P-51D MUSTANG

Fred Reese's sport scale Mustang, in either the World War II Fighter, or racing configuration is the most realistic looking Half-A ship published to date. In the performance category, it is virtually unsurpassed.

Needless to say, the age of 1/2A RC is really upon us. Half-A racing has demonstrated the capabilities and has given the modeler the experience to get reliable performance from small engines. We can now look beyond racing to high performance sport planes with more realistic appearance. Naturally, the P-51 with its streamlined look and perfect proportions for modeling, was my first choice for a Stand-Off Scale model. I decided, initially, that the model must look right, even after the concessions to available accessories. The plans presented here are the third re-design; each time subtle changes were made to make the model look better. At this time five P-51's have been built and are currently flying. Performance of all of the models has been outstanding. I was a little apprehensive of the first flight of my detailed military version, but I needn't have been. It flew out of my hand easily with only a touch of aileron trim needed to level it out.

With regard to performance, the P-51, like the 1/2A racers, needs a good engine or performance may be disappointing. I don't mean it needs a "super engine," — a custom or hopped-up mill. All of our flying has been done with new, out of the box, Cox TD .049's, Cox Racing Fuel and stock 6/3 gray Cox props. Running without pressure, these engine consistently turn 18,000 rpm or more. If your engine is old or tired, rebuild it or get a new engine. Many older engines can be brought back to life by removing the varnish from the cylinder with "000" steel wool. This should be done after every third or fourth flying session to maintain maximum performance.

High performance engines with or without throttles (no power loss), are available from Joe Klause, owner of Kustom Kraftsmanship, P.O. Box 2699, Laguna Hills, California 92653. Joe is the new owner of the Dale Kirn line of Cox Accessories. The customized engine with the Kirn needle is available for $24.95 or $27.95 with a pressurized backplate and enlarged venturi. The customized engine with RC speed control is $29.95 for either the TD .049 or .051.

The best part of all of this is that we have been really having fun with the little P-51's as they look authentic and really fly well. A pint of fuel is enough for an afternoon flying session and the airplanes can be flown almost anywhere.

CONSTRUCTION

Wing:

The wing is made using traditional con-

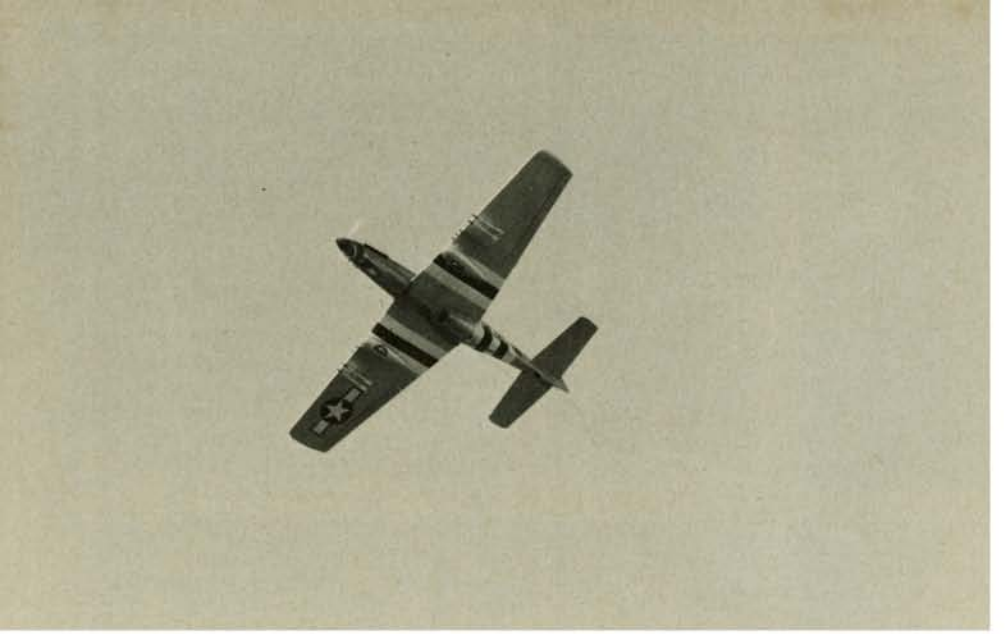

OP


7


HO
W


HO
7


MD
OP
413.372



struction techniques and built flat on the plan. The airfoil changes from root to tip, increasing in percentage of thickness and, at the same time, moving the high point of the airfoil forward at the tips. Building the wing flat also results in about 1½° of washout at the tips which further aids the stall characteristics. A side benefit is an apparent less critical CG location.

Begin construction by cutting out the ribs and the sheeting. All but the center sheeting can be cut from two pieces of 1/16" x 3" x 36". Cut the plywood rib doublers and contact cement them to ribs #3 and #4 and make the cut-outs for the gear blocks. The general construction sequence is a bit unusual for awhile, but please follow the sequence or you will have difficulty installing the gear blocks later.

