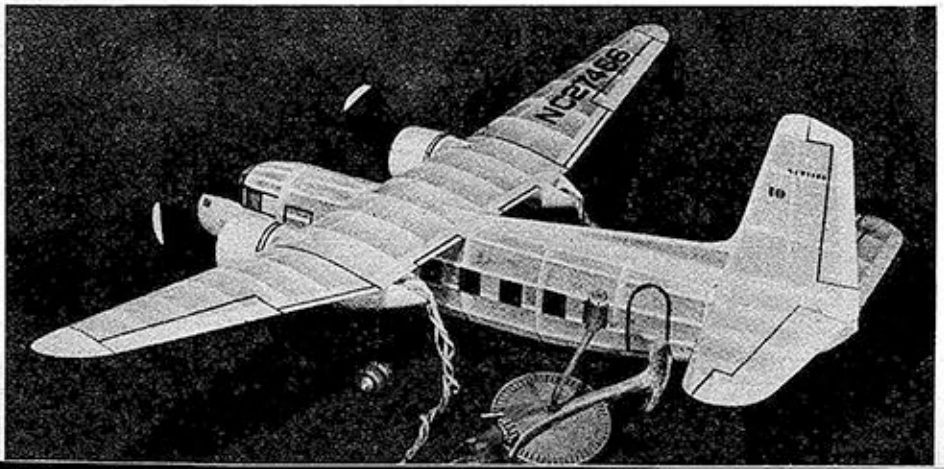

LOCKHEED SATURN

by S. RICHARD STRUHL

Somewhat off the beaten path but still a fine performer

WE present this month a most unusual rubber powered flying scale model—the Lockheed *Saturn*, which lends itself admirably for this type of model. The force arrangements and setup are almost perfect for stable flight, and the engine nacelle and stabilizer location provide just the proper amount of down thrust.

But a word about the "big job" before we get into the model; the *Saturn* was designed as either a short haul or feeder line passenger-cargo transport. It also lends itself nicely as a corporation personnel transport. The ship is powered by two 525 hp engines and has a top speed of over 240 mph carrying 14 passengers and baggage. The extreme simplicity of operation has kept the operating cost per mile very low. Crew consists of two men.

The model is a very pleasing performer. Takeoffs and landings are particularly nice with the tricycle landing gear. Obviously propeller torque, one of model aircraft's biggest bugaboos, is eliminated with the counter-rotating props. Although extra work is involved in winding up the motors, the flying results are more than worth the effort. The preliminary flights were held indoors where we found that 4 strands of 1/8 flat brown rubber in each motor was powerful enough to have our model "dead stick" at about 30 feet. We attribute this feat to the careful selection of material we put into the model. For example, all structures that had no stress on them (nose block, nacelles, wingtips, etc.) were cut from the lightest indoor grade balsa obtainable. Colored dope was shied away from except on props and wheels. In other words a definite effort was made to keep the weight of the model to a minimum.

Although the model is a twin engined flying scale, don't let this fact frighten you. A short study of the plans will convince you that the construction is as simple as can be and even beginners should have no difficulty. The only catch for the "lazy hounds" is the fact that you can't purchase the propellers. They must be carved as shown because no model manufacturerers produce a left handed prop. But both props shouldn't take over an hour's work, so buckle down, sharpen your knives and dig in.

The plans are drawn to a convenient scale and may be enlarged by employing a set of dividers or the 1/2" graphs.

First cut the fuselage bulkheads, fuselage keel and wing ribs from 1/16" sheet balsa, and the two nacelle bulkheads from 3/16" sheet. Use light quarter grained balsa for these parts. Pin the fuselage keel over the plans and cement the bulkheads in their proper locations, checking the alignment

(*Turn to page 77*)

MATCH TO WING PLAN

1/8"X 1/2" TRAILING EDGE

1/8" SQ. LEADING EDGE

WING RIBS

MAKE 8 OF NO. 1 AND 2 EACH OF REMAINDER. ALL CUT FROM 1/16" SHEET.

