along with its turning ability. The results lead us to believe that weight, if not excessive, concentrated as close to the CG as possible, shouldn't have a great deal of effect on turning and grooving. Our 18% wing is easily capable of lifting the load. Do we use all the control movement possible in a square corner? General feeling is that we don't, indicating more than ample lift.

A good rule to keep in mind is that when turning that tight corner, you have to multiply the weight of the airplane or any part thereof by the force acting upon it or the "G" loading exerted. Thus, if you add 1-oz of weight and you pull 20-G's that 1-oz suddenly weighs 20-oz. A very tangible weight that should be considered when adding up various odds and ends.

Up to this point we have been discussing location of mass that would affect the airplane on the pitch axis. Roll axis (sketch C) is affected much the same way. We must realize that the tips are light, but the moments are great . . . 27" each direction on a 54" wing. With such long moments, the moment of inertia is high, so concentrated weights must be kept small.

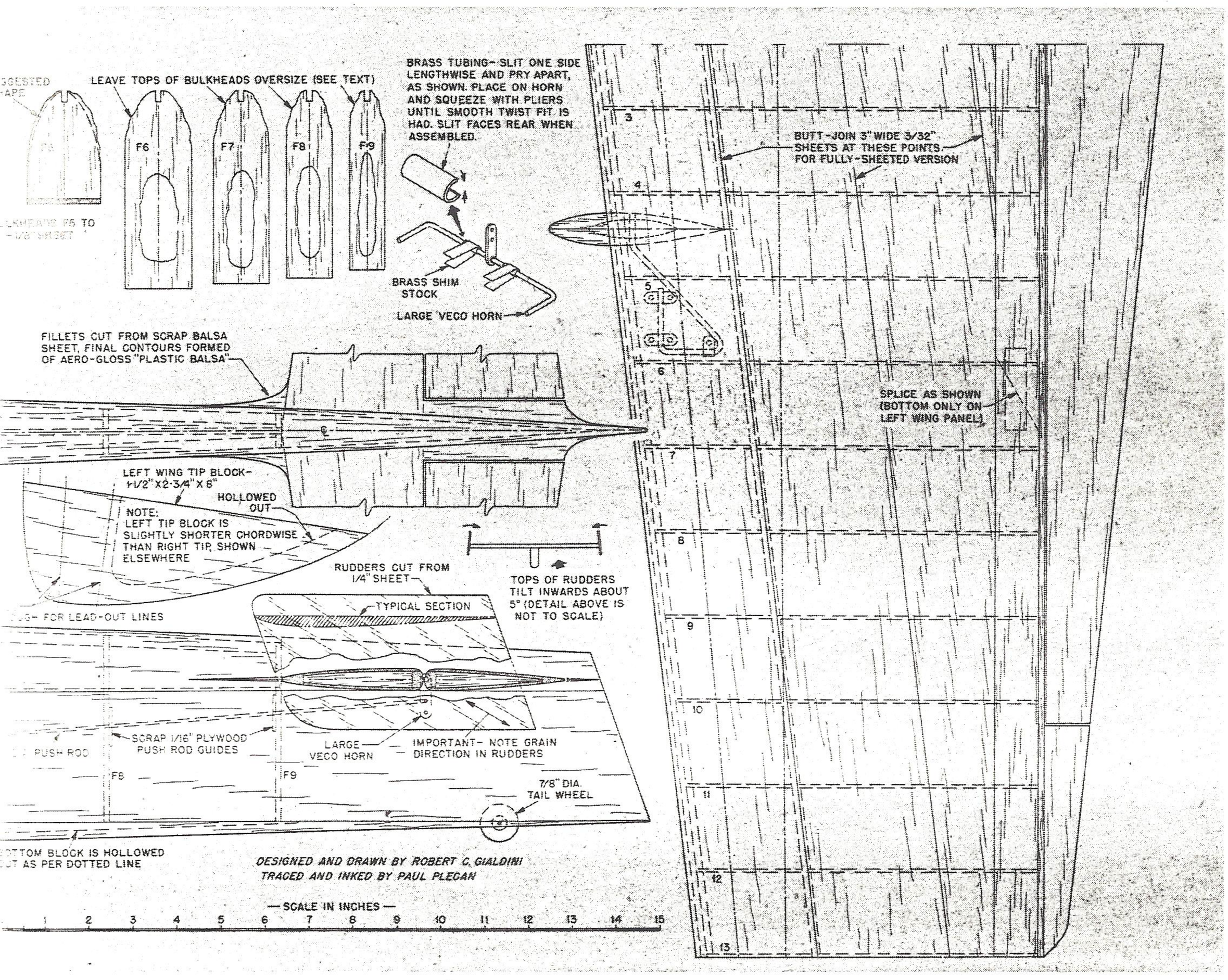
On the Olympic Mark V, I broke one of my own rules by locating the wheels in the wing rather than the fuselage, close to the CG. I tried to alleviate the effect of the wheels being outboard by sweeping the gear in toward the CG. Actually, the wheels and pants are in about the exact location as the previous Olympics so the only weight added outboard is the struts and the landing gear platform and these were kept to a bare minimum. By placing the wheels farther out we are, in effect, adding some bell to that bar again and in the corner, should you encounter a burble of rough air and roll does occur, it is noticeable because of the concentrated weight and the inertia stored up once it has moved.

This leads us to concentrated weight which affects our roll axis—that is, wing tip weight and control line weight. There has been much discussion regarding the merits of wing tip weight, but nothing ever has been pinned down as the answer, only theories. I have always believed in tip weight but at the barest minimum. Back to that problem of the amount of "G" force in the tight corners, since all weight is acted upon equally, that piece of lead has increased to a very tangible amount. One ounce with a 20-G force weighs 20-ozs. Therefore, my rule is to add just enough tip weight to make the outboard tip fall slowly when the airplane is supported on the thrust line.

This, of course, will change with the addition of finish when the inboard wing is larger, but it is not necessary to have an exact amount of weight. Fairly close is good enough. By placing a small amount of tip weight outboard we have a tangible amount of mass which statically unbalances the airplane, but dynamically offsets the weight of the control lines in the tighter corner. They, too, have weight and represent mass combined with a considerable amount of drag. Thus, that 20-G acts upon the control line also, but diminishes as it moves away from the airplane toward the control handle.

I have proved this by flying one airplane trimmed for .015 lines, which are standard, then flying on .012 and on .018 lines. The effect was that both the .012 and .018 lines created a slight wobble in turns because the former were too light and the latter were too heavy. In the .018 test, the corners, when tightened up, became rather unnerving because the tip weight was insufficient to offset the lines causing roll-in and loss of line tension. In conjunction with this I have always tried to keep the lead-out wires and end connectors as light as possible.

A word with regard to the longer inboard panel. Most



DESIGNED AND DRAWN BY ROBERT C. GIALDINI
TRACED AND INKED BY PAUL PLEGAN