

BUMPER CHRISTMAS



MODEL ENGINEER
EXHIBITION 1968

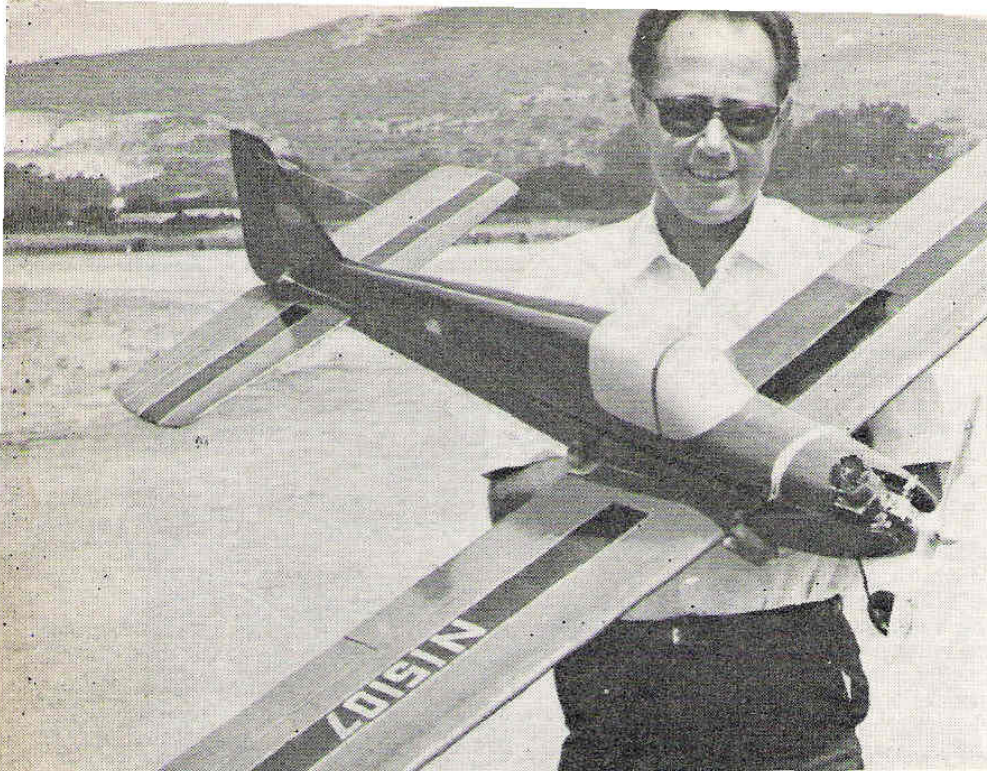
A square logo divided into four quadrants. The top-left quadrant shows a steam engine. The top-right quadrant shows a ship's steering wheel. The bottom-left quadrant shows a car. The bottom-right quadrant shows a lighthouse. The text 'MODEL ENGINEER' is written vertically on the right side, and 'EXHIBITION 1968' is written vertically on the left side.

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By Phil Kraft — W



AFTER two years of flying the Mark II Kwik-Fli, I decided last Autumn, that it was about time to design a new aircraft which would, hopefully, be a considerable improvement over the Kwik-Fli. The Mark II Kwik-Fli had been a fairly adequate design but its tracking in manoeuvres and inherent tail wiggle in rough air detracted from true contest performance.

We have watched Maurice Franklin fly several of his deep fuselage designs and were impressed with their stability and smoothness. It was apparent that the additional side area provided by the deep fuselage was a considerable asset in most manoeuvres. Consequently, the Bar-Fli employs a considerable fuselage side area. During the experiments with the Kwik-Fli, I have flown a variety of airfoil sections both semi-symmetrical and fully symmetrical, and I believe the full symmetrical sections produced the best performance. Therefore, the Bar-Fli employs a 15 per cent full symmetrical airfoil which is substantially thinner than the 19 per cent used on the Kwik-Fli. We assumed that the thinner section would give us a faster and somewhat smoother flying design. Total wing area is approximately 580 sq. in. which is on the small side for a full house multi competition model. Previous experience indicated that the rudder should be quite large for low speed effectiveness in manoeuvres such as the double-stall turn.

