#THE KNIGHT FLYER

October-November-December **1999**
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The Flying Knights Scale Rally '99

What happens when you mix good weather, good news coverage, a devoted flying club, and almost 90 pilots together for a weekend? You wind up with an incredible Scale Rally, and that's exactly what we got

August 7th and 8th at the Nike Base. Over the course of the two days, over 150 aircraft, some from clubs in Canada, Ohio, Pennsylvania and Michigan, as well as our local clubs turned out to give an amazing display of flying skill for the public.

The excellent media coverage ensured that the public was able to take advantage of the event as never before, with Channels Two, Four and

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Seven, as well as local cable provider Adelphia Cable, all making appearances at various times throughout the weekend.

The Kite Flyers put in their traditional appearance with a dazzling showing of kites of all shapes, sizes and designs. Also, both Field's and Tim's Hobby Shops arrived to set up displays promoting the hobby.

The Flying Knights, of course, were far from absent during the event. The club was well represented by members in the piloting and in the static display. Knights also covered the microphones and the information booth, and the highly successful food tent could not have functioned without several Knights and the extremely valuable help of their spouses.

A number of companies donated products for the pilot door prizes. A list of those companies, along with further information on the Scale Rally and all the Flying Knights' events, can be found on the Flying Knights web site.

The public turnout was excellent, including over 30 campers and enough people to sell 600 50/50 split raffle tickets to. As always, a portion of the profits generated by this turnout was returned to the public via a donation to "Camp Good Days and Special Times".

Thanks go out to all the club members and their families for the support they provided through-out the event, and a special thanks goes out to Tom Filipiak for volunteering to co-ordinate the event and to all the Knights on the Scale Rally committee who really put this show together. With such an able team, next year's show can only be bigger and better.

TO ALL CLUB MEMBERS OF THE FLYING KNIGHTS:

Earlier this summer, at a Nike Base club flying meeting, I brought up the subject of properly displaying your channel numbers on your transmitter [s]. Year after year I have observed, at both flying fields, many R/C Pilots that do not have any channel identification numbers on their x-mittrs. How many times have you walked up and down the flight line asking the worn out question ''What channel are you on''?????

Channel numbers should always be displayed on your transmitter antenna, not only for obvious safety reasons, but also as a common courtesy to your R/C Flying partners.

Realizing that the flying season is starting to wind down and with in a few weeks the flying activity will begin to subside, I am asking all club members that do not have channel numbers on their x-mittr antenna [s] to make an honest effort to put them on as soon as possible and to encourage non-members to do the same. All radio systems come with channel numbers and are easily installed

To further facilitate channel identification, several of our members are displaying their numbers on the fin or rudder of their airplanes with 1/2'' stick on numbers. [i.e.: CH 27]. This is an outstanding way to let everyone on the flight line to know what channel the airplane is operating on. This information is being provided for your analysis, consideration and action.

Very Sincerely -----Jerry Piscitello

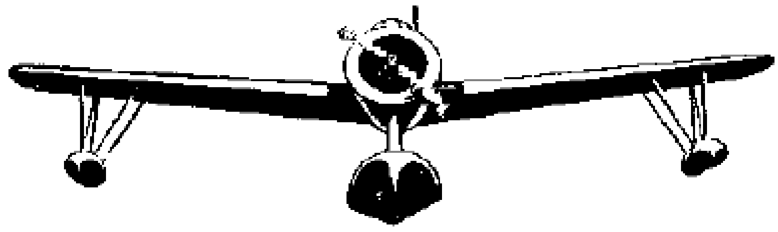
Fall Fun Fly

North Collins Field - Shirley Road

The knights will be playing host to the local Boy Scouts.
Bring a plate to pass lunch.

October 3rd

Float Fly



Your editors were invited to attend a local float fly. Needless to say, we were very curious as to where such an event could be held in our area.

Sure, some of us remember reading about the efforts of Jim Williams who used to fly on Green Lake a few years ago. Other float efforts were done on a private lake up in Canada by members of the RC Crafters and by Ray Roll (who gave a talk at the knights a few years ago) on a lake up in the Adirondacks.

But here! In western New York? Then we find out that it will be held on Lake Erie.

Whoa! The average waves on Lake Erie are bigger than the wingspan of most models.

Well, we accepted Jimmy Voelker's invitation and headed down Sturgeon Point Road on a hot Saturday in July,(the 24th). After a slightly confusing circle of the Marina, we spotted a group of likely suspects down by the water.

