

Hibiscus Coast Radio Flyers

The AEROBAT



How far could you fly this model?

Story and pictures page 4.

The Editors Desk

Here we are well into winter and my second club magazine. My first one didn't bring howls of dissatisfaction so that's a good thing, but it didn't bring much else back to my inbox either, which makes it hard to tell if it was a good read or not. Actually I did get a couple of pieces of positive feedback so I was quite pleased with that.

I read the RCM&E magazine every month and eagerly await its arrival in my letterbox. Its a costly magazine if you buy it from the bookshop but its actually cheaper to subscribe to it direct from the UK and you get 13 magazines for a 12 issue price. £67 or \$120 making it just under \$10.00 a copy. Anyway the point I was heading to is the editors job and in that magazine he writes a short spiel about what he is doing and usually starts of with the weather as I did. That's a thought, if there was no weather how would we start a conversation? So his spiel is about the only thing he writes but he has contributors that write for him.

I would like to have contributors for the Aerobat and indeed it was good to get some for the last one, Thanks to Bryan Leeves and Wayne Drinkwater for their great work. The thing is folks, the number of pages in the club magazine are going to reflect the input of the members and if I don't have any its going to be fairly thin. If you are a prolific writer fill your boots, but if you just want to tell me on the phone what you are doing, I will follow up and write something.

If you are doing something such as making a fibreglass cowl, or a model or a coffee send me some pictures or invite me around to drink the coffee and have a look.

Following the last edition, we have now had the Thermal Thaw and it proved to be windy but not too cold. There was a good turn out of people and I think about six HCRF faces turned up. I didn't count them properly because I was busy being tutored by Neal Moss on how to be a glider pilot with a flying chilly bin (Radian). Although some people refer to Radial Gliders as flying chilly bins, the appropriate word is "flying" and they do that very well, if you know how they work. I did see one experienced pilot loose his Radian to a full power, out of control loop, which goes to show that even good pilots have bad days. The worst thing you can do with a Radian as he found out is to give it full throttle. If you do the Radian will go horizontal for a millisecond and then go into a full loop and cut the grass after just half a second. Full down elevator does not do much even if you had time to work that out. Soft throttle after an easy, soft, slightly nose up bunt is all that is required.



The Presidents Report

Well its August already I can almost smell the sausages on the BBQ at our summer evenings twilight , OK Denison dream on don't wake up for goodness sake.

But the days are getting longer folks and we have had some lovely days especially on the first Saturdays of the month. Yep the gliding days just lovely and those of us who turn up on the days that turn to custard, well its worth it just to have a chat and a coffee with our mates between the showers and enjoy whatever flying we can get and not worry about the wind "well as long as it under 20 knots. That is what makes our club special, well for me anyway.

Last month we had our midyear Christmas Lunch at Valentines, which was really well received and everyone had a good time as unusual thanks to Ngaire. Unfortunately everyone, after all the years Ngaire has put into the job has decided to move on to let someone else have a go. Yes that's a wake up call isn't it.

So on behalf of everyone in the club for all your work Ngaire a big thank you !! We have been missing you both down at the field for sure, even Ross' Jokes !!! (Edd's note: yes but Ross has sent me some for the Aerobat, so you have not totally escaped them)

Other things this last couple of months, the indoor flying has been OK. Enough of us turn up to cover costs, and it sure beats watching TV. This last weekend we have been involved with the Model Show organized by Markin model railway club at the Whangaparaoa Hall . We had our stand on the stage overlooking the main hall so we could hang models from the support rails above the stage as well as on the tables provided .

The Markin chaps had a huge rail track covering most of the hall floor with smaller individual ones in the main hall, as well as the side room along with the model boat club. We were lucky that it was a lousy weekend weather wise so lots of people were coming through , with quite a lot of interest in our section. It was nice to hear people say that they really enjoy our open days - so I think it was worth the effort. A big thank you to everyone who helped make it happen .

I have been working on our house renovations this last 3 months or so. I have been kicked out of my nice dry warm spare bedroom that was my aero modelling room into our garage.

There is quite a lot more room but is definitely not as cosy and warm. I am back working on my Typhoon, "promised myself to get it flying before Christmas". I wonder where have I heard that before? At last I'm on to the covering, painting and detailing all the interesting stuff to look forward to . So hopefully we have lots of nice days ahead of us over the next couple of months and look forward to meeting up with you who make it down to the field.

Happy landings.

Pete Denison.

President.

Letters to the Editor

I thought this might be a good column to have in our club magazine as it will give club members an opportunity to submit items for publication. There will need to be rules of course. It cannot be a place to sling the proverbial at others or the club but it can be a really positive way to have your say or put your view and at the same time give something worthwhile to your club.

