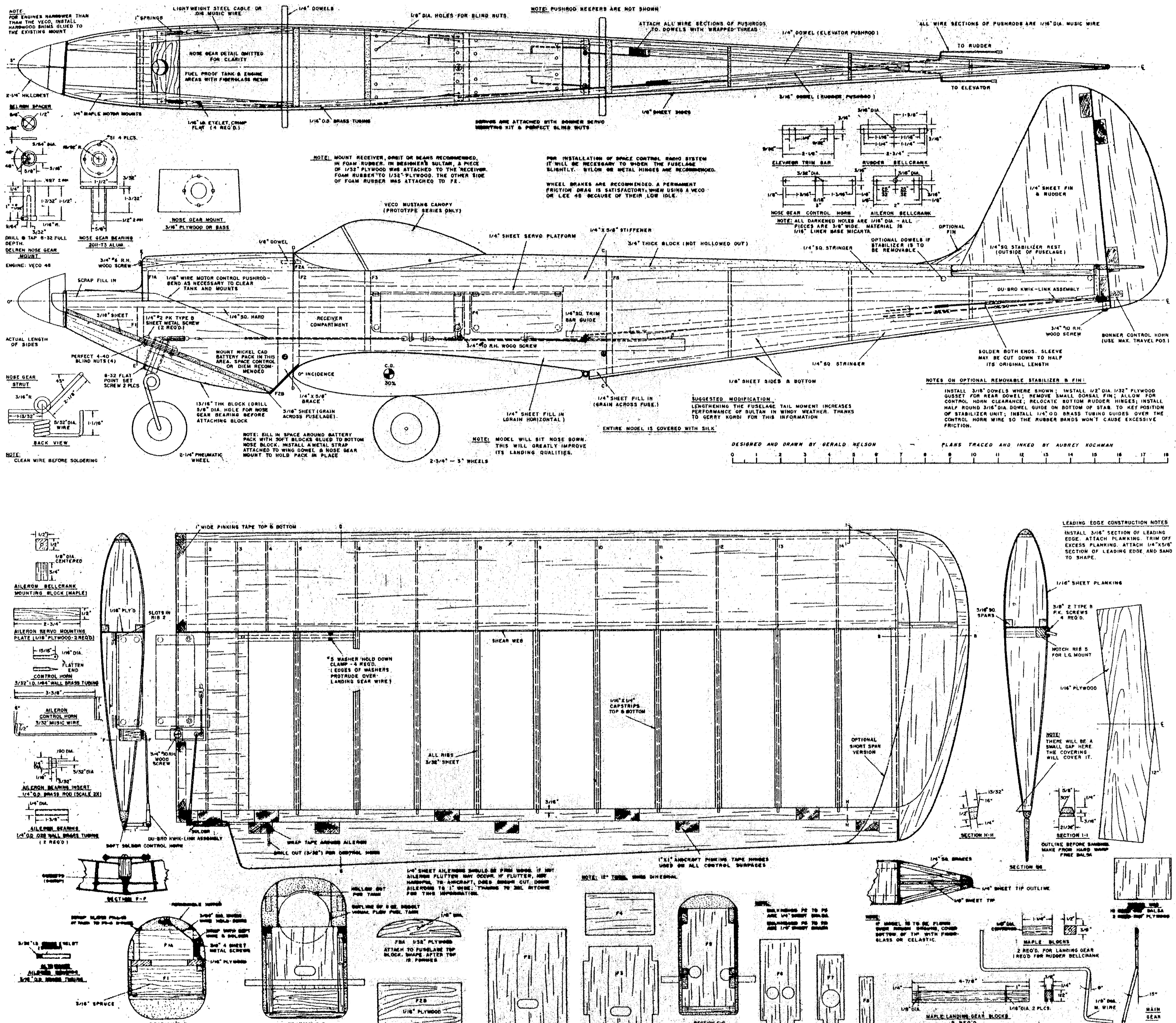
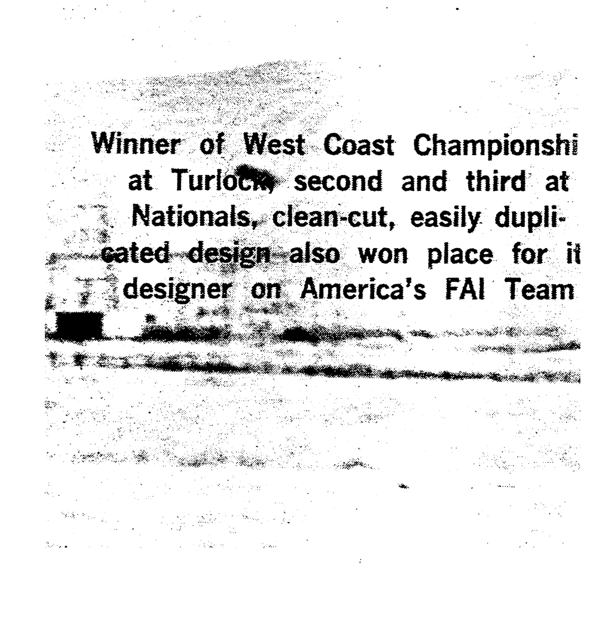


JERRY NELSON'S SULTAN



Winner of West Coast Championshi at Turlock, second and third at Nationals, clean-cut, easily duplicated design also won place for it designer on America's FAI Team

■ The Sultan design is my approach to an attractive, simple-to-build multi channel contest airplane. I am not saying that the Sultan is the absolute ultimate for contest work, but it is a design for your competitors to worry about.

