FEBRUARY 2008

TOPCAP

The Ottawa Remote Control Club Newsletter

THIS MONTH'S MEETING: TUESDAY, FEBRUARY 5, 2008

A method for locating the CG on model aircraft by Tom Hastie

There are many methods of measuring the CG of large scale aircraft. At some point, the wing sheeting just won't support the weight of the aircraft, making the good old "thumb" method a little tricky. Some people have rigs that hang the aircraft from the ceiling, but I never really liked suspending my $1000 airplane from the ceiling.

What follows is the method I've been using since getting into the 50cc class of aircraft. I've seen something similar described online, and indeed this is similar to the method used on full scale aircraft. Put simply, you measure the weight of the aircraft at each wheel, and you use some simple math to figure out where the CG is. What I haven't seen suggested before, however, is using the main gear as the datum. If you keep reading you'll see that by doing this you can greatly simplify the math required, and also greatly simplify the process of shifting weight around to get the CG exactly where you want it to be.

The main benefits of using this method are:
-My precious aircraft never leaves the ground. There's never any risk that it will topple off a balancing pivot.
-During this process, you also learn the exact weight of your aircraft. It's a good figure to have in mind when judging flight performance later.
-It makes it very easy to shift weight around the aircraft to get the CG locked in right where you want it.

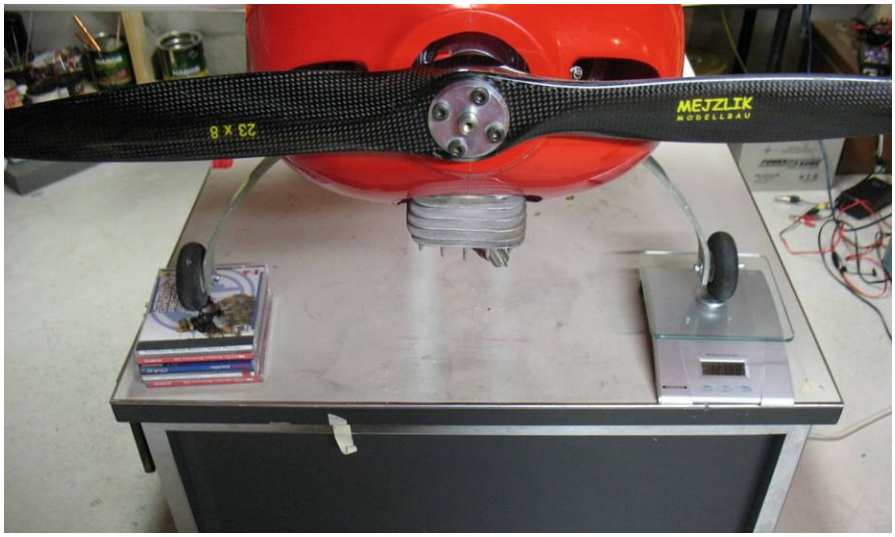
So lets begin.

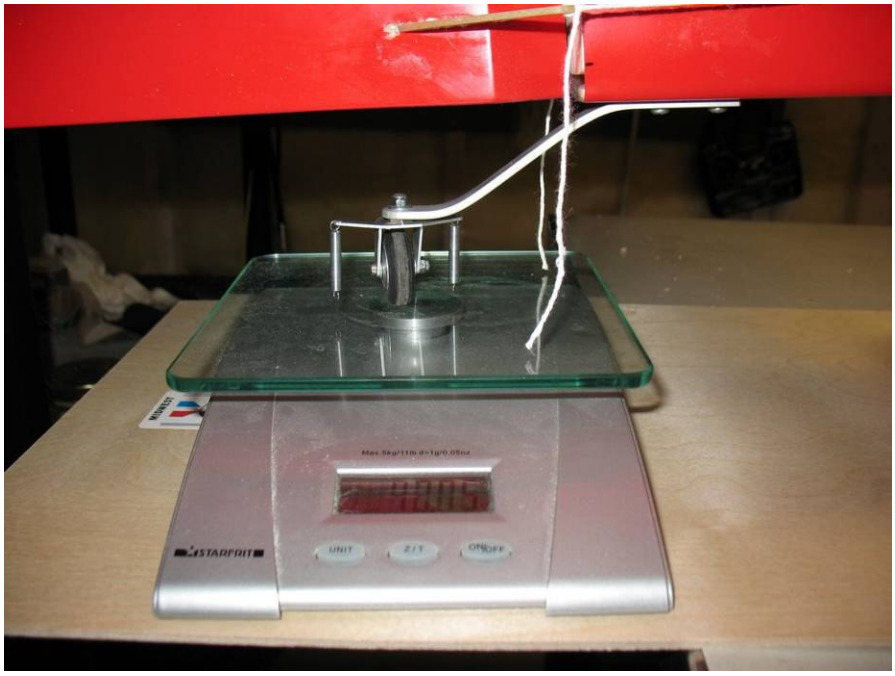
Here's what you'll need to measure the C of G this way:

1. A scale of some sort. I use a Starfrit Digital Food Scale that I purchased at Home Depot for $20. It measures up to 11lbs, and will give me 0.01oz resolution. The 11lb limit is plenty for measuring the CG of my 20lb aircraft.
2. Tape Measure
3. Square
4. Some way of leveling the aircraft as you weight each point (I use CD-Jewel cases)

Here we go. I'm going to demonstrate with my 50cc Krill Katana:

1. Place the aircraft on a level surface. I use the top of my build table.
2. Pile up CD cases until the pile is the same height as your scale. Make two piles of CDs.
3. Put one pile under the tail wheel, put the other pile under a main gear, and after zero-ing your scale, put the scale under the other main wheel.
4. Record the weight measured by the scale. On my Katana, the weight at this wheel was 125.7oz.
5. Swap the scale and CD cases, and record the weight measured by the scale under the other main gear. On my Katana, the weight at this wheel was 125.6oz.
6. Swap the scale to the tail wheel (Move the CD cases from the tail wheel to one of the main wheels). Record the weight of the aircraft measured by the scale under the tail wheel. On my Katana, the tail wheel weighed 48.1oz.
7. Using the tape measure, measure the distance between the point where the main gear touches the ground, and where the tail wheel touches the ground. On my Katana, the distance between the main gear and the tailwheel is 59.25 inches.





That's all you have to do with the plane. Here's where the math comes in. Don't be worried, it's not that bad.

The weight of the aircraft can be found by adding together the three measurements you made above.

$W_{left\ gear} + W_{right\ gear} + W_{tailwheel} = W_{total}$

For my Katana, I get:
125.7 + 125.6+ 48.1= 299.4oz. (or 18.7lbs)

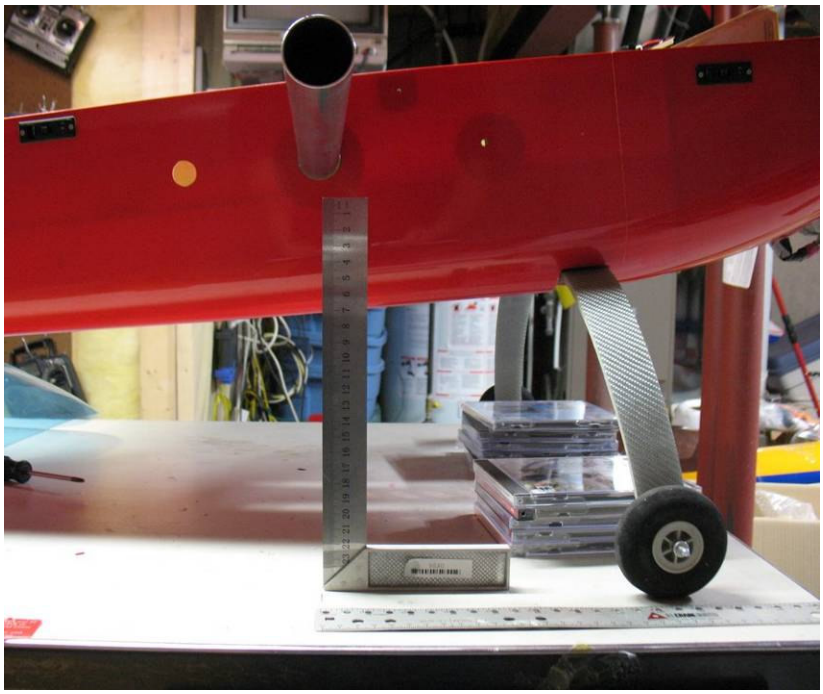
The location of the Center of Gravity, measured aft from the main gear can be found by the doing the following:

$X_{CG} = (W_{tailwheel} * \text{Distance between the main gear and tailwheel}) / W_{total}$

For the Krill I get:

$X_{CG} = (48.1 * 59.25) / 299.4$
$X_{CG} = 2{,}849.925 / 299.4$
$X_{CG} = 9.5$ inches

This means, that the CG of the aircraft is 9.5 inches aft of the point where the main gear touches the ground. I measure this distance along the ground, place my square there, and make a mark on the airframe. This is where the CG is.