ITEMS FOR THE MAGAZINE. Feel free to send me any items, but make sure they are of a general interest to most who receive this newsletter. We reserve the right to edit any articles, but always for good reasons! Don't forget you can also send photos, but they must be accompanied by a written contribution as well. (or call me to discuss)

SUGGESTIONS TO THE EDITOR. This is also a place that you can make suggestions for things that you consider to be valuable to the club and it will help me to fill the pages of the magazine with information, articles and items of interest to everyone.

DOB IN YOUR MATES. Well that speaks for its self doesn't it. Funny stories about things your mates don't want made public. Like my mate Jonny (not actually his name but close) that bought an out runner motor. The very first time he had bought one and called me up to say that it was seized up rock solid, straight out of the box. Turned out he was holding the outer canister and trying to turn the shaft. Of course the shaft is part of the outer canister and why its called an out runner. Then there was this bloke, new to modelling called Robert (real name) who followed the YouTube video on covering. Place the covering on the wing and apply the hot iron blah blah. But it would not stick so he got onto live chat with Hobbyking. They asked him if he had removed the backing sheet. What backing sheet he asked.....

Hi all from Magical Mangawhai.

As you may know I have stepped down as social secretary.

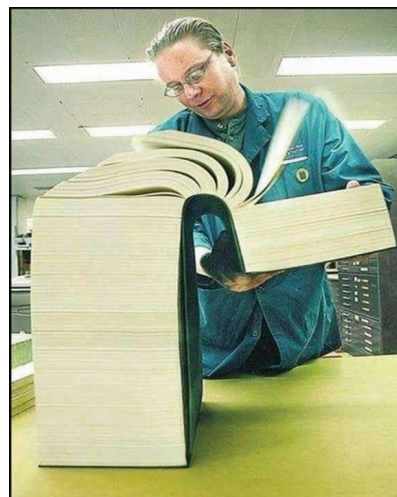
Contrary to what a lot of folk assumed this is not due to our shift to Mangawhai. The idea of the social side of the club was to bring members and families together in a social setting at luncheons and twilight barbeques as a way of giving back a little to our members.

The way things are being run now seems to be changing and I feel I do not fit into the new way of running things.

I would like to thank all those who have helped me over the years as it made my job so much easier.

All the best to you all and I look forward to catching up with you all soon.

Regards
Ngairé Ladd
(The Weather Witch.)



**The book
"Understanding
Women" has
finally arrived in
book stores.**

If you don't like my jokes, send me articles of interest for the magazine, so I don't have to find space fillers. (Ed)

World Record

Ten Years Ago: Mardna's 111km model seaplane world record

Thursday, 16 June 2016 22:11

Ten years ago Toomas Mardna set a world record for aero-modelling that still stands today: a 111km out-and-return flight with a piston-motor seaplane, flying along the banks of Lake Maardu in Estonia.

If you want to bag a distance world record in aero-modelling it can help if you get up early, when the wind is calm and the sky is clear.

For Toomas Mardna exactly ten years ago on Friday 17 June 2006, 'early' meant a pre-dawn start. Together with co-pilot Juri Laidna the pair were aiming to set a world record out-and-return flight with a model Mardna had designed and built himself.



Mardna was well-known in Estonia and the international aero-modelling scene. A member of the Estonian Aero-sports Federation his FAI Sporting Licence number was EST0002 – he was in at the very beginning. For the record attempt he had designed and built a special radio-controlled piston-motor seaplane. Controlled with throttle, rudder and elevator the FAI 3 Open Seaplane had a wingspan of 3.38m and a fuselage length of 2.01m. The engine type was O.S FS-52S.

On their chosen day the team of two pilots and three official observers – Peep Vare, Lauri Laidna and Prii Laanesoo – arrived at their take-off spot on the banks of Lake Maardu, northern Estonia, at 4am.

There the model was assembled and checked. Empty of fuel it weighed 2.93kg, with fuel it weighed 4.832kg.

Floating the model on the still waters of the lake the pair tested its flotation. Then, using a GPS they noted their coordinates. It was a still mid-summer's morning, with an air temperature of 9C, a clear sky and still wind.

Engine testing followed, and then at exactly 4.57am the record flight got underway. Mardna launched the model onto the water and prepared for flight. Within five seconds the seaplane model had completed its take-off run and was in the air, soaring gracefully into the sky.



After tagging the official start gate the model set off on course, flying at an altitude of 150-180m AGL. The pilots and official observers followed in two cars, chasing the plane as it travelled at about 70km/h.

The turnpoint was reached at 6am, before most people are even out of bed. But there was no stopping for coffee – instead, 100m past the turnpoint the model turned and the pilots switched. It was now Juri Laidna’s turn to take the controls. Now heading back into wind the cruising speed dropped to 25km/h, but after increasing engine RPM to 6,500RPM that increased to 40km/h. Flying at 150m AGL and still with good visibility they made it back to their start point at 7.27am. There, the motor was stopped and the model glided down through the air for two minutes until it landed softly in high grass on the edge of the lake, some 35m past where it had started from.



