



Tale Feathers November 2014

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Hi Club Members

Welcome to another issue of Tale Feathers.

The usual Disclaimer:

Articles and comments by the Editor and contributors may not necessarily reflect the views of the Club Committee, often won't be Politically Correct, but will be published anyway.

This newsletter is an information exchange and open forum for anybody to have their say.

With the move to bi-monthly meetings, the CLUB CORNER section will contain additional information on Committee plans & actions, to make sure everyone is kept up-to-date.

DANIEL RIDGWELL-ONE YEAR ON

It's been one year since a tragic fire claimed the life of this very personable and talented young man.

What hits home the most is not just that Daniel was an aeromodeler and had flown at our Club, but that it was a Li-Po battery that started the chain of events that led to his demise.

As reported in the Daily Advertiser, 27th November, Daniel was charging a Li-Po in the dining room, (where he could keep an eye on it, presumably) when something caught fire.

All Li-Po users should note the suggestion that toxic smoke from the battery was a contributing factor.

It's a dreadfully hard lesson, but we can take something positive away from this; that being that we should never trust Li-Po batteries when they are on charge.

While it would appear that the risk of fire or meltdown is much reduced with a charged battery, there is no room for complacency at any time.

All Li-Po's carry warnings that they must be supervised at all times while on charge, but in reality, this rarely happens. It's worse than watching paint dry.

It would be irresponsible to advocate leaving the little dears on their own while charging, but you should at least set up your charger operation on the assumption that one day it **will** catch fire or meltdown:

- Do not discharge your Li-Po's too deeply. 12%-15% should be the minimum residual charge left after flying (get a battery checker-\$13 from Hobby King Aust)
- **Charge as soon as possible after use**
- Double check your charger settings **before** pushing the START button
- Select STORAGE charge if they're not going to be used for a few weeks-this seems to be the safest condition for them-about 60-65% charge
- Set up a charging station outside or in an area that can tolerate a fire or meltdown

incident without spreading to the rest of the building, and where the toxic smoke can't build up

- Take the time to understand your battery charger very well. If you have any doubts about an old charger, flick it and get a current generation one. Technology marches on; chargers get cheaper, safer and more efficient.
- Don't be afraid to ask for advice if you have any issues setting up a charger

Let's make sure there are no more major incidents from Li-Po's.

CLUB CORNER BEING INFORMATION FROM THE COMMITTEE IN NO PARTICULAR ORDER

Next meeting, Sunday 14 December at the Clubhouse at 0930

THIS WILL ALSO BE THE CLUB'S CHRISTMAS LUNCH. PLEASE LET JORDAN KENDALL KNOW NUMBERS ASAP FOR CATERING. THERE WILL BE NO CHARGE FOR MEMBERS AND FAMILY.

**HOUSEKEEPING-AS USUAL
WASH UP ANY CROCKERY & CUTLERY YOU USE. WE DON'T EMPLOY CLEANING STAFF.**

Last one to leave the field each day checks; GAS OFF, FENCE UP & ON, ALL LOOSE ITEMS STOWED AWAY INSIDE, CAT OUT, MICE IN, CLUBHOUSE DOWN & LOCKED, CONTAINERS CLOSED AND LOCKED, PIT GATES CHAINED CLOSED & MAIN GATE LOCKED.

New Members

A very warm welcome to our new members;

Kyle Hughes

Kevin Smith

Trevor Roydhouse

John Thain

Wayne Girdlestone

James Church

A set of the existing rules along with a set of the proposed rules has been sent to you separately. Please read them carefully and if at all unsure of correct protocols or behaviour at any time, please ask another member or call a Committee member as listed on the website.

We sincerely hope that your time with the Club will

be long, happy and productive.

Email contact

As email is the normal form of contact with members these days, any members who are having trouble receiving emails please let the Secretary know.

Club Operations Manual & Rules

The amendment process has slowed with very few additional changes being suggested.

Therefore, the latest version, **v6.5**, will be circulated before the next meeting. Please read carefully.

Although we will try to take a vote at the next meeting, please remember that the Operating Rules are not set in concrete and can be easily revised or added to as circumstances change.

Flying field upgrade

The refurbishment of the main grass flight strip has settled down very nicely. Lack of rain initially slowed the process a bit, but use of the sprinklers, some storms, and liberal use of fertilizer has produced excellent growth.

It has now been trimmed twice and has had considerable use since then, all problem free. (You won't bog now, John)

We are working on a better way to protect the sprinkler heads and get rid of some of the giant holes where the plough disc covers currently sit.

