

# JODEL F12

**INTRODUCED TO THE HOMEBUILDERS  
WAY BACK IN 1948, THIS 1/3 SCALE  
MODEL IS A GREAT PERFORMER**

By Jerry Van Heeswyk of Louisville, Colorado

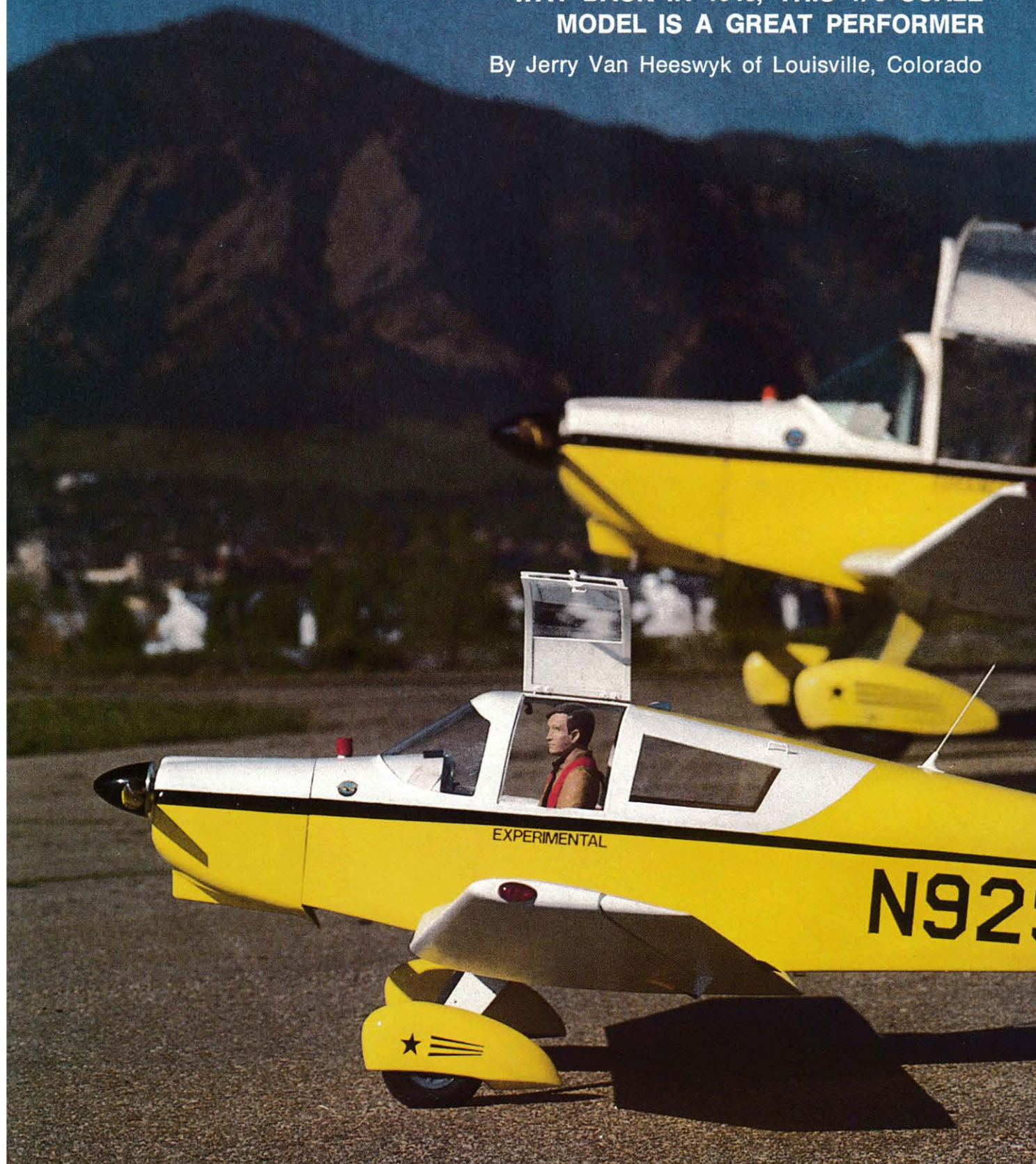
I suppose that there are about as many reasons why each of us participates in model aviation as there are modelers enjoying the hobby. For me, the challenge is to duplicate the appearance and flight characteristics of a full scale aircraft as closely as my skills will allow. I generally build a couple of planes a year and am a typical "Sunday Flier." Consequently, my models must be relatively simple, rugged, and functional. And, although I have tremendous respect for those who build true precision scale, I personally lack the patience, time, and skill to join their ranks.