The flight had lasted 2h31min31sec

and covered 111.01km.

The distance was calculated using official FAI software, and the record was officially ratified on 31 October 2006. The record still stands today.

Congratulations Wayne Drinkwater on your jump into self employment



Our member Wayne Drinkwater has set himself up in business as “Wayne’s Welding Place” here on the Coast. Wayne specialises in all forms of general light welding and engineering work, which includes trailer and horse float chaises repairs. Panel and rust repairs on vehicles is another of his fortes. No job is too small for Wayne who was busy repairing a gate hinge when I popped in for a chat. A new steel framed workbench for your aero-modelling department is just a phone call away.

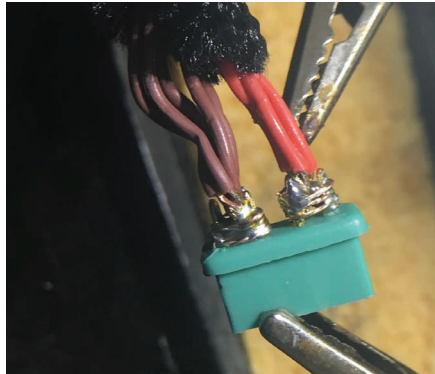
Wayne’s Welding Place, Unit 3 27 David Sidwell Place, Whangaparaoa, Phone 021 177 5175.

Wiring -n- Soldering

Robert Berger

I have been work-shopping with my Piper Twin Comanche for nearly two months now even though its an ARTF model. I have to say that this is my third Seagull model and it is quite frankly poorly finished and in hindsight I should have sent it back to the retailer, however I decided to persevere with it. This month I will give you an insight into the wiring of the model. In each wing of this model there are flaps, ailerons, ESC, lights and retracts, which means I have 14 wires to take back to the Receiver (Rx) for each wing. Because the wings have to be removed for transporting the model due to its two metre span, the electrical connections have to be simplified or minimised. I used 6 pin MPX plugs and sockets to do this. First point to note is that the red and

thin copper wire around the left 3 pins and then done the same on the right 3 pins. I then twisted all the negative wires together and inserted

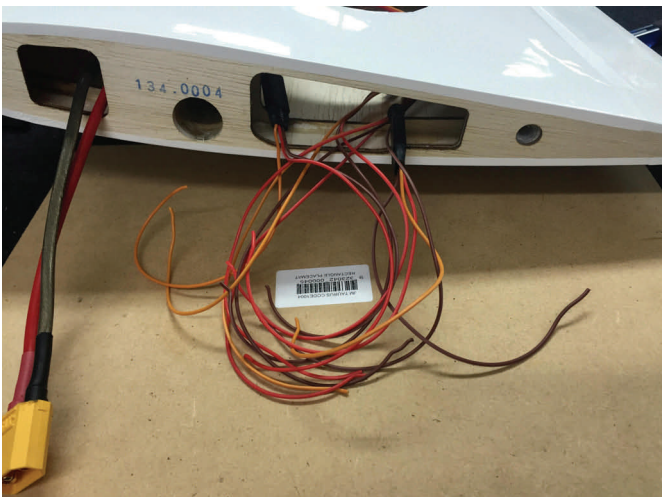


them into the middle of one coil and soldered it up. Repeating this on the positive wires and then slipping heat shrink over onto the two sets of pins to protect them from the possibility of shorting.

on another MPX plug.

In the fuselage I made a flat panel from ply and fitted surface mounts for the MPX sockets and from there took the individual signal wires to the Rx.

One thing we always see in model wiring is the use of 3 pin connectors (JR style plugs and sockets) and in most cases they are a reasonable push fit, but in others they are a crash just waiting to happen if they separate. When I got to the point where I had to use “Y” leads I decided to make permanent connection where I could by splicing the signal wires together for the ailerons and the flaps. After soldering use some thin heat shrink to insulate the joint.



brown wires are simply power supply wires from the battery and as such are common to each other. This means that you can join all the red (positive) wires together and all of the brown (negative) wires together.

