NEWSLETTER
VOLUME 2013 ISSUE 1

Editor
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Closing Date for next newsletter
14th April 2013
Email: cvrcm@spin.net.au

Next Meetings
24th February 2013 & 31st March 2013

PRESIDENTS FORUM

Greetings to all club members and a happy new year!

We have started 2013 with a well attended January meeting.

We have a busy agenda for the early months of this year. Importantly we must prepare for another successful Easter Fair display. CVRCM and Marong need to provide support for Matthew Young and his family in their efforts to raise funds to travel to the Netherlands, to represent Australia in the pylon racing World Championships.
I see this as consistent with our effort to encourage younger members and to sustain future club membership.
We continue to need to develop club resources to assist flight training for new junior aspiring model aircraft pilots. It might be useful to discuss ideas for creating a general consensus about a consistent method of pilot training. This would provide a clear pathway and understanding on how to obtain pilot skills.
For example, that the club assist or encourage simulator training as the first stage in training. This may require producing some written learning objectives, for example that the trainee practice flying an accurate circuit and a good landing glide slope.
We are currently enjoying some milder weather, unfortunately without rain. I hope we have some autumn rain even if we have to start mowing the airfield again!
I have enjoyed the cooler days to spend some time in the shed building “repairable” rotors for my autogyro. I hope to achieve more consistent and regular flying, with less time wasted rebuilding broken rotors. A better auto rotating landing technique may also prevent breaking blades when landing!
Finally for future club general meetings I would like the club to chair our meetings. I feel I am not serving the club well by chairing the meetings. This is because I am under stress to return home to care for my wife. Thus I may be ending our meetings too early for adequate discussion of club business. I depend on the good will of my neighbour, who visits my wife so that I can spend more time out at club meetings. I hope I have your understanding in this matter.
Thank you and best wishes.
Keith Mitchener

FROM THE EDITOR

The start of a new year has arrived; we hope that this will bring better flying weather for us.

I still would like to see more articles in the newsletter from members.

Tell us what you would like to see in your newsletter.

A few questions have arisen about the new bird that I have acquired, will it fly, etc. The answers to that is come down and have a look, as I have been looking for unusual R.C flight models, and I think I have come up with one.

Now the big one our junior Matthew Young ha s been selected to represent Australia at the World Championships in the Netherlands for pylon racing, we have all seen Matt fly at the field, and with the encouragement from members it would be good to see him do well at this event.
It has been requested that members participate in helping Matt get there with functions that are being held.

Please make sure your email address is up to date and I need to know your getting the newsletter by sending back the read receipt that is requested.

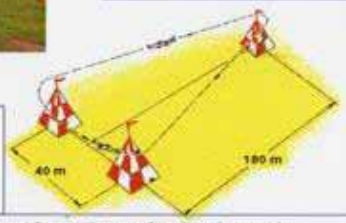
Help Matt go to the Model Pylon Racing World Championships

Hi my name is **Matt Young** and I have been chosen to **represent Australia** in the **2013 FAI Model Pylon Racing World Championships** to be held in **The Netherlands**, at the Deelen Airbase. This is a once in a lifetime opportunity for me as I am now 17 and can qualify as a junior. Next time in 2015 I will have to try a bit harder to make it on to the team as I won't be a junior then. I need to raise $15,000 to cover basic travelling, entry fees and accommodation. I am seeking **donations and sponsorships** to help me fulfil my dream. **If you can help please contact me at matthewyoung@ccb.vic.edu.au or ph 0458 107015, or 54425617, or via facebook http://www.facebook.com/groups/386261131451434/** (HELP MATT GET TO THE 2013 F3D PYLON WORLD CHAMPS)

The planes are made from carbon fibre, fibreglass, balsa wood and the wings are foam cored. The propellers that we use are made from carbon fibre. The planes average a speed of 350kp/h and pull about 32G around pylon 1. The minimum wingspan of these planes is 1150mm and the minimum weight is 2200g. They have a 0.40 cubic inch (6.6cc) high performance engine in them with tuned pipes. The engines have a venturi instead of a carburettor. This means the planes only have 2 speeds—full throttle or no throttle.