Working Bee

A very good turn-up of happy members with a variety of tools and equipment made short work of the tasks scheduled. The mower container is now well ventilated with a whirly-bird and two fixed vents.

It also has a packed, braced and stabilised road-base ramp, of the correct height, with two steel folding tracks for safe and easy access for the mower.

Tony Amos generously took the time to hold another briefing session for mower operators.

Other jobs carried out were;

- Fill in the holes around the sprinkler heads on the strip and attempt to re-establish the cover plates
- Grind rust off the container walls and apply primer
- Clean out items from the large container that haven't been used for more than 2 years or which were considered surplus to requirements
- Weld up the broken hinges on the Clubhouse rear doors. This is a temporary security measure until better doors are sourced and installed

A very big thanks to those who turned up to pitch in and also to those who very thoughtfully sent in apologies. We know you would have been there if possible. You'll get another chance soon.

Flight Strip matting upgrade

This upgrade, initially scheduled for completion along with the grass strip improvements, has been postponed as we considered the cost of the original Contractor's proposal was excessive, even though the result would have been excellent and long lasting. The project has been put on hold until a more affordable alternative is decided on.

The use of a Contractor to do the work was to minimise the time that the matting would be out of action, but cost-wise, this isn't the way to go.

Our latest thoughts are that, with some careful planning, we can do the work mostly ourselves.

The proposal is to:

- Peel back the matting
- Install drainage piping to prevent rainwater runoff affecting the strip
- Add a thin layer of quarry fines or road-base to the existing surface
- Use a contractor with a Bob-Cat to level and smooth the surface
- Compact the surface with a vibrating device, possibly on the Bob-Cat or similar
- Re-lay the matting

This is a gross simplification of the work to be carried out, but serves to show one option we are considering that will save a lot of money.

Mystically marvellous, mysteriously moving tables

Those members, who have been complaining that the tables & chairs get put away on a regular basis, should take note that they have also been cleaned of the tea, coffee, food and oil stains that have been left on them.

Additionally, the unwashed mugs and plates that were left out on the tables have been consigned to the rubbish bin.

If those responsible for not cleaning up after themselves continue the practice, we will soon have no more crockery to worry about. Problem solved!

The Committee recalls that this clean-up method was applied once before not that long ago and was successful for a time. Pity memories are so short.

Instructors Course

It has become obvious that the Club is woefully short of practicing, qualified Instructors and we apologise

to those new members who haven't received the quality Instructor time they deserve.

The Committee has set a high priority on significantly improving the Instructing part of Club operations, as we now have an additional group of new members and we have a duty to see that they are all trained properly to **current** MAAA standards.

We have been talking to MAS about holding a course at Wagga or close by, and we could see one next March or April.

Those wanting to be Instructors should appreciate that it is not enough just to be able to fly without crashing too often.

Amongst other skills, you must be able to:

- Know why an aircraft flies and be able to explain it clearly
- Demonstrate how to fly properly and safely in full control
- Know the relevant MAAA M.O.P.'s and Club rules
- Talk to a student while you are demonstrating a flight sequence. (And make sense at the same time)
- Be able to anticipate the student getting into a dangerous situation and take control in time, but if he/she goes too far, then be able to recover from very unusual attitudes, possibly close to the ground
- Pass on correct knowledge-not rubbish
- Adjust your training technique to suit the students ability, temperament and learning curve
- Adapt to and understand the latest training methods like simulators and airborne stabilisers
- Be prepared to undertake refresher courses every 5 years to keep up with changes

Those who believe they have the necessary skills to take on this demanding, but rewarding role should contact Jordan Kendall to be put on the assessment list.

Club Bank Details...easier to pay fees

Direct Deposit available for membership payment:

Wagga Model Aero Club, Inc.

Beyond Australia Bank, Wagga Wagga

BSB: 805022

Account: 38700257

(Please include your surname as a reference)

CLUB WEBSITE

**PLEASE NOTE THE MINOR ADDRESS CHANGE:
Web Site URL**

<http://www.waggamac.org>

One of our new members, Trev Roydhouse, has very kindly offered to reorganize the site and act as Webmaster, with the immediate result that the web site now stays up-to-date and is working very well. If there are any items that members wish to publish on the site, please **don't** contact Trev directly as all website content has to be coordinated through the President.

FOR SALE

I seem to have an excess of chargers and at least two must go. Both have instruction manuals and the Quad 6 (*odd name-there's no 6 of anything*) has a collection of leads.