Lay the bottom leading and trailing edge sheeting on the plan over waxed paper and pin down. Glue the 1/8" square spar on to the leading edge sheets. The lower front spar and sheet are now the wing jig but do not glue any ribs down to this unit until after the gear blocks are installed. Glue each rib except #1 to the trailing edge sheet only. Glue on the top 1/8" square spar, the 1/8" square at the trailing edge, and the 1/16" x 1/4" along the leading edge. Add the top 1/16" sheet to the trailing edge and allow to dry.

Remove the wing panels from the plan, leaving the lower front sheet and spar pinned down, and epoxy in the gear blocks. Now glue the wing to the lower front sheet and spar and add the top front 1/16" sheet. Glue in the dihedral angle gauges against the spars and slip in the #1 ribs. Add the remainder of the center section sheeting. Remove the wing panels and trim away any excess sheeting. Now, epoxy the wing halves together. Make the aileron linkage from 1/16" wire and brass tubing. Hollow the inboard sections of the 1/4" x 1" trailing edge stock for the aileron linkage and epoxy into place. Hold each side down on the table while the epoxy sets. Add the 1/4" x 3/8" leading edge, the angled fillets on the leading edge, the tip blocks, and sand to shape. Wrap the center section joint with 3/4" nylon cloth tape (available from Goldberg) and smear with glue or epoxy. Cut out a hole for the aileron servo and slots through the lower sheeting for the landing gears.

Fuselage:

The fuselage uses basic slab side construction with a top crutch to insure a straight fuselage. All of the contouring is done with hollowed blocks as is typical with UC stunt models. Begin by cutting the top crutch, fuselage sides, doublers, bulkheads, and firewall. Draw a line on the fuselage sides 1/16" down from the top, between the firewall and the rear bulkhead, to locate the 1/32" ply doubler. Contact cement the nose doublers in place and then the plywood doublers. Add the 1/8" square strips along the bottom rear of the fuselage sides. Mark the positions of the bulkheads on the fuselage sides and the crutch, then glue the bulkheads in place on the crutch. Next, glue the fuselage sides to the bulkheads and crutch. Bolt the engine mount to the firewall and install the blind nuts. Epoxy the firewall in place using the edge of the balsa nose doublers to index the correct amount of downthrust. The prototype airplanes were flown with downthrust and without it, but overall performance improved noticeably when it was added.

Glue scrap pieces of 1/8" square strip on each side of bulkhead B. Sandwich the tail wheel wire in the three pieces of 1/16" plywood and glue the unit into the fuselage. Now add the 1/16" bottom sheeting. Epoxy in the 1/8" x 1/2" plywood wing hold-down and the hatch hold-down plate. Fit the wing into the fuselage and install the 1/8" dowel in the wing leading edge. Lightly glue all of the blocks in place for rough shaping so they can be easily removed for hollowing later. I do most of the rough shaping with a plane and #50 sandpaper glued on a 4" x 10" block. The round contour of the top is done with a 3" x 10" strip of #50 sandpaper by holding the fuselage, top up, between your knees and sanding as if you were shining a shoe with a rag.

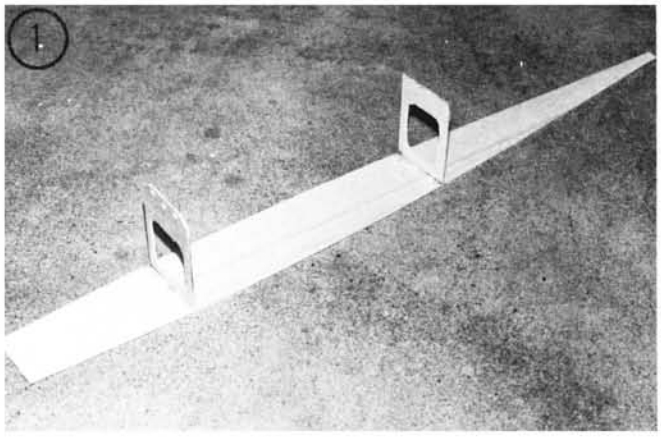
Remove each of the blocks and hollow — leaving about 1/8" wall thickness. Cut out the cockpit area in the top block. A Dremel tool with the sanding drum does the hollowing chore most efficiently but it can also be done with a rotary rasp in an electric drill, or gouges, or chisels and course sandpaper. For me, the hollow block construction goes faster than built up structures. Permanently glue the top and scoop blocks on place.