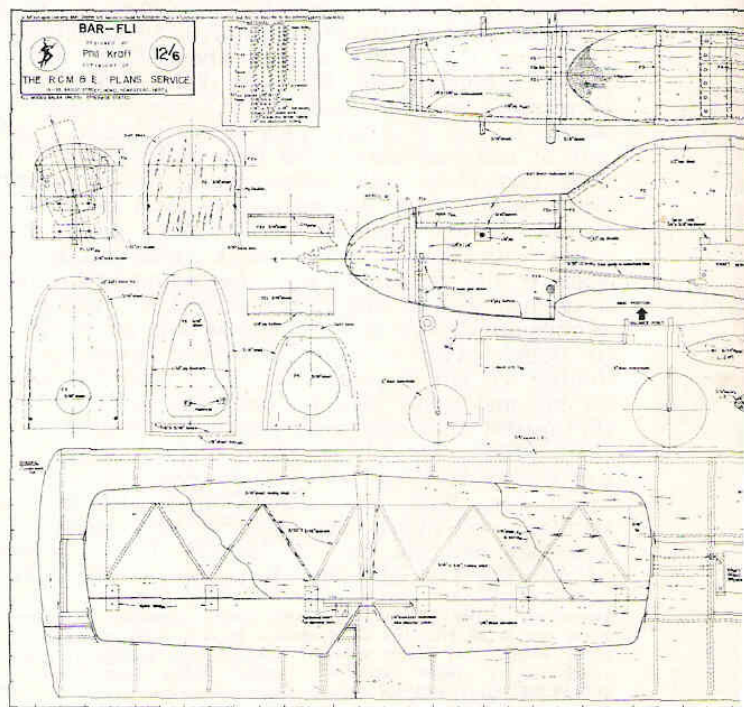
Overall, we have been quite pleased with the results and performance of the Bar-Fli. Possibly it is a bit small for competition. However, it is an extremely smooth flying aircraft which does very pretty manoeuvres, particularly under adverse conditions, such as high winds or turbulent weather. One great advantage to the aircraft which was not even considered during its design was its snap-rolling ability. I've never flown anything that snaps as beautifully or precisely as the Bar-Fli. Most aircraft tend to continue a snap manoeuvre for usually about a half a turn after the controls are neutralized. Not the Bar-Fli, it stops immediately whenever the controls are neutralized, which makes double snaps, snaps and a half, inverted snaps and a half, etc.—a real pleasure to fly. Since snap manoeuvres have been added to our American contest pattern for next year this aeroplane will have a definite advantage.

The same ability to stop precisely in the snap roll manoeuvres is evident in other manoeuvres as well. You don't lead this aircraft in rolls, 4 point rolls, 8 point

rolls, etc. The minute the controls are neutralized the aircraft stops. Probably the great side area of the fuselage contributes to this design asset. The aircraft also side slips extremely well either right or left and, naturally, it does the knife edge flight well. It is fully capable of an excellent contest pattern.

It does have the disadvantage of rather small size, and I personally believe that for contest use, the Mark III Kwik-Fli is about as small as is practical. The reason for this is that manoeuvre positioning is as important as the manoeuvre itself. The smaller models are usually faster than the larger ones and consequently their manoeuvres are every bit as large. Because of their small size they must be flown closer to the judges which makes the top parts of many manoeuvres too high in relation to the perspective of the judges. Consequently, I've flown the Bar-Fli very low in competition and this in itself is

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not always desirable, as errors are more easily seen by the judges at low altitudes. However, in actual practice the Bar-Fli has done well in the few contests flown in, winning the multi event at the South Western Regionals at Phoenix, Arizona and the Birds Annual at Long Beach.