Additional leads/plugs to suit your batteries are available from H-K at a very reasonable cost or possibly from the Seller if you talk very nicely. The Quad has had very little use and is priced way below cost. (also way below H-K's version)

**A..En Er G Pro LIPRO QUAD 6**

Four chargers in one neat package

#...DC input...11-15v

#...50W per channel, 0.1A-5.0A charging each channel

#...6S Lithium; 1-15cell Nicad/NiMh; 2-20V lead-acid

#...Charges all battery types incl. Li-Fe

#...4 independent charging channels

#...Any mix of battery types may be charged simultaneously

#...Normal 4-button layout each channel

Detailed, real English, User Manual

This is **not** the H-K version.

\$70...Call Ian 0427 602 388

B...

Schulze Chameleon isl-6-330d-Dual Charger

#...Stabilised DC 11-15.2v input only
#...Dual simultaneous output channels
#...11S Lithium capacity...5.5A max

This one has been passed around the Club for a



while as it is a bit complicated to program, but with some effort, will work very well.

It is a powerful charger and has a very complete user manual written in good English, although the style is rather complex, which makes it more difficult to work out. There are, however, some additional user notes supplied to make things a bit easier.

One drawback is that it has no internal balancing provision, so an external balancer is necessary. One of the battery level checkers with a **balance function** like the Turnigy dlux Auto Checker or the H-K Cellmeter 7 Universal Battery Checker & Balancer would do the job.

The price is right, being free to a good home.

Call Ian 0427 602 388

Assorted aircraft and accessories

From a deceased estate. Please contact Anne Carpenter direct with offers. 0427 229 083

#...Used Boomerang Trainer - with ASP91fx, DX7 radio in alloy case (\$300)

#...SIG Astro Hog 71" - suit 75fs - kit - wing built only (\$100)

#...Sportsman Aviation Super Decathlon, with Magnum 120fs (no engine)? (\$200)

#...GPM Spacewalker with OS91 Surpass pumped and Futaba Rx and servos (\$300)

#...GPMS Aeromaster with Fuji BT431 engine installed, HT645mg servo & Hitec Rx - never flown; engine has been run once (\$800)

#...Vmar Beaver with Zenoa G26 hitect servo and Futaba 1024FF7 Tx and PCM Rx (\$300)

#... Sportman Aviation Corby Starlet suit 70FS

(\$150)

- #...Hitec FTP-10 servo tester/programmer (\$100)
- #...Hanger 9 Double Vision charger (\$20)
- #...Spektrum AR 7000 Rx new (\$12)

The prices are the recent advice from the Hobby Shop that Dad used to support (and I have no idea what it all means). Am willing to negotiate on prices; as I'm really anxious to move them out of my garage

If anyone is interested, they can viewed in my garage - mobile - 0427 229 083. Regards, Anne Carpenter

EQUIPMENT REVIEW

Like most modellers these days, I seem to have a lot of different battery types and sizes and trying to charge several different types one after the other leads to a lot of button-pushing to get the right program selected. (There is an excellent potential to get it wrong, too.)

Technology moves ahead, fortunately, and reviewed here are two chargers that have passed my 'dumb-thumbs' test in grand style.

Even with a latest generation "smart" 4-button charger, (*the "smart" refers to what you have to be to work some of them out*) it is still necessary to hunt through menus when you want to change battery types or capacity, trying to remember the correct button sequences and saying "damn" or the equivalent every time you get the button sequence wrong.

Enter the **IMAX, X-200, X-350 & X-400** touch-screen chargers.

These are full-colour, touch screen, graphical display units where you see and touch what function you want.

I have the X-350, (350W/15A) which is a single output unit and also the X-400, (200W x 2 10A) which is the dual output jobbie pictured below.



X-400-Dual output charger

The smaller X-200 & X-350 (not shown) are single output units with a 200W/10A & 350W/15A max output respectively. All three of these quite powerful chargers have the same operating system.

Although the photo above doesn't show the screen layout very well, the display has a number of **very clearly labelled** touch-sensitive buttons that allow you to select exactly what battery type, capacity, charge/discharge/balance/store routine is required simply by pressing a button that is labelled for that choice.

The X-350 has a neat all-in-one battery plug receptacle that takes a glow-igniter, JST/BEC, JR/FUT servo-type, XT-60, EC3, Tamiya and Deans T-plug, as well as the usual JST-XH balance ports.

Button-pushing

Selecting the correct charging program is very simple, with all choices displayed as buttons. Touch to select.