I have competed in heats in various locations around Victoria and qualified for the world championships. The picture on the right was taken at the Marong model flying field where I came third. After seeing my dedication and potential other competitors have offered to support me at the world championships by supplying planes and flight gear for me to use and assisting me at the competition.

The race course is 180m long and 40m wide in a triangular shape. The race is 10 laps which is completed in about 60 seconds on average with the world record being 56.33 seconds. In total each race is 4km long.



The races are scored by times like 56.33sec and 60.03sec . The person with the quickest time wins, but if you cut a corner or go inside the course it adds 10% onto your time. If they have 7 races they drop your worst score, if they have 9 races they drop 2 of your worst scores. The person with the lowest score wins.

You can also find some more information on my facebook group http://www.facebook.com/groups/386261131451434/ (HELP MATT GET TO THE 2013 F3D PYLON WORLD CHAMPS) I am also available for questions and comments about model pylon racing and how to go about getting into this amazing sport.

THE SECRETARY'S FORUM

Twentieth Anniversary fun fly.

Present were N Gabriel and friend, Craig Chambers and Tim. Ivor Miller and friend Bill?, Matt and Roz Young, Wayne and Danielle Johnson, Chris Batterham, David Mew, Ron Beames, Peter Bisset, Ray Tampion, Roy and Carmel Shelton , a visitor with a small child (Tom?) Les Wiles the photographer, Keith Mitchener, Kevin Pentland.

About twenty present and past members and friends attended on the last Sunday of November to have a chat and a social fly as well as a BBQ cooked by Keith and helpers. Keith took care of the catering as usual. Thanks Keith. I would like to thank Les Wiles for his excellent photographs of the day. We may not all be flattered by some of the shots. President Keith formally welcomed all after the BBQ and asked some of the past members to reminisce a little bit.

Past presidents Ron Beames and Peter Sutherland spoke of times past and where we had been based usually in this area. We started behind the Longlea recreation reserve then to Bennett's road. I think still in Eric Robert's paddock.

One of the disappointments of the day was that Peter Bisset was having technical problems with his big P51 and could not fly.

Ivor Miller brought a nice scale Bell helicopter which flew well.

We wish David Mew well as he has to have some minor surgery in the near future.

We badly need some helpers for sausage sizzle at Hume and Iser's on February 23rd from about 10am to 2pm or a little later no previous experience needed but if you have a food handlers certificate that would be a great help.

Keep in mind supper dance on March 16th at Spring Gully hall. Help with making supper at the hall in the afternoon would be appreciated more details will be sent out shortly in regard to the dance.

Kevin Pentland

SAFETY OFFICERS REPORT

Electric Models be careful when testing electric motors with propellers fitted.

Fire awareness: Due to the amount of dry grass around the flying field make sure that there is a fire extinguisher on the flight line one on the post at the verandah of the caravan and that the knapsack is out and has water in it.

N Gabriel to investigate the cost of a new large fire extinguisher.