1/16"X 1/8" SPAR

1/8"X 1/4" MAIN SPAR TAPERED TO 1/8" SQ. AT TIP.

BOND PAPER FAIRING

1/16" SHEET WING TIP

BLACK TISSUE STRIPS FORM COWL FLAPS

WING AND STABILIZER SET AT 0° INCIDENCE.

"S" HOOK
2 REQUIRED .040

NACELLE BULKHEAD

PROPELLER BLANK
1-1/4"
3/4"
4 X 1-1/2" - 6"

CARVE LEFT AND RIGHT PITCH PROPS.

OPENING FOR PASSAGE OF MOTOR TO

POWER:
EACH MOTOR IS 4 TO 6 STRANDS BROWN RUBBER.

SOME STRINGERS NOT SHOWN FOR CLARITY

NOTE:
FUSELAGE TOP VIEW IS SHOWN ABO
BOTTOM VIEW OF FUSELAGE AND
SHOWN BELOW THE ℄.

NOSE BLOCK DETAIL

SOFT BALSA BLOCK HOLLOWED TO 1/8" WALLS

.040 STEEL WIRE

7/8" DIA. BALSA WHEEL

CELLULOID

WING SECTION

BOND PAPER

RUDDER OUT

RIBS AND SPA

1/32" SHEET COCKPIT

BLACK TISSUE WINDOW

D. 1/16" SHEET BALSA FUSELAGE KEEL

E.

F.

G.

H.

TO FIT NOSE PLUG

NACELLE BULK'D 3/16" SHEET

SAGITTAL SECTION OF NACELLE

ALL FUSELAGE BULKHEADS ARE 1/16" SHEET

1-1/2" DIHEDRAL

FRONT VIEW

.040 REAR HOOK

3/8"

REAR HOOK

1/8" FLAT

BLACK TISSUE

STABILIZER CONSTRUCTION

1/8" SHEET OUTLINE

REAR HOOK

ALL 1/2" SQUARES

NOTE HOW 1/8" SQ. STRIPS FORM LIFTING AIRFOIL SECTION ON STABILIZER.

1/8" SQ. RIBS AND SPAR

ABOVE ℄.
WING IS

LINE 1/8" SHEET
R 1/16"X 1/8"

NACELLES ARE CARVED FROM 2"X 2"X 6 3/4" INDOOR GRADE (4-5 LBS/CU/FT.) BALSA BLOCKS. SPLIT DOWN CENTER AND HOLLOW WALLS TO 3/32" DEPTH AS SHOWN ABOVE.

1/16" SHEET 'FILL-IN' BETWEEN STABILIZER AND STRINGER.

.040

BIND AND CEMENT

HARDWOOD NOSE PLUG

NACELLE BULKHEAD

SOLDER

1" DIAMETER DUAL BALSA WHEELS

H.

FUSELAGE KEEL (IN GRAIN)

ALL STRINGERS 3/32" SQ.

'S AND DOOR

SCALE:
0 1" 2" 3" 4" 5"

DESIGNED & DRAWN BY
S. RICHARD STRUHL
CAPT., A.A.F.

Lockheed Saturn

(*Continued from page 9*)

with a draftsman's triangle. Do not install any stringers until you remove the structure and have installed the other half bulkheads. When adding the 3/32" sq. stringers be sure to install the corresponding stringer on the other side of the fuselage to prevent pulling the fuselage out of line. Carve the nose block from very light balsa and hollow as shown in plans. The cockpit is cut to shape from light 1/32" sheet and cemented in place. Note the 1/16" sheet fill-in between stabilizer and stringer.

The engine nacelles may now be carved. Use the lightest balsa blocks obtainable for this structure. Two nacelles are required. The outline of the blocks are shown in the graphs. Shape the blocks to this outline, then carve to a circular crossection. Note that the section under the wing is flat for a smooth contact. After nacelle is sanded, split down the center and carve the interior out to about a 3/32" wall thickness, except near the nose, where the nacelle bulkhead must be installed. Be sure to leave the opening in the rear for passage of the rubber motor to the stabilizer. Now cement the halves together and install the bulkhead with several coats of cement.