In the picture below I have wrapped

The orange wires are signal wires from each servo and these cannot be joined together and must be insulated from each other, unless they are from a pair of servos that you would normally connect through a “Y” lead. So for each signal wire I connected them to individual pins

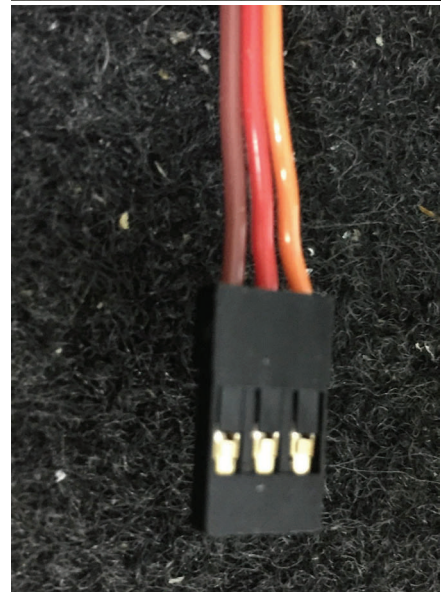
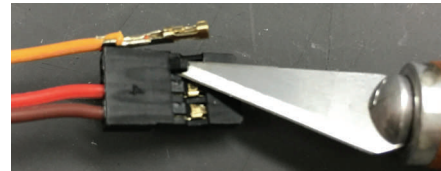


The retractable gear has its own triple “Y” lead with a built in circuit board, so I left that as it was.

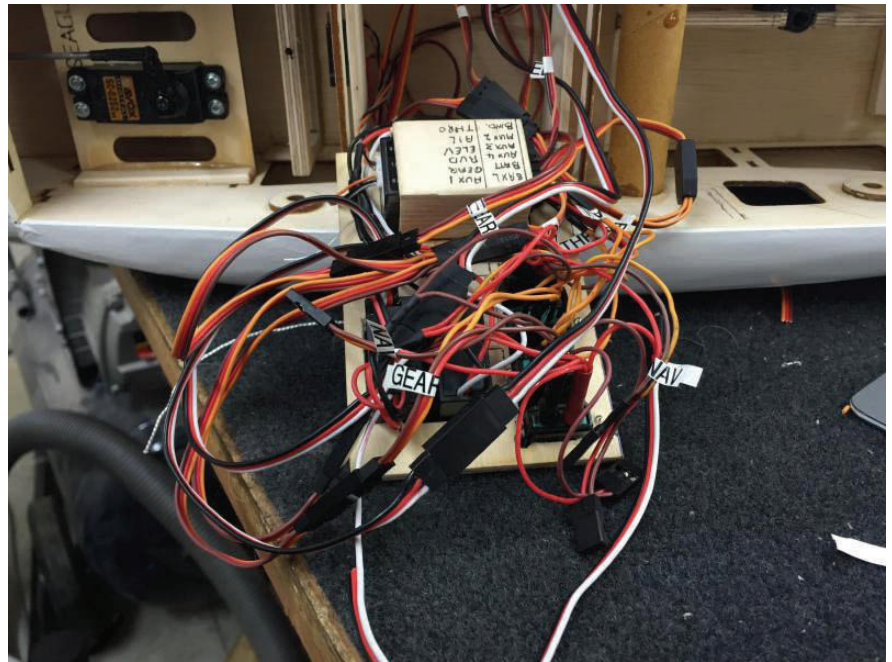
One important thing to note is that the current carrying capacity of these thin wires, limits the number of servos that can be powered through one wire. For that reason I

used all of the positive and negative wires that came from each servo. Think of a wire as if it were a water pipe and note that a narrow pipe will not allow as much water to pass through it as a larger pipe would. If you draw more current (Amps) through a thin wire it will cause heat and possibly melt the insulation. If you feel heat in a wire, then it is not big enough. Removing the wires from a plug is not difficult, but don't bend the plastic clip up too far because you will need this to sit back down behind the pin to prevent it pulling out of the plastic plug.

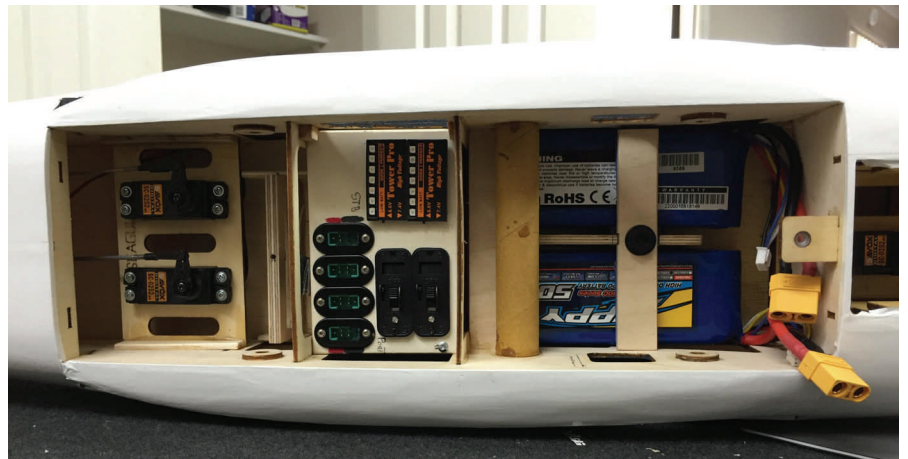
Make sure when re-inserting the wires to the plug that you get the polarity right (wires in the right hole)



From this wee birds nest



To this much tidier set up.