About this time we built a new fuselage for our Kwik-Fli and called it the Mark III. This turned out to be a very good contest aeroplane, but frankly, there was so little to choose between the performance of the Bar-Fli and the Kwik-Fli III that we had a very difficult time deciding which model was to be number one for the Internats in Corsica. The Kwik-Fli III is a better aeroplane than the Bar-Fli in calm weather. Because we had been told that Corsica had extremely mild weather conditions we elected to use the Kwik-Fli. Quite probably, it would have made very little difference because

there wasn't really that much to choose from between the two designs.

The construction of the Bar-Fli is quite simple and straight forward and I think needs little explanation. The fuselage can be built on a flat work surface as all of the bulkheads are installed in a straight line in reference to the fuselage bottom. One possible change would be in the block used for the cabin, which takes quite a large piece of wood and a lot of whittling. Several of the Bar-Flis have been built using a plastic canopy which has been moved back and faired into the bulkhead at the rear of the wing. This changes the appearance of the model a bit; I think for the better, and it doesn't seem to detract from the performance of it by the slight reduction in the fuselage side area.

As your editor has asked me to comment a bit on the preparation for a meeting, such as the World Championship, I'll sum up the Bar-Fli by stating that it is a great little aircraft to fly and I think more fun than most contest designs.

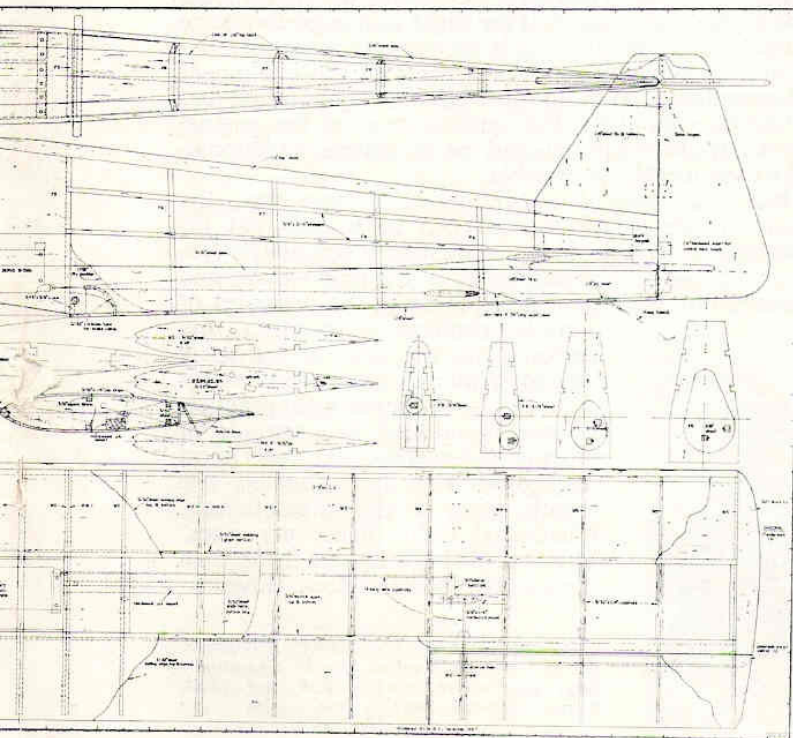
Contest Preparation

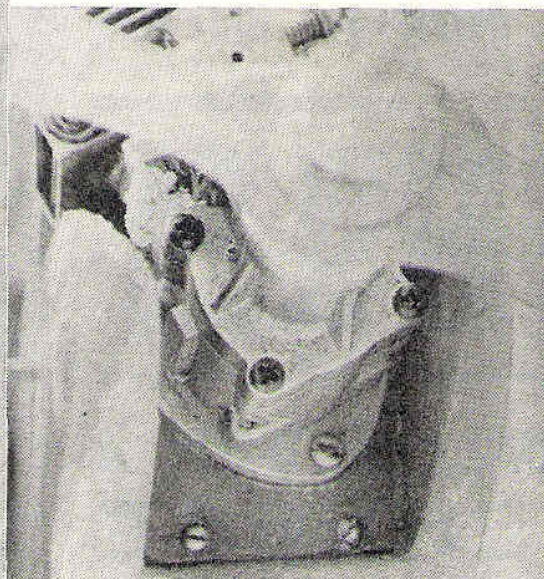
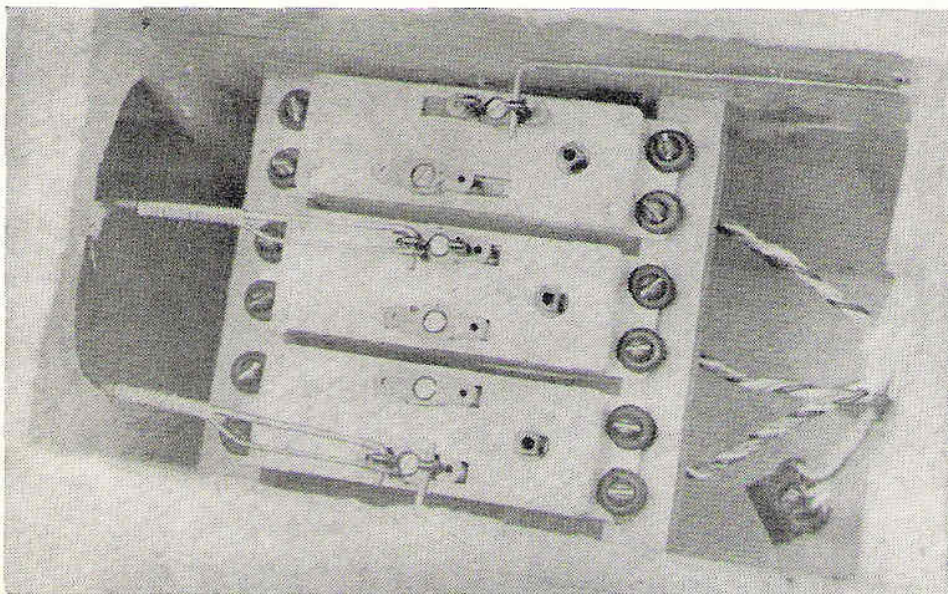
My preparation for the Internationals in Corsica was no different than for any other contest, except possibly, we knew that there we couldn't afford the embarrassment of even a moment's equipment trouble. The radio equipment has been in use for almost a year and consequently was of no particular concern. Naturally, the insides of the transmitter were visually inspected for possible wiring fatigue, loose connections, etc. The servo potentiometers were cleaned and that's it. My attitude in this respect is that when something has been working well, leave it alone.

