PLANE ON THE COVER

The 1972 Toledo design and finish winner is a state-of-the-art pattern ship. Fast, predictable, and smooth even in gusty winds. It is a model for the expert builder and flier.

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The word "intention," according to Webster's "often applies to little more than having an idea in mind, or the will to act or do a certain thing." With this in mind, it would seem that most modelers are inherently blessed with all manner of "good intentions/ideas." In most cases, the only catalyst required to convert these intentions into reality, is simply ample free time applied towards the varied types and numbers of model subjects in mind for the future.

More often than not, we do complete some of our model-intentions. Some require the passing of more time than others before completion. Then there are those which are just passed over due to the advancements in the State-of-Art, or forgotten over the years. I have dropped a few intentions along the way, as most of us have. On the other hand, I have managed to complete some which date back a few years. Recently, for example, I completed an intention of twelve years—that of restoring a full-size aircraft. Today I am the very proud owner of a classic 1947 Stinson-Voyager, N-12-DB (Best Stinson Classic, 1971 EAA Convention). The original intention was easy to come by; the time for actual restoration was "sumpin' else." The model presented here, though a new design, is really the completion of another intention that dates back to 1969.

Ostensibly, Viper began as only an intention while completing the research covering the North American P-51 Mustang for an ultra-scale model (another good intention). As so often one project is shelved in lieu of another, so went the Mustang. My scale deHavilland Hornet took its place, as did the Stinson restoration project. The Mustang remains shelved, but that intention is the prime contributor and factor of this design.

Obtaining the airfoils and sections employed on the Mustang was a feat in itself. Once accomplished though, these laminar flow designs really "turned me on." I became intrigued by the rather unusual curves and reflexes of these high-speed sections. Thus Viper-intention began. Someday I would experiment with these sections on a non-scale design, or at least before completing the Mustang.

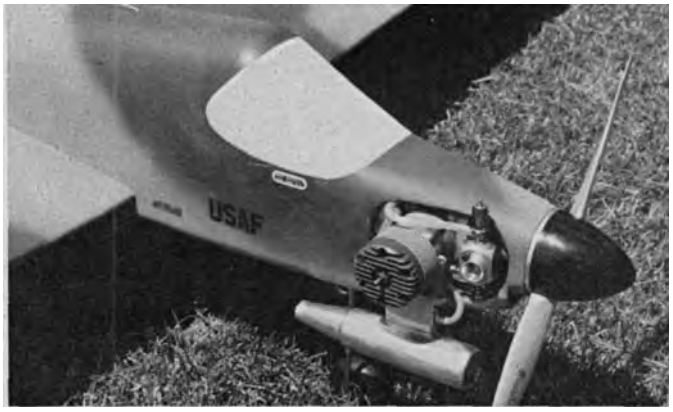
There were many long discussions about this project with other modelers. Seldom, if ever, were there any encouragements. Many had doubts and fears. The laminar-flow sections almost became more challenge than intention. Certainly obvious was the fact that a non-scale design would provide the best test vehicle in the least amount of time. My next pattern design would begin around these airfoil sections.

Undoubtedly, from the onset, there could be more gained than lost in the experimentations. If the sections proved to be "another bag of worms," the test model could always be fitted with another wing—a small price to pay should it someday save the early demise of the "still intended Mustang." Needed then was only the free time to begin. Sound familiar?

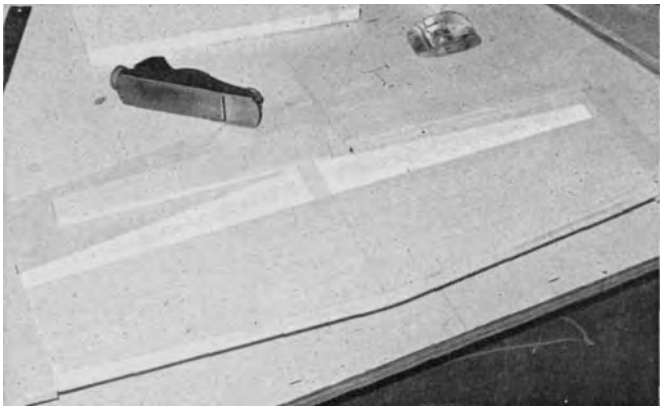
Inadvertently, as accidents occur, three fractured fingers left me with all sorts of time late in 1971. This period was not what I'd consider "good time," but I was grounded and idled. So I began the roughest of unnatural, left-handed sketches for Viper. Now there was time to incorporate new ideas and methods into those older one's learned through experience.