When I began looking for a subject for a new project I had several criteria to satisfy. The first and possibly most important requirement for me was that the aircraft be unique. No matter how well done, models of J3 Cubs, P-51s, and Lasers rarely excite me any more. Simplicity of design was also important to permit ease of construction, and airworthiness was certainly high on the list.

While looking for a subject I was extremely pleased to learn that my next door neighbor was the proud owner of a rare Jodel F12 home-built. You can imagine my reaction

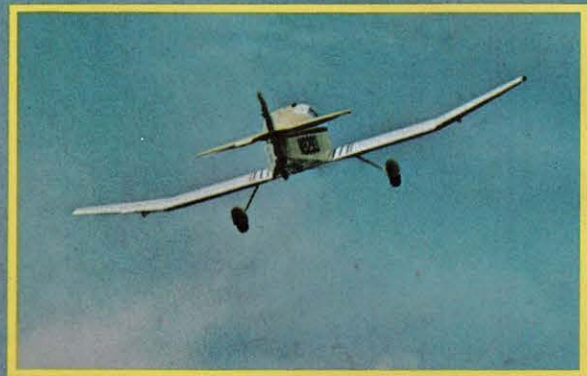
when I learned that he also, had access to the original plans. After researching the history of the Jodel, studying the plans, and flying the F12 I was confident that this plane would meet my every objective.

The only thing left to decide was the scale. The way I see it, there are only three things a modeler can do to achieve truly realistic flight; build an overpowered subject, build very, very light or build very large. I was not interested in the first alternative, was incapable of the second, so I have opted for the third. The project presented here, at 1/3 scale, has absolutely scale perform-



The model F12 sits on the ramp in the shadow of the full-size Jodel after which it was patterned. Isn't it great when you can make your model look just like a big one in your home area?

In the air, the Jodel F-12 shows its very pleasing lines. The design has been a favorite of European Homebuilders for many years, and rightly so.



ance. It will do large slow loops, slow rolls, slow snap rolls and scale landing approaches, steep and (you guessed it) slow. The full scale F12 has done each of these maneuvers and is capable of many more.

The Jodel was introduced to the world, innocently enough, in the countryside near Beaune, France, in January, 1948. It was the creation of Edouard Joly and his son-in-law, Jean Delemontez. Hence the name Jodel which was derived from the last names of the designer/builders. Joly and Delemontez were partners in an aircraft repair business and designed their first craft to utilize some old surplus covering and a used 26-hp Poinard engine. This aircraft performed very well and word of its flight capabilities spread throughout Europe. The two builders, who had intended to design only for their personal use, were soon deluged with requests for plans and information. That first design, which was later to become famous as the D9 BEBE JODEL, was largely responsible for the birth of the Jodel movement. To this day the International Jodel Club, headquartered in England, has a large, active membership of those who either own or just have a soft spot in their hearts for this "bent winged" little airplane and its descendants.

A two-seat version of the Jodel  
44 scale r/c modeler



The small French Homebuilt lifts off the mile-high runway in Colorado with power to spare.

was designed at the request of the French government. This aircraft, the D11, first flew in 1950 and was the forerunner of the F12. The "F" designation is given to the homebuilts which were built from plans marketed by Chris Falconar in Canada. There are seven of these aircraft now flying in Canada and approximately a dozen in the United States. The aircraft presented here (N9293) was completed in Cheyenne, Wyoming, in 1974 and is now owned by Jim Douglas of Louisville, Colorado. As

with any homebuilt there are no two which are identical. N9293 was modified from the original plans to incorporate a Cessna-type spring steel landing gear, a Swift wind-screen, and a fiberglass cowling to encase the 130 hp Franklin engine.

There are numerous other variations of the D11, similar to the F12, now flying in Europe. Some of these were homebuilt but many were certified and manufactured by one of several different European companies.

Flight performance of N9293 is excellent. The cruise speed is 125 mph with a stall speed of only 41 mph. The Jodel has a semi-symmetrical airfoil and a distinctive polyhedral wing which is a Jodel trademark. The polyhedral provides excellent stability but does not interfere with aerobatics. The tail comes up quickly on takeoff and ground handling is very good, even in a stiff crosswind.

I chose to model the Jodel F12 because of its fine performance and very unique appearance. The fact that it is a taildragger and that construction presented no serious problems assisted in my decision. This 1/3 scale model is built from the original plans with measurements taken from the full scale aircraft. The only significant deviations from scale are the greater width of the gear leg to support the 32-lb. weight and the increased thickness of the wing tip to simplify construction and to resist tip stalling. I have had the pleasure of flying the full scale Jodel and believe that this model duplicates the appearance and flight characteristics in every way.

