

# Flight



## INSTRUCTOR

Conducted by  
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• Can you believe it? I actually received three whole letters this month. At this rate, Fearless Leader will be able to print this column in the classified section in a few months. A couple months ago, a friend from Mexico asked me when I found time to answer all the inquiries. He was sure surprised when I told him that I had not only answered all the letters, but that every one had been used in the column and that over half the questions were made up by this writer! I'm beginning to think that our readers fit into one of only three categories: they know all the answers, they can't write, or they don't care. If you don't fit into one of these categories, then drop me a line.

The first subject this month will be the anhedral or drooped stab.

I keep kidding Don Lowe that when he designed the Phoenix, he bent it at the wrong end. The pros and cons of the anhedral stab are still being argued among the experts, but one thing all agree on is that the anhedral alters more than just the looks of the airplane. The main reason for the addition of anhedral is to correct the tendency of most airplanes to pitch the nose down when rudder is applied. It seems that when the rudder is deflected right behind the stab, it acts as an air dam and effectively blanks out a portion of the stab. This decreases the negative lift of the stab, causing the nose of the airplane to pitch down. (Yes, the stab is creating negative lift in most cases; see Dave Thornburg's "Center of Pressure" article in October '78 Model Builder). If you look at the enclosed sketch, you will see why the anhedral tends to hold the nose up. Bear

in mind that when you yaw the airplane, there is some airflow across the fuselage.

In Fig. 1, "A" represents the airflow across the fuselage due to yaw. "B" represents the lift vector caused by the anhedral, and "C" represents the lift vector caused by the blanking of the stab with rudder application. As you can see, if the anhedral is adjusted so that "B" equals "C", then the airplane will remain neutral in pitch when rudder is applied. Now, everything is cool, right? Wrong. This has now created an adverse roll when rudder is applied, due to the lift vectors on opposite sides of the stab. This must be compensated for by a slight increase in wing dihedral! If we ever get all this adjusted properly (and few people ever do), then we should have a perfect airplane, but now, what happens in a crosswind? It will not be any more problem than with a "normal" straight stab, but if it is a gusty crosswind, the anhedral will cause the airplane to bounce around, not only in yaw as it would normally do, but in pitch as well! This is caused by vector "A" in the previous drawing becoming variable, due to gusts creating a variable vector "B" without the balancing vector "C". Ya can't win!! Whether this cure for the downward pitch is worth the problems it creates is a matter of discussion, but I feel it improves the flying characteristics under most conditions, and is therefore beneficial, but I haven't yet given up on other ways to eliminate the downward pitch. One involves a simple adaptation of the Du-Bro V-tail mixer to apply a little up elevator when rudder is applied, as in Fig. 2.

Another possible solution to this may be to either move the rudder way back so it won't interfere with the airflow over the stab, or to split the rudder into a top and bottom half, leaving the section

behind the stab fixed. I don't know for sure that either will work, but I think they should, and neither would exhibit the crosswind problems of the anhedral tail. Let me know if you try either method and how it works out. Now I'll have to answer those three letters and sign off for this month.

Dear Dave:

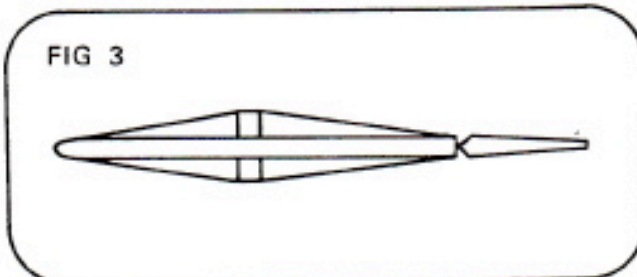
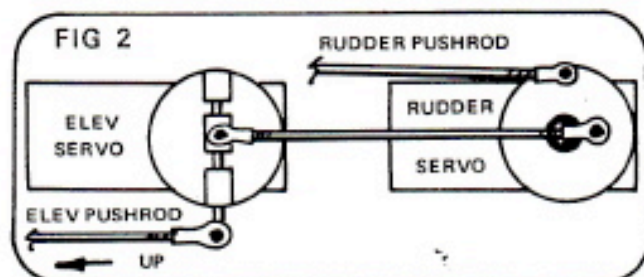
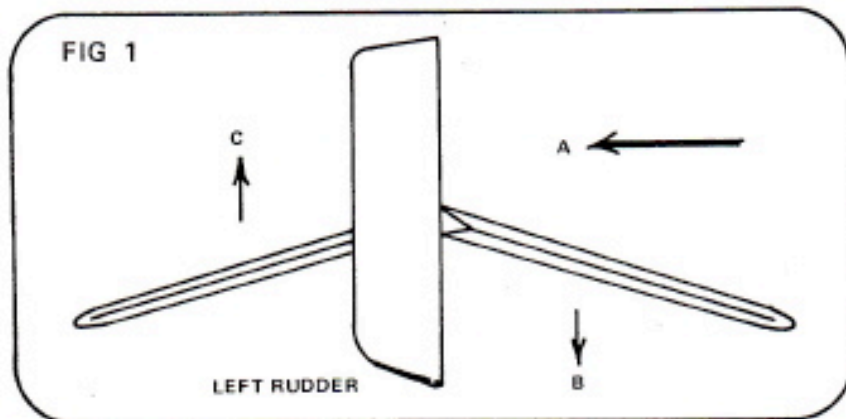
How about some tips on landing? It seems most guys have more trouble with that than anything else. Perhaps a series of some kind dealing with landing different types of planes. My own main difficulty at this time is not landing in general (haven't smashed one lately), but hitting the runway consistently. Sometimes I do, sometimes I don't. Is there a secret to it?