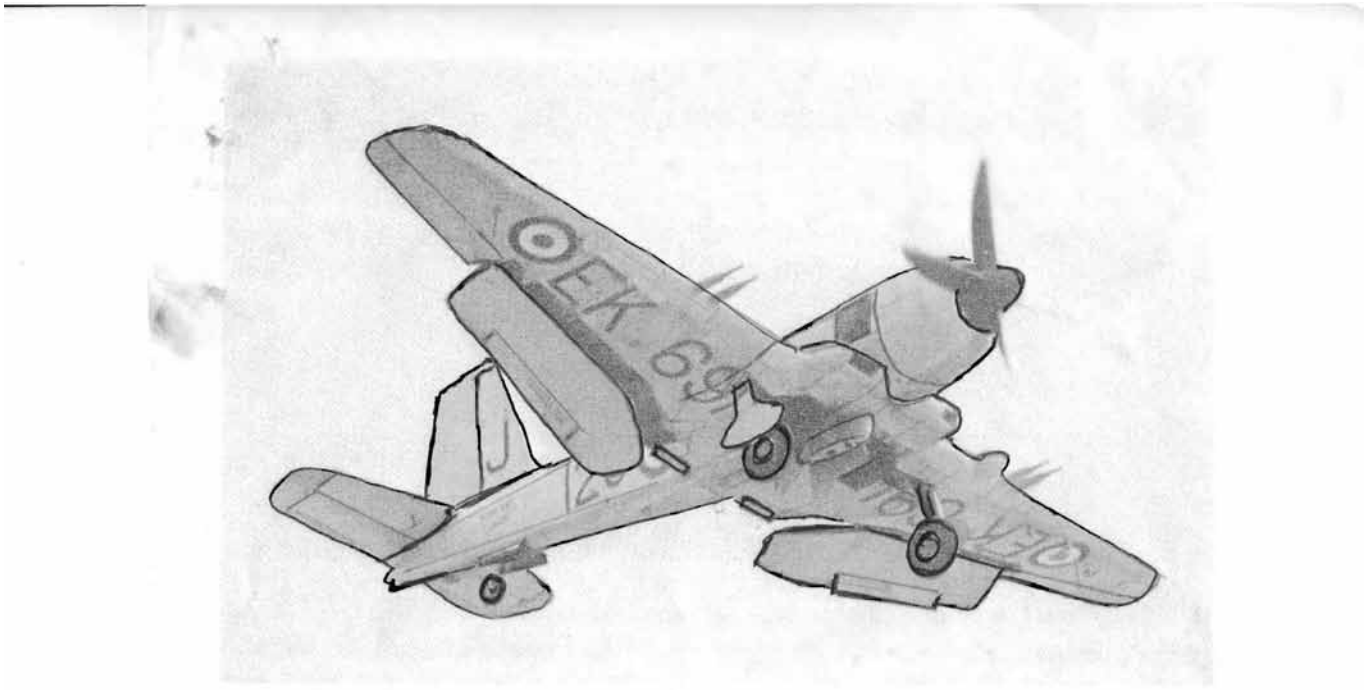
The fire extinguishers need to be checked to see if they are serviceable.

Keith's Column

Carrier aircraft feature a very robust undercarriage design to absorb the impact loads of carrier landings. The Harrier's rotating jet ducts are on the fuselage sides, requiring a high mounted wing. The main undercarriage is therefore on the fuselage centre line, with landing loads taken by the fuselage structure.

The wing outrigger is to support the aircraft during deck manoeuvres. The model designer chose to use the outrigger as the main undercarriage, without supporting spar structure in the foam wing.
One of the pleasures of designing scale model aircraft is researching the full scale aircraft and is design history. A useful design guide is "cut away

Drawings which show the structured and systems design of aircraft. I currently have a partly built scale Blackburn Firebrand. When this is eventually finished I hope it flies well because of a well-researched design and that I have achieved adequate piloting skills by that time.



Firebrand T.F. Mk 5 EK691, coded 123/J, making an approach to *Eagle* in 1953, showing the horn-balanced elevator peculiar to this mark. (*Flight Photo.*)

Blackburn B-37 Firebrand

Fine-Tune Your CG by Flight Testing

by Larry Renger

The plans told you exactly where to balance the airplane—right? What's that about messing with ballast and •incidence? The plane flies, so who needs Well, that depends on whether you to be a good pilot or not. The best pilots have planes that respond to their every input; they don't require constant Control just to maintain heading. The ideal is a model that will do what *you* want it p. not what it happens to be set up to do. Let's compare it with driving a car.

say you have an old clunker that has encountered its share of potholes and curbs. The front-end alignment is shot, the wheels aren't balanced, and the tires are bald. Add a rainstorm. OK, if you're a really good driver, you'll probably still be to go pretty fast and actually live to tell about it, but if you aren't.... Who needs it! I'd prefer a modern suspension with the best all-weather tires and the best maintenance I can afford to keep my tail out of the weeds. You want a machine that does *not* have a mind of its own. It should go exactly where and when you want and how you want it to. Unexpected response's can be fatal when driving a car, and they can total your model. My pur-pose here is to detail the techniques you need to use to tune your model to respond smoothly and appropriately to the type of flying *you* do.