My theory concerning the contest aircraft is based on one thing—simplicity. All gadgets, frills, extraneous controls which are not absolutely essential are eliminated. The Mark III Kwik-Fli used at the Internats was the subject of a great deal of good-natured ridicule by many other contestants. The wing was some three years old and had quite a few battle scars to show for its longevity. The fuselage was new but as in all my previous Kwik-Flis retained a tank hatch, and both wings and the hatch were fastened with rubber bands and dowels.

Our team manager, Jerry Nelson, quickly dubbed the Mark III "Orange Trash". After I was fortunate enough to win the Championships, the rest of our team did a great deal of kidding regarding my setting modelling back some 20 years. Certainly, I can't disagree with them

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but the one outstanding feature of the Mark III Kwik-Fli, as well as the Bar-Fli, is that the mechanics and overall design are entirely functional. Certainly, a hatch detracts from the appearance of the aeroplane. However, it is very comforting to remove rubber bands and open the hatch during fueling for inspection to make sure that the tank is properly filled, that the lines are not kinked and that there are no leaks to shorten the flight, and possibly get into the radio equipment.

The hatch also permits us to inspect the landing gear push rod, tightness of the motor mounting bolts, condition of the battery pack, etc. As to the rubber bands and dowels used to fasten the wing, screws are probably superior, however, we have never had a failure with the rubber bands and they prevent damage if the wing is inadvertently bumped. I have always used the radial mount for my engines. This seems to be in direct opposition to most other designers' theories. However, the radial mount is lighter, simpler, a great deal cleaner, and makes possible engine interchange without modifications.

