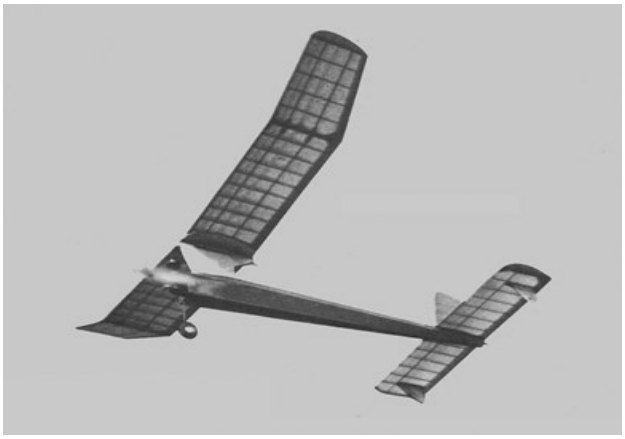
All American Free



Editor's Note: One of the greatest comebacks ever staged in model aviation has been the return of free flight. Actually, it never went very far away, but the tremendous growth of control line activity directly after the war resulted in the free flighters being forced to take a back seat at contests. Now a better balance seems to have been struck with the result, that-all phases of aeromodeling have advanced tremendously during the past two years. The hobby- sport offers diversification as one of its main attractions when one section overbalances the entire field as U control did in 1945 and 1946, activity suffers. Here, then, is a round-up of national trends in free flight jelled into one model: the All American by William Winter.

Free Flight, about the last frontier for the rugged individualist modeler, is the one competition category where overall dimensions, loadings, and shapes can be varied to suit a fellow's ideas. Speed jobs have come down to finless, helmet cowled, clipped wing bullets, as similar as peas in a pod. Stunters have grown bigger, lighter, and stumpier.

Indoor jobs, at least the ones that win, look generally the same as they did in the days before U control. To win, you must conform except in free flight!
Yet you can't go at free flight willy-nilly, for certain schools of thoughts have proved effective trophy winners. Charlie Folk's Climax, for an example, is an extremely short-coupled, big-tailed, high pylon. Paul Gilliam's designs are long and thin. Dennie Davis' "middle-of-the-road" models come between the two. And there are others. Now the remarkable thing about many of these standout airplanes is that a designer may state that his approach is the best, if not the only, way to win contests consistently. Each is right, given his typical sectional weather. In Eastern winds, try to beat a Climax bouncing and turning on a dime. On a genuine sunny California day try to better a Civvy Boy. For average weather those "middle-of-the-road" airplanes should consistently outpace the others. A lot depends on where you expect to compete. And there are other factors.

An analysis of all free flight winners of both the Nationals and the Plymouth meets, and of standout designs over the past year, tells a highly interesting story. Not only are certain types at an advantage in certain sections of the country, but concrete facts on loadings, aspect ratios, and other pertinent features add up to very definite combinations when these facts are substituted for hearsay.

Most disputed point in free flight is wing loading. In other words, you'd expect the greatest variations in wingspans and areas. Yet, an average of dozens of airplanes reveals that a solid eight ounces wing loading per square foot is winning the most trophies. Nor is this average the result of extremes, such as four ounces and twelve ounces; a cluster of big-name ships comes in at from seven to nine ounces and most of these hover around eight.

We should keep in mind, however, that this average is a "middle-of-the-road" figure. Careful analysis of "world beating" ships, in their own back yards as well as at the intersectional fracases, shows these loadings in the old Class C: 4.64, 9.3, 10.21, 8.87, 8.52, 5.75, 8, 8.61, 9, 8.64, Class A tended to be lighter, such as 7.8, 6.1, 4.83, 10.4, 7.8. Evidently, the wise boys still figure that to win you have got to get them up and the higher the better.