The designer told you where to balance the model, and you did it, so what's the deal? Well, models differ—even the same design built by the same modeler from the same materials. We just can't build airplanes so perfectly that they don't require adjustments. In addition, a model's designer will tell you a "safe" CG location that will work every time. But it will almost never be the "best" CG location for your particular model.

STATE OF TUNE

consider your level of expertise and the type of model you fly. Every type has a particular character and will respond to plot input according to the level of his skills. Let's discuss a few of these types:

♦ Trainers are basically stable. If you get into trouble, it's best to let go of the sticks and wait for the model to resume flying by itself. Lots of altitude helps, of course, but the model is completely stable flying itself. The classic old-timer free-flight with minimal power comes to mind as a comparison—no pilot input required. In flying of this type, the term "radio influenced" seems more apt than "radio controlled."

On the next level are the so-called "aileron trainers." Here, you want a plane that rights itself, responds in a moderate manner to control inputs and doesn't require lightning-fast reflexes.

♦ High-performance or competition aerobatic models—the third basic level of stability. Here, the ideal is a model that's precisely neutral in all stability axes, i.e., it goes exactly where it was last pointed, until told to do something else. The pilot has to be totally in command,

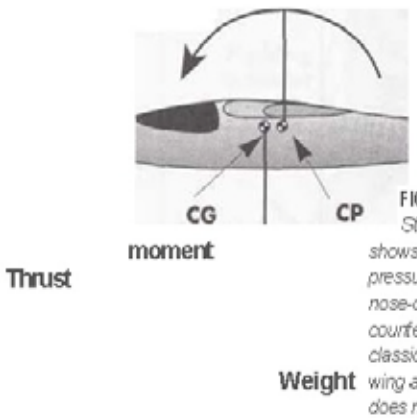


FIGURE 1
Stable margin (slightly nose-heavy). This drawing shows a case in which the CG is ahead of the center of pressure (CP). The weight adds to the wing's nose-down pitching moment, and they both must be countered by a downforce at the tail. This is the most classic stable configuration. As speed picks up, the wing and tail forces increase, but the weight moment does not. As a result, forces are unbalanced and the nose comes up; this reduces speed.

but the reward is a level of response and flying precision that can be achieved in no other way. Mind you, this level of neutrality is usually combined with extremely sensitive control inputs, so the average Sunday pilot wouldn't find the models flyable. For the sport pilot, neutral stability with mild control sensitivity can make for pleasant flying.

TAKING A DIVE!

The dive test measures how sensitive a model **is to changes of speed while holding constant as many other variables as possible. The validity of the test** has long been controversial, because it doesn't seem to work with all models.

In a very practical sense, the test also measures a models margin of stability. It compares its flight in a horizontal, stable

Mode to one in which it's flying faster—in effect, two points on the net pitching moment curve.

The model is trimmed to be stable (no accelerations) in level flight, then pitched down and returned to the same trimmed flight. The model is no longer in equilibrium because lift is reduced and the model is accelerating. As a result, the model will respond to the pitch trim more than the weight balance.

If you were flying tail-heavy with a lifting stab, the model would pitch downward.

If you were flying nose-heavy with a downward lifting **stab, the** model would pitch up. If trim is neutral, the the model will fly straight.

Note that the results are the reverse of the obvious tail-heavy causes the nose to go down; nose-heavy makes the nose come up. See Figures 1 through 5 to understand why this is so.

Note that forces are assumed to work on a horizontal line through the CG. In fact , the problem is at least two-dimentional in that the thrust, drag, and lift all different vertical planes. My aim here is just **to get the pitching moment** concept across.

CG VS. CONTROL SENSITIVITY—and other related factors

In model aircraft setup, one of the most difficult things is to distinguish between such factors as basic design, trim, center of gravity location, control sensitivity and engine thrust line. The key is to evolve a technique to isolate each factor in turn. It would be the work of a lifetime to start with a clean sheet of paper and come up with a totally new design that worked well; 99.9 percent of "new" model designs are adaptations of previous designs. The most successful models are the result of refinements made by a modeler who, over a period of time, builds several versions of the same model and makes small modifications every time. (As they say, "The name changed, but the moments are the same.") Dealing with the entire range of adjustments, design changes and settings required to develop a new airplane design is certainly beyond the scope of this chapter. For the purposes of this chapter, you should be working with a well-established design that generally works for anyone.