Most modellers today have gone to the more sophisticated electric or drum-type mechanical brakes. Frankly, I definitely prefer the drag-type used on the Kwik-Fli. The drag brakes have the advantage of simplicity, a smooth even stop, and ease of adjustment. This wasn't important in the International competition because of the lack of ground manoeuvres, but it's a definite factor in our American pattern flying.

The engine is of probably equal importance to the radio equipment. We have been using the same *Enya 60 II* for the last year and it has never stopped once in competition or practice. It is true that the Enya does not have quite the same power output as some of the other

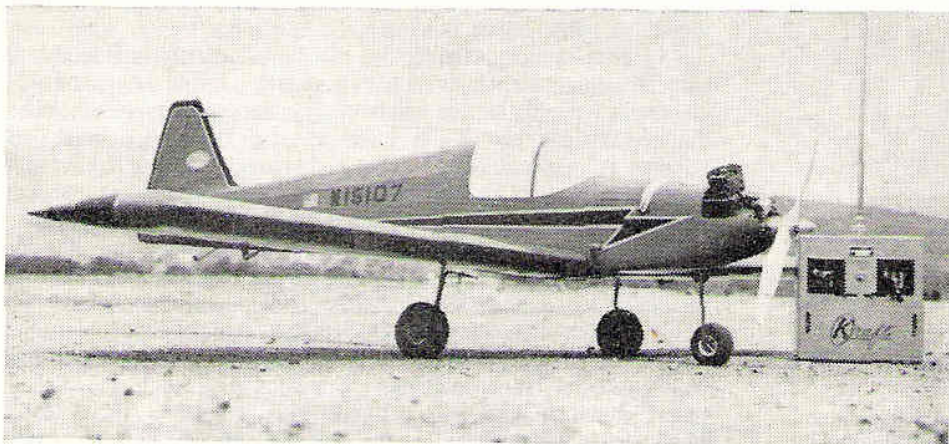
Above left: detail of Bar-Fli's radio compartment showing three new style Kraft servos with plastic cases. Note dual output arms. Servos mounted on hard wood rails for ease of installation. Above: details of Enya 60 power plant installation, showing backplate mounting system.

stunt engines, but I personally feel that its dependability makes it mandatory for serious contest use. In fact, in Corsica we didn't even change the needle valve setting nor had the setting been changed for some months prior to the contest. We can't say enough about the dependability and non-critical performance of the Enya 60 engine.

