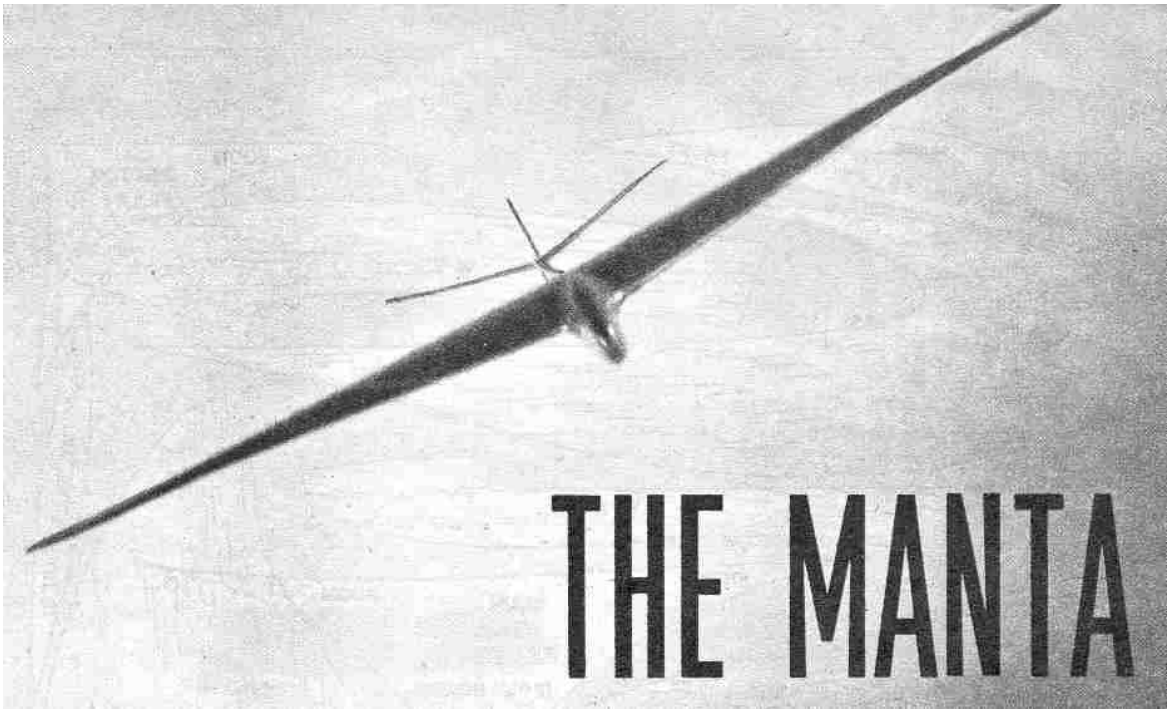
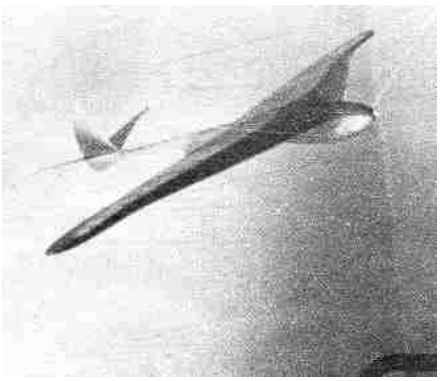
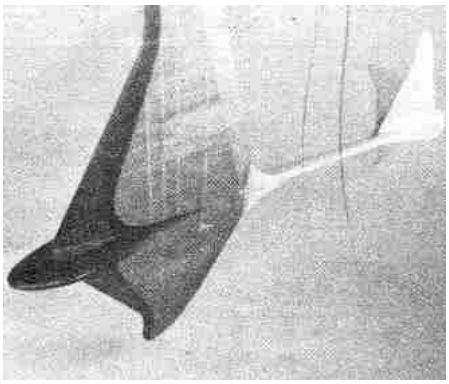


Infinite variations on a single theme is provided by this basic wing design

by **CPL. PAUL PLECAN**



For sheer beauty, this design surpasses most of its competitors -- and it performs, too!



Each angle of the *Manta* shows an entirely different pattern. Note broad wing root, smooth lines

THE *Manta* is that "different" design you've been looking for. Utilizing a unique wing design, the *Manta* holds promise of development in several directions. One possibility could be a sleek gas model or control line racer featuring a "submerged" engine installation for low drag. This could be accomplished by mounting the engine on its side, neatly enclosed in the thick center section of the *Manta* wing.

