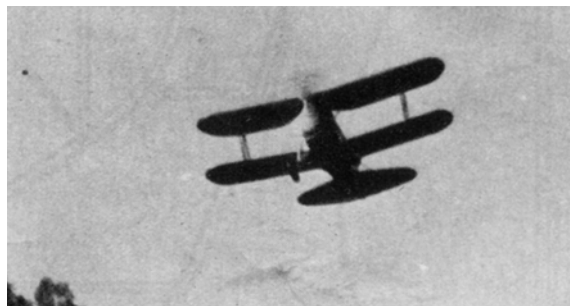


A Flying Grumman Fighter

How You Can Build a Model of One of the Latest U.S. Navy Fighters That Is an Excellent Flier By WILLIAM WINTER



The completed model is faithful to scale and detail



The model in full flight is very stable

THE Grumman F3F-1 is the latest accepted single-seater of the sturdy Grumman line. Design improvements through two successive models since the F2F-1 have improved the performance. This new machine is one of the foremost fighting planes of the world and because of the excellent combination of structural ruggedness, maneuverability and high speed should prove an awesome foe.

The power plant is the well known Pratt & Whitney Twin Wasp Junior affording the ship a high speed of at least 250 m.p.h. on a total of 650 h.p.

The model presents the same pugnacious appearance and stream lines as the full scale plane. The performance for this type of ship is excellent. Needless to say the ability to stand abuse is inherent. In flight its stubbornness and speed are particularly striking. The satisfaction that this model is sure to afford, will amply justify any amount of time and care spent in construction.

Fuselage

The method utilized calls for the use of four master stringers cut from sheet balsa. Trace the side, top and bottom outlines of the fuselage on 1/16" sheet balsa and cut to shape. Mark the positions of the bulkheads on the master stringers. Cut the bulkheads from 1/16" sheet balsa in accordance with the patterns given. The first bulkhead, however, is cut from 3/16" sheet so that it may be curved in to the front as seen on the plan. The No. 8 bulkhead is two ply 1/16" sheet. Cut only the notches for the master stringers marking the others for a later operation. Cement the bulkheads in place on the side master stringers starting the operation with the widest two. When dry, cement the bottom and top master stringers in place taking care that the assembly is aligned as required. Bend the rear hook to shape from .028 wire and insert in the two ply No. 8 bulkhead. Cement the 1/16" sq. auxiliary stringers in place cutting the notches already marked as the work progresses. The cockpit cutout is formed by bending 1/32" sheet balsa. Mark the outline and cut out when dry. Cut the cockpit former from 1/16" sheet and cement in place. Cut two ribs similar to the main wing rib and glue one to the right hand

bulkhead fillet extensions and the other to the left hand. Carve the two small fillet blocks, visible on the three main views, from soft balsa and cement in position having first provided the 1/32" sheet mounting as required between the second and third bulkheads. The fillet sheet is also 1/16" sheet balsa. Its pattern may be obtained from the top view. Note that the center section strut joint at the fuselage is reinforced with sheet balsa. The landing gear joint is also strengthened in like manner.

To cover use narrow strips of tissue running the full length of the fuselage. Trim surplus paper after each strip has been attached. The finished covering is evenly sprayed and doped.

Landing Gear

The two balsa triangles are cut from 1/8" sheet and streamlined as detailed. The oleo struts are built up as detailed. Note the angles at which the bamboo pegs are inserted in the balsa portion of these struts. The axles are V-shaped and are formed from .028 wire. The fuselage ends of the axles are inserted and glued in the No. 2 and No. 3 bulkheads. The wheels, 1-7/8" in diameter, should be the heaviest obtainable to aid in the balancing of the ship.

The 3/8" tail wheel is mounted on an .014 wire axle attached to the fuselage structure as seen on the side view.