You might notice in the picture that the fuselage of the aircraft isn't level. So long as the aircraft attitude is the same as each measurement is taken, and the CG distance is measured horizontally along the table top, the method will produce results that are accurate enough for our purposes. I use the CD cases to ensure that the aircraft remains in the same attitude as each measurement is taken. I use the square to bring my CG measurement from the table surface up to the fuselage (as shown in the figure).

Now, here's the magic of this method. Usually you know where you want the CG to be. You can reverse the equation above, so that if you know where the CG should be, you can figure out what the weight of the tail wheel should be:

$W_{tailwheel} = (W_{total} * X_{CG}) / \text{Distance between the tailwheel and the main gear.}$

For the Krill, the CG should be on the main spar. I used the square to help me figure out how far the CG location is from the main landing gear (my datum).

I found that this point is 8.75 inches aft of where the wheels touch the ground. So as is, my aircraft is slightly tail heavy at the moment.

Plugging things into the equation above, we get:

Wtailwheel = (299.4 * 8.75) / 59.25
Wtailwheel = 44.2

This tells me that to get the CG at 8.75 inches aft of the main gear, I want the tail wheel to weigh 44.2oz. Now, I take some easily moveable weight within the plane. Usually this is the receiver battery, or some other easily relocated mass. With the scale under the tailwheel, just move this weight forward and aft in the aircraft until the scale under the tail reads 44.2oz. Once I'm there, I secure my weight with some Velcro, and that's it. The CG is set exactly without adding extra weight, and without suspending my precious aircraft precariously from the ceiling.

It might be a good idea to check all three wheels one more time and crank through the calculations to make sure everything is correct. But other than that, the CG is now exactly where you want it. My aircraft never left the ground, and never had to balance on any sort of pivot.

I hope this method helps you guys. If there are any questions regarding it, feel free to contact me. I'm easy to find on www.calmdays.com

See you out at the flying field.

Tom Hastie

FEBRUARY MEETING – AUCTION!!

One of the most popular meetings of the year! Bring something from home to sell – pick up something to add to your collection! 10% of the selling price goes to the club. There is a non-refundable 5$ fee to place a reserved bid on any item. Get there early to register anything for sale (see Gudmund), and to check out what you can buy.

Just a friendly reminder to support our local hobby shops.
They're always ready to help the club to support all of our events.
Your business is appreciated!

Upcoming Events

After some confusion, the date for the **ORCC Winter Fun Fly** will be **Saturday, February 23**, at the Drummond Field. The draw for the Extra 270 ARF will also be on Feb 23, at the event. If you need a ticket for the plane, contact Shahram Ghorashi, Mike Toner, or anyone on the executive.

The **ORCC Warbird Fun Fly** will be held at the ORCC Drummond Field on **Saturday, July 5, 2008**.

Landing fee is $5 which includes a BBQ lunch. Flying starts at 9AM.
Limited camping available (no hook-ups).

All types of warbirds, large or small, fixed wing or helicopters, are welcome. Because this is intended to be a fun event, we will be rather generous with the definition of a warbird. A limited selection of peel-and-stick insignias will be available. Come and show us your warbirds!

The **ORCC Electric Fun Fly** will be held at the ORCC Drummond Field on **Saturday, August 23, 2008.**

Landing fee is $5 which includes a BBQ lunch. Flying starts at 9AM.
Limited camping available (no hook-ups).

All types of electric airplanes and helicopters are welcome. Large or small - park fliers to kilo-watt machines. Bring your EDF bungee-launch jet and wow the crowd. Do you have a lovely scale electric airplane? We'd love to see it fly! Come and join us for a day of electric flying.