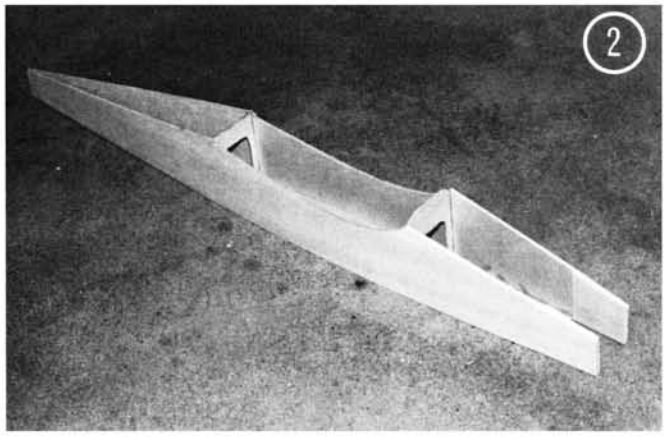
The wing and cowl attachments can be done a couple of different ways. Washers can simply be recessed and epoxied into the blocks to seat the bolts. Holes are then drilled through, blind nuts set, and the wing and cowl bolted down. An alternative method is to use lengths of 1/4" dowel drilled out with a 1/8" drill, epoxied into the blocks so that the dowel seats against the hold-down plates in the fuselage. With this method the bolts can be tightened without fear of crushing the balsa blocks.

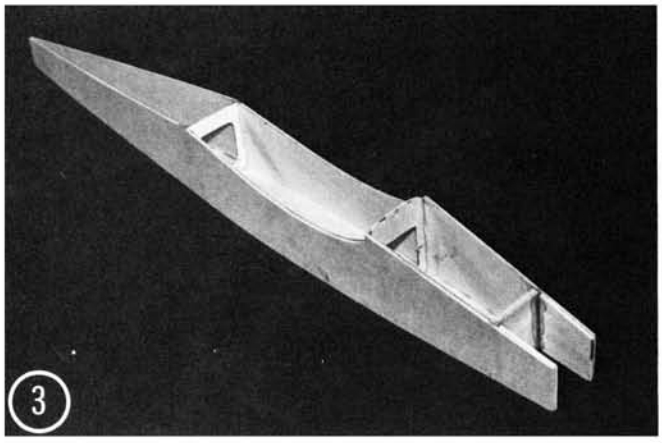
1/2A P-51D MUSTANG

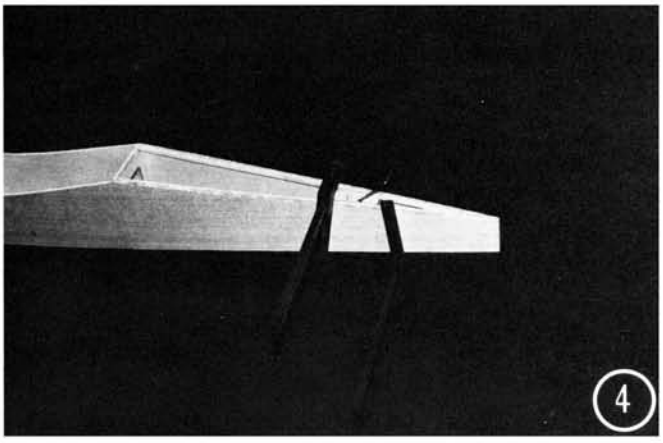
Designed By: Fred Reese

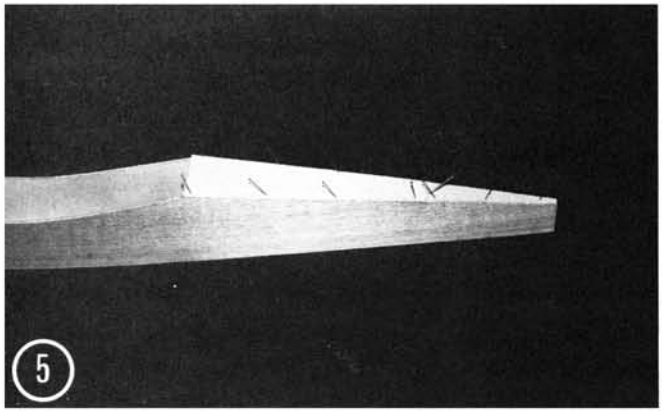
TYPE AIRCRAFT
Stand-Off Scale — Sport
WINGSPAN
35⅝ Inches
WING CHORD
7¾" Root — 4½" Tip
TOTAL WING AREA
216 Square Inches
WING LOCATION
Low Wing
AIRFOIL
Semi Symmetrical
WING PLANFORM
Double Taper
DIHEDRAL, Each Tip
1½ Inches
O.A. FUSELAGE LENGTH
28½ Inches
RADIO COMPARTMENT AREA
(L) 6½" X (W) 2" X (H) 1¾"
STABILIZER SPAN
13-5/16 Inches
STABILIZER CHORD (Incl. elevator)
3⅛" (Avg.)
STABILIZER AREA
41 Square Inches
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
4 Inches
VERTICAL FIN WIDTH (Incl. rudder)
3¼ Inches (Avg.)
REC. ENGINE SIZE
.049 — .051 Cubic Inch
FUEL TANK SIZE
2 Ounce
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
Two
CONTROL FUNCTIONS
Aileron and Elevator
BASIC MATERIALS USED IN CONSTRUCTION
Fuselage ..... Balsa and Ply
Wing ..... Balsa and Ply
Empennage ..... Balsa
Weight Ready To Fly ..... 24 — 28 Ounces
Wing Loading ..... 16 — 18.6 Oz./Sq. Ft.

