THE KNIGHT FLYER

Jan - Feb - Mar **2003**
Editor: **Jim Devlin**

FLYING SLEIGH LANDS IN HAMBURG

The seasons have made their annual turn and winter has descended once more upon the South Towns.

The planes have been hung on the mantel with care, not a motor can be heard. The 2002 Scale Rally is only a distant memory.

Deep in the WNY freezer one warm spot was still be found.

The basement of St. James church in Hamburg, is once again the site of the annual Flying Knights RC club Christmas Party.

Prior to the meeting members visited Loomis Funeral Home to pay their respects to long time member Don Black.

The meeting got under way around 8pm. Your editor managed to attend, thanks to the elevator that made it possible for him to get to the basement on crutches.

The voting took place with remarkable rapidity, in stark contrast to previous years when even the Pizza had been held hostage.

As usual, very little business transpires at the December meeting and thoughts turned quickly to the task at hand which of course was the consuming of the goodies.

Flying Knights swoop down on pizza trays

The party went well, with even some real old timers showing up.

It was good to see George Northem and Billy Scaglione after so many years.

The radio raffle was won by Vince Rasp while your editor captured the split.

Everyone seemed to be having a great time, recapping the flying season just past and discussing what they plan to do in the season just ahead.

It's great, to have at least one meeting a year where everyone can sit back and enjoy themselves, without becoming embroiled in the nuts and bolts of running a club.

The Club Simulator

WNY winters provide few opportunities to get out and fly.

Nowhere is this dearth of activity felt more strongly than among our new members who may not have gotten enough flights during our short summers.

With this in mind, our club purchased a computer and the Great Planes Flight Simulator.

Can a simulator really help someone learn to fly?

Consider that one obstacle encountered by every beginner, the simple act of turning the airplane as it approaches you.

Josh Chatwood demonstrates the Club Simulator

Everyone of us has had to face that challenge.

For many of us, the price was a steep one, for some, the loss of our first airplane.

This is where the simulator really earns its keep. By practicing this simple maneuver on the simulator during the off season, the beginning pilot will have mastered one of the most difficult challenges of model flying.

When the warm days of spring return, he (or she) will be one step and one airplane ahead of the game.

2003 elections - Some old, Some new

L- R Stu Brierly, Ron Wojic, Dave Kobie, Bob Waldraf, John Newman, Chuck Schummer & Jim Devlin.
Not in picture- George Fox, Herb Horni

Election of officers and board members for the coming year was held at the December 20th meeting. Ron Wojic, Dave Kobie and Stu Brierly were re-elected to their respective posts.

John Newman stepped down as treasurer and George Fox was elected to fill his office.

Jim Devlin agreed remain as editor.

Our board members for the upcoming year are John Newman, Herb Horni, Bob Waldraf and Chuck Schummer.

Congratulations to all.

With deep regret we report the loss of two members of the Flying Knights of Hamburg.
Ray Climenhaga passed away on Oct. 12, 2002
Don Black passed away on Dec. 18,2002
May they rest in peace.
Our prayers are with them and their families.

What to do while the glue dries

Now that winter is here and we can't get out to the old flying field, how in the world will we spend all this time waiting for the glue to dry.

One third of our members have access to the world wide web so here are a few RC sites to visit.

Southern Scale Warbirds Association:
www.geocities.com/CapeCanaveral/9771/
Rochester Aeromodeling Society:
www.rcplane.com/
RCCR: home.rochester.rr.com/rccr/
Dutchmen:
home.golden.net~snglbuny/dutchmen_pg_1.html
Balsa Dusters:
www.Fortunecity.com/marina/pierhead/199/
AMA District 2: www.amadistrictii.org
The Spad Site: www.spadtothebone.com
and of course.....
The flying Knights:
www.members.tripod.com/flyingknights/

March Mall Show

March 7th, 8th & 9th

McKinley Mall

A Dimensional Dilemma

We all like to fly scale airplanes.
What does this mean?

Well, when we fly a quarter scale aircraft, it means, basically, that a real airplane has been shrunk down to a fourth of the size of the original.

When things get re-scaled, one must pay attention to the dimensions (length, width etc.) that one is working with.

If we are working with a linear or one dimensional object our scale factor is simply the value of the scale.

If, for example, we want to build a quarter scale model, our subject will be reduced by a factor of 4. A fifth scale model will be 5 times smaller.

But this is where the simple stuff runs out.

The dimensions of scale:

When we deal with areas we are working in two dimensions.

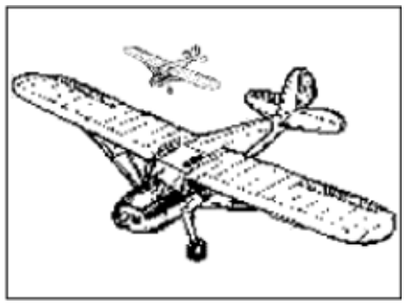

Fig.1 Full size and scale model

Two dimensions always involves areas or things that behave as areas. In this case we must work with the square of our scale factor.

For the quarter scale model that means 4 times 4 or 16. Everything that depends upon the area will be will be multiplied or divided by 16

Going one step further, when we work in three dimensions ,it is going to be the cube of our scale factor. This means that anything that depends upon the third dimension will be scaled by the cube of the scale factor.

Once again, the cube of four is 4 times 4 times 4 or 64. Everything that depends upon the third dimension will be scaled by 64.

