

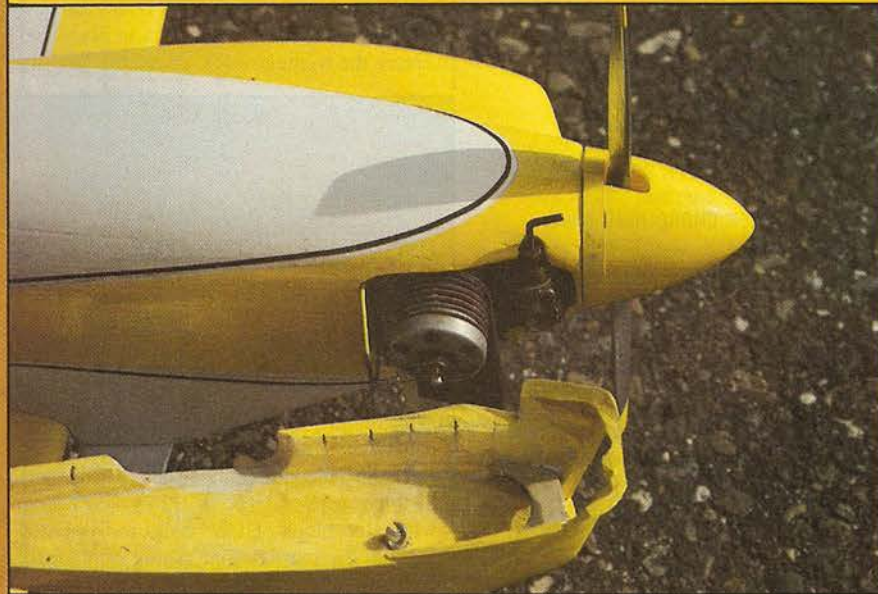


VAN'S RV-3

By Fred Reese

Van's RV-3 is a single seat, all metal home-built designed by Dick Van Grunsven in 1968. The project took 2½ years and \$2000 to complete and now plans and kits are available to amateur constructors. At the 1972 EAA Fly-In, Oshkosh, the RV-3 won the award for Best Aerodynamic Detailing and at the 1973 Oshkosh Fly-In, the RV-3 won the Pazmany Efficiency Contest with an all time high score. Actually the RV-3 is a very conventional airplane, but with careful attention to detailing. Power for the original is a 125 h.p. Lycoming O-290 G, 4 cyl. engine. Wingspan is 19' 11", length is 19', and the wing area is 90 sq. ft. Empty weight is 695 lbs. and gross is 1050 lbs. Maximum speed is 200 mph, cruise is 185 mph and landing speed is only 48 mph. Rate of climb is 1900 ft./min. with 125 h.p.

The model is scaled at 2" = 1'. The full sized RV-3 is sleek, streamlined and



graceful but when scaled down to model size it appeared fat so I narrowed and reduced the height of the fuselage. All other outlines are true to scale. For proof of scale: Jane's Pocketbook of Home-built Aircraft by Michael Taylor, published by Collier Books, Division of Macmillan Publishing Co., Inc., New York; Home-built Airplanes by Wolman/Garrison, published by Chronicle Books/Prism Editions, San Francisco, California; Sport Flying, August 1979, by Challenge Publications, Canoga Park, California.

The model is powered by an old Super Tigre .15 and gives excellent performance with a 7/6 or 8/4 prop. The size of the model should handle any engine up to .30. Speed of the model is moderate to fast and it is fully aerobatic. Take-offs with a rigid link to the tailwheel are straight and easily controlled, although the large rudder tends to weathervane the model when taxiing in the wind. Slow speed and landings are also easy, making the RV-3 a very reliable little flier.

Construction

Mount the engine onto an aluminum motor mount and bolt the mount to firewall using 6-32 screws and blind nuts. Drill a 3/32" hole through the firewall for the

RCM is happy to present Fred Reese's Stand-Off Scale model of the award winning home-built for .15 to .30 sized engines. Scale appearance, excellent flight performance and ease of construction is sure to please.

throttle pushrod and two 3/16" holes for the fuel lines.

The word glue will appear throughout this article as a matter of convenience. I have found that Jet and Super Jet by Carl Goldberg Models takes care of my assembly needs in a superb fashion.

Cut out the two fuselage sides from medium 1/8" balsa and glue on the 1/4" balsa nose doubler and the 1/16" side doublers. I used vertical grained 1/16" balsa for the side doublers but 1/16" or 1/32" plywood can be used. Add the 1/4" sq. bottom, rear stringers.

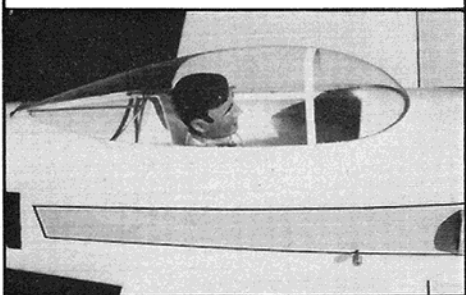
Glue bulkheads F-3 and F-6 to one of the fuselage sides and glue on the second fuselage side. Pull the tail together and glue, then add bulkheads F-7 and F-8.

Epoxy the firewall and motor mount into the fuselage.

Glue the 1/16" balsa cockpit floor between the fuselage sides even with the top edge. Make an angle template from the plan for bulkheads F-4 and F-5 and glue them in place on top of the cockpit floor.