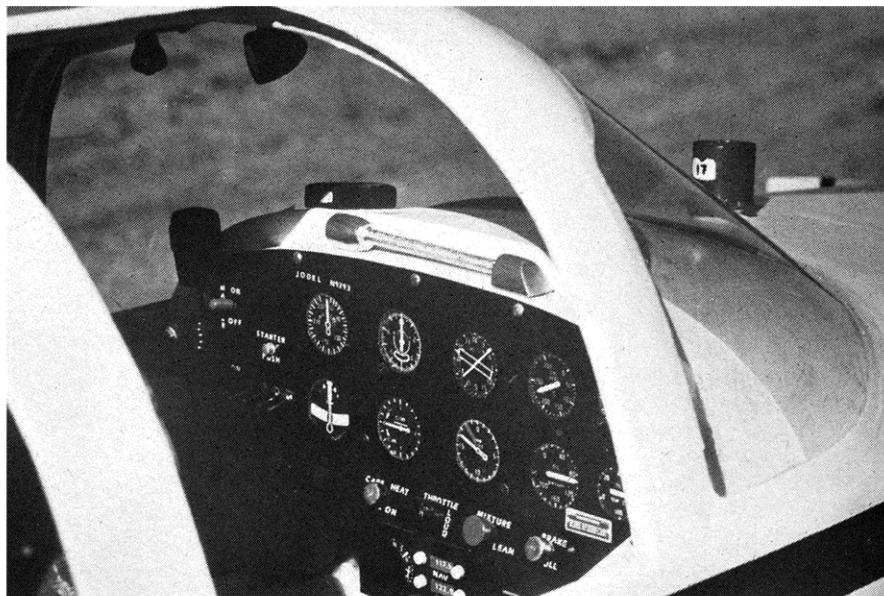
## BUILDING INSTRUCTIONS

Space does not permit a detailed description of the building process but I will cover some general information about construction of the Jodel. Construction materials consist primarily of 1/8-inch Philippine mahogany plywood, 1/8-inch balsa wood and spruce. Balsa may be substituted for the 1/8-inch plywood but it is much more expensive. A 4-foot by 8-foot sheet of 1/8-inch plywood costs less than \$10 and you can make a whole lot of airplane parts from one sheet. Other required plywood (1/4-inch and 1/2-inch) is heavy enough so that ordinary construction grade will be adequate.

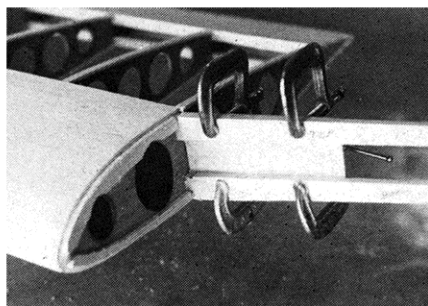
In general, Titebond or a similar adhesive is recommended. Epoxy glue, silicon rubber cement, or polyester resin are required for specific applications.

## FUSELAGE

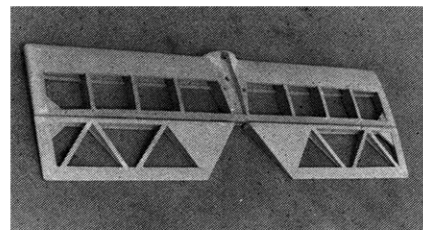
Begin construction of the fuselage by laying out the sides on a sheet of 1/8"x48"x96" mahogany plywood. If you are unable to obtain mahogany plywood in your area you can remove the skins from interior hollow core doors as an alternative. Doors with minor damage are usually available from building supply centers at very reasonable prices. Clamp the sides together for final sanding to ensure that they are identical. The prototype was built with



The cockpit interior is very nicely detailed. With the wide-opening canopy, it's almost a must to detail the interior in order to get the best static score possible.



Construction of the wing tip begins by gluing the tip spars to the center section spars. Laminate polyhedral joint with 1/8 inch mahogany plywood. Note false rib to provide base for sheeting.



Stabilizer detail. Note notch for mounting fin.

the aid of a Dremel scroll saw. This tool proved invaluable for working with these materials.

Next, the bulkheads are traced onto the appropriate plywood and sawn to proper shape. The firewall is made from 1/2-inch plywood. F2B and F10 are made from 1/4-inch plywood. All other bulkheads can be cut from 1/8-inch mahogany. One method that works very well to transfer the bulkhead shapes to the plywood is to make a copy from the plans on a dry-process photocopy machine (IBM, Xerox, Kodak, etc.). The copies are then placed facedown on the wood and using a very hot household iron and firm pressure, the toner image is transferred from the paper to the wood. Copies can be taped together for large parts. Dark copies work best and you should ensure that there is no significant enlargement or reduction.