The only design parameters that can provide the exacting performance required of our pattern competition models are those found by the tried and proven methods. This will include many hours of testing, modifying and testing again. Reynolds Numbers, lift-drag ratios/coefficients, scale effect, etc., have little effect on RC as we know it today. Designs based upon these terms generally turn out poorly.

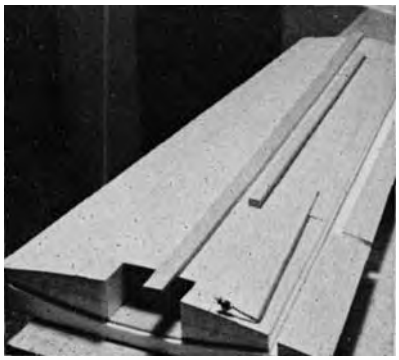
About the same results can be expected of the "Averager Design," a



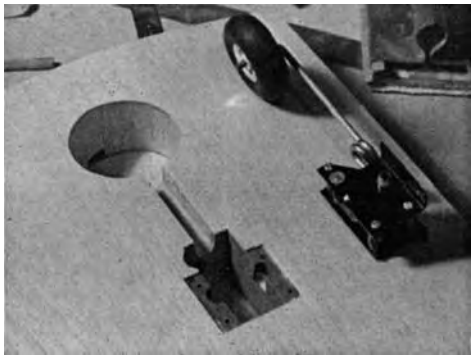
Neat and uncomplicated engine installation. Webra rests on Kraft-Hayes plastic mount.



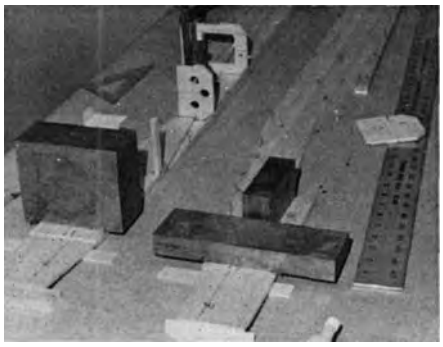
Thick air-foiled stab is balsa sheeting over foam. Note that like ailerons, elevators are foam cored. This guarantees airfoil continuity.



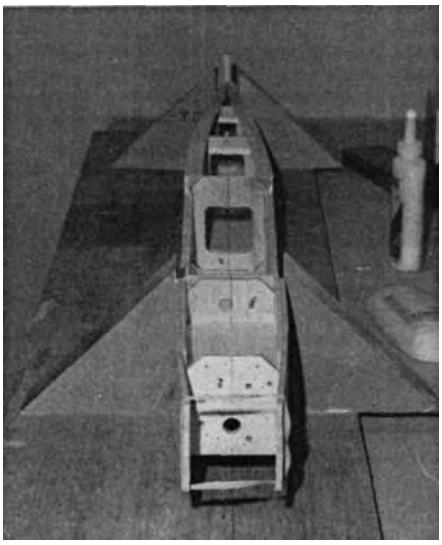
Sheeted wing is ready for aileron and wing facing, then hinging. This unusual airfoil required precision work.



Pro-Line retract system is flown in one plane and shown being installed here. Violett landing gears are also considered excellent.

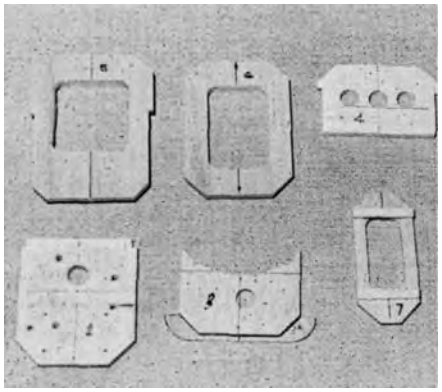


Rather than bend fuselage sides to fit bulkheads under tension, sides are water and ammonia soaked and laminated for doubters and bent on this jig. When dry, bend stays in without tension.