Epoxy the landing gear mount F-9 and the wing mount F-10 in place.

Make the tailwheel assembly by first bending the 3/32" wire strut. Cut the 1/16" plywood parts A and C and the 3/32"



VAN'S RV-3

Designed By: Fred Reese

TYPE AIRCRAFT

Stand-Off Scale Sport

WINGSPAN

40 Inches

WING CHORD

9 Inches

TOTAL WING AREA

360 Sq. In.

WING LOCATION

Low Wing

AIRFOIL

Semi-Symmetrical

WING PLANFORM

Constant Chord

DIHEDRAL EACH TIP

1 1/2 Inch

O.A. FUSELAGE LENGTH

38 Inches

RADIO COMPARTMENT AREA

(L) 9" x (W) 3" x (H) 2 1/4"

STABILIZER SPAN

14 Inches

STABILIZER CHORD (incl. elev.)

4 1/2" (Avg.)

STABILIZER AREA

63 Sq. In.

STAB. AIRFOIL SECTION

Flat

STABILIZER LOCATION

Mid-Fuselage

VERTICAL FIN HEIGHT

5 1/4 Inches

VERTICAL FIN WIDTH (incl. rudder)

5 3/4" (Avg.)

REC. ENGINE SIZE

.15-.30 Cu. In.

FUEL TANK SIZE

4-6 Oz.

LANDING GEAR

Conventional

REC. NO. OF CHANNELS

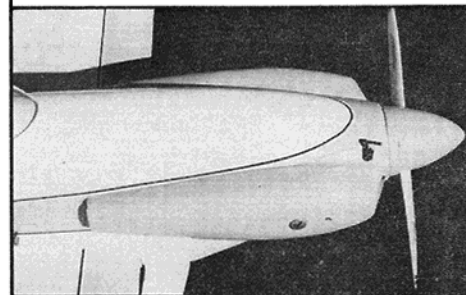
4

CONTROL FUNCTIONS

Rud., Elev., & Throt., Ail.

BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa and Ply
Wing	Balsa and Ply
Empennage	Balsa
Wt. Ready To Fly	48 Oz.
Wing Loading	19.2 Oz./Sq. Ft.



plywood filler B. Epoxy A, B and C together with the wire strut sandwiched between them. The steerable tailwheel unit is made from .030 x 1/4" brass and 1/8" O.D. brass tubing. First mark and drill the holes for the steering arm before cutting it from the strip including a 1/8" hole in the center for the brass tube. Having the steering arm attached to the tube makes the soldering step easier. Cut a 2" length of the brass strip and bend into a "U" just wide enough for the tailwheel to fit between. To hold the assembly while soldering, drill a 1/8" hole about 1/2" deep into a piece of wood to hold the brass tube. Use the brass tube full length until after soldering, then cut to length. Slip the steering arm over the tube and stick the tube into the hole in the wood and press the arm down against the wood. Position the wheel yoke around the tube and over the steering arm and solder. Trim off the excess tubing and file to shape, drill for the axle and solder the wheel and axle in place. It would be best to use a metal hubbed wheel such as the 1" Perfect streamlined. Epoxy the tailwheel assembly to the fuselage and finish sheeting the bottom of the fuselage with 1/16" balsa.

Glue the bottom cowl block in place and epoxy the triangle stock above the landing