Tail Assembly

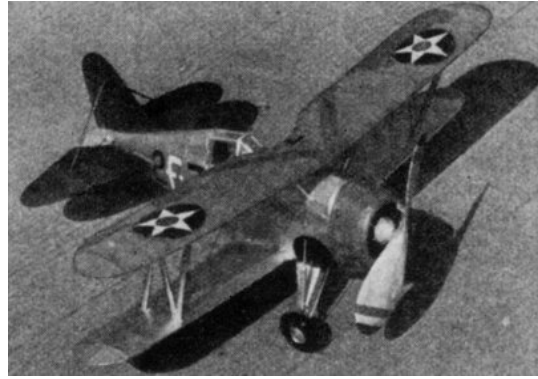
The tail block is shaped from soft balsa and is cemented permanently in place. The top of the block is rounded to 3/16" width to support the rudder. The streamlined housing for the landing hook is 3/16" sheet.

The spars of both the stabilizer halves and the rudder are cut from 1/16" x 3/16" balsa. The cross pieces with the exception of the innermost, which are 1/16" x 3/16" are 1/32" x 3/16". The edges of all sections are bent to the required shapes from 1/16" sq. bamboo.

To cover use a separate piece of tissue for each side of both stabilizer halves and for the rudder. Attach the paper at the edges only. Spray the semifinished covering with water and pin the sections to the bench until dry to

prevent warping. When thoroughly dry, brush lightly with clear dope and attach the units to the fuselage, aligning them with care. The stabilizer has been set at a slight positive angle. The stabilizer braces are cut to the required

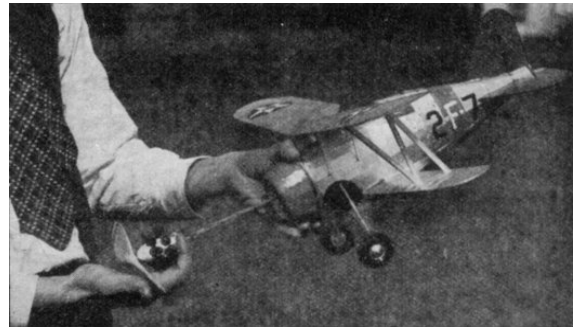
length from 1/16" x 1/8" balsa and streamlined. Cement the 1/8" filler sheets in position between the stabilizer opening and the fuselage.



Just like a large plane in appearance. It is a real addition to your fleet



Launching the ship. Note its steady get away



The motor is wound by pulling out the nose plug

Wings

The top wing is made in two pieces. The two center ribs are 1/16" sheet. The spars of the top wing are 1/16" x 1/4" while those of the lower are 1/16" x 3/16". The leading edges are 3/16" x 1/8" and the trailing edges are 3/32" x 1/4".

The construction is accomplished in the usual manner. The spars are pinned to the bench. The ribs, with the exception mentioned above and the first rib of each lower panel, are cut from 1/32" sheet. Cement the ribs to the spars. The wing tips and the center section cutout are bent to shape from bamboo. Note that the innermost ribs of all panels are slanted slightly for dihedral. Small pieces of 1/32" sheet are inserted between the first two ribs of each panel to prevent warping when covered.

To cover use a separate piece of tissue for each side of all wing panels. Fasten the edges in place at first. Spray the covering thus attached and pin the panels to the bench until dry to prevent warping. It may be necessary to use small pieces of tissue to cover the tips to prevent wrinkles. When dry, apply a light coat of dope. Rub all frayed edges down with dope.

If the wings have been assembled correctly, the dihedral when mounted will be 1/2" at each tip.

The light and bomb rack shown on the plan and located beneath the lower wings are constructed of balsa and glued in place.

The hand grip on each lower wing tip may be painted.

The enclosed control for the aileron is nothing but a small block cut to shape and cemented to the covering.

The center section struts are cut to the required lengths from 3/32" x 3/16" balsa as are the interplane struts. Cut away a small piece of paper at each of the strut joints so that the struts will come directly in contact with the wood. Cement the center section struts in place on the fuselage aligning them with care. Use pins to hold the work in position until the cement has set. Glue the upper wing in place on the struts. The lower panels are glued directly to the fillet ribs. Check the angle of each to the other and to the plane. Use any convenient objects to hold the wings at the proper angle until the assembly is completed. Cement the interplane struts in position.