This shows proper lineup of the centerlines and accurate fuselage side alignment with heavy triangles.

Very important to accurate modeling is use of centerlines throughout. Text describes in detail.



phrase coined recently by one well-known RC editor, in which the averages compiled from some sixty-odd good models are used in achieving the ultimate in design. However, when employing average design methods, one should expect an average, not ultimate, model. Averagers can only lead to averages! Those items or combinations of items which perform well for one model seldom, if ever, perform well in combination with another set of conditions. I am not proposing that all designs begin on a "hit-or-miss" basis. In the Viper, other than the laminar-flow sections, combinations known and learned through experience were the only guidelines. Inspired by the new wing sections, it lead to some newer approaches toward the over-all design. The six available weeks helped, too. The completion of the drawings and the arrival of New Years Eve, 1972 were simultaneous.

The Toledo Conference was but 56 days off as the first balsa sheets were cut. Things went along smoothly even though some of the construction techniques were slightly unorthodox (foam ailerons), in an effort to maintain alignment and retention of the laminar sections. This "Toledo-bound" model was first presented, unpainted, at the January meeting of the Milwaukee Flying Electrons, nine days after its start. It was not alone—another member also displayed Viper Number Two the same night. The old doubts and fears were more in evidence that night than the models themselves.

Of the remaining 47 days before Toledo, 37 passed during the final assembly and finishing. Five more days passed for the display stand, leaving four days for some needed arm resting before the long drive to Toledo. Friday night in the Rec-Hall Viper made its formal debut, as yet, unflown!

The model stirred more than just casual interest. I noticed the apprehensive faces of the onlookers, who were aware of its distinctive airfoils, knowing it still was earthbound. My spouse, who was in charge of babysitting my models, began to have her own doubts of the venture, after overhearing the comments of the viewers.

Toledo is where it's at! To even "place" there is more than ample reward for one's efforts when viewing the quality of craftsmanship on display.

If you've not tried it; let me tell you there are some very tough acts to follow! The awards I received there for Viper were far above my wildest expectations! I again extend my all too simple "Thank You" to all the Weak Signal members.

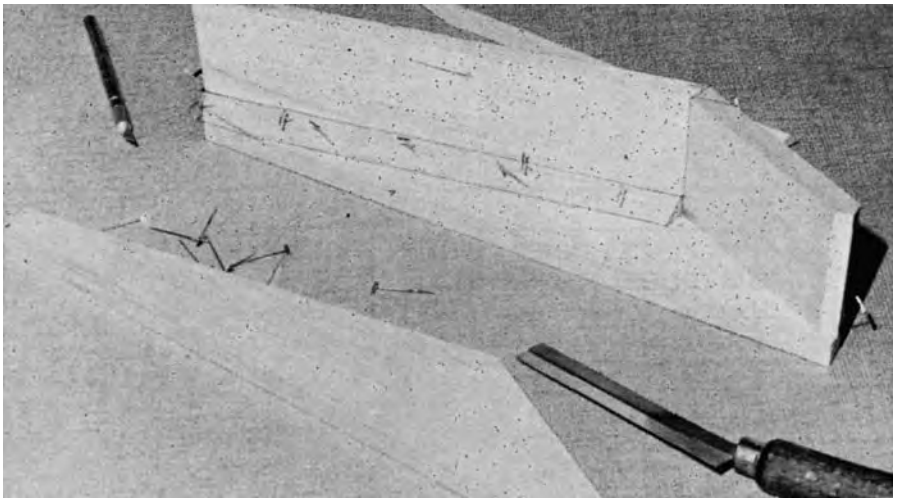
Mother Nature saw fit to prevent any test-flying of Viper No. Two until April Fool's Day. All of us in attendance braved the cold winds, sloshed through the still remaining snow, standing water puddles and sticky mud. It may have been springtime around the country, but here in Wisconsin one would never have known it. A single but brief flight ended the doubts and fears concerning the laminar flow sections!