What a great place! The dock extends out into the lake and on the leeward side there is a sand bar extending along the shoreline. Between the sandbar and the beach there is what might be described as a small pond about a hundred feet long or so by perhaps fifty feet wide.

The water is perfectly quiet. The breeze is light. Perfect conditions for flying!

About ten modelers had arrived with their float planes and were busily discussing the merits of each.

The first plane to take off left the water but lost altitude and the float struck the sandbar at the end of the pond, but bounced back into the air.

The pilot recovered and managed to fly about for a while, apparently thinking about how the plane might act when it touched down with the bent float.

The landing was perfect and the damage was repairable.

There were several models resembling racing craft of a by-gone era. One model happens to be a favorite of this editor.

It was a PBY Catalina. Designed in 1933 and first flown in 1935, the Catalina was the first flying boat to eliminate all of the bracing wires by introducing a cantilever wing with no supporting structures. It also introduced retractable wing-tip floats.

This model was gorgeous on take-off, leaving a perfect wake on the water. After numerous passes over the flight line, the pilot brought it in for a perfect landing on the water.

Quite a few of the RC-Crafters were present and who should show up but our own Gerry Piscatello and grandkids.

We did not see any mishaps and frequency control was in effect. We understand however that at some of the past events, a wayward plane did manage to come down out in the lake!

But not to worry.

Jimmy has a row boat standing by, just for that eventuality. By the way, if you should lose a plane out on the big water, at least it won't be hiding in the trees or the tall grass.

Jimmy Voelker lives near the beach and hosts this kind of event several times during the year. It is open to all fliers so if you would like to try flying off the water, build yourself a seaplane this winter and keep your eye open for the dates.

Your editor was so impressed that we are going to make it a point to get the dates into the Spring Newsletter.

It's a Real Drag . . .

Performance:

As we watch models perform at different events, we cannot help but notice the wide variation in the speed and performance. Sleek racing planes easily buzz the field at 120 m.p.h. while other more classic models drift across the field at a stately 20 m.p.h. Planes loop and roll, climb and dive.

It seems to matter little whether we are talking about models or full scale airplanes.

So what's behind all this big difference in performance. Can we get a handle on it?

We're all familiar with the four forces that act on an aircraft. These forces are lift, weight, thrust and drag. The interplay between them defines the behavior of the airplane. In the June issue of the Knight Flyer, we looked at the Lift Force. It told us how the wing would handle the weight of our plane. We saw that we could easily calculate the amount of lift.

What is drag?:

Let's look at the other half of the ''Equation''. Both thrust and drag are a little more complicated than lift.

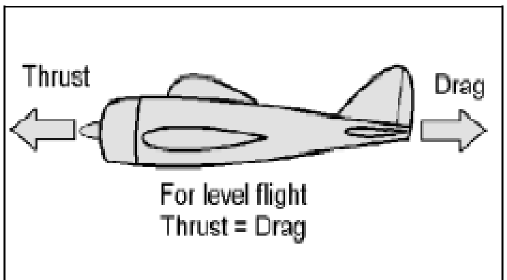


Figure 1

Drag, like lift is measured in pounds. Gravity always pulls our plane down, Drag always pulls our plane back. The engine that makes our plane go develops thrust in pounds. As shown in figure 1, in level flight, ''pounds of thrust'' must equal ''pounds of drag''.

Drag is the analog of friction. It is something that gets in our way and spoils our fun. Like friction we can never get rid of it. The best that we can do is to reduce it to some minimum.

An object's shape:

Drag is independent of scale. Whether you are talking about a giant 747 or a model of one, the shape is the major factor in determining the drag Coefficient. The actual drag is going to be much different for these two extremes, of course, because of the size and speed, but the Coefficient of Drag will be the same.

An object's shape is not often ideal. Anything that sticks out into the windstream changes the shape of the object and therefore contributes to the overall drag. That's why old airplanes always went so slow. They had everything but the kitchen sink hanging onto the airplane. There were wires, and struts; wheels and control wires, windscreens and cylinder heads.

The basic concept of drag is somewhat as follows. Picture a signboard, a large square piece of material. When the wind blows head on, it produces a pressure on the surface. If the board is one square foot, the force is easily computed. Its units will be pounds per sq. ft.

The Drag Coefficient for a flat plate is 1.28. The wind strikes the flat plate head on creating a force on it, but some air leaks around it. Amazingly, all drag situations can be reduced to a square piece of signboard.