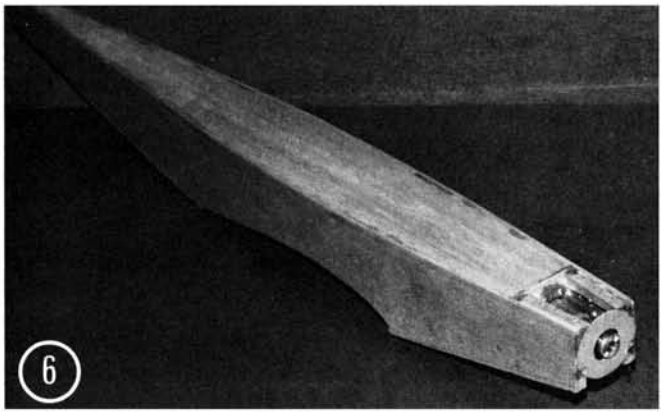


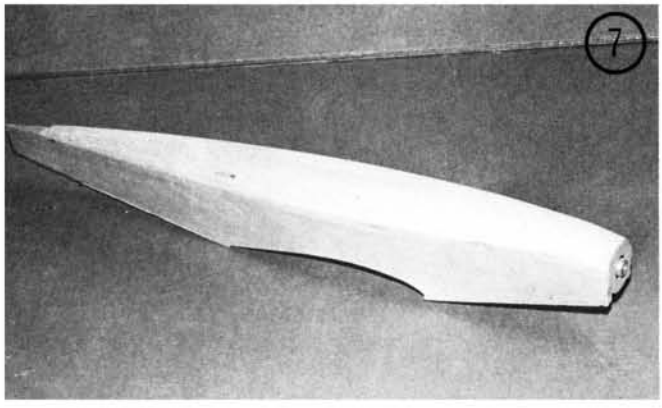


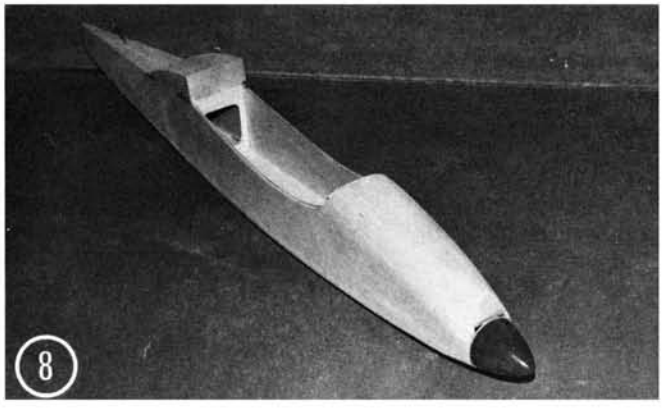




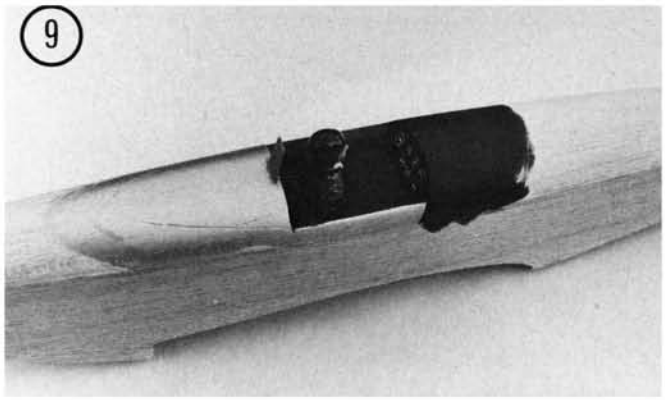


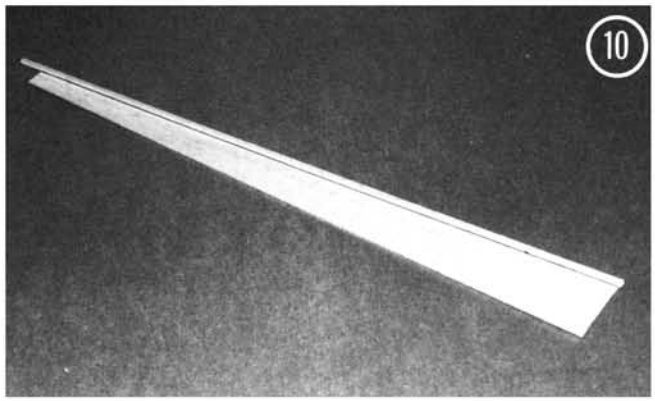


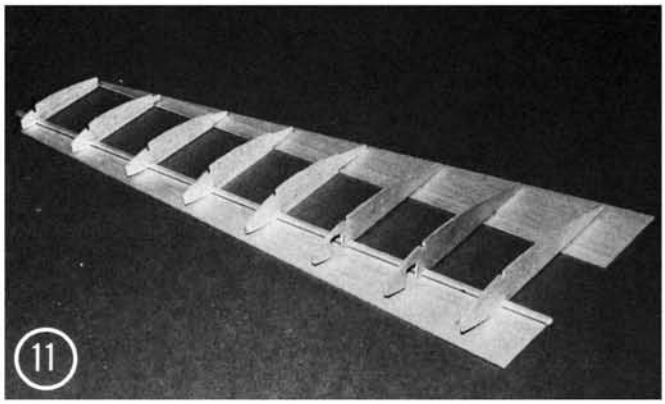


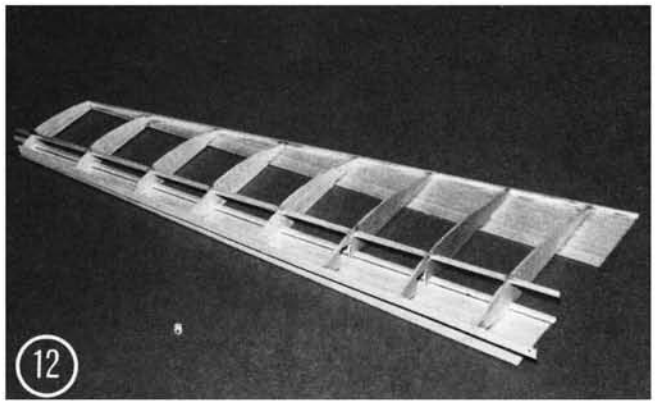


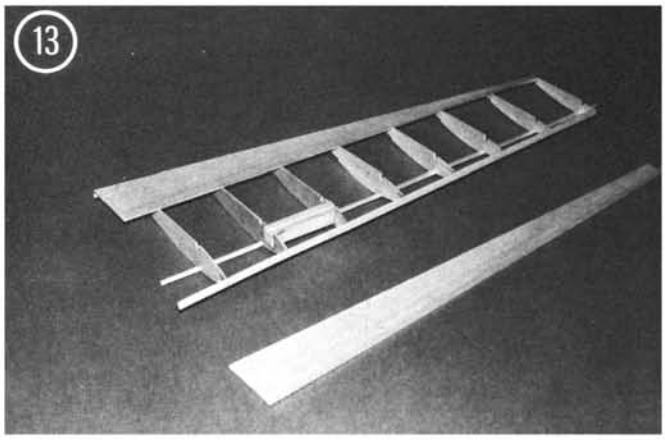
(1) The two bulkheads are glued to the 1/16" balsa top crutch. (2) Glue the sides to the bulkheads and crutch. (3) Epoxy in the firewall. (4) Sandwich the tailwheel wire between plywood and epoxy into the fuselage. (5) Add the bottom 1/16" sheeting. (6) Bolt in the engine mount and add the triangle stock. Bolt in the engine and center the spinner ring. (7) Temporarily bond on the top block and carve to shape, then remove it and hollow it out. Permanently bond on the top block and (8) shape the cowl and add the rear portion of the belly scoop.