All of the bulkheads are made in two pieces to permit the fuselage to be assembled upside down on a flat surface. When built over the plans this will ensure a straight and true

structure. Lay the top view of the plans over a 3/4-inch plywood building board and nail 1-inch wood scraps tangent to the fuselage outline at each bulkhead location. The 3/8-inch by 3/4-inch longeron should be glued to the fuselage side in the jig to hold the proper shape. The fuselage sides are then held against the jig by clamps and the bulkheads. Pins are not of much use when working with plywood so "C"-clamps and masking tape are used as substitutes. The cabin frame bulkheads are made by laminating a layer of 1/8-inch plywood on each side of 1/4-inch by 3/4-inch spruce. If the grain of the spruce is laid according to the plans the frame will be very strong. The 5/16-inch by 5/16-inch spruce center stringer is then glued in to brace the bulkhead tops prior to sheeting. The sheeting is 1/8-inch plywood forward of the instrument panel and 1/8-inch balsa on the cabin and turtle deck.

After sheeting the turtle deck and cabin area the door openings and rear cabin windows are cut to shape. Leave 1/2-inch of sheeting inside of

the door openings to act as a jig on which to build up the doors. The door frames are made from four laminations of 1/32-inch plywood and are built up right on the fuselage side. This method ensures a good fit and produces a very strong and light structure. When the doors are completed the cabin openings are cut to proper size and a strip of 1/32-inch plywood, 1/8-inch wider than the balsa sheeting, is glued inside to act as a door stop and to reinforce the door hinge area. The door is held to the fuselage by two 1-inch brass hinges available from most hardware stores. The door windows are made from .030-inch butyrate.

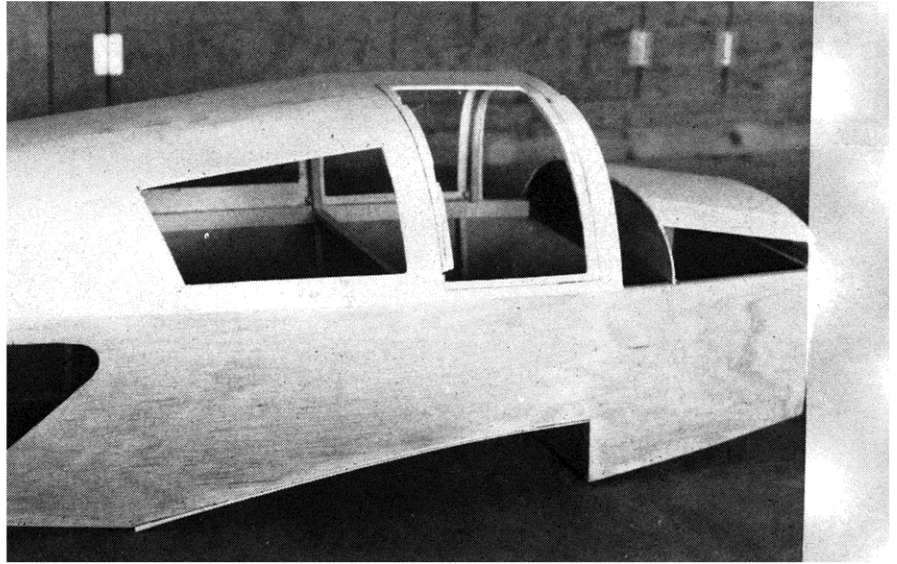
The windscreen is made from 1/16-inch polycarbonate available from plastic supply stores. Don't use plexiglass because it is brittle and subject to damage from bending and chemicals. Epoxy is a suitable adhesive if the edges are roughed up slightly.

The battery, fuel tank, throttle servo, and choke servo (if used), are mounted in the forward fuselage between the instrument panel and the firewall. The balance of the radio is installed behind the seat in the baggage compartment.

## ENGINE INSTALLATION

The engine is mounted to a standoff which is made of 1/2-inch plywood and fibreglassed to the firewall. The standoff should be constructed to suit the engine you choose to use. The original was powered by a Sachs Dolmer 3.7 cu. in. engine. This proved to be more than adequate power even compensating for the high Colorado altitude and a very effective but restrictive muffler system. An engine in the 2.6 to 3.2 cu. in. range will provide scale-like power. I recommend that the engine be mounted on a shock absorbing mount to help protect the radio from vibration. On the prototype this was accomplished by running the engine mounting bolts through a length of rubber hose inserted through the front of the standoff.

A 32-oz. rectangular solvent can was used for the fuel tank. It is mounted in the top of the fuselage between the instrument panel and the firewall. This is the full scale location and easily permits the scale gas cap to be functional. The manual choke was routed to the mixture control knob on the instrument panel via a Nyrod pushrod. The engine kill switch is mounted on the front of the firewall and is also operated



from the instrument panel. It is wise to use Nyrod for these applications because steel cable can carry interference from the ignition system back to the radio compartment.