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The relationship is D (lbs)=1.28 x .00234/2 x Area x Velocity squared.

This formula is identical to the one for lift.

We can re-write this equation so that our speed is in miles per hour instead of feet per second. The equation then becomes: Drag=.0033 times Area times Speed (m.p.h.) squared.

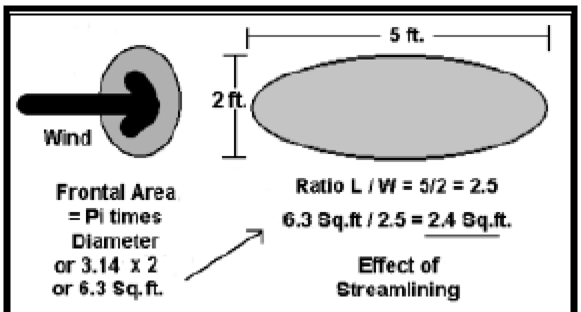

Figure 2

The drag Coefficient and the conversion factors are all included in the number .0033. Plugging in the numbers above we find the force on a 1 sq. foot plate at 40 m.p.h. is .0033 x 1 x 40 x 40. This comes out to 5.3 pounds.

Effect of streamlining:

A streamlined body is simply represented by a smaller square. That is, we just reduce the Frontal Area by some factor that represents the streamlining.

This is shown in **Fig. 2**

Here's how? Just divide the length or diameter of the fuselage by its maximum width.

The cadet fuselage is 39 inches long and our maximum width is 6 inches. Divide the length by the width and we have 6.5. This is called the fineness ratio. It tells us how sleek and skinny our airplane is.

If we have a short fat airplane the number will be low and the resultant drag will be high. A long skinny airplane will give us a high number.

Unfortunately, on large objects this only works for numbers up to about 4, then the drag starts to increase again.

This is due to the effect of skin friction. This number should be applied to the fuselage only, so divide the fuselage frontal area of 24 by 4, (instead of 6.5) to get an area of 6 Sq. in.

A familiar example:

Here's an example with your car. First, there is the friction drag of the wheels on the road. This is extremely low compared to the aerodynamic drag and independent of the speed so we can ignore it.

Almost the entire drag penalty is due to aerodynamic drag.

Start with the projected frontal area of the car. The width and height of a typical car is about 6 ft. by 5 ft. If you cruising down the road at 30 m.p.h., your car can be represented by a signboard nearly 30 feet square being pushed flat into the wind.

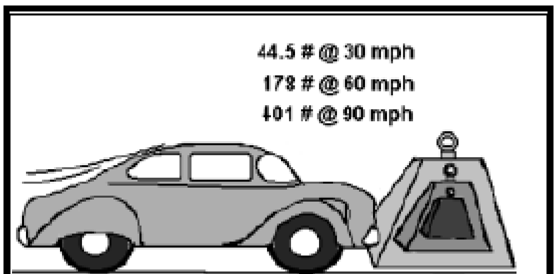

Figure 3

Because the car is somewhat streamlined, much more air leaks past it so the ‘‘effective’’ board area is less than 30 Sq. ft. A small car is about half as wide as it is long, so let’s reduce our frontal area by 2.

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If we deal in "miles per hour", the formula for the force on a flat plate is .0033 times the "area" times the "speed" squared. Let's compute.

Force = .0033 x 15 x 30 x 30 = 44.5 pounds at 30 m.p.h. Not too bad.

But wait! It gets ugly really quick.

If you **double the speed**, you will have **four times** the force!

At 60 m.p.h. the force is 178.2 pounds! And if you like to really move, try 90 m.p.h. T**hree times the speed** means **nine times** the drag!

Force = .0033 x 15 x 8100 = 400.9 pounds.

It's the same as pushing 400 pounds down the road.

That takes real power. No wonder it takes a lot of fuel to go faster.

Winged thingys:

Here again, there are several kinds of drag to consider. First, there is drag of the wing and second, the drag of the fuselage. The drag of the fuselage and all of the parts that stick out into the wind is called ‘‘parasite’’ drag.

Wing drag has two components. These components are **Profile Drag** and **Induced Drag.**

Profile drag is the price we pay to fly. The air spins off our wing tips because the high pressure on the bottom of the wing tries to get around to the low pressure on the top. It circulates and creates a vortex at the wing tip.