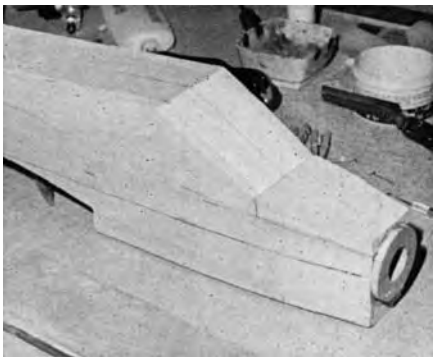
The model displayed some amazing speeds as it cut through the choppy cold winds, rock-steady! (Something not expected due to the rather sharp leading edges.) The next question was just how fast must this thing be flown in order to bring it down in one piece? The new Black-Head decided to quit when the question cleared my mind; the position the model was in at the time could never have been more dangerous. To make the open part of the field would require a very tight turn as the model's altitude was less than 20 ft. Even the tight turn and stretched-out glide required for the landing proved to be no problem whatsoever, as Viper settled at a snail's pace. Only one flight, and everything learned added up to the black side of the ledger! Speedy, rock-stable, good penetration, ample response in the ailerons with no indication of any tip stalling tendencies at ultra-slow speeds—some display for one flight! As we left the field, the doubts left too.

Considerable testing continued throughout the following weeks; the weather improved slightly. With most any new design not all its characteristics are going to be on the plus side. Viper's only undesirable trait proved to be a slight rolling tendency when yaw control (rudder) was applied. The balance of its performance left little, or nothing, to be desired in pattern maneuvers. Modifications were made on the field to the fin-rudder combination, with little effect. There were of course many comments as to the cause—most cited the airfoil, naturally. (What else?)

I was convinced the cause lay elsewhere, and was willing to modify or try anything, but not the wing sections! The wing, I felt, offered the superior performance in pattern work—too much to give up! In further evaluation flights I concluded the problem lay in the wing dihedral angle. Another model was near completion at this time, and was modified with less angle. In a week testing began again with Viper No. Three and the problem ended. No. Two was then modified and confirmed the results, even though it still wore the modified fin/rudder combination. These models were soon joined by Viper No. Four built by yet another flier. The original Viper No. One (shown at Toledo) awaits this modification before it leaves the ground—another intention?

Lots of flying and competition have done much to really prove the design.



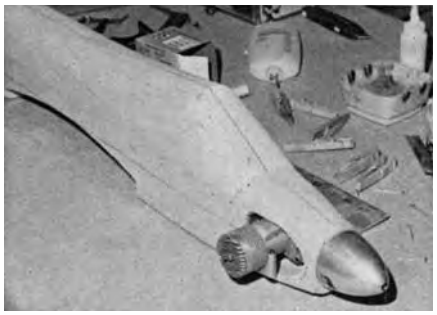


Above: What looks like a canopy is built up of balsa blocks and triangles. Space inside will house battery packs.

Right: Before carving and sanding, fuselages sure look ugly!

Below right: A Viper takes on smooth curves. Fit the engine to aid In shaping the nose.

Below: Vipers 1 and 3 differ in that the latter model has less dihedral. Several have been made by very different builders; all perform the same.



Author with Toledo winnings. Dario still has not flown the original plane—it is too pretty! The others fly all the time when Dario is not making helicopters.

We who have flown the Viper are convinced that the laminar sections do make great difference over the more conventional sections. I claim no knowledge of exactly how these sections join in making Viper the speed demon it is and yet give it the super-stability it has in slow flight. Nor can I explain how it can be so docile and predictable in any maneuver, in most any wind conditions (It is well suited in choppy crosswinds.)

I have designed and flown a few models over the years, but I feel none can begin to compare with Viper's performance. It just must be experienced to be appreciated! The laminar flow wing design does make the difference. A word of caution, however, is in order. Viper requires a little extra space and time in which to burn off some of its speed, so give it a little room. Don't expect it to slow in an instant for those short-field landings.

Rather than bore you or challenge your abilities with pages of construction details, I'll only touch on the subject and pass on a few ideas I use which can be employed on any other model as well. When cutting out the various formers, doubters, fuselage sides, etc., try cutting the templates and, with Sanford's Rubber Cement, cementing directly to the required materials, thereby eliminating the chance of error found in transposition. You can save the original plans by tracing off the various templates onto tracing paper first and cementing these tracings onto the materials. Don't forget the all-important centerlines too!