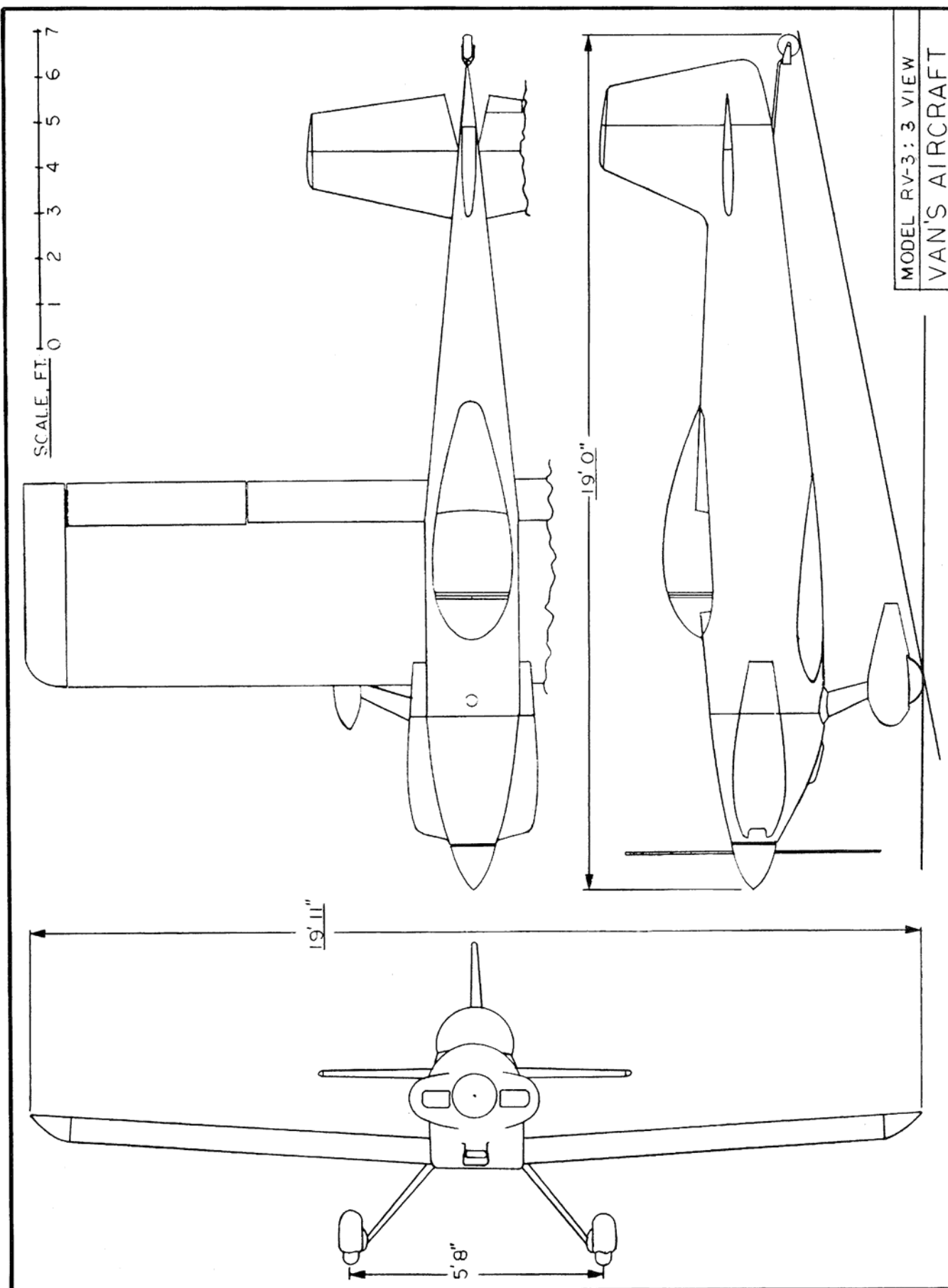


gear mount F-9 and the trailing edge stock behind the firewall.

The rounded top of the fuselage is formed by three strips of 3/16" x 1/2" on each side with a top block of 1/2" balsa in front and 1/4" in the rear. Before gluing on a strip, bevel the bottom edge of the strip to match the angle of the bulkheads. This bevel decreases at the rear of the airplane. Trim off the excess wood with a razor saw and finish off with a flat sanding block before gluing on the top blocks. Sand the sides down even with the tops of the bulkheads. Glue on the top blocks and rough shape the fuselage.

Cut out the engine access in the side of the fuselage and bolt in the engine. Trim the front of the fuselage to give a 1/32" gap behind the spinner and F-1. Glue F-1 in place and carve the front of the fuselage to match the spinner.

The cheek cowls are made from a 1/2" sheet block cut to the outline of the cowl from the side view of the plan. The top and bottom of each cowl is 1/4" balsa bent to match the sides. Sounds tough, but it really isn't. With a hack saw blade, make cuts at least half way through the 1/4" parts and then wet the outside. The cuts should be about 1/4" to 3/8" apart. Using Jet, start at