A catapult glider would be a novel experiment since the inherent strength of the *Manta* wing would enable safe, high speed launchings to be made. As it is, the *Manta* is a fine soaring glider despite its low aspect ratio as compared to existing types.

The author makes no claims of originality in the use of this type planform. It was developed by David R. Davis, who will be remembered as the original backer of Donald Douglas in the formation of the Davis-Douglas company 'way back in 1924. After

the partnership was dissolved, Davis continued his interest in aviation, one important outcome of which was the development of the "Davis wing," the well known section used on the famous Consolidated B-24 Liberator bomber as well as several other Consolidated models.

The *Manta* planform was created by Davis for a single seat pursuit plane he projected for the Army Air Corps back in the 'thirties.

The plane had a "buried" Allison engine and tests on models showed great promise. However, it was not built and the project was abandoned, leaving only the unique planform as the result.

From an aerodynamic point of view, this planform has several advantages. We are all familiar with "wing tip stall" in which airflow about the wing tips causes a stall a short time before this phenomenon occurs over the wing as a whole. When the tips stall, lift is lost over that region, adversely affecting the entire lifting ability of the wing. With the Davis *Manta* type tips, stalling of the tips results in considerably less loss of lift because the area of the stall region is much smaller than on conventional wing planforms with "straight" leading edges. In addition, tip vortices are cut down due to the smaller areas and a general improvement of aerodynamic efficiency of the wing is brought about.

Frankly, we don't know whether the use of these tips on our *Manta* glider resulted in any aerodynamic improvement or not but there is one thing we *are* certain of: it sure gives a slick appearance to the model and maybe that's the most important thing after all!

To begin actual construction, draw up a sheet of 1/2" squares about 18" square and copy the full size outlines from the plans. For a more exact duplication of the ribs, 1/4" squares should be used but we suspect you'll photostat plans up to full size. Next, splice up some 1/8" sheets to obtain 45" lengths for wing spars. Save the soft 1/8" sheet for the tail surfaces -- you'll have to butt-join the sheets to obtain the necessary width here.

The wing layout should be marked off on a long sheet of wrapping paper and the spars pinned in place. The ribs can be slipped in place now, working from the center of the wing toward the tips. Be sure to bevel the trailing edges as per crossection on the plans before cementing it in place, as it will be harder to shape it later. Very soft stock should be employed for the tip sections to keep their weight down. Once the necessary sheet balsa has been cemented in place, the wing can be sandpapered and covered with silkspan of gas model weight. Lighter paper can be used but will not absorb as much punishment.

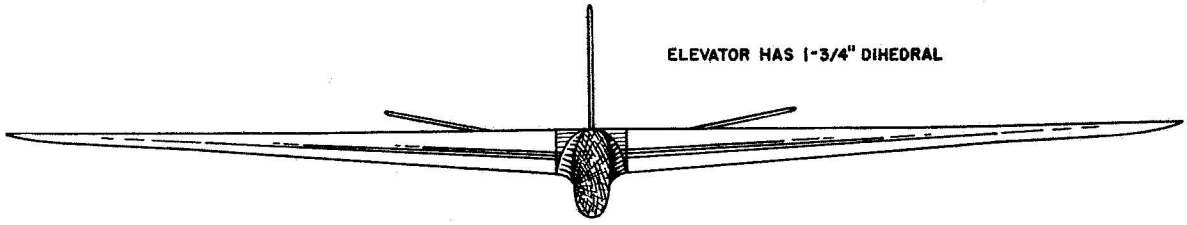
The pod and tail-boom are next, the pod being carved from a 1-1/2" x 4" x 14-1/2" medium balsa block. Use the full sized pod outline to obtain the correct shape. The boom construction should be almost self-explanatory. Just remember that the relation between wing and tail incidences should be zero-zero and that an extra strong joint is desired where the boom connects with the wing. The bristol board fillets serve a dual purpose, improving streamlining and adding strength (enhances appearance, too!). A plastic wood fillet will also help blend the pod into the wing.