Cowling-Propeller-Motor

The cowling as noted is of oval cross section. The front portion is built up of two 1/4" sheets as seen on the various views. Do not complete the shaping of these front sections until they have firmly dried together. The rear bulkhead cut from 1/8" sheet has only a square hole cut in it to hold the removable plug in place when in use. Trace the side, top and bottom outlines of the cowl on 1/16" sheet to obtain the four main cowling supports. Pin the rear bulkhead to the bench and glue the four cowling supports in place using pins to hold them in position. To them cement the front portion of the cowling when it is completed. The remaining eight supports are now cut from 1/16" sheet balsa to fit their particular positions.

Cover the cowling with small pieces of tissue taking care to avoid wrinkles. Make 14 valve covers one of which is illustrated on the side view. Cement them when completed around the cowl to fit over the seven front cylinders.

The crankcase is of three pieces. The two rearmost ones are similar to each other and are to be seen on the plan with the side view. They are cemented together so that the cylinders when fitted to the crankcase will be staggered, seven in each row.

The cylinders are built up of scraps, the rocker arm housings being shaped from strips. Use bamboo or wire for the push rods. Note that a square of balsa at the rear of the plug to fit the reception hole in the rear cowl bulkhead is necessary to prevent the wobbling of the plug.

Cut two two-pronged washers front tin using the pattern shown on the plan. One of these tin washers is forced into the front face of the plug to serve as a thrust bearing.

The propeller blank is shown in detail with all dimensions oil the plait. The carving is done in the usual manner. However do not round the tips until the carving has been completed. Balance with care after sanding, shaving away enough wood to obtain the desired effect. Drill the hole large enough for the .028 shaft. Bend the front of the

shaft U-shaped and force into the prop boss. The extra tin washer already cut is slipped on the shaft and forced into the rear of the hub. Slide a loose washer and the dummy motor on the shaft before bending the rubber hook.

The motive power is eight strands of 1/8" flat rubber.