English Electric Lightning

The **English Electric Lightning** is a supersonic fighter aircraft of the Cold War era. It was designed, developed, and manufactured by English Electric, which was subsequently absorbed by the newly formed British Aircraft Corporation. It was then marketed as the **BAC Lightning**. The Lightning was the only all-British Mach 2 fighter aircraft and it was used by the Royal Air Force (RAF) and the Royal Saudi Air Force (RSAF). Although it was the RAF's primary interceptor for more than two decades it was never required to attack another aircraft.

The Lightning is powered by two Rolls-Royce Avon turbojet engines in a unique staggered stacked installation in the fuselage. The Lightning was developed to intercept increasingly capable bomber aircraft (Tupolev Tu-16, Tupolev Tu-22, Tupolev Tu-95), and thus has exceptional rate of climb, ceiling, and speed; pilots have described flying it as "being saddled to a skyrocket". This performance made the Lightning a 'fuel critical' aircraft meaning that its missions are dictated to a high degree by its limited range. Later developments provided greater range and speed along with aerial reconnaissance and ground-attack capability.

Following retirement in the late 1980s, many of the remaining aircraft became museum exhibits and, until 2010, three Lightning's were kept flying at "Thunder City" in Cape Town, South Africa. In September 2008, the Institution of Mechanical Engineers conferred on the Lightning its "Engineering Heritage Award" at a ceremony at BAE Systems' site at Warton Aerodrome.

So you can understand why Colin Austen decided to knock one up in his spare time. Actually its far from a weekend job and his dedication to it so far has been on the go for the last two years. Colin estimates that it will take another year to compete. His model has a wingspan of 2.7metres, which is quite modest against the fuselage length of 3.8 metres or 4.2 metres if you count the pitot tube





The man who fell into an upholstery machine was fully recovered

Twin Engine Airplane

It doesn't take long to realize that most of the challenge of learning to fly a **twin engine airplane** is learning how to do it on one engine. Compared to a single engine aircraft, the engines of a twin (with the exception of centreline thrust twins like the Cessna Skymaster) are not on the centreline of the aircraft. Therefore, when only one engine is operating, the twin engine airplane is in an unbalanced, and potentially unstable state. Here's a picture of a skymaster — and if you learn to fly a twin engine airplane in one of these your license will be limited to centreline thrust configurations only, versus a twin engine airplane with conventional displacement of the engines out on the wings.