Now all that remains is to cut the tail surfaces to outline, cutting and sanding their leading and trailing edges to shape, Some may not desire a dihedralled stabilizer but it helps keep the tips off the ground and avoids breakage to some extent, so it is worthwhile. The tail surfaces should be covered with tissue of silkspan for greater strength and smoothness, as should all other exposed wood portions.

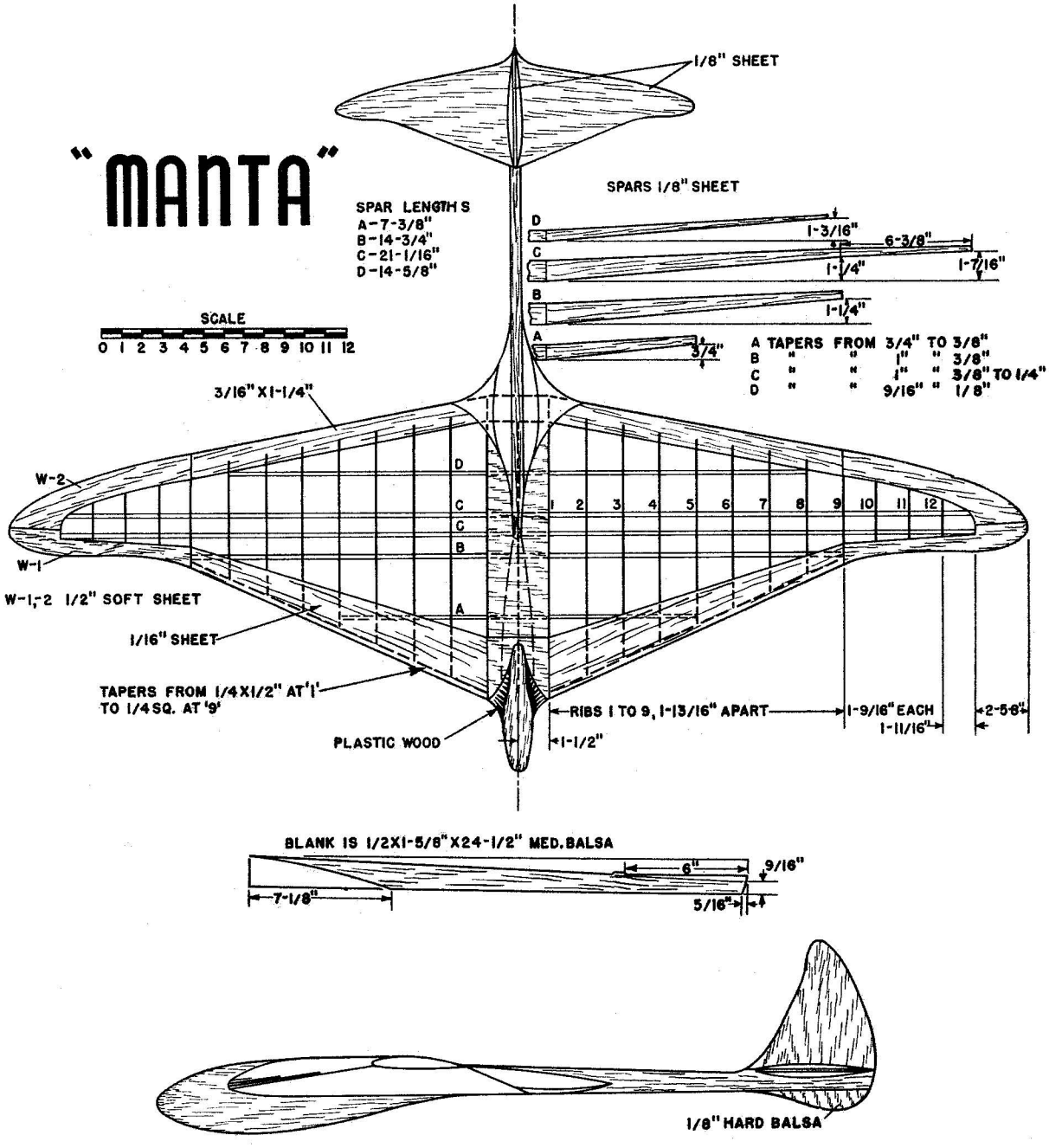
Adjusting is done in the usual manner. Your *Manta* will most probably be tailheavy to start with, so the addition of clay to the pod and test glides over tall grass are in order. When the glide is fairly satisfactory, start working on a rudder warp so you can obtain a circle to the left in the glide. The original *Manta* showed good duration when hand launched in a manner similar to the procedure used for gliders (banked to the right in launching and with the usual "S" recovery and subsequent circling to the left).