As usual, the charger will perform a dumb-thumb check to make sure the connections are correct before allowing charging to commence.

Changing the charger setup for different batteries and capacities is equally easy and there are 10 memories so you can save the setup for each of your main battery types, for instant single-button recall.

There is a separate push-button menu for setting up the usual basic parameters like:

- Low voltage protection
- Over temp, capacity or time
- Ni battery delta peak
- Etc...

These parameters all set out very clearly and explained in the instructions. They usually only need setting once.

A really neat feature is that once the charge is started, the selection display changes to a graph display that shows very clearly and accurately the progressive charge voltage, charge rate in mAh, mAh added, charger temperature, time on charge and individual cell balance. The balance function is very effective to 0.01 V or better.

The software is upgradable via a mini USB port and it has a USB outlet for charging phones, tablets, iPods, etc. The full colour, easy to read User Manual is very simple and explains all functions very clearly in pretty good English. I don't know how well these chargers

will last in the long term, but they are working well so far.

For those who still have problems when trying to charge different batteries & capacities (and I've had my share as well), these chargers go a very long way toward making the task of charging multiple battery types and capacities much safer, easier and a far more pleasant experience. Recommended.

SPECS

IMAX X-350...single channel

Specs:

Touch Screen: **4.3-inch 480 x 272 pixel**

Operating Voltage Range: **11.0~18.0V**

Circuit Power: **Max 350W (charging) and Max 40W (discharging)**

Charge Current Range: **0.1~15A**

Discharge Current Range: **0.1~6A**

Current Drain For Balancing LiPo: **300mAh / Cell**

Lithium Battery Cell Count: **1~6 series**

NiCd / NiMH Battery Cell Count: **1~16 Cells**

Pb Battery Voltage: **2 to 24V**

Dimension: **148 x 140 x 48mm** Weight: **0.55kg**

IMAX X-400 Dual Channel

Specs:

Input Voltage: **11~18V**

Circuit Power: **400W Max (200W Max each port when charging 2 batteries)**

Charge Current Range: **0.1~10A (each channel)**

Discharge Current Range: **0.1~3A**

LiPoly/Li-Ion: **1~6 cells**

NiMH/NiCD: **1~16 cells**

Pb Battery Voltage: **2~20V**

Weight: **665g** Dimensions: **195x140x55mm**

TECH TALK

Finding the C.G.-why it's important to get it right

This month, I thought we'd look at that all-important, but frequently misunderstood factor affecting safe flight, the Centre of Gravity, or the model's balance point.

These rules apply equally to full-scale aircraft as well as models, and both sizes suffer exactly the same consequences if the pilot/operator gets it wrong.

Not only fixed-wing drivers need worry about C.G.

Helicopters & multicopters also need to keep the C.G. in the right spot. The main symptom of getting it

wrong is that the model pitches or rolls as it lifts into a hover, skating off in the wrong direction, despite having the correct linkage setup. If you can't trim the unwanted movement out easily, check the C.G.

Definition: Centre of Gravity (C.G.) or Centre of Mass

"The point at which the entire weight of a body may be considered as concentrated, so that if supported at this point the body would remain in equilibrium."

In the case of a model, the plans or instructions will indicate a balance point (C.G.) as being a certain distance back from an easily found feature on the model. e.g. *"150mm back from the leading edge of the wing, measured where the wing meets the fuselage."* Or just as an arrow point on the side view.

This is exactly where the model should balance for it's first flight. Be wary about experimenting until the model has flown with its balance at this point.

In practice, there is usually a very small range of position of the C.G., where slightly rearward of the ideal point will cause the model to react more quickly to elevator deflection, (more agile-twitchy to fly-more experience needed) and if forward of the ideal point, the model will be more stable, (less agile-easier to fly).

Once again, do not conduct the first flight with a C.G. outside the recommended position.

C.G. Range

The useful range of C.G. position is where the model will still fly, albeit with different handling characteristics, ranging from mild to wild.

Unless a thrill-seeker, you would want to stay on the mild side of wild.

Sometimes the manufacturer makes it easy by indicating a small range of position for the C.G.

e.g. *"between 140mm and 160mm back from the wing leading edge at the root."*

This example of a model's C.G. safe handling range is typical, but still isn't very large and in this example, is just 20mm or less than 1 inch.

This is a good time to point out that the common practice of picking a model up with a fingertip under each wing tip is not good structurally. The wing is designed to support the total model load, even up to 10 or 15G in flight, but that load must be spread over the whole wing area, not concentrated on a 1cm² fingertip way out on each wing tip.