All these factors are shown in Table 1 for 3 popular scale sizes.

Things that scale by the cube are **volumes, weights and forces**. Thrust, drag and Lift are all scaled by the "cube".

A funny thing happened on the way to the hanger. Velocity and time are reduced by the **square root** of the scale factor.

However speed and time still get all messed up.

Scale	4	5	6
Lengths (Linear)	4	5	6
Areas (Square)	16	25	36
Volumes (Cube)	64	125	216
Times (Sq. Root)	2	2.24	2.45
HP (3.5 Power)	128	279.5	529.1

Table 1

Models appear to fly too fast. This is because of a thing called the **Reynold's Number** that describes the turbulence on a wing moving through the air.

This is a very complicated phenomena and might be better treated in a completely separate article.

Another complication appears when we try to scale horsepower. This quantity scales by the 3.5 power. The scaling factor of 4 when raised to the 3.5 power is 128.

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Here is how we apply these dimensions to our models.

A real life example:

Here's the scoop on the real Cub.

The published wing length is 32 ft., with a fuselage 22 ft.. long and a wing area of 179 sq. ft.

The Cub has a 65 Hp engine and weighs 730 lb empty. It will carry a load of 190 lbs and has a max speed of 85 mph.

As one would suspect the quarter scale cub would have an 8 ft.. span and be 5 and a half feet long.

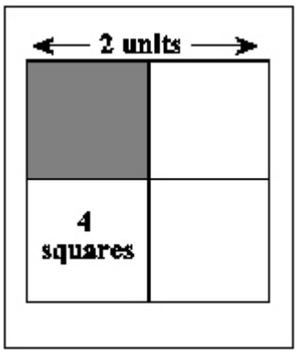

Figure 2

But here is where the simple stuff ends. Not everything scales down so easily.

Many of the dimensions and quantities that we need to calculate the flight qualities of the model do not go down by the simple scale factor.

We need the wing area and the weight to compute the lift and weight of our new scaled down model.

As shown in Fig.2 all "area" functions are squared.

From the table we see that the factor for area for a quarter scale is 4 squared or 16.

Figure 3 shows the meaning of cube. The cube of 2 is 8.

Since areas scale as the square, we find the model wing area to be 179 divided by 16 or 11.1 sq.. ft..

We need this number to calculate the lift of our new model.

Lift is the force that balances the weight of the airplane. Thrust is the force that balances the drag of the airplane.

How do weight and horsepower change when we scale our model?

These quantities are definitely not linear. Areas scale as the "square" and volumes (including weight) scale as the "cube".

However, they are all related to the same scaling factor.

All of the scaling factors are shown in Table 1 for three popular model scales.

Using scaling factors:

In order to fly, our model must generate a lift equal to its weight at the given speed.

Let's see if it does.

Weight scales as the **cube**, wing area as the **square** and speed as the **square root** of the scale factor.

Since lift must equal weight, let's find the scale weight.

We can use the empty weight, so the model weight should be 750 lbs divided by the cube of 4, or 750 lbs / 64 which equals 11.4 lbs.

The speed given above is scaled by dividing by 2 (the **square root of 4**). 85 mph divided by 2 is 42.5 mph.

This should be the maximum speed of our scale cub.

Our equation uses speed in feet per second so 42.5 mph must be converted to 62.5 feet per second.

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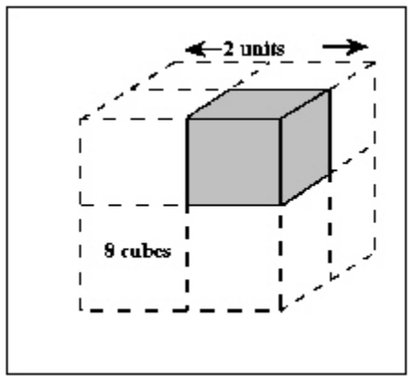

Figure 3

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At the maximum speed the attack angle will be low. For a flat bottomed wing, 0 degrees will give a coefficient of lift of about 0.1.

Air density as always is .0024 lbs per cu. ft.

We have everything we need to calculate the lift of our model.

$$L=C_L * d * V^2$$

Using our equation for lift, we get, (.1 x .0024 x 11.1 sq ft x 62.5 ft/sec x 62.5 ft/sec.) which equals 10.4 lbs. This is very close to what we would expect.

To find the horsepower needed for our scale model we need to divide the full scale horse power by the scale factor for horsepower.

From the table we see that our scale factor (4) is raised to the 3.5 power, or 128.

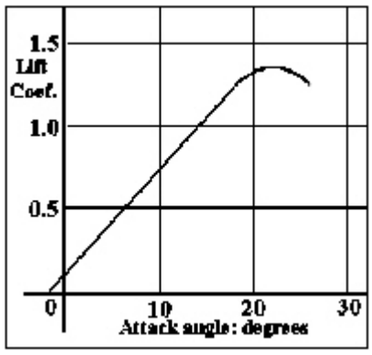

Fig.3 Typical Lift curve

Dividing 65hp by 128 gives us, 0.5 hp. If we could get this horsepower to the prop with 100% efficiency we probably could fly our model with a .40 size engine, but we can't.

Our props are only 50% efficient so we will need to at least double our horsepower. Our scale cub should fly with a .60, but as everybody knows, we won't be satisfied with a cub that flies like a real cub.

We always want go faster and higher, to loop and roll, even if a real cub can't do it anyway.