I noticed that your column deals mainly (so far) with pattern flying and pattern ships, but there are lots of other types (scale, gliders, etc.) which require different techniques. How about some columns on specific types of planes and the right ways to set up and fly them? Anyway, I think your column is a good idea. I know I have learned a few things! So keep up the good work, and may your thumbs be never dumb. Aerially Yours, Jan G. Eugenides, Coral Springs, FL.

Dear Jan:

If you will look up the column in the May issue, it covers landings in some detail, but I'll repeat most of the important points. First, the airspeed and attitude of the airplane is controlled by the elevator, and the placement of the landing is controlled primarily by the use of throttle. The secret is to aim short and drag the airplane to the spot with the throttle. This will solve the problem of landing properly lengthwise, but to hit the runway crosswise will require

Continued on page 115



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events for novices?

I admire Expert and Master-type fliers, but don't like them in Novice. Three wins and they move up . . . baloney! Here in Texas we have ten-year novices.

Looks like the manufacturers, if no one else, would like a broad-based Novice event. Oh well, at least you will get this one letter this month. Happy Flying, Ben Garrett, Brownwood, TX. Dear Ben:

I don't think they will become that rare, because in some parts of the country, pattern contests are on the rise. I do agree that perhaps the equipment used in the Novice event is becoming too sophisticated, but the other side of the coin is that if the equipment is

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restricted, it will be obsolete when the competitor moves up to the next class. Proposals are being made now to the AMA which should help this situation, but I'd like to recommend that you submit a proposal to the R/C contest board, detailing your ideas which may be incorporated into a final proposal or rule. The advancement system is the primary problem, as it advances people out of Novice too slowly and into Masters too quickly. ●

Fuel Lines . . . Continued from page 61

to "light off" than alchy. My notes from 1968 have a notation "use 1650 ft./sec.". Since I was totally involved in speed in those days, and "go fast" was the word (I once ran 88% nitro, 10% lube, and 2% propylene oxide), let's assume this figure related to at least 70% nitro content fuel.

O.K., the most important point to remember is that the length of the pipe is measured from the face of the piston to a "mean" point of reflection from the rear or baffle cone. This mean point is approximately one-half of the complete rear cone; that is, if it was measured from its major diameter out to a sharp point (see Fig. 1).

All of these dimensions can be determined by drawing the complete system out on paper, or they can be calculated by the formulas given later on. Our main

object here is to give you an easy way to determine the correct length for your commercially-produced engine and pipe, not to get into pipe design. By taking the length specified by the engine manufacturer, you can work backwards to find the correct wave speed for your fuel.

The formula for finding the length of the system is:

$$L = \frac{E \cdot V}{N}$$

Where L = Tuned length (see Fig. 2).

E = Total exhaust timing in degrees.

V = Velocity of gases in ft./sec.

N = rpm.

From the above, you can arrive at a reasonably accurate figure for various fuels and/or props, and/or nitro content. Just remember that you cannot have more than one variable at a time to get consistent results. If your engine's manufacturer specifies a tuned length for a given rpm, consider the nitro content of the fuel for that length. For example, if it is an OPS or Rossi, the chances are 99.9% that their figures relate to FAI or no-nitro fuel.

3) All of the engines you mention are fine pieces of equipment. The Super Tigre X-60 is relatively new, and we still have not received the pipe for this engine from Italy via World Engines.

Our only observation with the X-60 so far is that it takes a lot of running to come up to its full potential. It's hard to say what you can expect from these engines, except that you mention blowing up an OPS .60 on 40% nitro. With this much nitro and the pipe, I'm afraid you obtained the results to be expected! Consider that in C/L speed, the engine rarely runs for more than 15 seconds at full power. At 200 mph, it takes less than 9 seconds to make 6 laps on 70-ft. lines. Consider also that it is not unusual to rebuild a racing .60 or .65 several times to get one flight with a full pipe and high nitro! Now, think about what you are asking your R/C engine to do. If you fly for only 3 minutes with a full pipe on 40% nitro, you're asking a lot of an engine, much less the glow plug. Unless you are willing to invest about \$50 in special phenolic retainer bearings, if available, and another \$50 to \$100 in a titanium connecting rod that utilizes caged needle bearings, don't expect any engine presently available to stand up to the rigors of high nitro fuels and several minutes of flying time on the pipe. The only engine I know of that can possibly stand "the gaff" is the special TWA's, as built by Glenn Dye of Performance Model Engineering. I understand that K&B is due to release a new rear-exhaust, piped .61 soon. As it is also designed by Bill Wisniewski (as was the original TWA), perhaps it will be capable of much more, but my guess is that, in order to be commercially marketable, 15% nitro fuel will be about the upper limit. And even then, be prepared to replace parts. The K&B 6.5 is probably one of, if not the most powerful engine for its size ever produced. But be prepared to rebuild it if you run lots of nitro,