The author with a short-coupled polyhedral slope soarer in the hills of California.

So let's just try to set up the CG for a model that has been built and set up correctly. The plan is to make *your* model perform as well as possible.

First, the model must be built and aligned correctly. You really do have to make all those funny measurements to ensure that the wings are at right angles to the fuselage, the tail is parallel to the wing both the vertical and the horizontal directions, and that the vertical tail is straight along the fuselage and at 90 degrees to the horizontal stabilizer.

INITIAL SETUP

Set the controls as recommended in the instructions or on the plans. If settings aren't given, about 20 degrees of throw in each direction on all surfaces is a good starting point. For most designs, this should give you a pretty docile model. If the design uses full "flying" surfaces, for starters, throw should be limited to about 10 degrees. The key here is to have a model that's rather *unresponsive* so you can distinguish the model's stability from

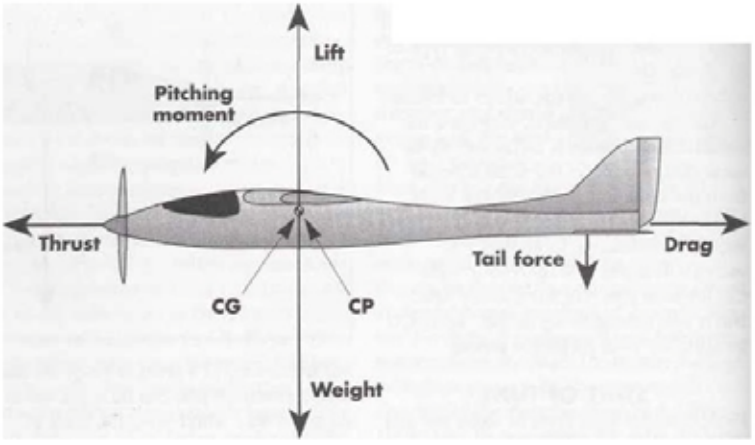


FIGURE 2
Zero margin of stability (neutral CG). Here, the condition is neutrally stable. The weight is on the CP, and the model's forces are the balance of the tail force versus the pitching moment. If speed picks up, the forces stay in balance and no pitching happens.

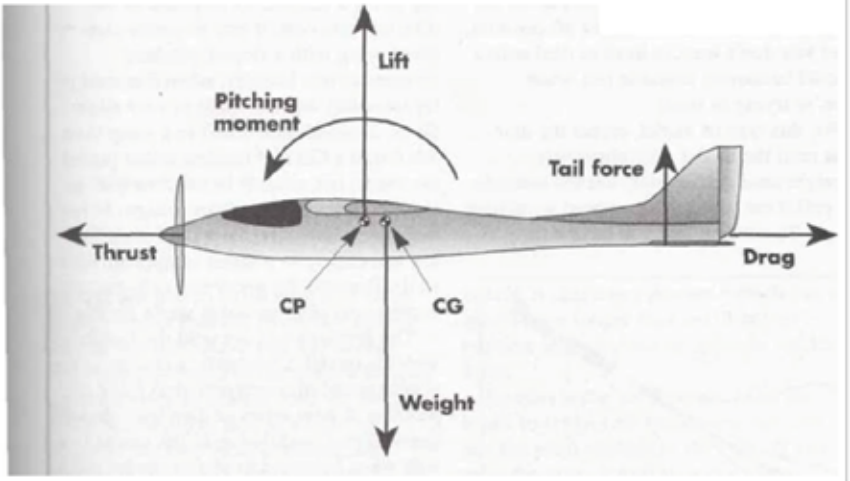


FIGURE 3

Negative margin (slightly tail-heavy, unstable)—uh-oh! This one means instant death. Here, the CG is behind the CP and is countering the pitching moment. Tail force may be zero or even a force lifting upward (sounds very efficient, and it is). The bad news is that it's "speed unstable." As speed picks up, the tail force and wing pitching moment overpower the weight force, pitch the nose down and increase speed **more.** *The result is a divergent instability.*

the control input response. It's very easy to think that a model is tail-heavy, when the real problem is too much elevator ;control input.