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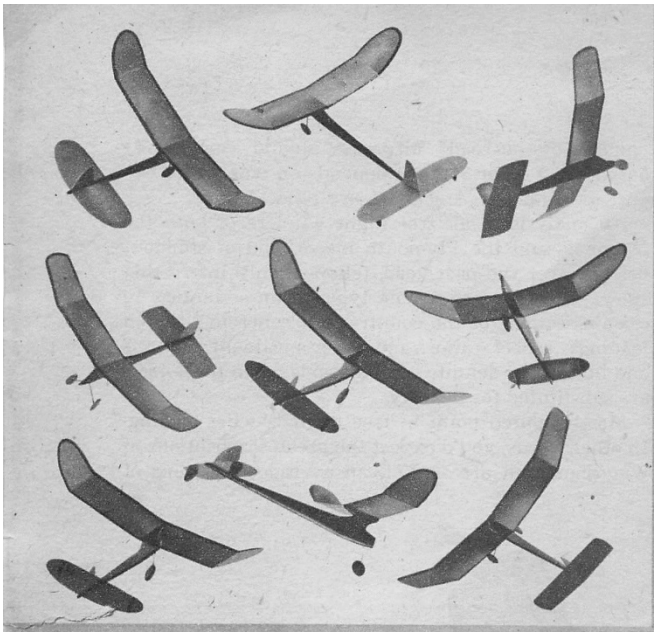

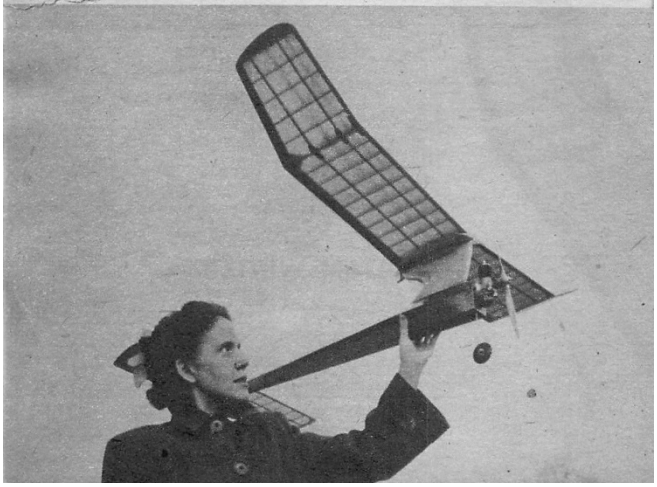

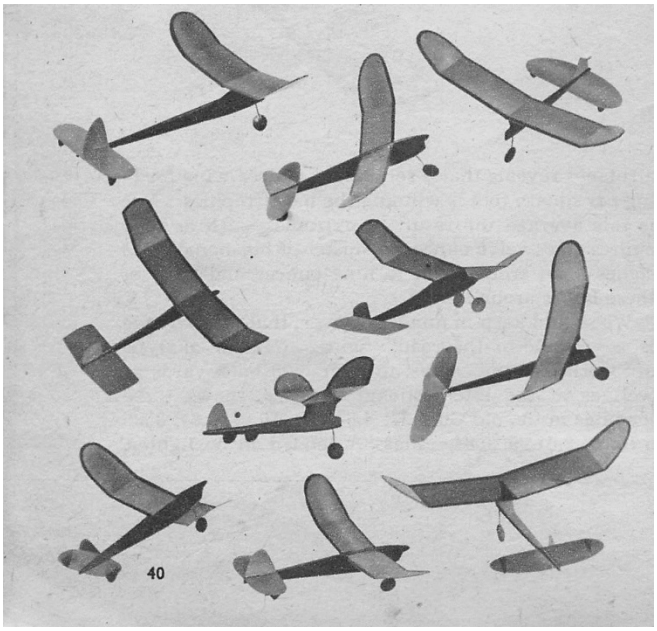

Construction of the All-American is a cinch. Plans are self- explanatory, no special instructions needed. Takes big A engines.

Such statistics could fill a book. But what do they add up to? To find that answer, five designs were worked up, four of them shown in three-view and "model-of-a-model" form, and the fifth was completely worked out, built, and test flown. This ship most nearly illustrates the average contest winner regardless of section. It is most interesting to note that this machine very closely approximates the outline and weights of Davis' San DeHogan, both being powered by a .199.

Plane #1: let's call this the Easterner. It is a near composite of Folk's Climax and Carl Wheeley's Senator and would be a sterling windy-weather machine. Its stabilizer area is about 50% of the wing, and its tail moment arm on the average is but 40% of the span. The pylon is quite high and the leading edge of the wing forward of the engine. The single-wheel gear shown might be made retractable, or can be replaced by a two-wheel gear if preferred. While no particular type of fuselage is standard, it does seem that the diamond cross section is used most often.

