Wayne Mathews at left holds *Hornet*-powered ship, while Irwin Huth shows the McCoy 49 version

Speed Trainers

by Willis L. Nye

GENERAL. The development and the construction of these high speed basic trainers represents approximately three months of engineering prior to the assembly work. These models were constructed for competition in the Class C and Class D categories and also for use as high speed basic trainers for future competition. The trainers performed in a commendable way and established records in competition. A *Hornet* or *McCoy* engine may be used as desired. The original Class D ship carried a *Hornet*, while a *McCoy 49* powered the C job.

AERODYNAMIC DESIGN. The wing configuration is shown on Sheet No. 1. It is conventional in all respects and has a tapered constant airfoil section. A Goettingen 595 airfoil was selected and exhibits excellent stability and lift characteristics. At high speed, stability about the lateral and the vertical axis is of major concern. The wing is set at a negative 1/2° angle of incidence. Each wing tip is washed out, and the projected wing area is 46 sq. in.

The tail plane is symmetrical and is an N.A.C.A. 0006 airfoil. It is set at 0° angle of incidence.

The fuselage is tapered in planform and cross section; no fillets are installed at the wing-fuselage attaching points.

Construction of only one model is described, except for the few points of difference between the two; these points are detailed in text and plans.

STRUCTURAL DETAILS. The fuselage is made in two halves, the dividing or parting line being coincidental with the thrust line of the airplane. The lower half is carved and hollowed from straight grained basswood for high strength to weight ratio. Basswood is stronger though somewhat heavier than balsa. The monocoque construction accommodates the engine installation and the fuel tank. The strength and the form is maintained solely by the basswood shell. The wall thickness of the shell is thinned toward the empennage. Dural plates and balsa blocks are used at the engine installation to provide additional strength against the high speed landing loads.

The upper part of the fuselage is constructed of 1/8" balsa planks attached to bulkheads as shown on the drawings to maintain the form. Balsa planking is stronger than a balsa shell in this respect. The fuselage halves are joined by 6-32 Allen head steel screws. By means of these socket head screws, it is possible to join the halves securely together by use of a hexagon rod wrench inserted into a suitable handle. The shank of the wrench should be of sufficient length. The screws fit into tapped holes in the duralumin crossbraces and the bridge structure.

The wing is made of solid hard straight grained balsa, and is carved and sanded to the desired airfoil. It is made in one piece. The wing, the upper half of the fuselage, and the tail surfaces are all covered with *silkspan* which contributes additional strength to the entire structure.

The bridge structure is made of dural formed to the dimensions shown on the drawings. The bridge varies in the basic width dimension for each model. It is flanged and provided with drilled lightening holes to reduce weight. Each type engine presents different installational requirements and different mounting lugs must be used for the various engines. As the prospective builder can see, the function of the bridge section is to form a central structure to which the fuselage, engine, and wing assemble. The bridge is stiffened by providing sufficient thickness of metal for the countersunk rivets and tapped holes for the attaching screws.

For convenience, the bridge and the engine installation should be so constructed that the engine mounting lug is formed correctly. Accuracy in dimensions should be maintained so that no holes require "drifting" to achieve a satisfactory fit. Note that the *McCoy* engine requires

(*Turn to page 42*)