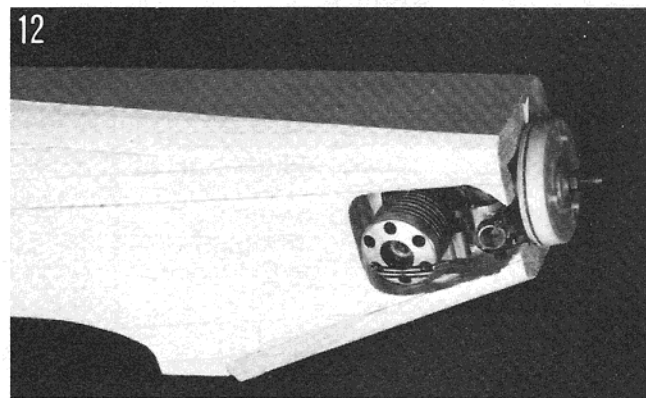
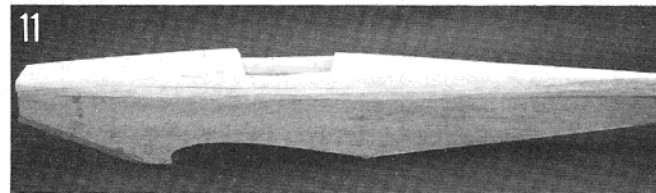
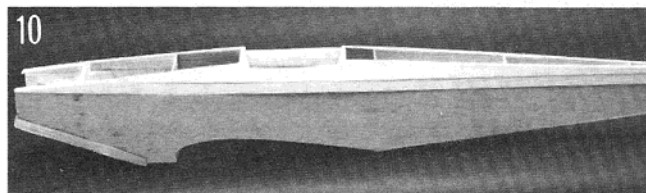
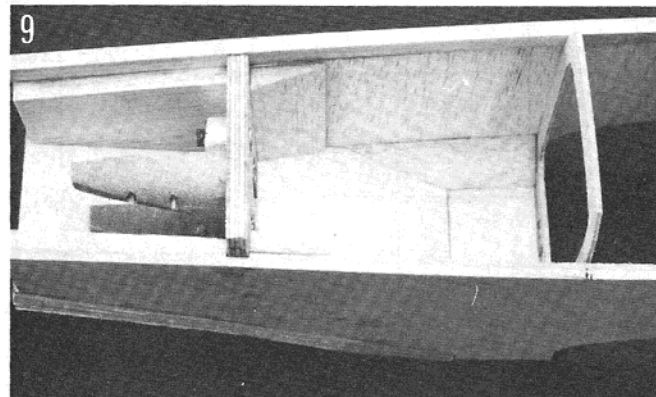
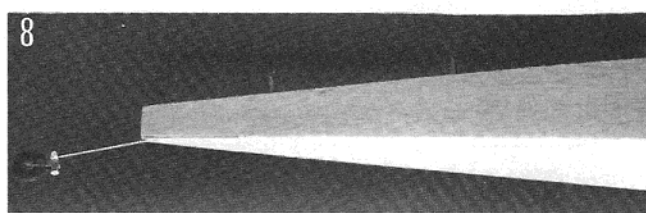
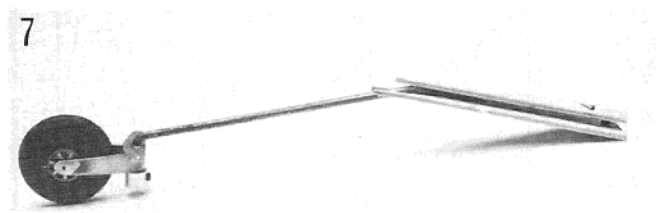
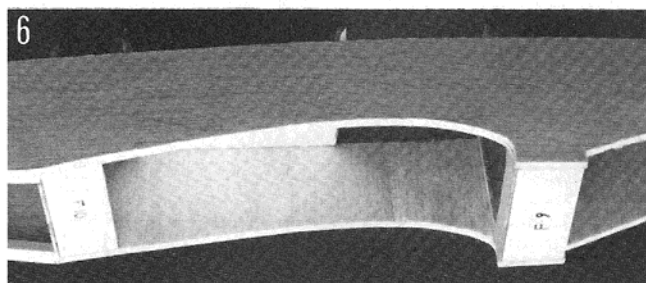
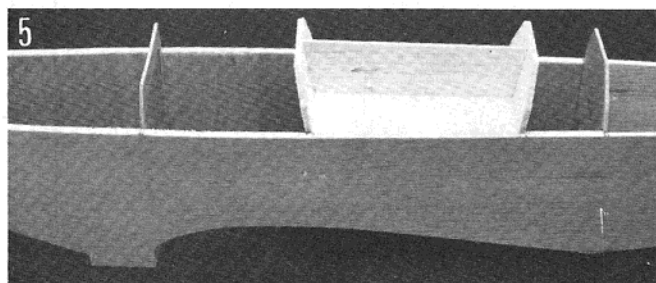
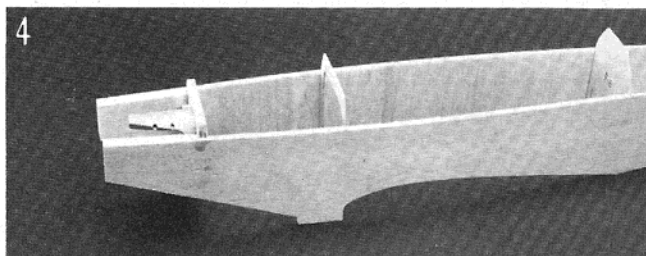
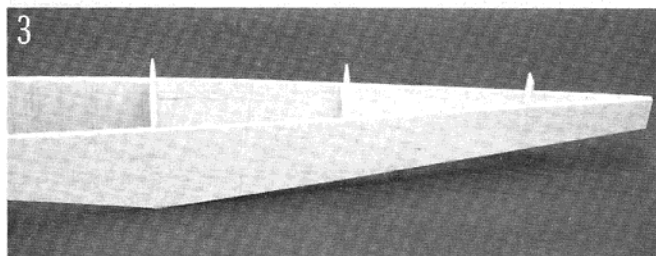
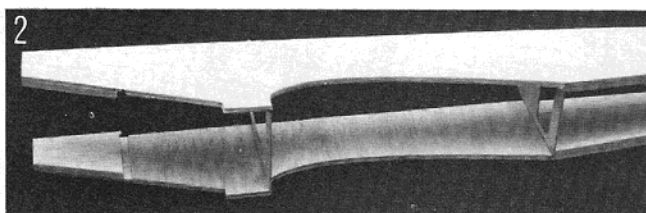
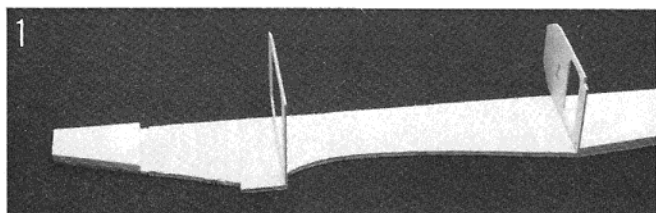


the rear of the cowl and work forward, bending the wood as you go. It will be necessary to add some 1/4" sq. around the air inlet to make the opening rectangular.