In order to make all these "models of models" directly comparable, aspect ratios of six to one are used in every case. The builder can vary these to suit his own ideas, but it would be well to keep in mind that the great majority of winners have aspect ratios of six or seven to one.

Plane #2: the Californian (with apologies to dissenters!). This is the long moment-arm flat-gliding, moderate pylon job representative of the Gilliam school of thought. A 50% stab is set on a 50-60% moment-arm fuselage. These ships actually follow the long fuse indoor gliders and under proper conditions have an ideal glide. Yet they are not too lightly loaded—or oversized—to handicap climb. One wheel is favored.

Plane #3: the Shoulder Wing. Generally frowned upon as inferior to the pylon as a means of handling power, the shoulder wing has, nevertheless, been proved by such builders as Don Foote and Jerry Brofman. It is a type of model thoroughly acceptable in the larger sizes, as indicated by Brofman's consistent winning at

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the Nationals. Foote has proved it acceptable in all sizes, his latest being a .19 job (now flying on a Forster 29) of fairly high aspect ratio, wing loading, but with fairly small moment- arm and tail area. Usually fitted with two wheels.

Plane # 4: the Hatchet. You can't count this one out, for it is a type that has given birth to many of our best airplanes through the years. Examples— Banshee, Zombie, Pacer, Cumulus, and so on. Actually, it is a form of low pylon layout, with the pylon being stretched out as part of the fuselage. It offers the advantage of fully enclosed engine without excessive cross-sectional area. Both one and two wheels are popular.

Plane #5: let's call this one the All-American (see construction plans). It is a composite of famous pylons and, for the average, includes the ideal aspect ratio, moment arms, areas, and weights. This is an A job with a big engine in, its class.

The American's span is 54 inches, its wing area 384 square inches. The stabilizer area is 38%% of the wing area and the tail moment arm is 39% when figured from midchord of wing to midchord of stab. Glow ignition is used but if the ship is built as shown with light covering it will be underweight, permitting the addition of any timers and gadgets without penalty. And it won't be at a disadvantage if you prefer spark ignition. While the fuselage was built up of both vertical and horizontal sheet balsa keels and bottom, with sheet siding, a built-up "box" could be substituted. Although a flat-bottomed, fairly thin airfoil was used (many builders believe this is the best means of getting maximum altitude) glide is exceptionally good. It would be difficult to achieve more of a floating glide without making the ship impractical for even a moderate wind.

If you look for rule-of-thumb clues for your next model, these five ships cover the ground fairly well. But, if you are a real individualist you can at least use them to hit upon something different, for these are the machines you have to duck to be different! While the pylon is the king it is not necessarily fatal to try something else.

"The trend seems to be towards long, skinny, weak pylon jobs." says individualist Don Foote whose Westerner is a potent contender in a wind—or calm! "The big beef about old rules was that they did not allow experimentation, yet, now that we have a free hand, there is a terrible lack of originality. It takes crashed airplanes to get the bugs out of a new design and the fellows just haven't the spunk to develop a radically new design.

"Most ships," continues Don, "use too much stabilizer area and far too much vertical fin. Since cross section rules were abolished, designers seek more stability by lengthening the moment arm. It is an unfortunate fact that they are doing just the opposite of what they should do for greater stability. Long moment arms have advantages, but these are outweighed by their disadvantages. When wing loadings first came off, I built a ship of tremendous proportions. It gave good results but was too slow on the climb and took all the fun out of flying.

In the Northwest Earl Cay ton explains that most fellows are still flying about the same jobs they had in 1947. Ignition motors in Zippers, Interceptors, Powerhouses, and Sailplanes are typical.

"We saw great numbers of 'new look' jobs in 1948," says Earl, "with glow motors and super wing areas, but these frail jobs weren't strong enough to fly long at contests under all conditions and smeared sooner or later. Most of our jobs still have about seven ounces per 100 square inches of area and most of us prefer to put our area in the wing and use 'one-third' stabilizers.