Those creaking and groaning sounds mean something and it's generally not good.

A Big Dog

As a 'by-the-way' example, here are some basic specs on a full scale Boeing 747.

MGTOW (max gross take-off weight) 334,090kgs

Wing span...59.64m

Body length...70.66m

CG range...1.6m. (That equals just 2.36% of the total fuselage length)

Sort of explains why everyone has to stay seated for take-off and landing. Imagine the result if the back half of cattle-class decided to wander up front to check out what champagne the nobs were sucking up, just as the Skipper tried to rotate for take-off. Helllooo boundary fence!!!

If your model has a published C.G. range, you can safely explore the model's handling;

Forward to the front limit if you want extra stability for first flight or training or;

Rearward to the rearward limit for extra agility and responsiveness in pitch and;

In the centre for well-balanced handling

Behaviour when out of range

It's when you deliberately or accidentally stray outside the recommended C.G. range that things get interesting.

Being careless with your balancing technique, or adding/taking out gear without re-checking the C.G. is the usual cause of this potentially exciting problem.

Nose heavy

Excessively nose heavy will certainly make the model more stable, but perhaps so much so that the elevator cannot lift the nose to take off. If you do get airborne, the model's nose will sag in turns, needing a lot of elevator to hold the whole thing level.

When trimmed to level flight, a roll to inverted flight will see the nose dipping down quite sharply.

While this is not a particularly unstable condition, it can be quite uncomfortable to fly and must be corrected before further flights.

Tail heavy

This is the really exciting one, but try very hard not to go here, as outside the rearward limit, the model will be virtually un-flyable.

It may pitch up steeply at take-off, sometimes before full flying speed is reached, resulting in an immediate snap roll, stall and spin in. At that height, the only recovery you'll be doing is with a basket for the bits.

If you do get manage to get airborne, the model will be super-sensitive in pitch, alternately diving, then climbing with little regard for Tx stick manipulations. It won't be able to be stabilised and the landing, at best, will be a semi-controlled crash.

Sometimes cutting the motor will allow a small measure of control to creep back in, but this is about all you can do to try to improve a horrible situation. Land immediately and don't worry about where that is. Just get it down and try to minimise the damage to the model or someone else.

Ways to find the C.G.

Point balance

With a smaller, light model, the usual way is to mark the C.G. point at a convenient point on the wing near the fuselage and use two fairly fine points to support the model. (Fingertips will do the job, but aren't as accurate)

If it tips nose down, it's nose heavy and will need some equipment moved back, or (worst case) lead weight added to the tail.

Obviously, the reverse applies if it's tail heavy.

During this process, check and double-check that the balance points are still right on the designated C.G. point.

Note that a liquid-fuelled model should be balanced with the gear down and fuel tank empty. Electrics must have the battery installed.

Plumb-bob balance

With heavier and physically larger models, the point balance method just doesn't work. Here is a system that is a little more complex, but very accurate.

The photos tell the story, but I've done my best to confuse things with words.



1...Set the model up on a bench or table, gear down, tank empty or battery installed and the C.G. marked on the upper part of the fuselage.

2...Make up a cord, strong enough to support the model's weight, as shown with loops in each end that will hook onto some part of the nose and tail. It doesn't matter where the loops are around the model, so long as they are as far apart as possible and don't shift during the procedure. They could be around the prop or spinner, for example, on a prop model. You can see the two loops of this cord around the nose and tail of the F-15 above.

2...Another strong cord is attached to an overhead fitting, (in this case, a steel bar, but it could just be a strong hook screwed into a ceiling beam) and looped through the support cord, so that the model is supported just clear of the table or bench for safety. The support cord must be able to be moved back and forth, although a fair amount of friction is good, as it doesn't need to move too freely.

4...Attach a small plumb-bob to the attachment point on the ceiling, so that the plumb-bob is easily able to be adjusted up or down and it hangs down exactly past the apex of the peak of the triangle formed by the model support cord as shown.



(This photo shows a short length of fuel tubing added to the support cord to provide friction.)

5...Level the model by sliding the support cord back and forth, either into a level flight attitude, (slightly nose up) or using a spirit level placed on a flat part of the model that would be horizontal in flight.



6...With the model level, lower the plumb bob until the point just touches the fuselage. If the plumb bob touches the C.G. mark, the model is perfectly balanced for that attitude. If the plumb bob is forward of the C.G. point, it's nose heavy and weight needs to be added to the tail to bring the plumb-bob back to the C.G. point.