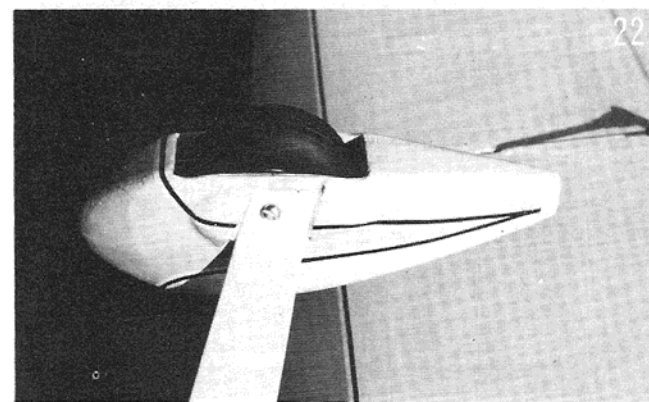
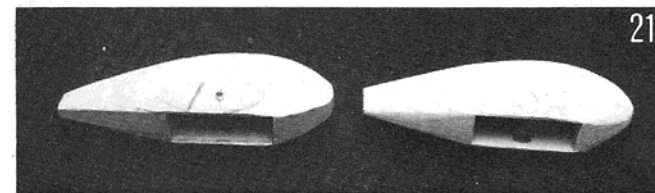
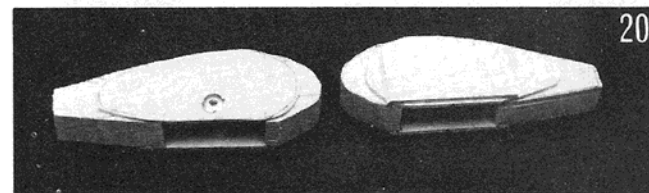
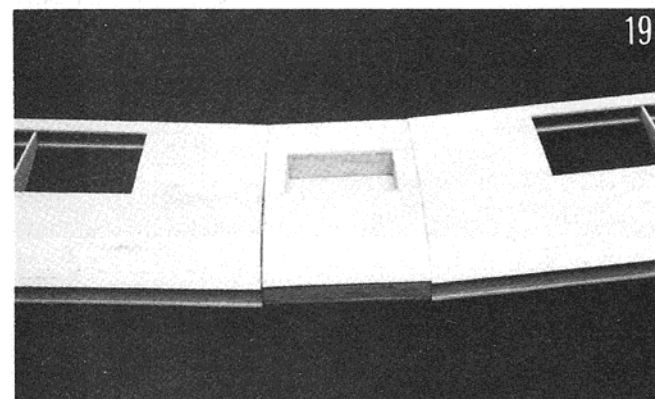
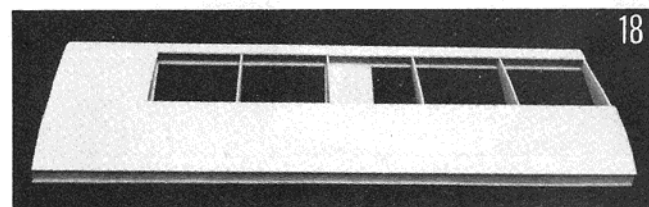
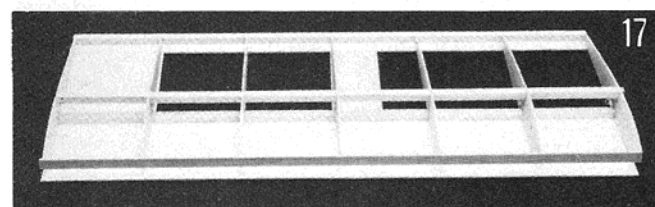
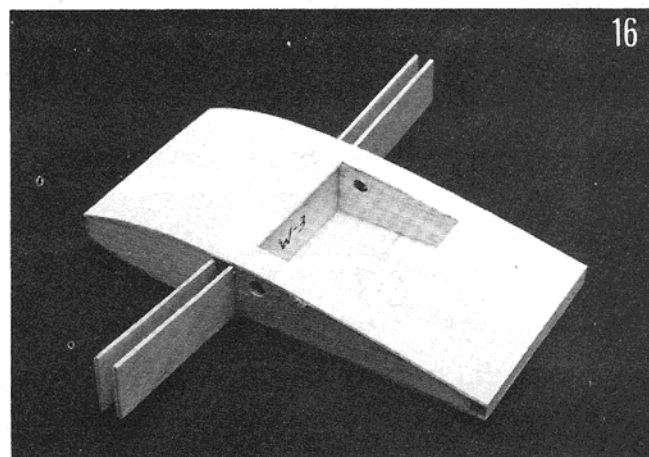
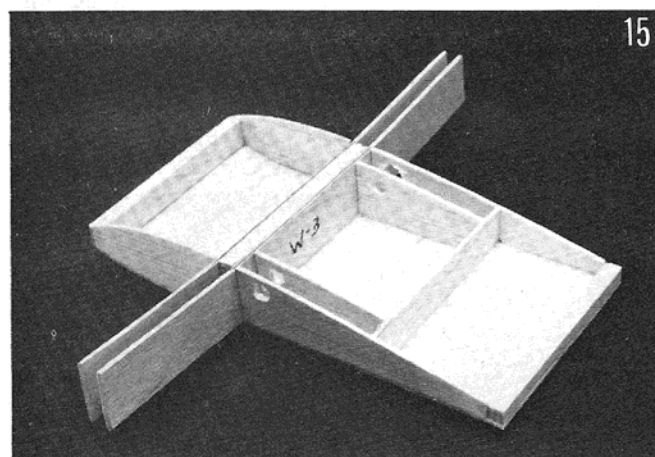
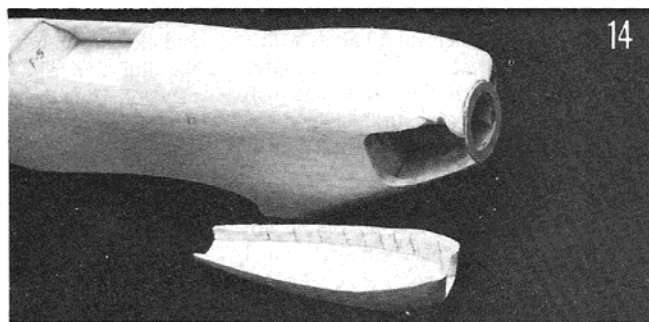
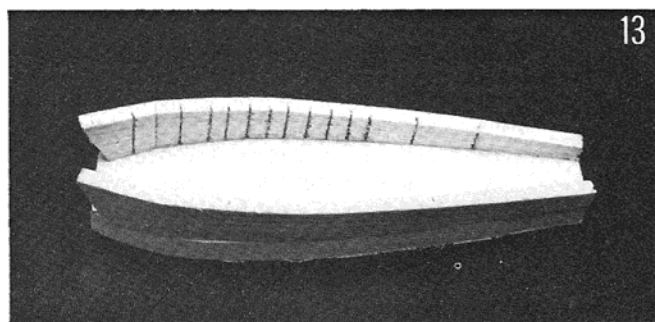
Carve and sand the cheek cowl to shape and fit them to the fuselage. Glue the left or fixed cowl in place.