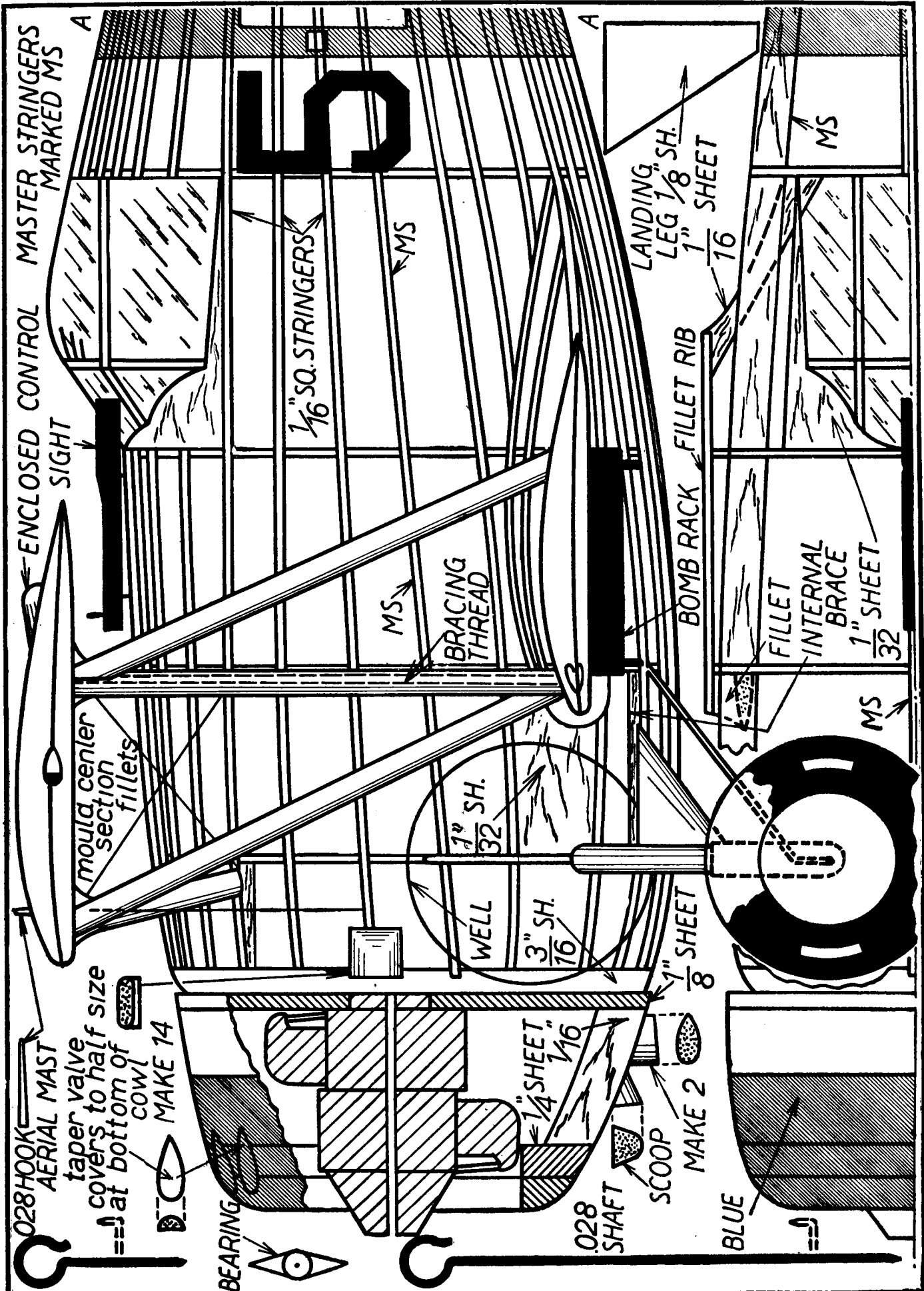
Flying the Model

It will be noticed that the power is excessive for this size model but it seemed more fitting that our Grumman should not loaf along but should zip with the speed of its big brother. Test over deep grass if possible. If not, wind the ship a few turns and let it run along the ground under its own power. Increase the turns gradually adding weight if necessary to provide the proper balance. As the balance is attained, increase the turns to capacity.

The original model was thoroughly tested proving itself to be an excellent flier. It is, however, sensitive to the slightest elevator variation making the balancing operation one to be performed with care. Its sturdy construction and powerful motor causes it to fly as realistically as its prototype. After the usual abuse common to a well flown model, our F3F-1 remains undamaged except for covering.

Bill of Materials	
8	1/16" sq. x 36" strip balsa
2	3/32" x 1/4" x 36" strip balsa
2	1/8" x 3/16" x 36" strip balsa
2	1/16" x 1/4" x 36" strip balsa
2	1/16" x 3/16" x 36" strip balsa
1	1/16" x 3" x 36" sheet balsa
1	1/32" x 2" x 36" sheet balsa
1	1/8" x 3" x 6" sheet balsa
1	1/4" x 3" x 12" sheet balsa
1	3/16" x 3" x 6" sheet balsa
2	1-1/8" sq. x 5/8" block balsa
1	1" sq. x 1/2" block balsa
1	1/2" sq. x 1" block balsa
1	1-3/4" x 3/4" x 1-3/16" block balsa
1	8" x 1-3/8" x 7/8" block balsa
Miscellaneous	
1 oz. cement, 2 oz. clear dope, 2 white tissue, 3 flat bamboo, .028 and .014 music wire, celluloid, 6 ft. 1/8" flat rubber, 1 pr. 1-7/8" wheels, required colored dope or paint.	

**Scanned From February 1937
Model Airplane News**



028 HOOK AERIAL MAST taper valve covers to half size at bottom of COWL MAKE 14

BEARING

028 SHAFT SCOOP MAKE 2

BLUE

ENCLOSED CONTROL MASTER STRINGERS MARKED MS

SIGHT

mould, center section fillets

LD

1/16" SQ. STRINGERS

MS

MS

BRACING THREAD

1" SH. 32

WELL

3" SH. 16

1" SHEET 8

LANDING LEG 1/8 SH. 1" SHEET 16

BOMB RACK FILLET RIB

FILLET INTERNAL BRACE 1" SHEET 32

MS

MS