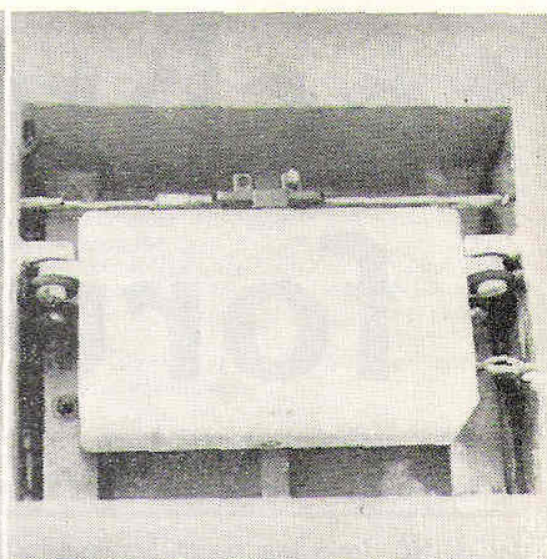
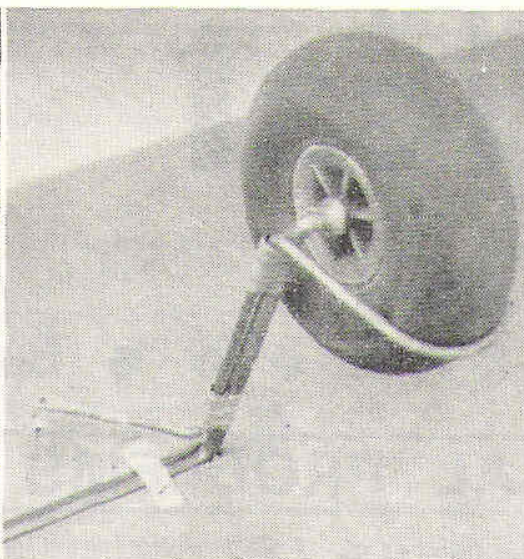
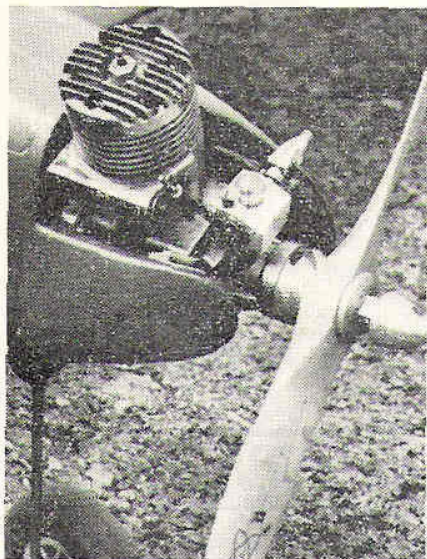
Another thing along the lines of contest reliability is the aircraft design itself. Other things being equal in regard to pilot's skill, etc., the larger, heavier aircraft will consistently produce a superior contest performance. However, the heavier aircraft require peak engine performance and this decidedly detracts from reliability. With the lightweight Kwik-Fli a rich engine run meant no real loss of performance. Being able to run the engine slightly on the 4-cycle side eliminates another possible chance of failure. Therefore, we believe the light model to be more reliable and that the slight gain in performance by the larger, heavier types is therefore outweighed.

Thus, to sum up the requirements of the equipment and aeroplane, the radio must be thoroughly tested and of proven reliability. The same is true of the engine. The air frame design should be as simple, functional, and as serviceable as possible.

Once the previous conditions have been met, the balance is up to the flyer. When he knows that his equipment is reliable and consistent he is completely free to concentrate on the executions of the manoeuvres and presentation of the pattern. Because of the pressures of actively running a business, my personal practice time is extremely limited. While each individual is different in his requirements for practice, I have found that long periods of practice did a great deal more harm than good. For approximately one month, prior to the Internationals, I averaged eight flights per week. This is probably a lot less flying than the average modeller does. However,



Low level shot of Phil Kraft's prototype Bar-Fli used at Corsica World Championships as reserve model. Red and black colour scheme with gold trim very attractive.