Set the CG as suggested by the model's designer. Generally, I expect the designer to define a "safe" position with a little extra margin of stability to keep us out of **trouble.** In other words, the CG is farther forward than it really needs to be, so all the models built from the design will fly OK. From here, we'll proceed through a process to achieve the ideal balance point your model and style of flying.

POWER OFF!

As mentioned before, for a model, one of the most difficult elements in setting any aspect of trim is to isolate it from the other factors that affect a model's aerodynamics. By setting the control sensitivities low, we eliminate one distraction. The next item to isolate is the power or thrust effect. Not surprisingly, to do this, you must turn your model into a glider (or close to one). Initially, find a power set-**ling** that lets the model fly comfortably in level flight, but at a power setting that's as low as possible.

On a glider or an airplane with power off, trim for a glide at minimum sink angle (maximum lift-to-drag ratio). The blade speed will be noticeably faster than the stall, or even minimum sink-rate speeds, **but** not so fast that you have to point the nose down noticeably. Typically, it's the point at which people say the glider is "on the step."

Here we get to the famous (or infamous) "dive test." The idea is to compare the model flight in level trim to the same model in a faster, nose-down attitude. (See the "Taking a Dive" sidebar and the figures for details on what's happening aerodynamically.)

The dive test is very simple, but if the model to be tested is a trainer, it's probably better to have an experienced pilot do the dive testing.

Set up your plane to fly level or, in the case of a glider, in a smooth glide at the best glide angle. If the model is truly unstable, you won't be able to get that smooth glide in the first place. Add nose weight until you can get a steady glide or smooth level flight. Mechanical problems—slop in the control linkages or servo-centering problems—can give you trouble here, too.

The control surfaces must be free enough to return to the same place every time.

Having achieved level flight, just put the model into a steep dive, release the controls, and observe the resulting flight path. The results and the actions to take are as follows:

- If the model turns in either direction, you have a misalignment or warp, and you must fix that before you try to tune the model. If all is well in that department, here's how to set the model.

- **Trainers.** The airplane should pull out of the dive in 20 fuselage lengths or so, and it should return by itself to steady level flight after a stall or two. If the model pulls out very quickly but never settles down to steady flight (it may even accelerate in the stalls until it loops), it's very nose-heavy. Move the CG back no more than 1 percent of the chord at a time. When the CG is within 2 percent of optimum, the model will probably fly OK.
- If, however, the model takes a long time to pull out, or the dive steepens, you should move the CG forward. Again, keep the changes small, and repeat the tests until the model flies perfectly.