Since the original *Manta* was built during a furlough, the author would like to hear from others who have more time to devote to flying, adjusting and further modifications of the design, especially gas powered adaptations.

VICTORY



"MANTA"



DESIGNED BY PAUL PLECAN
DRAWN BY JAY T. HOLMES.
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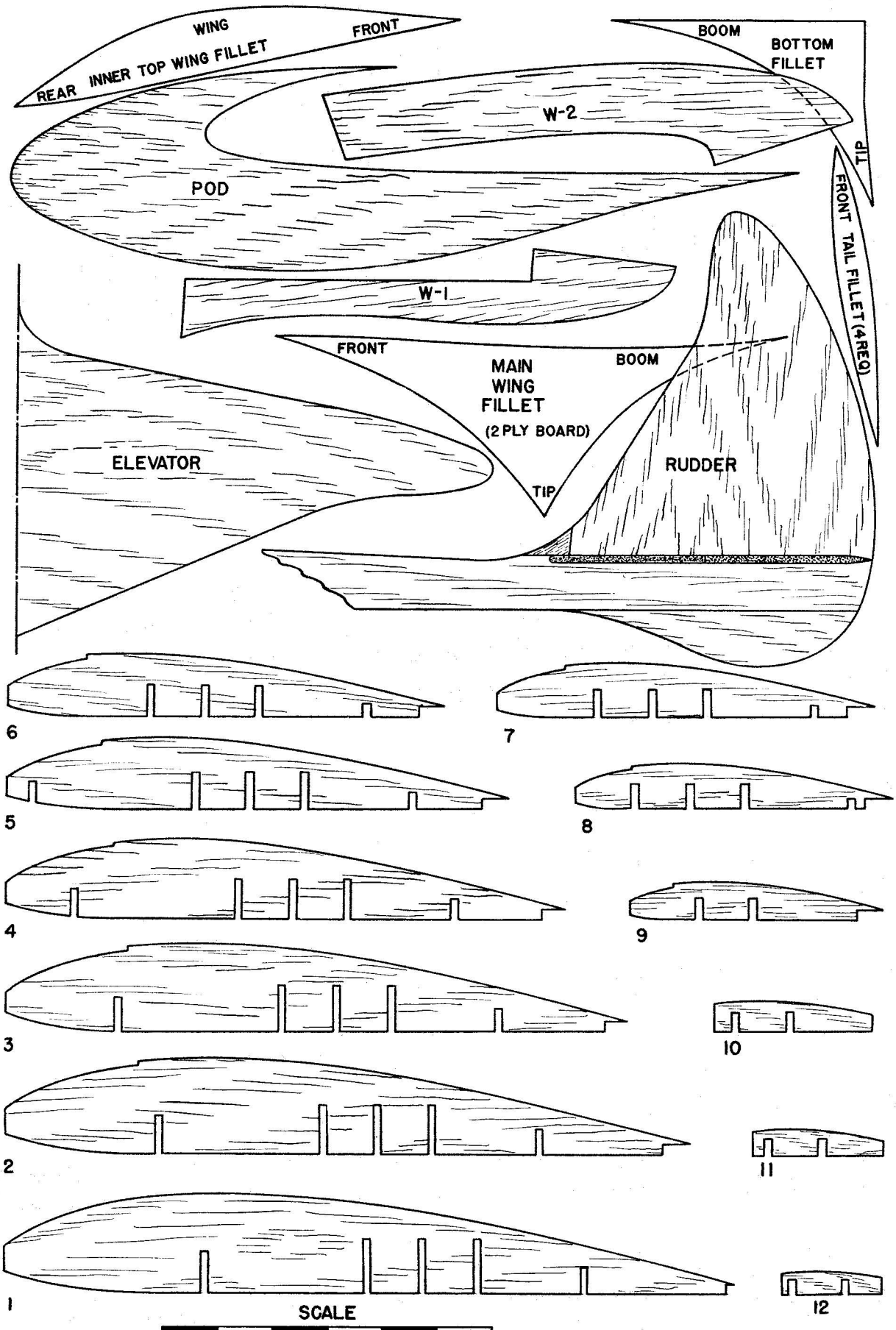

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