Finish sanding the fuselage and

removable cowl and cover them with 3/4 oz. K & B glass cloth and finishing resin diluted 50/50 with acetone.



(1) Glue the nose and side doublers and the 1/4" sq. stringer to the fuselage sides and then glue bulkheads F-3 and F-6 to one of the sides. (2) Glue on the second fuselage side. (3) Glue the fuselage together at the tail and add bulkheads F-7 and F-8. (4) Bolt the engine mount to the firewall and then epoxy the firewall into the fuselage. (5) Glue the cockpit floor between the fuselage sides. Make an angle template from the plan for bulkheads F-4 and F-5 and glue them in place. (6) Epoxy the landing gear mount F-9 and the wing mount F-10 into the fuselage. (7) Make the tailwheel unit from 3/32" wire and brass. Wire is sandwiched between plywood. (8) Glue tailwheel unit into fuselage and add bottom sheeting. (9) Glue on bottom cowl block and add triangle stock behind the firewall and above the landing gear mount. (10) Glue three strips of 3/16" x 1/2" on each side of the top of the fuselage and trim off even with the tops of the bulkheads. (11) Glue on the 1/2" top front fuselage block and the 1/4" top rear fuselage sheet and rough shape the fuselage. (12) Cut out the engine access and bolt in the engine. Fit the spinner ring F-1 and glue it to the fuselage.



(13) The 1/4" top and bottom of the cheek cowl are bent to the shape of the cowl side by making saw cuts halfway through and then wetting the outside. Use Jet to glue, working forward. (14) Finish shaping the front of the fuselage and fit the cheek cowl. Glue the left cowl to the fuselage. (15) Build the wing center section starting with the bottom sheeting and 1/4" sq. trailing edge and work forward. (16) Glue on the top 1/16" sheeting to the wing center section. (17) Pin down the bottom wing sheeting. Glue down the 1/4" sq. spar and trailing edge and add the ribs and 1/16" x 3/8" leading edge and top spar. (18) Glue the bottom front sheeting to the ribs and leading edge, then add top sheeting and capstrips. (19) Epoxy the wing panels to the center section. (20) Make wheel pants from 7/8" balsa core and 1/8" plywood sides. Install 6-32 Sig blind nuts on each side and cover outboard side with 1/8" balsa. (21) Glue on 1/8" plywood fairings to inboard side of pants to position pants on gear strut. Carve and sand wheel pants to final shape. (22) Wheel pant is attached to aluminum landing gear by a single 6-32 bolt.

While the resin is curing, cut out the tail surfaces and join the elevator halves with a piece of 3/16" dowel. (I make the elevator as one piece, epoxy in the dowel, and then cut away the notch after the elevator has been sanded to airfoil shape.) Sand the tail surfaces and prepare to prime.

Apply one or two coats of K & B primer to the fuselage, cowl, and all of the tail parts. Sand between coats and apply vinyl spackle to fill any grain not filled by the first coat of primer. This airplane has a long tail moment and a rather short nose moment so it is important not to apply too much paint on the tail end or you may have to add lead to the nose. The prototype balanced as shown on the plan, but the servos were moved forward to avoid adding weight.