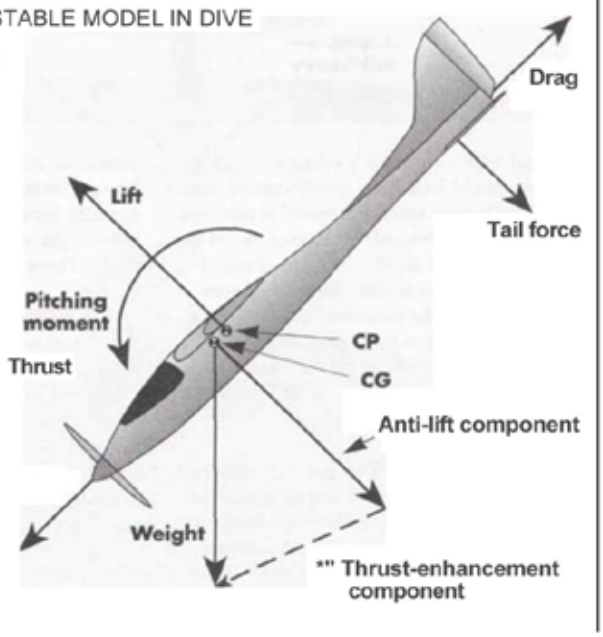


FIGURE 4

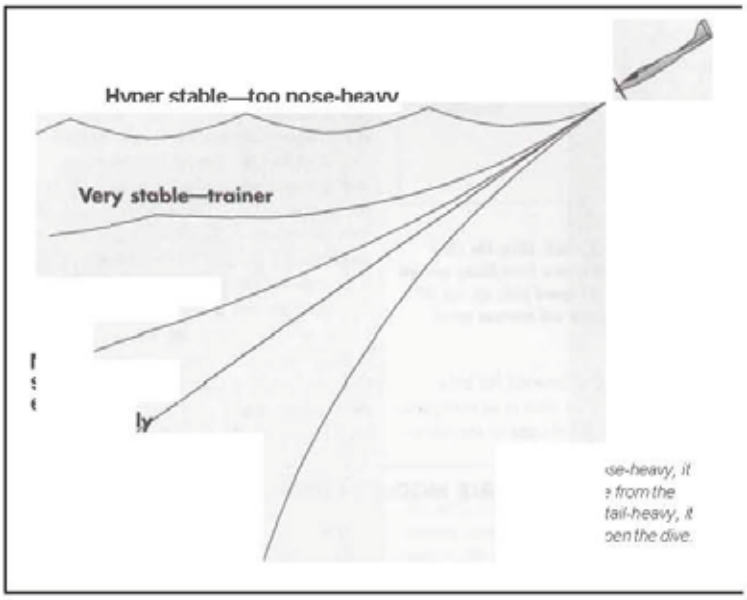
A stable model in a dive. Here we take the case shown in Figure 1 and put it in a dive. As you can see, one component of the weight vector now augments thrust, and the other component of weight (counter to the wing lift) is reduced. As a result, speed picks up because the forward force exceeds the rearward. The tail force, wing pitching moment and the wing lift all increase together. Because the weight pitching moment is decreased and the aerodynamic pitching moment is increased, the model has a rotational acceleration (nose up). It is also lifted upward by the net force unbalance toward the top of the airplane. This is a stabilizing action.

• If the model shows odd characteristics such as a nice pull-out in a mild dive, but it tucks under in a steep dive, you need to really dig in and do some research and re designing, but that's way beyond the scope of this chapter, so *good luck!*

♦ **Intermediate models.** Here you are, trying for a model that's just slightly stable, i.e., it will tend to find its own level flight at all times, but it isn't a fanatic about it. You should look for a gently curved, nose-up flight path when the model is released in the dive. This will result in a model that shouldn't stall at all at the end of the dive, but will end up transitioning to smooth level flight. The statement about steepening dives applies here, of course. You'll probably find that, to get the model just right, you'll have to get the CG within about 1 percent of perfect.

♦ Expert **models.** The goal for an expert-class model is to have the plane achieve exact neutral stability. It goes where you point it until it is told to do something else. This type of stability is only achievable on airplanes that were designed to have it. You can't trim a trainer to be truly neutral at all speeds. The airfoils and moments have to work together to give you this capability.

• It's important to perform this test on a high-performance powered model with the tank nearly empty. During this part of the flight, the CG is in its farthest aft position, and you don't want to have to deal with a model becoming unstable just when you're trying to land! • For this type of model, repeat the dive test until the model goes absolutely straight until you actively use the controls to pull it out, i.e., it has no speed sensitivity at all. To confirm that you have a truly neutral model, do the same test inverted! If that's a bit beyond your skills, compare the elevator stick position needed for inverted level flight with that needed for upright flight. There should be no difference.



STRIKING A BALANCE

When a plane has too much stability, its up-and-down oscillation never settles back to smooth flight. This is generally more difficult to deal with than a tuck-under. In full-scale aviation, an excess of stability coupled with oversensitive controls results in pilot-induced oscillation, which is occasionally fatal.

I contend that the dive test always works, but it may not tell you what you want to know. An unstable model can be flown, and one that has unusual pitch characteristics to the airfoil may fly stably in many conditions, but will be unstable in the dive test. Sometimes, the test may tell you that you should modify your design.