Always re-level after adding weight

If the model is well out of balance, then after weight is added, the model may need to be re-levelled.

This is done by sliding the support cord through the upper loop. The amount of movement needed to re-level the model should not be very much, but that will depend upon how far out of balance the model is.



So that's it. Perhaps a bit fiddly to set up, but it gives a very accurate result with a large or heavy model.

Weighing method-as per full-scale

Also applicable to a large model that is too heavy to sit on balance points or lift with fingertips. Much safer and doesn't involved dangling your heavy, expensive model from the ceiling on bits of string.

1...Rig the model, gear down, zero fuel, and mark the recommended C.G. position on the top or side of the fuselage. Find a place where you can put the nose of the plane up against a wall. Take a level and raise either the tail wheel or nose wheel, until the fuse is either sitting level or preferably in flight attitude.

2...Once the plane is sitting correctly, stick pieces of masking tape on the floor or bench where the main wheels touch the surface and make a mark right on the tape under the axles. Then make another mark where the centre of the nose or tail wheel sits in the same manner.

Books or magazines are best to level the model.

3...With the model still touching the wall or fixed stop measure from the wall to the recommended CG point that was marked on the fuselage. Write that length down.

4...Measure from the wall to the centre of the main wheels. Write that length down.

5...Measure from the wall to the centre of the nose wheel or tail wheel. Write that length down.

Lets say you come up with these numbers:

Wall to LH main – 560mm ()
 Wall to RH main – 560mm (hopefully the same)
 Wall to Tail wheel – 1780mm

6...Now get an accurate kitchen scale (5-8kg is best, depending on model weight) and place it under each wheel individually. (If you have three scales you can get all the weights at the same time, which is much faster, but make sure the plane is level before noting the weights)

As you place the scale under each wheel in turn, you will have to re-adjust the packing under the other wheels to keep the plane sitting level. Add more magazines. (But don't weigh the magazines)
 You will end up with three weights, one for each wheel.

Lets say you come up with these numbers:

LH main – 4.1 kg
 RH main – 4.1 kg
 Tail wheel – 2.28 kg

(A tail-dragger is used for this example, but a trike gear is exactly the same procedure)

It now just takes a few keystrokes on the calculator to find where the CG sits, based on these weights and

distances.

7...The formula is:

WEIGHT x ARM (distance) = Moment

Main wheel #1...4.1 kg x 560mm=2,296 kg/mm

Main wheel #2...4.1 kg x 560mm=2,296 kg/mm

Tail wheel...2.28 kg x 1,780mm=4,058.4 kg/mm

8...Now add the total of all the moments and the total of all the weights.

Weights: 4.1 + 4.1 + 2.28 =10.48 kg (this is the model's total weight without fuel)

Moment arms: 2,296 + 2,296 + 4,058.4 = 8,650.4

9...Divide the total moment by the total weight.

$8,650.4 \div 10.48 = 825.4 \text{ mm}$

That number, 825.4 mm, is how far back from the tip of the spinner or nose is where the model balances right now as it stands. This becomes the **calculated C.G.**

Compare that 825.4mm to the distance that you measured earlier, which was from the tip of the nose to the **recommended** CG location.

If the **calculated C.G. point** is closer to the nose than the **recommended C.G. point**, the model is nose-heavy and will need equipment shifted or (worst-case, weight added to the tail)

If the **calculated C.G.** is closer to the tail than the **recommended C.G.** then the model is tail-heavy and weight is needed at the front.

10...If you need to add weight or shift gear forward or back, you must re-weigh each wheel to see if the C.G. is now correct, although it's not necessary to re-measure the **ARM** (distance) as they will stay the same. Then just repeat the previous calculations.

Summary

It may sound confusing and a lot of work but it really doesn't take long and is much safer than stringing a heavy model up from the rafters or trying to balance it on your fingertips. Also much less painful and very accurate.

This is also how full scale planes are balanced, including large, heavy airliners. You can't lift one of them by your fingers or stick it on a C.G. machine. Try it-you might like it.



TALE PIECE FROM THE CAT.



On another subject entirely.....

Pearls of Wisdom from that venerable Asian aviator, Confuze-us.

#... The Evening news is where they begin with 'Good evening', and then proceed to tell you why it isn't.

#... Dolphins are so smart that within just a few weeks of captivity, they can train people to stand on the very edge of the pool and throw them fish.

#... It isn't the mistake that causes the crash - it's the time it takes to realize that it WAS a mistake!!



Straight Take-offs, Soft Landings and stay away from the tyres.