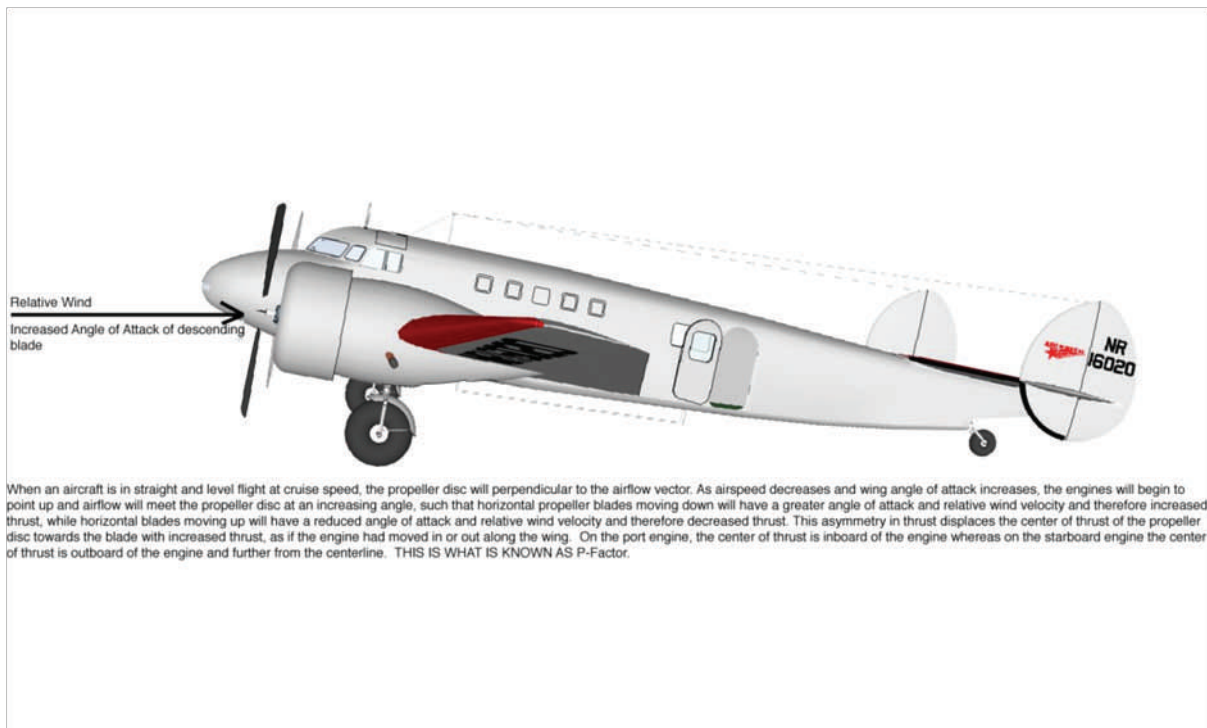


The Beechcraft Travelair that I'll be flying for this check ride does not have counter-rotating propellers. Viewed from behind, both props turn to the right. This is important because in a climb attitude, the descending prop has a larger angle of attack with respect to the relative wind than the ascending blade — taking a bigger bite of air — and therefore displacing more air towards the rear of the airplane. This results in 4 main factors that become important when only one engine is turning:

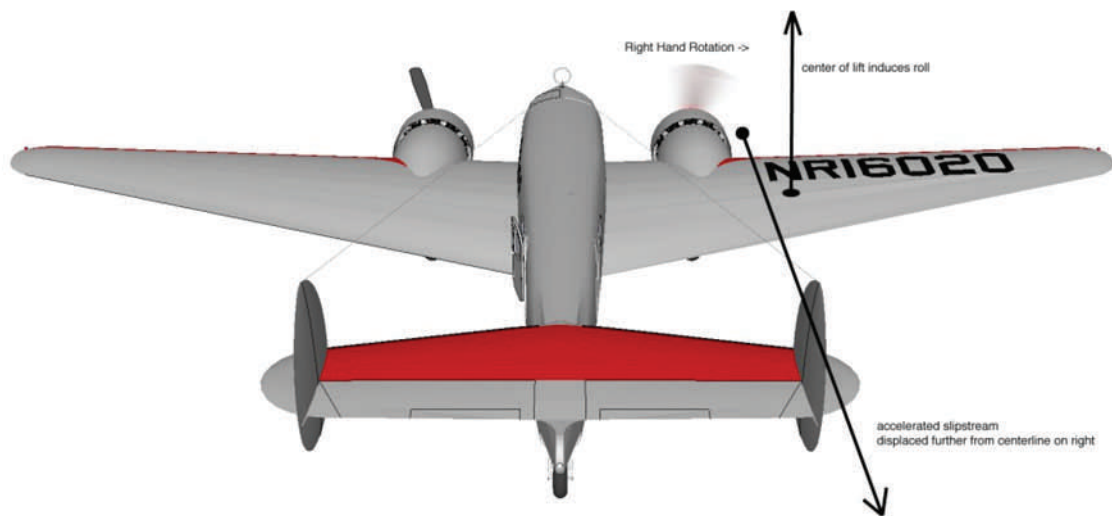
- The engine on the right has a greater lever arm about the Yaw Axis because the centre of thrust is further from the centreline of the aircraft (P-Factor)
- The accelerated slipstream created by engine on the right creates an area of increased lift over the wing that is also further from the centreline of the aircraft
- The accelerated slipstream created by the engine on the right is further from the rudder so the rudder has less authority
- The counter torque produced by the engine on the right adds to the rolling moment caused by the increased lift of the right wing

These four factors make the left engine the critical engine: IF THE LEFT ENGINE FAILS, YOU ARE IN A MORE CRITICAL SITUATION THAN IF THE RIGHT ENGINE FAILS, because the airplane is more unstable and difficult to control.

Lets go through each of these points one by one, with a few illustrations. First a review of p-factor. The Wikipedia consensus statement on P-factor reads something like this: When an aircraft is in straight and level flight at cruise speed, the propeller disc will be perpendicular to the airflow vector. As airspeed decreases and wing angle of attack increases, the engines will begin to point up and airflow will meet the propeller disc at an increasing angle, such that descending blade will have a greater angle of attack and relative wind velocity and therefore increased thrust, while the ascending blade will have a reduced angle of attack and relative wind velocity and therefore decreased thrust. This asymmetry in thrust displaces the center of thrust of the propeller disc towards the blade with increased thrust, as if the engine had moved in or out along the wing.