## WING

The wing is constructed in one piece with the center section built first and the tips added on later. The left wing will be built over the plans while the structure is duplicated for the right wing. Begin by laying the four wing spars out on the plans parallel to the main spar location. Ensure that at least 3 1/2 inches of the main spars extend beyond W4 to be used for the polyhedral joints. Using a combination square mark the centerline location and each rib location on the left wing spars. Rotate the spars 180 degrees, align the centerlines, and mark the rib locations for the right wing using the left wing plan. These marks will be used to position the ribs during construction of the center section. When all of the ribs have been cut out, clamp with "C"-clamps for final sanding and drilling of the lightening holes. The notches for the spars can also be cut at this time using a band saw or radial arm saw. Position each center section rib using the marks on the spars. Before gluing the ribs in place build up the trailing edges from 1/8-inch balsa wood.

When the trailing edge assemblies have dried, slide them into position to ensure that the ribs are in alignment and glue everything. Before the glue dries it's important to add washout. Place a 1/2-inch scrap of balsa under the rear spar at the centerline and a 3/4-inch shim under the rear spar at each W4 location. Weight the wing down to hold everything in position and allow to dry thoroughly before proceeding. The leading edge

Felt pen lines indicate actual door outline. The excess sheeting inside of the lines is the jig for building the doors.

and top sheeting can then be installed. Next, remove the wing from the building board and add the landing gear mounts, shear webs, and bottom sheeting in that order. NOTE: The shear web behind the landing gear mount should not be installed until the landing gear is fitted and the T-nuts are installed. A little epoxy on the T-nuts will prevent them from coming loose when servicing the gear.

The wing tip sections are built directly onto the wing center section. They are built in one piece to ensure proper alignment and then the aileron portions are removed and framed up. Begin by cutting out the ribs, tapering the main spars and marking the rib locations on the spars. Glue the main spars to the center section main spars, add the polyhedral braces to both sides and clamp until thoroughly dry. Position rib W8 in place to ensure the proper taper for the main spars. The remainder of the ribs, rear spars, and trailing edges are added as was previously done with the center section. The leading edge and leading edge sheeting are added next. NOTE: There is no additional washout from W4 to W8.

To build the ailerons, cut them off of the tip section just behind the rear spar. Glue 1/8-inch balsa across the top and bottom rear spars with the grain vertical. This balsa sheet is inadequate to support the aileron hinges so a block of soft balsa is glued in at each hinge location. Cut enough of the aileron ribs away (approximately 9/16-inch) to permit installation of the 1/4-inch sheet balsa, the 1/4-inch square balsa aileron



Completed wing section.

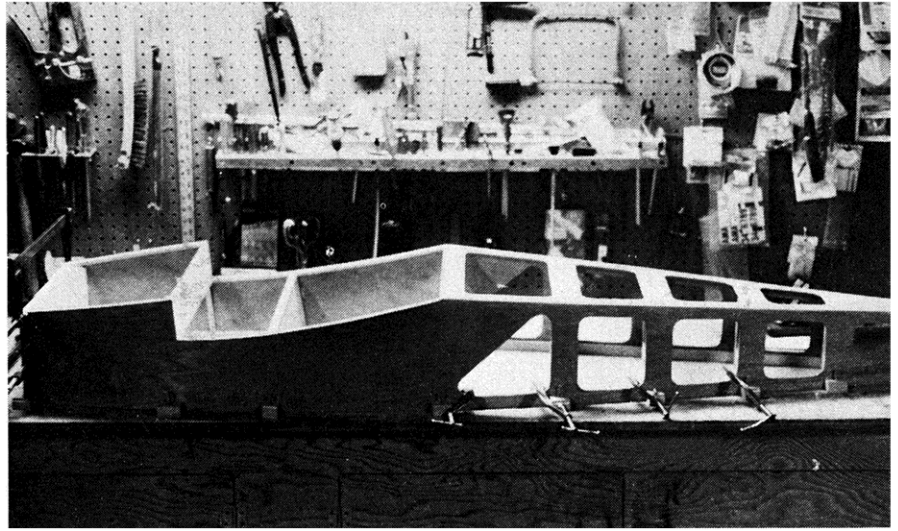
leading edge, and the hinges. The diagonal ribs are added next to prevent warping and to increase rigidity. Finally, the 1/8-inch balsa sheeting, cap strips, and wing tips are glued in place.