Upcoming Dates to Remember

Date	Event	Contact
2008		
Tuesday, 05-Feb-08	Club Meeting – Auction	
Saturday, 23-Feb-08	Winter Fun Fly – Drummond Field	Shahram Ghorashi
Tuesday, 26-Feb-08	Executive Meeting	
Tuesday, 04-Mar-08	Club Meeting	
Tuesday, 25-Mar-08	Executive Meeting	
Tuesday, 01-Apr-08	Club Meeting – Concours D'elegance	
Tuesday, 29-Apr-08	Executive Meeting	
Tuesday, 06-May-08	Club Meeting	
Saturday, 10-May-08	Glider Fun Fly – ORCC Glider Field	
Sat 17-May-08, Sun 18-May-08	Ottawa IMAC Competition	Tom Hastie/Dave Rees
Saturday, 24-May-08	Helicopter Fun Fly – Drummond Field	Corey Groves
Saturday, 24-May-08	Hand Launch Glider Contest	
Tuesday, 27-May-08	Executive Meeting	
Sunday, 01-Jun-08 Tentative	Interclub Glider Series Round 1– C2VM	
Tuesday, 03-Jun-08	Club Meeting	
Saturday, 07-Jun-08	Giant Scale Fun Fly – Drummond Field	Geoff Fry
Saturday, 14-Jun-08	Thermal Duration – ORCC Glider Field – Interclub	John Blenkinsop
Sunday, 15-Jun-08	ORCC F5J Contest	Aurele Alain
Saturday, 21-Jun-08	Doug Pinhey Float Fly	Aurele Alain
Thurs 26-Jun-08 to Sun 29-Jun-08	Rally of the Giants - Arnprior	
Saturday, 28-Jun-08 Tentative	Interclub Glider Series Round 4 – MATS	
Saturday, 5-Jul-08	Warbird Event – Drummond Field	Mike Toner
Saturday, 12-Jul-08	Dawn Patrol - Kingston	
Saturday, 12-Jul-08	MAAC Zone Fun Fly	
Saturday, 19-Jul-08	Glider Fun Fly – ORCC Glider Field	
Sat 19-Jul-08, Sun 20-Jul-08	SMALL - Rideau Club	Ken Park
Saturday, 19-Jul-08	IMAC Competition - Quinte	
Sat 26-Jul-08, Sun 27-Jul-08 Tent.	Interclub Glider Series Rounds 5 & 6 - MATS	
Saturday, 02-Aug-08	Arnprior Fun Fly	
Sunday, 17-Aug-08	Thermal Duration – ORCC Glider Field – Interclub	
Saturday, 23-Aug-08	Electric Fun Fly – Drummond Field	Mike Toner
Tuesday, 26-Aug-08	Executive Meeting	
Tuesday, 02-Sep-08	Club Meeting	
Sat 06-Sep-08, Sun 07-Sep-08	Arnprior Aerotow – Arnprior Field	
Saturday, 13-Sep-08	Glider Fun Fly – ORCC Glider Field	
	Interclub Glider Series Round 7	
Saturday, 27-Sep-08	Brown Bag Float Fly – ORCC Float Pond	Aurele Alain
Tuesday, 30-Sep-08	Executive Meeting	
Tuesday, 07-Oct-08	Club Meeting	
Saturday, 11-Oct-08	Fall Fun Fly – Drummond Field	Shahram Ghorashi
Tuesday, 28-Oct-08	Executive Meeting	
Tuesday, 04-Nov-08	Club Meeting	
Tuesday, 25-Nov-08	Executive Meeting	
Tuesday, 02-Dec-08	Club Meeting	

Attention Glider Pilots!

Join the ORCC Glider distribution list

To learn more about the orcc-g group, please visit
http://groups.yahoo.com/group/orcc-g

RENEW YOUR MEMBERSHIP NOW!!!

You must renew your membership before you fly in 2008

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3D Flying	Tom Hastie	
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Drummond Field Managers	Rick Ward Dave Blackwell Tyler Blackwell	613-723-2661
Pattern Flying		
Webmaster	Corey Groves	613-736-8079
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MAAC President	Richard Barlow	613-348-1696

Interested in Float Flying?

Join the new ORCC Float Flyer distribution list.

To subscribe, send an e-mail to:
ORCC-FloatFlyers-subscribe@yahoogroups.com.
You will be automatically added to the distribution list.
To send an e-mail to the group send to:
ORCC-FloatFlyers@yahoogroups.com.

ORCC Website : http://www.ottawarcclub.ca

March Meeting: Tuesday Mar 4, 2008

ORCC Club Meetings The first Tuesday of each month
Date & Time: from September to June at 8:00 PM.
Location: McNabb Community Centre
180 Percy (at Gladstone), Ottawa
Submissions for the TopCap Newsletter can be sent to:
Mark Josefowich, TopCap Editor
276 Parkin Circle, Ottawa, K1T 4G8
EMail: editor@ottawarcclub.ca Phone: 613-248-0514

Closing Date for the February TopCap: Tuesday, February 26, 2008