The background of the design concept might interest the reader. The Sultan was my grst ship with full span ailerons. Correspondence with Hal deBolt prompted me to try this type.

After drawing up a rough set of plans, Sultan #1 was built in one week. This proved out its simple-to-build features. The ship weighed 5-lbs, 6-oz. A Space Control radio system was utilized. The ship flew quite well but it had one serious fault. Directional stability was lacking in consecutive maneuvers such as loops. I overcame this by adding additional fin area. This solved the directional problem but created another. Because of the enlarged fin, it was difficult to accomplish spin maneuvers. I added more rudder and elevator area and the result was a positive spin maneuver.

Sultan #1 also was my first attempt at utilizing a full symmetrical airfoil section. The results were gratifying. Inside and outside loops were consistent in size. As you know, this is not usually the case with a semi-symmetrical airfoil. Now the symmetry of the loops is very evident in the vertical eight maneuver. There is no "knothole" in the outside loop portion of the eight.

Takeoffs and landings are improved with the symmetrical airfoil. To generate the necessary lift, the airfoil must fly at a higher angle of attack than normally. This results in a nose-high attitude of the fuselage, which is desired for good landings and takeoffs.

Stall recovery is also no problem. Stalls are very mild with no tendency to snap out of the stalls nor wing dropping. This gives a feeling of confidence during short field takeoffs and low and slow landing approaches.

While #1 was being flown, I built another Sultan for my 10-channel Orbit reed system. Knowing how the Sultan flew on proportional, I was curious to see how it flew on reeds. The first flight was quite spectacular. I knew the ship was a little bit tail-heavy, but I didn't know how serious it would be. I found out the first flight—loops were about 15 feet in diameter—vertical eights were fantastic to watch. The only thing I couldn't do was to fly level . . . a minor problem! Five ounces of tail lightener (nose weight) cured this.

The tail-heavy condition proved that a symmetrical wing design should be balanced farther forward than usual. About 25 to 35 percent is about right for a symmetrical wing design, whereas 35 to 40 percent is about right for a semi-symmetrical job.

After a few minor trim flights on the #2 Sultan, I found that the ship proved to be a fine flyer on the reed radio system.

Sultan #3 was built with a tricycle gear installation. The tricycle landing gear greatly improved the ground handling characteristics over the two-wheel gear on #1 and #2. Two-wheel gears are just as good as a tricycle gear providing the aircraft weighs over 6¾-lbs and if takeoffs are always directly into the wind. Cross winds and two-wheel gears don't mix too well. I have been to several contests where the takeoffs had to be slightly cross-wind and it was next to impossible to do a full point take-off or landing with a two-wheel gear.