For example, I had a model I was tuning in for a kit, and its response to the dive test was odd. It had an under-cambered wing with a sloped, pitching moment curve. Initially, when trimmed :: fly smoothly and be stable in very slight dives, it would tuck under in a steep dive- I We found a CG and incidence that pulled I the model out reliably in the dive test, as required for a trainer glider design. In normal flight, however, the model would gal-lop and end up in a series of uncontrolled 1 stalls. Because the glider had only rudder control—no elevator—this was a disaster!

The problem was not with the test, but I with the model. Ultimately, a change to the stabilizer airfoil was required to solve the I problem. A new series of dive tests showed that with the modified stab, the model flew well when balanced as shown on the plan

I assume that you're working with a properly designed model.

FINAL THOUGHTS

That is really all there is to it, but realize that we're dealing with only one of a number of interacting controls here. We assumed a well-designed model. This means that if you get the pitch CG **correct** it will be in the right place for spiral stability, rolling, knife-edge flight and ever thing else. When you have the correct C you can move on to adjusting the thrust-line angles and control sensitivity to fine-tune the model. ♦

ABOUT THE AUTHOR

Larry Renger

Larry's first "own design" was a glider that he cut out of 1/6-inch balsa by bearing down repeatedly with a pencil. He says that, "being too cheap to buy kits," he designed his own models throughout high school. During college It at MIT, with the patient tutelage of Fay Harlan he captured many indoor national records. As an avid sci-fi fan, he was also interested in rockets, so he invented the first forward engine boost glider for an Estes Industries design competition. After a stint in aerospace engineering. I Larry broke into the model industry at Estes, Fox Engines and finally, Cox Hobbies. Money I talks, however, and he spent 11 years at Mattel working on He-Man™, Hot Wheels™, etc. Lai is now back at Cox as director of engineering, i and he's loving it!

CENTRAL VICTORIA RADIO CONTROL MODEILLERS INC.

CLUB RULES

It is in our interests to at all times be aware of these rules and conduct ourselves accordingly.

These rules have been prepared to assist with the orderly running of the club, in particular conduct at the flying field..

In addition these rules reflect the conditions under which we are able to lease the land from the landowner Mr.E.Roberts.

1. In the absence of the appointed Safety Officer, the member with the lowest VH Number or the Club instructor or both will assume the role of Safety Officer.
2. Each pilot shall be responsible for ensuring that their key is placed in the keyboard before turning their transmitter on.
3. No flying over pits, car park, road or adjoining properties.
4. Right or Left hand circuits will be flown if there are more than three (3) aircraft in the air at any one time.
5. The field is to be left clean and tidy and the last member leaving must ensure that the gate is closed and locked.
6. No consumption of alcohol prior to flying or between sessions as this can nullify insurance Blood alcohol level is 00 whilst flying.
7. Dogs must be kept on a leash at all times on the field and must not enter the pits or runway area
8. Smoking is only allowed in the designated area i.e.. The car park (the pits and the runway are out of bounds.
9. There shall be no flying of any powered aircraft, (including electric powered) on days of TOTAL FIRE BAN

FREE OR FOR SALE

This space will be reserved for members that have flying items that they wish to sell or give away, make sure that you include a contact number with your add

We have a number of these club cloth patches available to members for sale.

Also car stickers they are white background black decal

Frequency Keys also available

Contact club secretary
Kevin Pentland
5439 5322

A DVD of photos of our 20th Birthday celebration day is available from the Secretary for a small cost of $5.00.
The funds raised from the sale of the DVD's goes to assist young Matt to get the pylon racing competition

Pit Chat

The Adventures of President Keith
More Busted Blades

Last Sunday I continued my gradual progress in learning to fly my autogyro.
I returned home with one broken blade; however the repair has only taken two days which is in progress.

More unfortunate Matt was flying his new Harrier, which suffered a wing failure in flight.
Disappointingly this appears to be caused by poor design by the model manufacturer

I hope that Matt achieves his ambition to build a Harrier because it looked great in flight over our airfield.