Bend the landing gear to shape shown. Dimensions may be obtained from the side view. Note that we employ dual wheels same as the "big job" does. The two struts are bound together with thread and cemented. The axle is held in place with a drop of solder. Use balsa wheels as they are so light. A drop of cement will hold the wheels in place. Bend the front landing gear strut to shape shown from .040 and cement it well into the nose block.

The tail surfaces are simple to construct. The rudder is flat in crossection and can be built directly on the plans. Ribs and spar are 1/16" by 1/8" and the outline is cut from medium 1/8" sheet. The stabilizer is built in same manner as the rudder. Note that the stabilizer is built in one piece and the ribs and spar are all 1/8" sq. balsa. Observe how 1/8" sq. soft strips are used over the ribs to create a "lifting" airfoil. If your model is on the heavy side you may add some 1/16" sq. crossbraces in the stabilizer as it must take the load of the fully wound motor. Do not assemble any of the major parts until they are covered.

The wing may be constructed directly over the plans. Be careful to avoid any warps. When the cement has set install the 1-1/2" dihedral under each wingtip. Apply several coats of cement at this joint.

Before applying the colored tissue, run over the entire framework with light sandpaper to remove any ridges or bumps that may mar the covering. Since the fuselage is quite symmetrical and has straight lines it may be covered with rather large sections of tissue. Smaller pieces will be needed as you approach the tail section. Cover the rest of the structure with the grain of the tissue running parallel to the long dimension of the structure to be covered. Bend the rear hooks from .040, force them into the leading edge of the stabilizer, and apply several coats of cement.

Cement the wing in the fuselage notch provided for it and align. Now cement the stabilizer and rudder in place. Small tissue fillets may be doped in place but these are not necessary. Cement the two engine nacelles carefully in place, making sure the alignment is the same. If thrust lines are out of alignment it will create a spiral effect. The nacelles are covered with small pieces of tissue.

The model is now sprayed lightly with water to shrink the covering. When dry, apply two coats of thin clear dope over the covering. All details such as windows, door outlines and control surface outlines are cut from black tissue and doped directly onto the covering. License numbers and identification are decals. Cover the cockpit windows with celluloid.

Select two medium light balsa blocks for the propellers. First blank the blocks out as shown in the plans. Remember that we use a right and a left handed prop with this model. Carve about 1/16" undercamber into each blade and keep the thickness to about 3/16" at the hub and taper to 1/16" at the tips. If much outdoor flying is anticipated, free-wheeling devices may be installed. Prop shafts are bent from .040 steel wire, slipped through the hardwood nose plug and ball bearing washers, then into the propellers. Give the finished props one coat of wood filler, sand lightly with fine sandpaper and brush on one coat of black dope and allow to dry. Prop tips are painted a bright yellow as seen in the photos.

The average model will require six strands of 1/8" flat brown (T-56) for each motor. Each motor has about 1-1/2" slack and is held to the rear hook by an S hook bent from .040 wire.

You have a choice of three methods of winding your model: you can use the old fashioned "egg beater" type of winder and wind both motors at one time; or with the aid of a third helper you can use two drill winders, each person winding a motor and both finishing simultaneously. Lastly, you can wind one motor, hook it on to the rear hook, then proceed to wind the second motor. Using a good rubber lube, each six strand motor should take 625 turns, which is more than enough to get your model "up thar".

If possible conduct the first test flights indoors (in an Armory); if not, choose a calm day for this critical period. First glide the model after ascertaining it is in approximate balance. You may bend the elevators down slightly to compensate for any slight stalling tendency. The turn may be either left or right as there is no torque effect. Warp the rudder to achieve about a 50 foot circle. . . . Good luck!