In the Oklahoma City area where a national reputation has been built these last few years, Ray Mathews says, sizes are running to about 450 square inches for the old Class A, 600-750 for the old B, 900 for C, and 1200-1500 for the D's. Wide experience with half-A indicates that best areas lie between 140 and 170 square inches, with the smaller end of the scale producing somewhat higher climbs and the upper end a floating glide.

While the play-it-safe contestant will stick to his pylon, other possibilities for winning machines still

exist. At a recent British Nationals, Continental machines well nigh ran into the ground American and English designs. One of the most sensational of these machines was the Flanders Flyer type, a box with shoulder-mounted tapered wings, featuring extreme down thrust of about 20 degrees (that is no misprint!) and a pendulum device to control the rudder against Spirals. Climb was high, fast, and straight. No freak, this design has consistently proved itself one of the world's best.

A great many Continental designs are variations of the basic shoulder wing shown in our collection of "models of models." While Gaston Joostens' Flanders Flyer, despite a normally high thrust line, incorporates tremendous down thrust, others, notably the Swiss, have installed inverted engines quite high in fully enclosed cowlings so that the thrust line runs well above the chord of the wing. The fuselage then sweeps down swiftly to the familiar low stabilizer. Very squat, small twin fins are frequently used.

It is highly probable that refinement by our own builders on the shoulder wing theme would offer an intriguing avenue of progress in addition to the thirteen-year-old pylon theme. It seems likely that such shoulder wings would feature relatively small stabs (say one- third wing area), 45-50% moment arms, except in the larger sizes, 50% chord balance point and symmetrical or low- lift tail sections.

What should you build? That's largely a choice of weather and taste. If you are a pylon man there are at least those three variations on the theme: the long job, the short job, and the middle-of- the-roader. If you don't like pylons, there's the hatchet or the shoulder wing. If you are experimentally inclined, the latter offers a number of yet untried variations, such as the Belgian and Swiss examples. Considering that wing loadings run about five ounces per square foot in half A from five to ten in A, averaging out at 7-8 pretty much the same in B and eight or more in C, it is a simple matter to establish sizes and shapes with the aid of the accompanying three views.

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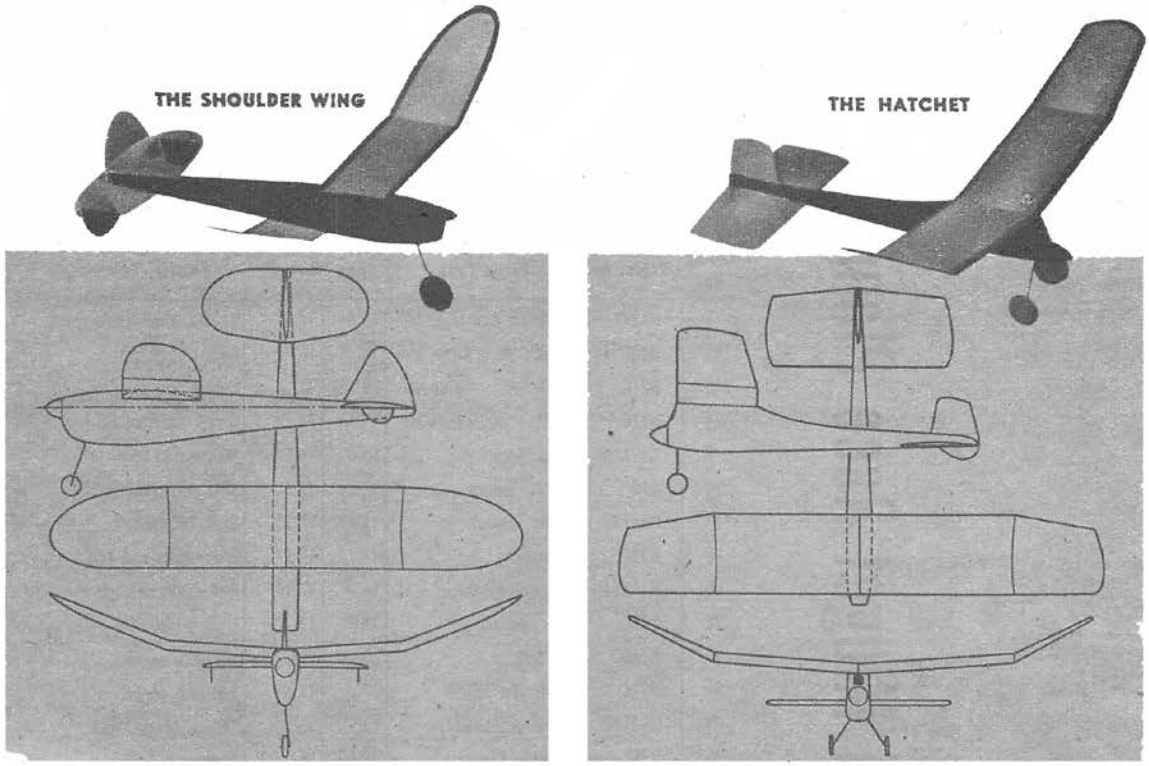