I chose to drive both ailerons from a single S16 servo mounted in the wing center section. The aileron servo drives two cut down CB Associates bellcranks via a cable system. The bellcranks in turn operate the ailerons through a short pushrod. This method works very well but the aileron servos may be mounted in the wing tips if you prefer.

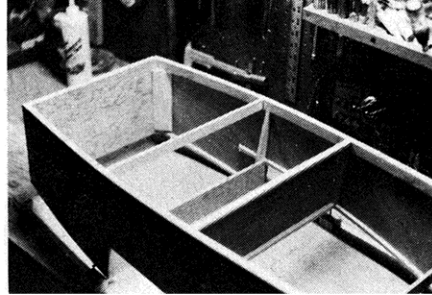
## VERTICAL AND HORIZONTAL STABILIZERS

The horizontal and vertical stabilizers are built over the plans. Construction is straightforward. Note that the shape is somewhat elliptical looking forward from the hingeline. Begin by cutting out the ribs and shaping the 1/4-inch balsa hingeline pieces. Shim the assemblies so that the centerlines of the leading and trailing edges are parallel to the building board during construction to prevent building in a twist. The elevator and rudder ribs are triangular and no pattern is required. Balsa capstrips are used over all ribs to provide a smooth broad surface for covering.

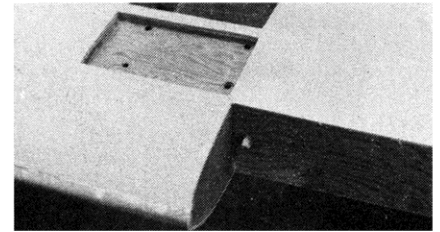
The stabilizer assembly is removable for access to the pushrods and the tail wheel mounting area. It is held in place by a 1/4-inch hardwood dowel and two 6-32 bolts. The two lower rudder hinges must come apart to remove the stabilizer assembly so it is important to use re-



Basic fuselage assembly clamped to jig.



Fuselage is turned upright when dry for installation of the bulkhead tops. All strip wood in this photo is spruce.



Bottom view of wings shows 5/16 inch aluminum mounting rod and cutout for landing gear mount.

movable hinge pins.

## LANDING GEAR

The landing gear is made from two layers of 1/8-inch T6 aluminum. Form the gear to the shape shown on the plans and bolt the two layers together using 6-32 screws. Clamp the gear legs to the wing and drill the mounting holes. After the mounting holes are drilled, the "T"-nuts and the remaining shear web can be installed. The gear should be formed so that there is 1 to 2 degrees of toe-in to assure good ground handling.

The axles are made from 4-inch 1/4-20 bolts with the heads cut off. The threaded portion is used to bolt the axle to the gear leg with a nut on each side. The wheel rides on the unthreaded portion and is held in place by 1/4-inch wheel collars. Du-Bro 6-inch treaded wheels are the proper scale, fit well inside of the wheel pants, and are very realistic in appearance.

## COWLING AND WHEEL PANTS

The wheel pants are made by carving and sanding Styrofoam blocks to the proper shape, coating with several coats of latex paint, and laying up two layers of 6-oz. glass cloth over the mold using fiberglass (pol-

yester) resin. The latex paint seals the foam and prevents it from being attacked by the resin. Make absolutely certain that it is sealed. I prefer to use Styrofoam because it is inexpensive, readily obtainable, and can be easily removed. When the resin is fully cured, acetone can be poured into the mold to dissolve the foam.

The wheel pants are supported on the axle by pieces of plywood glued to each side of the pant with polyester resin. The inboard side (1/8-inch) holds the "T"-nuts for the screws to mount the pant to the gear and the outboard side (1/4-inch) has a 1/4-inch hole drilled through the plywood to accept the end of the axle.

The cowling is made just like the wheel pants except that the foam blocks are tack glued directly to the firewall and sanded to shape. Protect the fuselage from resin with masking tape and lay the glass up right on the fuselage. After the cowling is removed a 1/4-inch plywood frame is glued inside using polyester resin and glass cloth. The purpose of the frame is to provide rigidity and a means of attaching the cowling to the firewall.

## SCALE DETAIL

Every builder will make his own decision on how extensive the detail-

ing will be. A photo documentation package is available for those who would like to go all out and duplicate N9293. Below is a summary of the methods used to create the detail on the prototype.

The navigation light lenses, strobe light lens, fuselage vent, and rudder pedals were created by vacuum-forming .050-inch butyrate over molds which were carved from basswood. If you do not already own one, a vacuum plenum can be made for about two dollars and is very useful for projects such as this. The wing tip lights were colored using Tamiya clear red and clear green paints. I made the lights functional by adding flashlight bulbs for the navigation lights and a McDaniel strobe. The lenses are attached with silicon glue and may be easily removed with a razor blade to permit bulb replacement. The battery pack for the lights is plugable so that it may be omitted for sport flying. The toggle switches for the lights are mounted on the instrument panel in the scale locations. The headphone jack on the passenger side serves as the charge receptacle for the batteries.