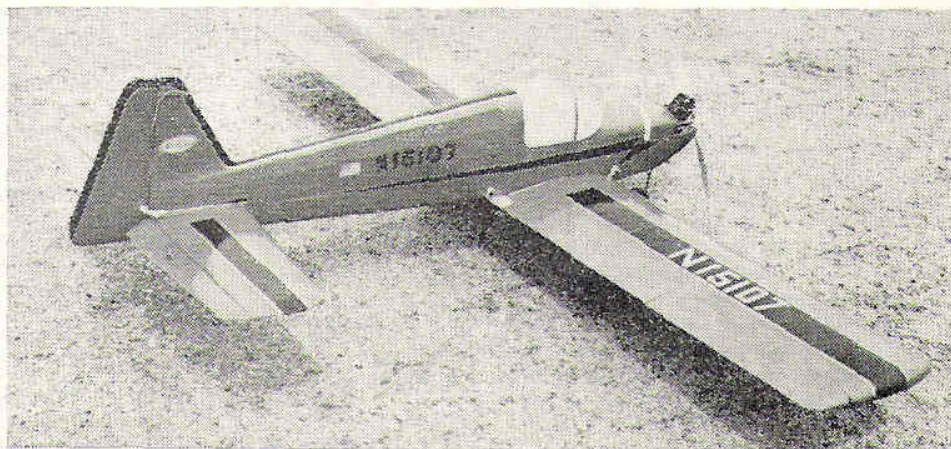
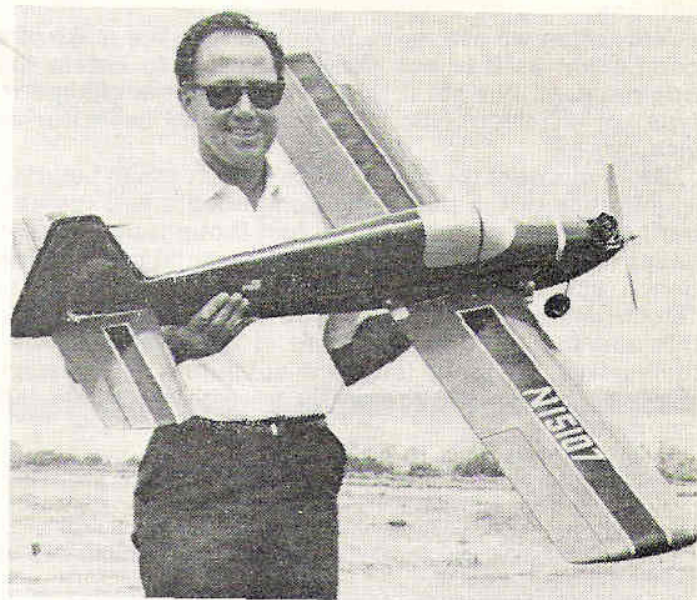
Above left: another view of Enya 60 installation showing inclined position of motor and cut-away side sheet to allow access to exhaust stack for priming. Phil never touches needle valve—primes through exhaust port. Above centre: brake system preferred by Phil Kraft is simple "tyre-plonker" type. Works reliably. Above right: new style Kraft aileron servo installation showing side lugs for mounting.

these practice sessions were short—seldom more than a half hour. I'd try to get away from the plant for a half hour or so at lunch time to the nearby flying field for two practice flights. At least for myself, I find that with any more than three flights, fatigue becomes a factor and I begin to lose sharpness. Actually, the concentration put into the practice periods and rigid discipline is more important than long periods of practice time. During these two and sometimes three flight sessions, the first flight would be the complete pattern presentation. The second flight would be to practice those manoeuvres which were rough during the first flight.

One of the most difficult and obviously overlooked aspects of contest flying is presentation. The manoeuvres must be placed consistently where the judges have the best opportunity of observing them. I try to fly at least one hundred feet perfectly straight and level before entering a manoeuvre and on the completion of a manoeuvre to continue on an absolute straight and level heading for at least the same 100 feet. Usually, in competition I stretch this even further, perhaps 100 yards. Many flyers perform beautiful manoeuvres but flit in and out of them in such a manner that the entire effect is down-graded. For maximum effect, the pattern must be flown smoothly and almost rhythmically. The first few manoeuvres establish a pattern in the judges' minds. When they see an almost effortless appearing presentation with smooth entries in and out of the manoeuvres, carefully established headings, and a continuity to the turns used to fly back and forth, they will automatically score the manoeuvres higher. Altitude of the manoeuvres is also important. Very few flyers fly too low, although this is as bad as flying too high. Bear in mind that the judge should see the manoeuvre at an angle of approximately

45° from where he is sitting. This means that all manoeuvres must be fairly low because, if they are not, the aeroplane is too far away and you will be down-graded for the inability of the judge to see the manoeuvres clearly.

To sum up, we find that short, frequent practice sessions produce the best results. Concentrate on presentation with the same diligence that is done with manoeuvres themselves. Establish a pattern, a continuity to that presentation and the rest will tend to fall in line. A little luck helps also.



Centre right: Phil Kraft proudly displays his fun machine. He has a right to look proud—had just won World R/C Championship. Right: rear $\frac{3}{4}$ view of Bar-Fli showing large fuselage side area and big rudder for good stall turns.