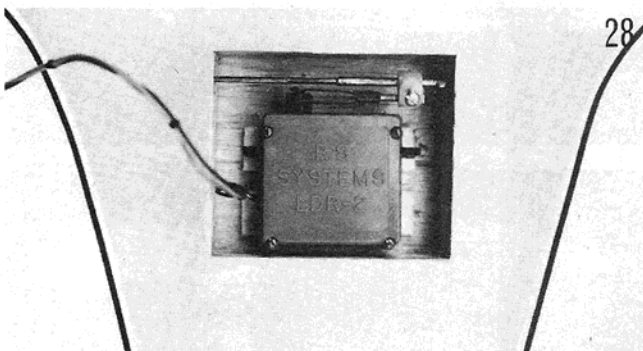
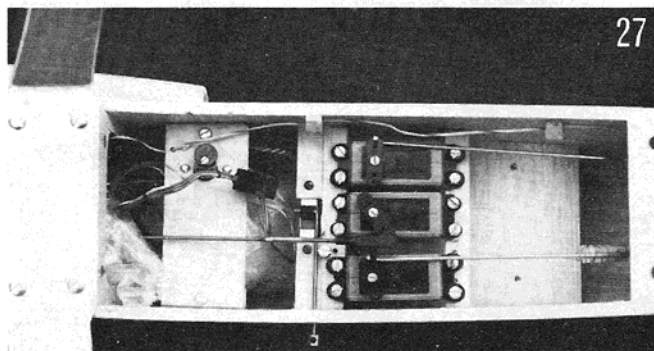
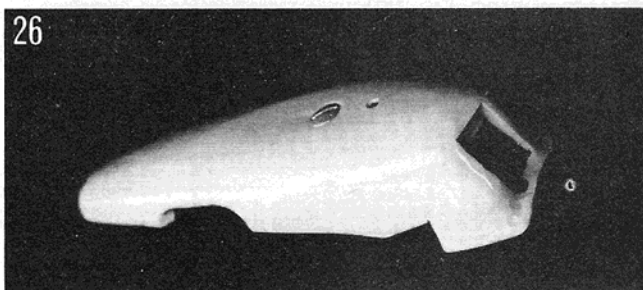
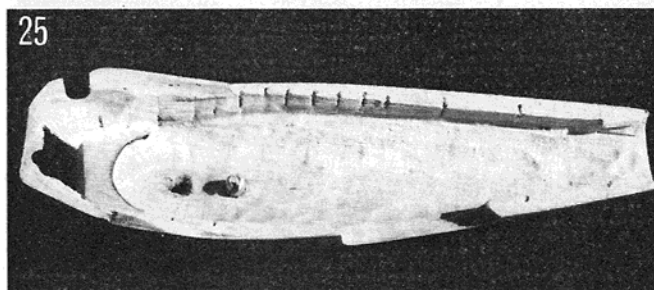
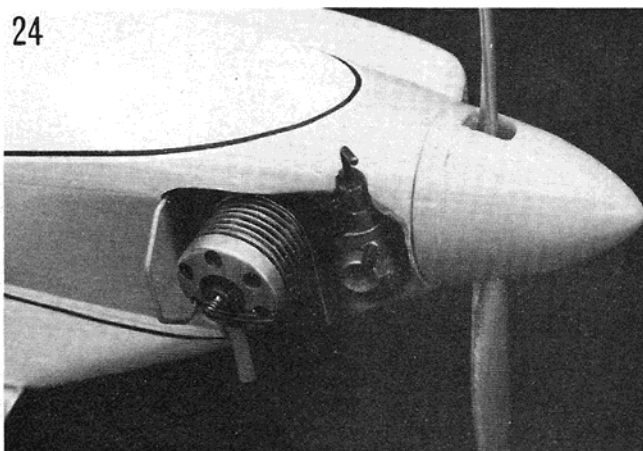
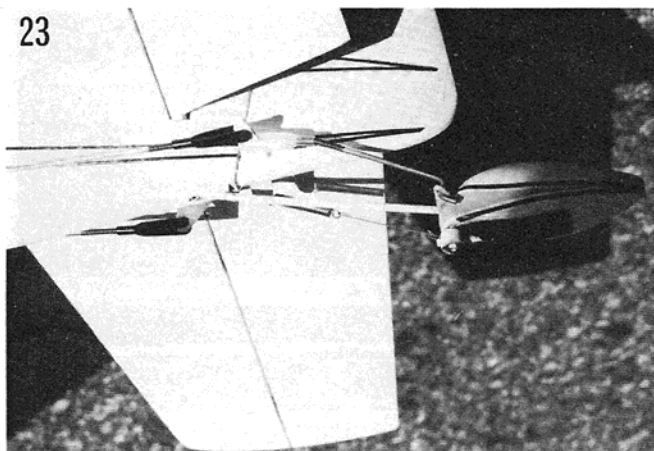
Sand the primed tail surfaces and then

hinge the elevator to the stab. Glue the stab and elevator into the fuselage and then fill the little notch in the fuselage behind the elevator. Glue the fin into the fuselage with the forward tab on the fin being glued to the stabilizer. Fill any gaps or cracks and touch up with primer.

There will probably be gaps where the cheek cowl does not cover the engine opening in the fuselage. If so, it will be necessary to add a thin flange along the edge of the cowl and across the front. The flange is made of several layers of thin glass cloth or one layer of heavy cloth or matt. Cover the engine opening with Saran Wrap smoothly so there are no wrinkles where it needs to fit tightly. Apply a 3/4" strip around the front of the cowl and as far aft as needed. When set, sand off any bumps and

cut away any excess cloth. Apply a micro-balloon and resin filler to smooth out and fair the cloth into the cheek. When set, remove from the fuselage and trim. Hollow the cheek cowl as needed to clear the cylinder head and glue in a 1/16" ply baffle to direct some of the air directly over the top of the head. Also cut another air outlet behind the engine on the underside of the cowl as shown on the plan.

Fit the Prather Formula One cowl retainer wire to the firewall with sheet metal screws as shown on the plan. To allow for adjustment, bend "U"'s at the ends of the wire longer than needed. The retainer wire can then be moved in or out by loosening the screws. Once adjusted, a little epoxy will set them. Glue a 1/16" strip on the fuselage



(23) More positive tailwheel steering is obtained by removing spring on one side and replace it with a quick link. (24) Engine installation and cowl retainer wire. (25) Removable engine cowl held in place by a Prather Formula One cowl retainer. (26) Note the 1/16" plywood baffle to direct cooling air to the cylinder head. (27) Radio installation: position servos to help balance model, note switch installation, receiver is held up and away from throttle pushrod by a plywood tray screwed to blocks glued to fuselage sides. Landing gear is attached by four #6 x 1/2" SM screws. (28) Aileron servo and Goldberg aileron servo connector. Servo held in place with servo mounting tape.

side to position the rear end of the cowl and keep it from shifting.