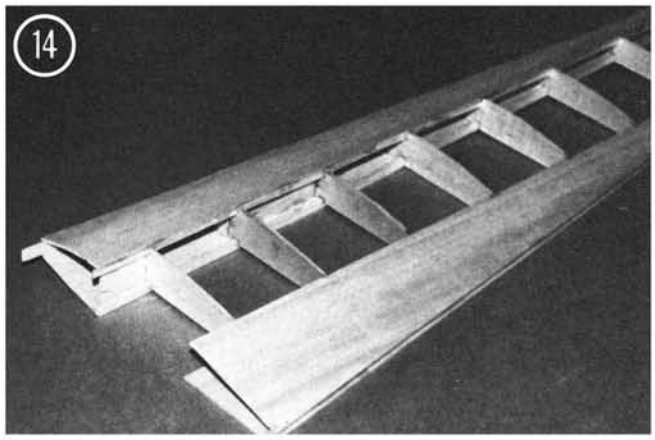


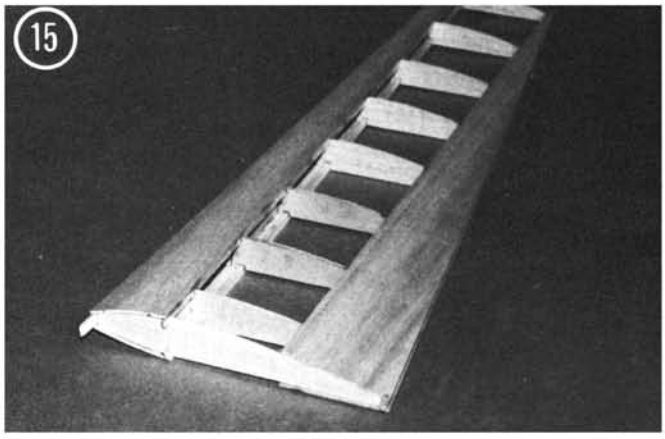


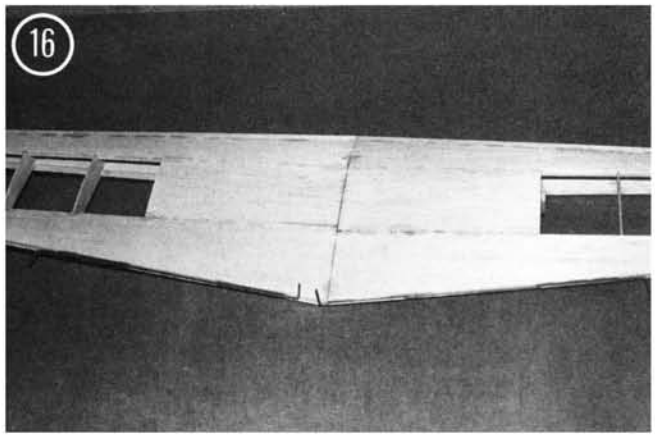












Add the cockpit detail (9) and then glue on the plastic canopy. (10) Begin construction of the wing by gluing a 1/8" square to the bottom leading edge sheet. (11) Contact cement the plywood doublers to ribs 3 and 4. Position the ribs on the spar but do not glue. At this time only glue the ribs to the trailing edge sheet. (12) Add the 1/16" x 1/4" leading edge and the top 1/8" square spar. (13) Remove the wing from the plan and epoxy in the LG mounts. (14) Glue in the bottom spar and sheeting and add the dihedral angle gauge and then (15) glue in the #1 rib. (16) Add the remainder of the center wing sheeting and trim, then epoxy the wing halves together and wrap the joint with 3/4" nylon cloth tape and smear with epoxy or glue. Tack the aileron linkage in place.

TOP: Close-up of detailing including pilot and cockpit interior. CENTER: RCM's Co-Editor of 'Racing at Random', Don Dombrowski, about to take-off one of the P-51D prototypes. In the last photo, Don shows the proper 'Top Launch' technique for hand launching Half-A low wingers.