It is independent of the attack angle up to the stall point. Profile drag does not contribute to useful lift so we will treat it as parasite drag.

Induced drag does depend on the lift, which in turn depends on the attack angle. There ain’t no free lunch! The **more lift**, the **more drag.** This component is very important for the computation of drag over the full flight envelope.

We're going to limit our example to only one attack angle, -straight and level flight. The induced drag in this situation is minimal, so we will ignore it.

Mention should also be made about the Reynolds Number. Reynolds number is a measure of the stickiness of a fluid. Depending upon the pressure and the temperature, all fluids have a certain stickiness or ability to flow smoothly.

The density of the air at normal temperatures is small. The velocity of our planes is also small. The lengths over which the air flows are also small, inches compared to feet.

We are only concerned with near zero attack angles, so we can ignore the Reynolds Number.

Parasite Drag:

Ok, this is the big one!

Parasite drag is the kind we are most familiar with. It is like friction. The name describes it well. It is like a parasite.

All objects have some drag. Rough bulky things have high values of drag, while smooth slim objects like our models have low values.

When we get into models that have a lot of things sticking out into the airstream, such as wheels, cabins, struts, mufflers and engine parts then we must take all of these things into account.

Ignoring them will make our estimate less accurate but simpler. If the items are large, such as mufflers and wheels, we must account for them. We can ignore the small stuff.

A WW1 airplane with all of its struts, wires and protrusions is represented by a very large square. Jets, because of streamlining have very low Drag coefficients or present very small squares (Frontal Area).

Finally:

Calculating the drag of a Sig. Cadet:

The computation of the total drag of an aircraft is the sum of the major components, the fuselage, the wings and the wheels.

Here’s how we do it. We start by taking the front view outline of the plane as shown in **Fig. 4.**

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If you put a light behind the tail of your plane and cast its shadow on the wall, the shadow would represent the frontal area of the plane. **See Fig. 4.**

The idea is that the frontal area is what the wind sees as it strikes the plane. It is all the area contained in the outline of the shadow.

The areas of most planes are

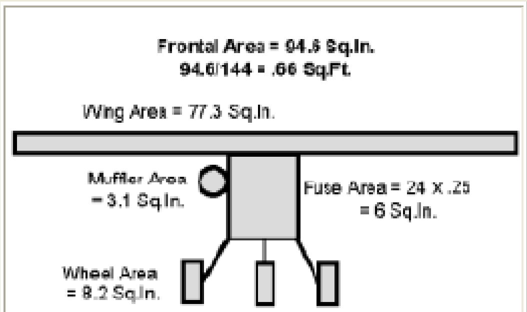

Figure 4

simple circles or squares. Just take a ruler and measure the plane at its widest parts. Then compute the area.

The Sig. Cadet:

Here are some measurements of a Sig. Cadet.

Look the fuselage in the eye. It is a rectangle about 4 inches by 6 inches.

The frontal area is 24 square inches. Remember to account for streamlining. Divide fuselage area by the length / width ratio (Max =4). The result is 6 Sq. in.

The wing frontal area is a long thin rectangle. The span is about 56 inches and the chord at its highest point is about 1.38 inches. The area is 77.28 inches square.

Each wheel is 2.75 inches by 1 inch or 2.75 square inches. There are three of them so triple it to 8.25 square inches. Since they are not retracted, they must be included.

If you have wires, muffler and other junk sticking out into the air stream either calculate the areas or estimate a percentage of the total and add it in. We have a non flow-thru muffler that is 1 inch in diameter so we'll add its area (Pi x D) of 3.1 Sq. in.

Now sum these four components together for the total frontal area. This comes out to 77.28 + 8.25 + 6 + 3.1 which is 94.6 Sq. in.

Divide this number by 144 to get a **total frontal area of .66 Sq. ft.**

Well, that's all we need. We can easily calculate the drag at any speed. For 30 miles per hour, we get .0033 x .66 x 30 x 30 which gives us a drag of 1.96 or about 2 pounds.

This means that our prop has to develop 2 pounds of thrust in order to maintain straight and level flight at 30 m.p.h.

At 40 m.p.h. the drag is 3.5 pounds. More drag, more rpm's.

Next issue we'll see how we can calculate the thrust for a given prop size and RPM.

Flying Knight's 8th Annual Auction

Sept. 25, 99
time: 1 pm (doors, 11 am)
place: Trinity Lutheran School