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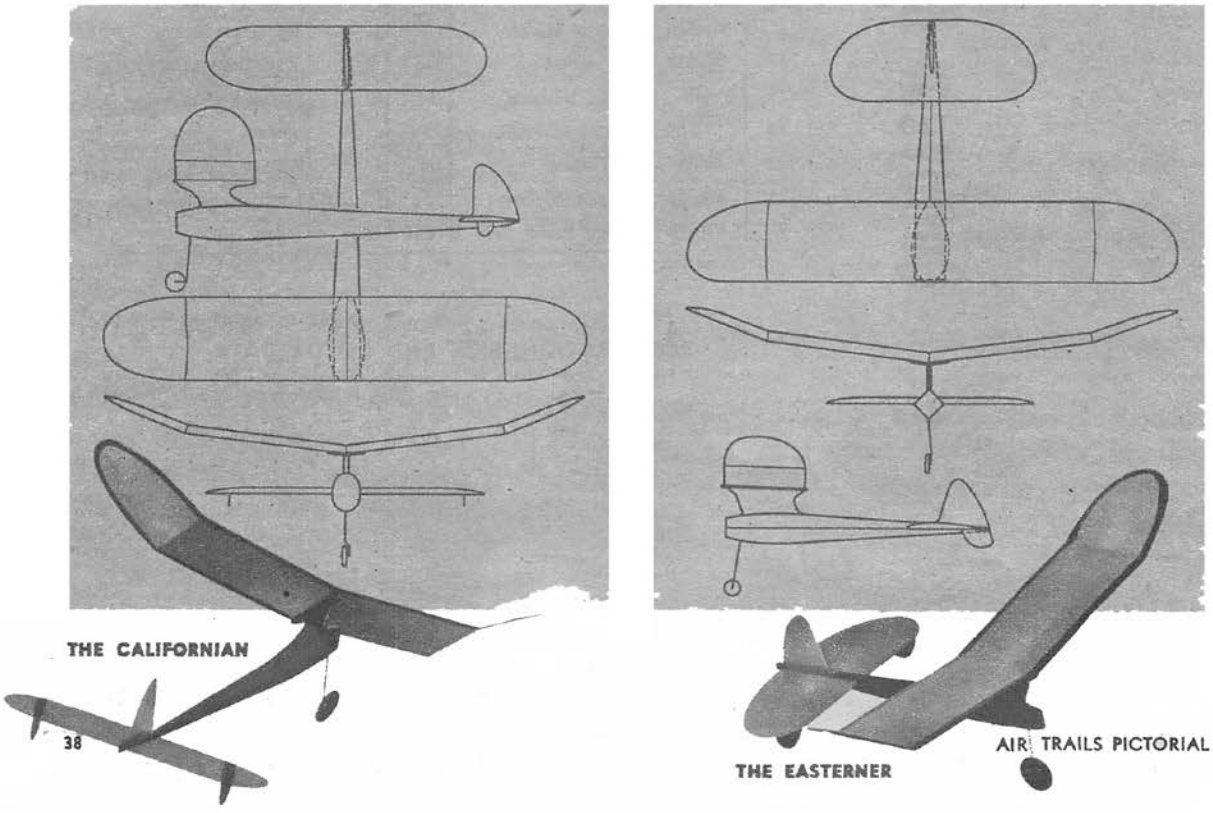

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