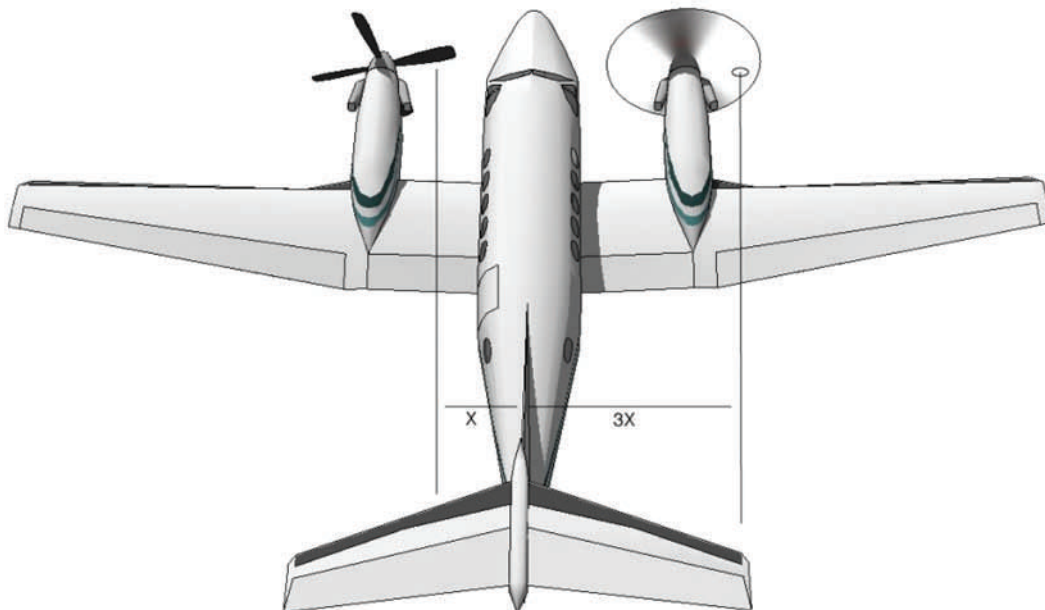


Seen from above, the situation looks something like this....on the starboard engine, the descending blade creates an accelerated slipstream outboard of the engine. The increased velocity of the airflow over the wing creates a localized area of increased lift that wants to lift the right wing. Also, in a conventional centreline vertical stabilizer and rudder configuration, this accelerated airflow is further from the rudder, decreasing its authority. Ever wondered why airplanes are designed with multiple vertical stabilizers right behind the engines (like the Lockheed Electra in this illustrations) — Now you Know.

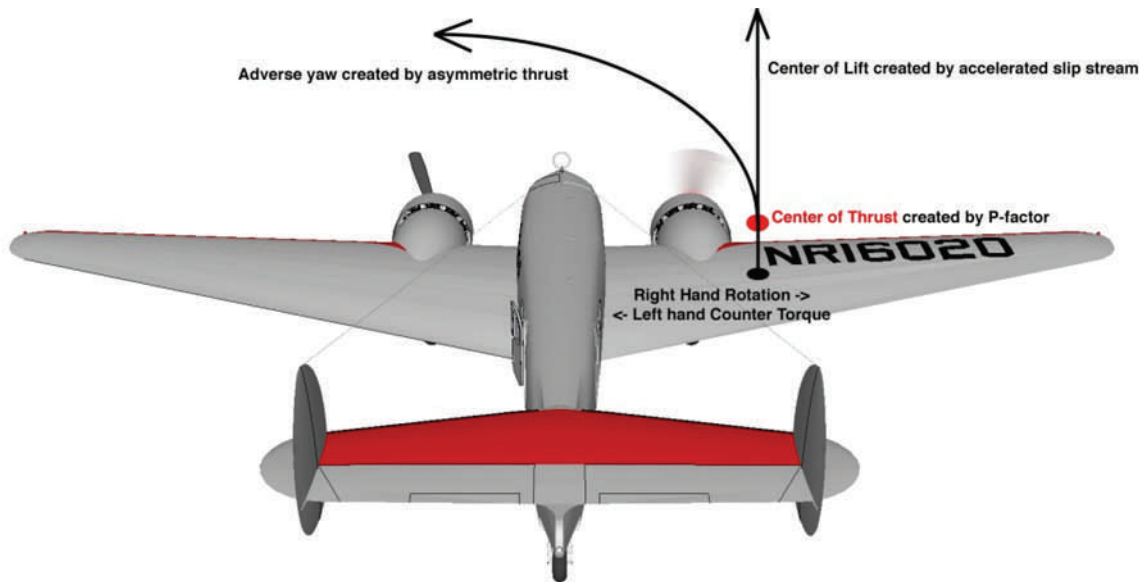


Here is a picture of a typical twin engine airplane with a centreline vertical stabilizer and rudder. In this example you can see that the accelerated slip stream is 3 to 4 times further from the centreline of the aircraft on the right side than it is on the left side. This has a significant effect on rudder authority at slow speeds when the relative proportion of airflow over the flight control surfaces produced by the wash from the propeller increases.