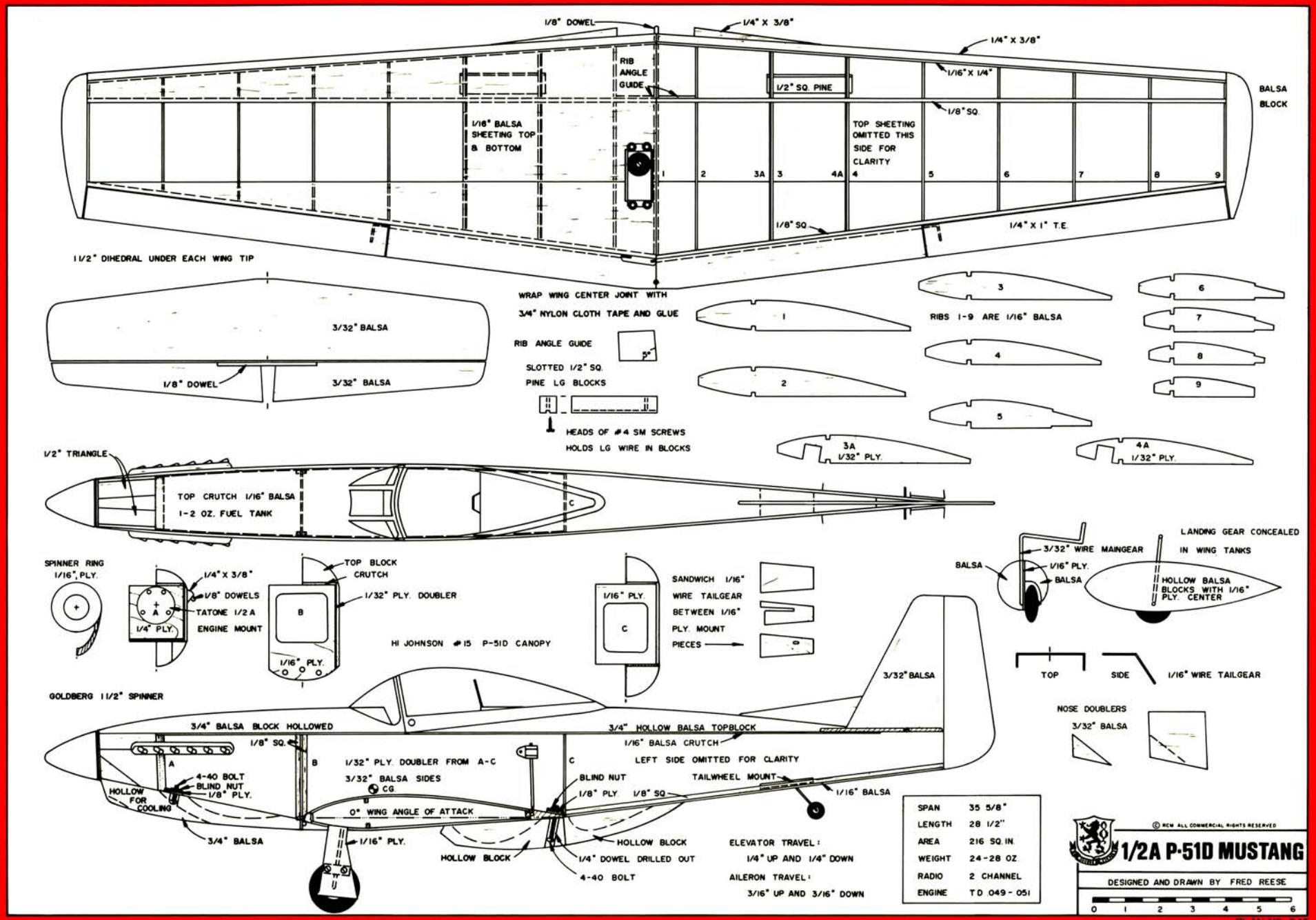
Glue on the two short lengths of 1/8" dowel in the back of the cowl to key into the bulkhead. Now, bolt in the engine. Fitting at this time will probably be easier if the carburetor is removed. Slip the plywood spinner ring in place and bolt on the propeller and spinner. Using scrap 1/32" plywood as spacers between the back of the spinner and the spinner ring, center the spinner ring and glue into place. Finish contouring the blocks with progressively finer sandpaper, i.e. #80, #100, #220, and finally #400 if you plan to paint.

Either a 7" Sig WW II canopy or the Hi Johnson 7.25" P-51D (list #15) canopy can be used. The Hi Johnson canopy is detailed and really looks best and is available from Hi Johnson Model Products Inc., 11015 Glenoaks Blvd., Pacoima, California 91331. Price including postage and handling is $2.75 for the canopy. Trim the canopy to fit the fuselage and mark the outline with a pencil. Complete all of the cockpit details at this time. An excellent picture of a P-51D cockpit interior is the D & B advertisement on page 121 of the March '76 RCM. A 1" Williams Bros. pilot is the closest to scale but appears a little small. Additionally, the 1" pilot must be raised about 3/8" to be at the right height. The 1½" pilot is too big to be scale but actually looks better in the model. Glue the canopy in place. Assemble and hinge the stabilizer-elevator and epoxy into place. Glue on the rudder.

How you finish your P-51 will depend somewhat on your choice of a color scheme, although the entire airplane can be covered with MonoKote or Solarfilm. Clear MonoKote or Top Kote can be used and the entire airplane can be painted with dope or epoxy. Also, the wing can be MonoKoted and the fuselage painted to match. As a point, Hobbypoxy silver matches silver Super MonoKote. The American Air Force insignias were cut from MonoKote trim as were the ID letters and D-Day stripes on the wings. The ID stripes on the fuselage were painted using B & E 1/8" masking tape to get around the compound curves. The rivet detail and lines were drawn on with a #1 point Rapidograph pen and Pelikan water soluble ink (green label). The ink can be washed off with a damp sponge and "409" if you make a mistake. The exhaust stains are dirty thinner sprayed on with an air brush. After all detailing was completed, one coat of Flecto clear gloss Varathane was brushed over the entire airplane except the canopy and the anti-glare panel in front of the canopy.