The aluminum landing gear can be cut from flat stock or re-cut from a larger commercial gear. I used a Bridi 12" as the center width was as wide as the fuselage. The excess aluminum was cut away with a hack saw and the ends were bent in a vise. The sweepback is scale and puts the center of the wheels 1/2" behind the leading edge which is good for pavement but would be too far back if flying off of grass. For grass fields I would recommend a stock Prather Formula One landing gear installed backwards which would put the wheels about 1/4" ahead of the leading edge.

Formula One racing wheels and wheelpans would work well on this model although they are narrower than scale. For wider wheels, pants made with balsa core and plywood sides, and then covered with glass cloth are very durable and are more realistic. Glue the 1/8" light-ply sides to the 7/8" balsa core and drill 5/32" holes for the blind nuts. Epoxy the blind nuts in place with a bolt screwed in for alignment. Cover the outboard blind nuts with 1/8" balsa and add the 1/8" ply fairings on the gear side which will position the pant on the gear. Carve the pants to final shape, sand and cover with 3/4 oz. glass cloth and resin. It will be necessary to trim the lengths of the blind nuts so that the wheels will slip into the pants and the heads of the axle bolts will tighten against the aluminum gear. The tailwheel pant is all balsa and is just attached to the brass tailwheel assembly with Super Jet.

The fuselage, cowl, landing gear and wheel pants can all be painted the base color with Superpoxy.

Build the wing by starting with the center section. Pin down the bottom 1/16" sheet and glue on the 1/4" sq. trailing edge. Add the end ribs and the spar joiners with a 1/4" x 1" balsa spacer followed by the forward portions of the ribs and the leading edge strip. Add the remainder of the structure to form the servo box and the 1/4" x 1/2" leading edge reinforcement. Add the top sheeting to the center section.

Build the two wing panels at the same time. Glue the 1/4" sq. spars to the bottom sheeting and pin down over the plan. Add the bottom sheeting at the inboard ends and under the aileron bellcranks. Glue the ribs in place with the end rib at an angle to match the center section. Glue in the top spar and the 1/16" x 3/8" leading edge strip. Don't glue the spars to the inboard end rib as this portion of the rib will be cut away to receive the plywood spar joiners. Pull up the bottom leading edge sheeting and glue to the ribs and leading edge strip. Add all of the top wing sheeting and capstrips. When dry, remove from the plan and add the bottom capstrips and the 1/16" plywood bellcrank mounts. Epoxy the wing panels to the center section, blocking up each wing tip 1 1/2".

Slip in the 1/16" wire pushrod and install the aileron bellcranks. Drill down through the output hole in the bellcrank with a 5/64"

drill and continue through the bottom sheeting. With the drill running, rotate the bellcranks to open a slot matching the arc of travel for the pushrod to the aileron horn. The pushrod has a "Z" bend at the end that can be inserted through the slot after covering and will slip into the bellcrank.

I glued the trailing edge on as one piece to each wing panel skipping the glue in the aileron portion. The ailerons can be simply cut out after the wing is sanded. Add the 1/4" x 1/2" leading edge and wingtip blocks and then finish shaping and sanding the wing. Fit the wing into the fuselage and add the dowels in the leading edge to match the holes in bulkhead F-3. I usually drill the holes in the wing for the dowels slightly over-size and use 5-minute epoxy to glue in the dowels. Just before the epoxy sets, the wing can be slipped into the fuselage and held tightly until it sets making the dowel alignment perfect with the holes. Drill through the wing and F-10 for the nylon wing bolts with a 3/16" drill and then run in a 1/4-20 tap through F-10 and open the holes in the wing to 1/4".

Add some scrap balsa fill at the leading edge of the center section to match the fuselage. Finish sanding the wing and apply a coat of Balsarite before covering with your favorite iron on material. Wing color trim can be added with MonoKote Trim or can be painted on. If painting over iron on coverings, use a low stick masking tape such as drafting tape to mask the colors.

Secure the edges of any trim with Jet or apply a coat of clear over the trim.

Balance the model by positioning the radio equipment. There is plenty of room and the servos can be forward or back in the fuselage. The RV-3 has a fairly long tail moment so care must be taken not to build up weight in the tail with heavy wood or excess paint. The servo mounts are 1/2" sq. pine epoxied across the fuselage. The 1/16" switch mount is then glued to the forward servo mount. The battery pack is wrapped with foam and a baggie and stuffed in under the fuel tank. To keep the receiver from interfering with the throttle pushrod, I glued a short piece of the servo mount material to each side of the fuselage, just above the level of the pushrod. The receiver is wrapped in foam and a baggie and positioned above the pushrod and held by a piece of 1/16" ply across the fuselage screwed to each of the blocks.

The aileron servo can be mounted with servo tape or aileron servo mount bracket supplied by the radio manufacturer. To connect the servo to the 1/16" wire pushrod in the wing, I used a Goldberg Aileron Servo Connector.

The RV-3 makes a very attractive model that can be flown every day for sport. □

**Editing By Hlsat.
RCModeler
Jan. 1 981.**