

SHOULD I MODIFY THE PLANS??

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AS YOU MAY know, it has been our policy to not be adverse towards those who want to modify the VariViggen. We have had this policy mainly in the interest of promoting education and design progress. However, we have seen some examples of modifications, even some under construction, that will result in disappointing performance and in some cases, unsafe flight characteristics. In all cases those individuals designed their modifications by aesthetics and by eyeball rather than by valid engineering calculation supported with appropriate tests. In most cases, when I was able to point out the disadvantages and calculate the effect on performance and stability, the author of the change decided to stick with the plans.

I must modify our policy to point out that we are not adverse to anyone modifying the airplane who is qualified (or finds qualified help) and is willing to conduct the analysis and test required to verify the modification before flying his aircraft. I am very adverse to those who may give all the rest of us a bad image by building a "VariViggen" that either has poor performance or contributes to an accident statistic under the name VariViggen.

A plans-built VariViggen has good utility and excellent flying qualities. Modifications that add weight, be they as subtle as extra heavy gussets everywhere or fiber-glass over the wood skin, or more substantial as 70 gallons fuel or four place, etc., etc., can result in very disappointing climb performance at high altitudes. Our experience in flying the prototype, N27VV, over 400 hours in all kinds of flight conditions, runways, weather, density altitudes, etc., is very valuable and we have found that due to the low aspect ratio (necessary for optimum low speed flying qualities) the airplane should have a lower weight-to-power ratio than conventional designs. You cannot expect to carry four people and more fuel adequately from Albu-

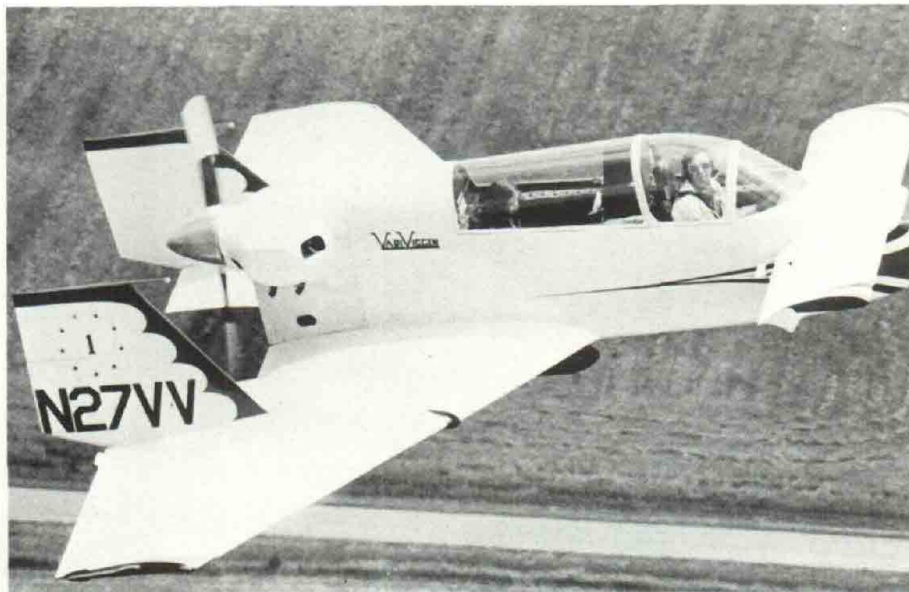
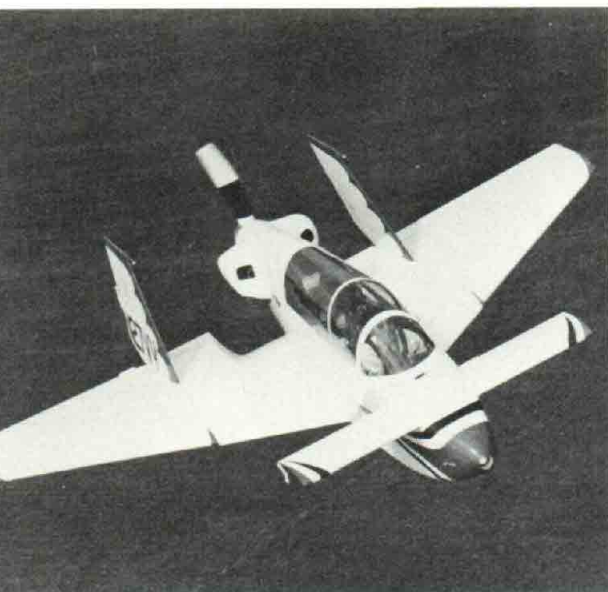
querque in the summer unless you use at least 200 hp.

You cannot expect the same safe flying qualities if you stretch the nose several feet for "looks." This would decrease stability and actually slow down the aircraft! You cannot just assume that a beautiful flush inlet three inches from the top of the wing will provide adequate cooling. My measurements during development of an oil cooler system showed terrible pressure recovery during low speed.

I should point out that because with a canard aircraft both surfaces are **lifting** wings (The canard actually has a much greater wing loading than the main wing) their size, position, interference with each other, high lift devices, etc., have a very important effect on the cg range, the flying qualities, and low speed performance. Their design is far more critical than with a conventional aircraft with one main lifting wing (sized for performance, etc.) and a tail sized merely to provide adequate static margin and sufficient cg range. For example a formula-one racer has an extremely small tail — but it can be designed for one cg only and still provide adequate stability and sufficient control. But if it were a canard, the designer would have much less room for change to provide a large flight envelope (speed range and maneuverability) even for one cg. Therefore I am unable, without conducting the appropriate test, to answer a question like "is it okay to move the canard down eight inches to clear my extra radios in the instrument panel?" I am not adverse to anyone making the change, however, if they are willing to conduct the test and verify its satisfactory result. The car-top "wind tunnel", for which we will have plans in early 1975, is an excellent method; others are also valid.

Remember, this aircraft was not developed by "guess work" but by a very careful design/test program. Small changes can be full of 'surprises'. If you modify an aircraft, when it is ready to fly, you are an **experimental** test pilot, not a production test pilot — be prepared to accept the **full responsibility** to safely plan and conduct exploratory testing and critical flight envelope expansion for there are no proven limits on your airplane.

I don't mean to inhibit progress, only to promote valid development. In this way we are also promoting education, which is what EAA is all about!



Burt Rutan's VariViggen. Plans for this aircraft have been approved by NASAD and have been rated "Amateur, Average." This means that, in NASAD's opinion, the VariViggen can be built as a first time project by persons having only the common hobby shop power tools and hand tools. The prototype now has over 400 hours of flying time logged and copies are being built in 10 different nations. Look for some very exciting developments from the Rutans in the months ahead.

(Photos Courtesy Burt Rutan)