The instrument panel has several functional features in addition to the nav and strobe light switches. As mentioned previously the choke and kill switches are operated from the panel and the "TO" and "FROM" lights on the NAVCOM are actually radio battery voltage indicators which flash when the "RA-DIO" toggle switch is turned on.

The instrument panel is made from .016-inch aluminum sheet which is painted flat black. The lettering is accomplished using 1/8-inch dry transfer material. The largest instrument faces available at the time the prototype was built were 1/4 scale, so it was necessary to enlarge them on a copy machine with an enlargement feature. The seat cushions were made from some excess material left over from the full scale upholstery. One-inch red ribbon was used to create the seatbelt and harness straps while the buckles were built up from 1/32-inch plywood. The microphone is carved from balsa and the coiled cord is from one of those pens you find at market checkstands.

Homebuilders sometimes use strange materials in construction of their aircraft and that was certainly the case with N9293. The radio speaker is housed in a cigar box which is mounted on the bulkhead at the rear of the passenger compartment. The gas cap on the original was fabricated from a small tomato juice can and includes an integral fuel gauge. It would be a crime to build this

model and not duplicate these features which add so much "character." The model's gas cap is removable to provide access to the fuel filler tube. It was made by cutting the top off of a plastic Pactra paint bottle, gluing the plastic portion to the fuselage and building the gas cap around the metal lid. Plastic tubing was used to make the handholds on the top of the fuselage (3/32-inch) and the radio antenna shaft (1/8-inch). The radio antenna base was carved from balsa and mounted on 1/16-inch plywood.

### SETUP AND ALIGNMENT

Before covering, the alignment should be checked against the following specifications:

*Wing incidence (root)*—+4 degrees

*Wing incidence (tip)*—+3 degrees

*Stab incidence*—+1 degree

*Engine offset*—0 degrees downthrust  
1-2 degrees right thrust

*Landing gear*—1-2 degrees toe-in  
(each wheel)

### COVERING AND FINISHING

Solartex was selected for the covering material both for its ease of application and the fact that the texture closely duplicates the fabric used on the full scale aircraft. Acrylic enamel paint, with a plasticizer, was used to duplicate the yellow, white, and black paint scheme of the full scale aircraft. No primer was required over the fabric. Paint should be used sparingly to keep the gloss down and to prevent too much filling of the fabric texture. The red lines on the wing walks were made from trim Monokote and the anti-skid material was purchased from a hardware store and cut to proper widths.

### TRANSPORTATION

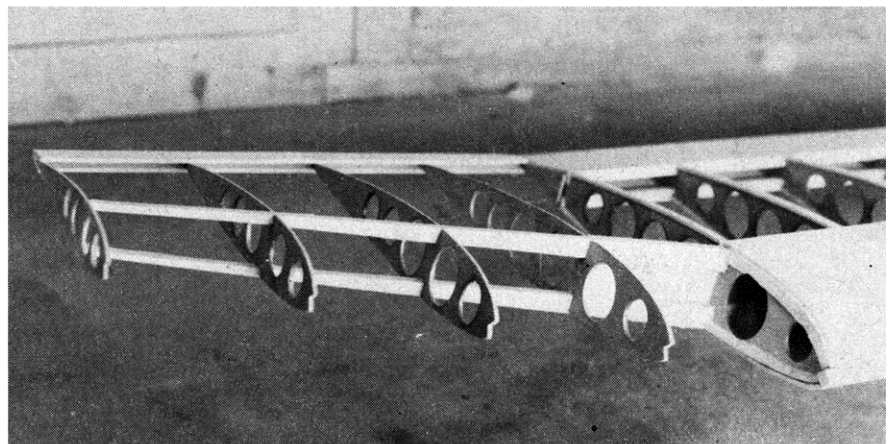
If you have gotten this far and you do not own a truck or a van you are probably starting to wonder how you are going to transport this giant to the local flying field. The Jodel is large, even by Giant Scale standards. I contemplated building it with removable wing tip sections but the fuselage is still too long for either of my cars.

Here is how I solved the transportation problem for the Jodel and also for an even larger 1/2 scale Druine Turbulent. I decided to build a cartop carrier from a wooden ski rack which I purchased at a garage sale. The fuselage rests on top of the rack and is secured by cloth straps. The wing sits upside down in a cradle made of fir and is sandwiched in by a fir cap. The cap is held to the cradle by a hinge on the inside and a hasp on the outside. The airfoil shape is cut into the cradle and cap 1/2-inch oversize all the way around. Rubber weather stripping fills the extra half inch and protects the wing from scratches. A bungee cord hooked through the hasps ensures that they do not open on the road. In addition to the brackets which secure the rack to the roof gutters I also tie the rack to the car roof with a nylon safety rope.