I made two landing gear sets for the military aircraft. One set is the standard gear with doors bolted in place to clips soldered to the gear legs. The second set hides the wheels in the auxiliary fuel tanks but uses the same wire gear struts. The dummy tanks were each carved from two pieces of 3/4" balsa with a 1/16" plywood center core bolted to the wire struts. The blocks were hollowed and one inch wheels were fitted. The wing tanks give the model the appearance of having the gear retracted while flying, yet func-

to page 151


1/8" DOWEL
1/4" X 3/8"
1/4" X 3/8"
RIB ANGLE GUIDE
1/2" SQ. PINE
1/16" X 1/4"
1/8" SQ.
BALSA BLOCK
1/16" BALSA SHEETING TOP & BOTTOM
TOP SHEETING OMITTED THIS SIDE FOR CLARITY
1 2 3A 3 4A 4 5 6 7 8 9
1/8" SQ.
1/4" X 1" T.E.
1 1/2" DIHEDRAL UNDER EACH WING TIP
3/32" BALSA
1/8" DOWEL
3/32" BALSA
WRAP WING CENTER JOINT WITH 3/4" NYLON CLOTH TAPE AND GLUE
RIB ANGLE GUIDE
5°
SLOTTED 1/2" SQ. PINE LG BLOCKS
HEADS OF #4 SM SCREWS HOLDS LG WIRE IN BLOCKS
1
2
3
4
5
6
7
8
9
RIBS 1-9 ARE 1/16" BALSA
3A 1/32" PLY.
4A 1/32" PLY.
1/2" TRIANGLE
TOP CRUTCH 1/16" BALSA
1-2 OZ. FUEL TANK
C
SPINNER RING 1/16" PLY.
1/4" X 3/8"
1/8" DOWELS
TATONE 1/2 A ENGINE MOUNT
A
1/4" PLY.
TOP BLOCK
CRUTCH
1/32" PLY. DOUBLER
B
1/16" PLY.
HI JOHNSON #15 P-51D CANOPY
1/16" PLY.
C
SANDWICH 1/16" WIRE TAILGEAR BETWEEN 1/16" PLY. MOUNT PIECES
LANDING GEAR CONCEALED IN WING TANKS
3/32" WIRE MAINGEAR
1/16" PLY.
BALSA
BALSA
HOLLOW BALSA BLOCKS WITH 1/16" PLY. CENTER
TOP
SIDE
1/16" WIRE TAILGEAR
NOSE DOUBLERS
3/32" BALSA
GOLDBERG 1 1/2" SPINNER
3/4" BALSA BLOCK HOLLOWED
1/8" SQ.
3/4" HOLLOW BALSA TOPBLOCK
1/16" BALSA CRUTCH
LEFT SIDE OMITTED FOR CLARITY
3/32" BALSA
A
4-40 BOLT
BLIND NUT
1/8" PLY.
HOLLOW FOR COOLING
B
1/32" PLY. DOUBLER FROM A-C
3/32" BALSA SIDES
CG
0° WING ANGLE OF ATTACK
C
BLIND NUT
1/8" PLY
1/8" SQ
TAILWHEEL MOUNT
1/16" BALSA
3/4" BALSA
1/16" PLY.
HOLLOW BLOCK
HOLLOW BLOCK
1/4" DOWEL DRILLED OUT
4-40 BOLT
ELEVATOR TRAVEL:
1/4" UP AND 1/4" DOWN
AILERON TRAVEL:
3/16" UP AND 3/16" DOWN
SPAN 35 5/8"
LENGTH 28 1/2"
AREA 216 SQ.IN.
WEIGHT 24-28 OZ.
RADIO 2 CHANNEL
ENGINE TD .049 - .051
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1/2A P-51D MUSTANG
DESIGNED AND DRAWN BY FRED REESE
0 1 2 3 4 5 6

PLAN NO. 645

P-51D MUSTANG

from page 30/24

. . . . . tion as a normal landing gear. If flying off of grass, you could omit the wheels and just use glider skids on the bottom of the tanks.

Several of our prototypes have the fuel fill and vent tubes hidden in the scale exhaust manifold. It is a plumbers nightmare but, once installed, is not only impressive but functional. If you have a 500 mah battery, you will probably need the extra room up front for the battery rather than the additional fuel lines.

I recommend that the airplane be flown as a two channel with aileron and elevator control for maximum performance and lowest weight. However, the wing is a little larger than most 1/2A's, so additional servos can be added. We have added a rudder servo which allows ROG take-offs and we plan to try the Kustom Kraftsmanship TD .051 with throttle. I can't wait to see the new lightweight Cannon four channel system as it would be a natural for this airplane. Imagine an all-up flying weight of 26 ounces with four channels!

The model should not present any problems for the average RC flyer who is used to flying with ailerons. The controls are not sensitive, yet are completely responsive. The wing has excellent stall characteristics which makes it easy to land. The scale dihedral gives natural stability and a solid groove in the air.

Here is a model P-51 that looks like the real thing, flys like a miniature pattern ship, and gives hours of fun on a pint of fuel. □