While on the subject of centerlines, here's a little trick I use. While the paper template is cemented on the work piece, I drill a 1/16" hole through the piece, directly on the center-lines, this way when the template is removed I can locate and scribe the centerlines on both sides of the work-piece with accuracy. In the case of fuselage sides, top blocks, etc., even after final shaping and sanding, the centerlines can always be located and re-scribed for final alignment and reference. The small holes can be easily filled just before the final finish. Neat?

Performing the required curve of the fuselage sides is a simple task if done while cementing the doublers in place in the laminating process. (See the small sketch on the plans.) The sides are actually over-bent in this case at the start, but when the pressure is released, you'll find the finished curve is just right. The drawings do not show the top-view of the fuselage but this should offer no challenge to those who prefer to build over a drawing. Checking the various cross-sections, you'll find the actual fuselage sides are flat, parallel to each other, across the wing-saddle section to a point mid-way, the fuel tank area. Oh, yes. You'll have to buy the little woman a bottle of hand lotion if you want a fuel tank.

Build the canopy as a complete component, including the triangular stock reinforcements before cementing to the fuselage itself. Any model will fly only as true as it has been built, so watch those centerlines!

If you've looked at the drawings at all, you'll be aware that the ailerons and the elevators are actually part of the original foam cores. These make the job a lot easier than it looks. Simply sheet the cores, add and shape the leading and trailing edges, remove the narrow section indicated for the 1/4" spar, which in turn becomes one of the hinge edges. Remove another 1/4" for the other hinge edge of the control surfaces involved and the task is complete. Use the "female" section of the core blocks to retain alignment and don't forget the centerlines! You can save the messy job of cementing the wire horns later by inserting the small section of matching brass tubing into the control surfaces during construction. When assembling the wire horns, simply slip into place without the epoxy messing up your finish. I have made no attempt to shape the ailerons of balsawood, as the shapes involved are too complex. This is how the foam control surfaces came about. I find this method faster and more accurate than any other method, too. Keep the centerline hole idea in mind for the hinge line spars—they do help!

When the model is complete and all the equipment is in place, be sure to balance the model along both its longitudinal and lateral axis, don't forget the muffler if you use one. A few regular nails pushed into the left-hand wing panels will overcome the side-mounted engine. The CG as noted on the plans is only my preferred location, and can be used as a starting point for locating your own preference. The originals have been tested with the CG located

At rest on the gear, Viper has that look of ready action. Note the moveable sub-fin. This Is most helpful In wingovers

up to one in. forward and one in. aft of the position shown with no ill effects, though it is more docile when placed as indicated.

If you are looking to me for that all-perfect, award-winning finish in three easy steps, forget it! There is just no easy way! How many others have written about sanding, sanding, and more sanding? To this I can only add: rubbing, rubbing and still even more rubbing! The Toledo model is finished in that "old standby," dope over two coats of laminating resin. This included approximately 50 sheets of assorted wet and dry sandpaper, ten coats of white dope as a base, ten coats of each color of the paint scheme, followed by still another ten coats of clear dope over "The Whole Thing." Between every coat of dope was a lot of wet sanding with 600 grit, then before applying the next coat, the surface was wiped dry with DuPont Prep-Sol to remove any particles of dust, fingerprints, etc.

When you get this far, the model should look great, now the work really begins. That's right, now starts the rubbing, rubbing, and more rubbing! What I look for in a finish is not the shine, but rather the luster, and the only way to this luster is in the buffing or rubbing process. In my own estimation, most all epoxy-type finishes impart only a shine; real luster comes only from lacquer-based paints. A really great finish is made up of millions of microscopic scratches, reflecting the available light. The more minute these scratches are, the greater the visible luster. The actual grit of the buffing compound used in the final rubbing is therefore very important. This grit must be quite fine, and like wet-sanding, the more water used, the better the results. As in the sanding process, when you think you have it done to perfection, take a break, look at it again, and start over or at least continue.

I hope you'll try this design. If you don't make them yourself, the laminar wing cores are available from Wing Manufacturing Co., Box 33, Crystal Lake, III. 60014. I have written a complete, six-page step-by-step construction manual entitled "Building the Viper, My Way." This booklet is available for $1.00. And if there are any questions you'd like to ask, please feel free to contact me at 1032 E. Manitowoc Ave., Oak Creek, WI. 53154. Besides, I know you'll enjoy being Viper-Bitten once you get airborne.