This carrier is very easy to put on the car and prevents me from having to assemble an aircraft at the field from many small sub-assemblies. Simply plug in the aileron servo and bolt on the wing. I have used this carrier for over three years and hundreds of miles with no problems even at speeds of up to 60 mph.

### TRIMMING AND FLYING

Now for the fun part. Naturally, the Jodel should be thoroughly checked out and preflighted before attempting the first flights, prefer-



Wing tip construction proceeding with addition of ribs and trailing edge.

ably by someone other than the builder. It's amazing how easy it is for us to overlook our own mistakes.

If built according to plans, the first flight should be exciting but uneventful. Of course, full power should be used on takeoff and a little right rudder will be required to keep the nose pointed in the right direction. The Jodel will stay on the runway until a touch of up elevator is applied. The right rudder should be held on climbout and gradually relaxed as speed is gained and the angle of attack is reduced. I normally take a new ship up to a safe altitude and experiment with each of the controls to feel the plane out and let us get used to each other.

The most important tests for me on the first flight are stall tests. The elevator should be eased back at varying rates and at different throttle settings until the stall and any tendency to fall off on one wing are entirely predictable. The model Jodel, like its full scale counterpart, displays excellent characteristics in this area. Stalls are very gentle and predictable with no tendency to fall off to either side. At the prototype weight of 32 lbs., slow flight is so good that I have been unable to land at full idle with a 12-inch pitch prop and was forced to kill the engine on final in order for the Jodel to settle in. Consequently, I would recommend nothing larger than a 20-10 prop.

Wheel landings and full stall landings can be performed with equal ease. Just be prepared for a slow stall speed.

The 1/3 scale Jodel F12 has been a true pleasure to build and fly. I hope that you will find it an equally satisfying project. If you have any questions about the building or flying of your Jodel or would just like to swap stories please don't hesitate to write or call:

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Louisville, Colorado 80027  
(303) 666-9523

*EDITOR'S NOTE: Dear Readers: We thought you'd enjoy reading this short autobiography by the talented author of the JODEL F12 article.*

I began modeling in 1954 at the age of nine in order to earn a Cub Scout merit badge. My first plane was a 25-cent Comet kit of a rubber powered J3 Cub. I built several similar stick models after that Cub.

It didn't fly and neither did they.

I got into power with one of the prebuilt control line planes a year or so later and began building free flights to utilize the WEN-MAC .049 engine which was all that was left after my numerous crashes. After several unsuccessful free flight models I finally got one to fly. No one was more surprised than I.

I should have left well enough alone but could not resist the urge to move into R/C. So, at the wise old age of 13 I saved a whole summer to purchase a primitive radio. Needless to say, it didn't work and I was back where I had started. If I had thrown that radio in a lake it would have sunk, intermittently. Kids in those days seemed to have a lot more persistence or a lot less brains than kids today (I'm still not sure which). So I continued to build and crash in the hopes that one day I would become a real R/C pilot. As is so often the case, it was not until a good friend, who was also an electronics engineer, took me under his wing that I was able to achieve that first successful flight.

I was really hooked now. Kits were relatively expensive in 1959 so I designed and built many planes from scratch. You could spend up to \$15 on a kit but could buy the materials to build a comparable plane for about a third of that amount. I never lost the satisfaction of scratch-building and have designed and built about twenty planes in the last thirty years.

It occurred to me that there might be interest in some of these planes when a fellow club member asked if he could obtain a copy of the plans for one of my ships. That event led to my decision to market plans for the Jodel and hopefully a couple of other planes.

I am one of those modelers who believes that the definition of the word AIRPLANE extends far beyond "any manmade object that moves through the air." I have an appreciation for models that are held in the air by their wings, rather than their engines and bear some resemblance to real airplanes. It makes me just a little ill to see J3 Cubs doing vertical rolls and no model has ever been more appropriately named than the Ugly Stik. I realize that my personal bias places me firmly in the minority but I sense that I may have some company in that small group from the readers of your publication.

I have now been involved in this hobby for about 30 years and have loved just about every minute of it. I hope that I can share some of my experience with your readers through this construction article.

Plans for the JODEL F12 are available for \$35.00. Also available is a 30-photograph documentation package for \$12.00 additional. Write to: Jerry Van Heeswyk, 231 Sunland Street, Louisville, CO 80027. Phone: (303) 666-9527. ●