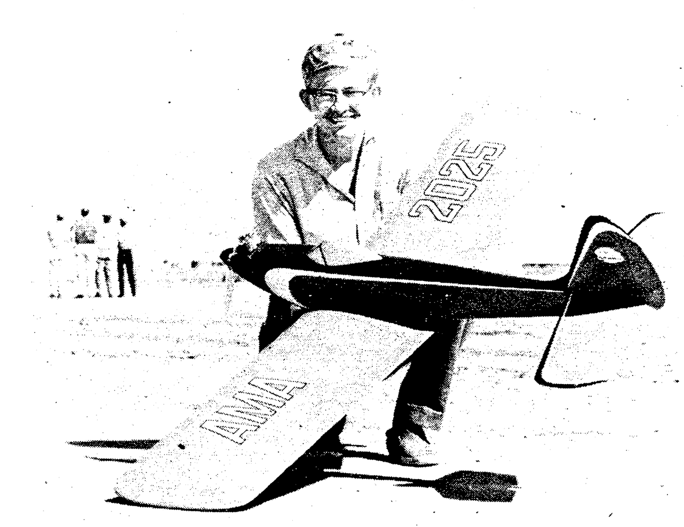
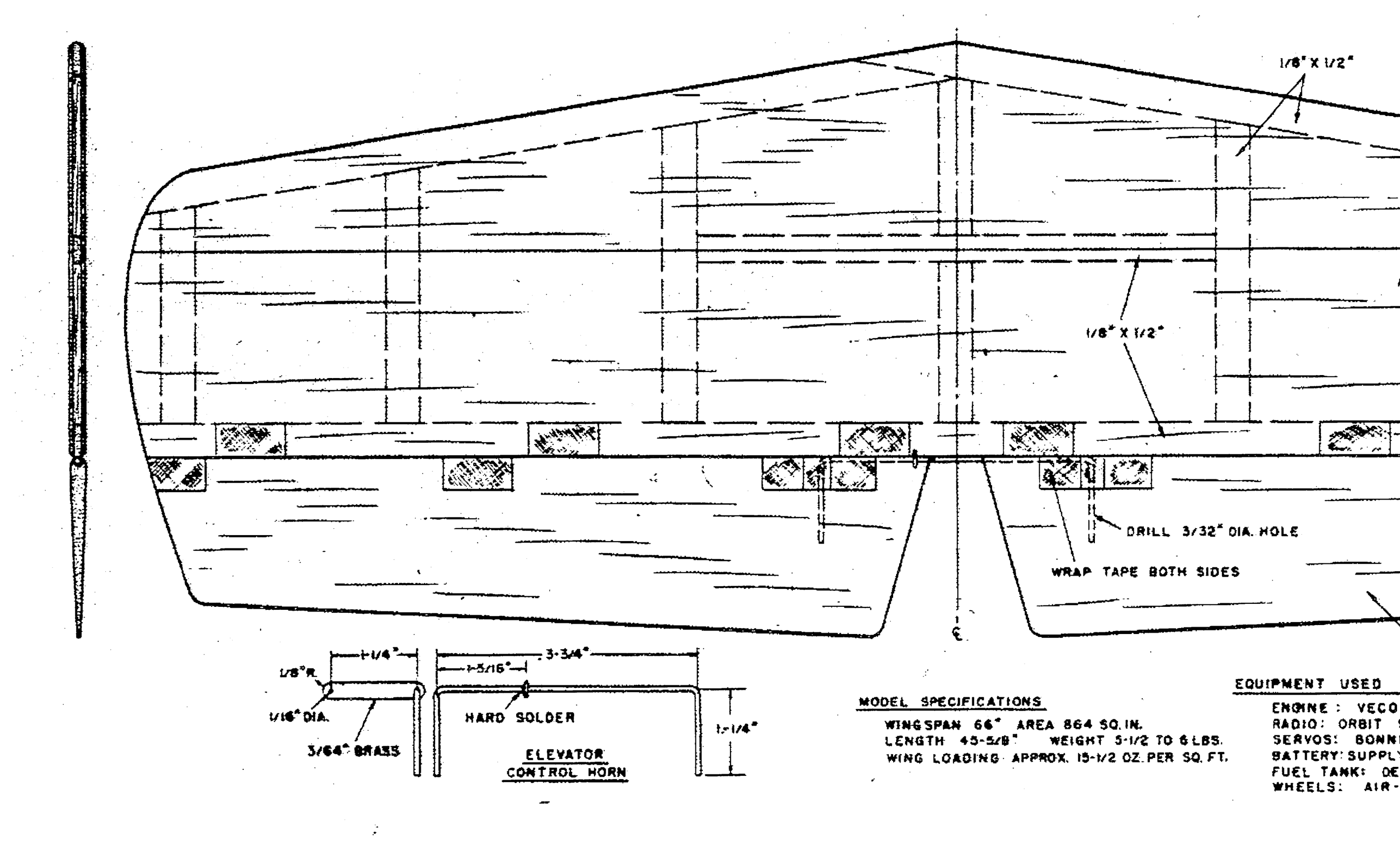
A longer nose was also designed into #3 to cure the tail-heavy condition encountered in #2. Total weight of #3 was an even 6 pounds. That longer nose increased the rate of spin rotation but the resultant spin rotation speed increase was not enough to worry about.

By this time, Sultan #1 and #2 were retired from use—one by an honest crack-up, the other from a misunderstanding with a barbed wire fence. I needed a spare airplane and #4 was built. Changes in it were of a construction nature only so building time was whittled down a few more hours. Sultan #4 was the one I flew at the 1962 Nats.

Here are some of the modifications others have made on the Sultan design. Zel Ritchie had a flutter problem at very high speed with his. To cure the problem he cut down the aileron chord to a constant one-inch. This eliminated the flutter which was caused by too soft wood for the ailerons. A medium to hard wood should be used.

E.B.R.C. member Pete Peters added a piece of ¼ by ¼ spruce on the leading edge of his ailerons for greater torsional stability. Another club member, Ed Von Adlung, installed ¼ O.D. aluminum tubing on the leading edge of the aileron. Both worked out well. But there will not be any flutter if soft balsa is avoided. Also, there shouldn't be any excess clearance in the aileron linkage.

Our use of slightly tapered ailerons was to give the wing a slightly tapered look. But you can make one inch wide ailerons as Ritchie did with equal results.

Being a relatively light ship with a light wing loading, in very windy weather the Sultan can be difficult. Club member Gary Korpi added two inches to the tail movement of the fuselage to see if he could improve directional stability in windy and turbulent weather conditions. The standard Sultan will oscillate slightly around the vertical axis when a strong gust of wind hits the ship. Additional fin area did not cure this problem. I didn't worry too much about this particular problem because the oscillation was minute. Korpi's longer tail

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