The accelerated slip stream on the right hand engine is further away from the centerline of the aircraft than the accelerated slip stream on the left side of the aircraft. This results in less rudder authority at slow speeds when the left engine is out.



Torque Roll. If you remember back to your high school physics class on Newtonian motion, you'll recall that for every action there is an equal and opposite reaction. When a combustion engine turns a propeller in a right hand direction, the propeller tries to turn the aircraft in a left hand direction. On the right side of the aircraft the torque effect increases the rolling tendency to the left since it reinforces the rolling tendency created by the asymmetric lift produced by the right wing. On the left side (when the right side engine is inoperative) the torque also tries to roll the aircraft to the left, but this is counterbalanced by the right rolling tendency created by the accelerated slip stream over the left wing.



This airplane wants to roll left and yaw left

So here is an illustration of our one engine out scenario. The Critical left engine has failed and the aircraft is yawing to the left and rolling to the left. The accelerated slip stream is far from the centreline of the aircraft so the vertical stabilizer and rudder have less authority.



Seen from behind the situation looks like this. The left engine is out, the aircraft is banked to the left and yawing to the left as well.



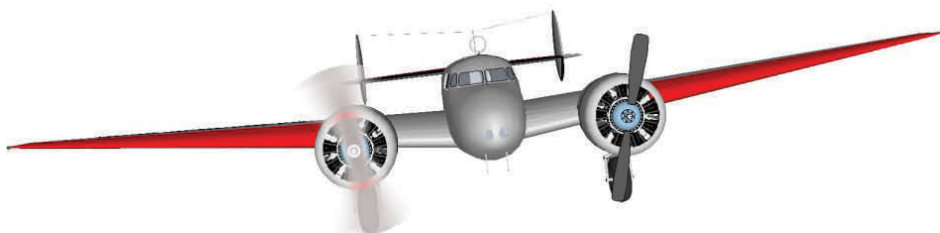
Corrective manoeuvres

The moves that we make to correct this situation do two things:

1. They set the aircraft up for optimal performance.
2. They help identify the dead engine.

The flight attitude that we are trying to achieve is a “zero-side slip” attitude. If the engine out attitude is corrected only with rudder inputs, the aircraft will slip towards the inoperative engine, decreasing climb performance. This will occur even if the ball is centred on the turn coordinator. The result of wings level flight with an inoperative engine is described as a moderate sideslip towards the inoperative engine. Climb performance will be reduced and V_{mc} will be significantly higher than published as there is no horizontal component of lift available to help the rudder combat asymmetrical thrust.

If the engine out attitude is corrected only with aileron inputs, there will be a significant bank towards the good engine, resulting in a large sideslip towards the operating engine. This sideslip will also decrease climb performance and increase V_{mc} . The solution is a combination of rudder and ailerons. 2-3 degrees of bank towards the good engine and rudder inputs to centre the ball with the reference line on the side of the operative engine. The exact combination of rudder and aileron input varies from model to model and also with flap and gear settings and with airspeed. Unfortunately, there is no instrument inside the cockpit to tell when you have achieved a zero side slip configuration, but one can be made by taping a yaw string to the windshield (before the flight!) for training purposes.



I said earlier that our corrective manoeuvres would also help us identify the dead engine. The mantra goes something like: “Dead Foot, Dead Engine”, or “Idle Foot, Idle Engine”. Because we are concentrating on flying the aircraft, our rudder input to stop the yaw will occur on the same side as the operative engine. Left engine out requires right rudder, right engine out requires left rudder. You get the idea. Once we’ve figured out, and called out, “Left Foot Idle, Left Engine Out”, we can go through our checklist for dealing with an engine failure.

Sheble has their checklist organized into a 3 step process: POWER UP, CLEAN UP, and FEATHER. First POWERUP.

If this engine is going to fail, it is probably going to do it when we’ve just rotated on a short field and are slow and heavy. We’re going to go to Mixtures RICH, FULL PITCH on both props, and FULL POWER on both engines. Now that we are at a maximum performance power setting, we’ll clean the airplane up for minimal drag and best climb performance.

Next CLEANUP

BOOST PUMPS ON, FLAPS UP, GEAR UP. Okay, so far so good. Airplane is clean and flying. We’ll pitch for the blue line in order to achieve best climb single engine operative.

Finally, FEATHER

The last thing that we can do is minimize the drag caused by the wind milling propeller. Remember that a wind milling propeller has the flat portion of the blade perpendicular to the airflow which creates a lot of drag. We want to rotate the prop blades such that they are parallel to the airflow, minimizing drag. The most important thing about this manoeuvre is to do it on the INOPERATIVE ENGINE. It is super embarrassing to have an engine failure and then shut down the good engine by mistake. The three step process for feathering is to Identify, Verify, and Feather. Once again, we’ll want to call out, “left foot dead, left engine out”, but we’ll verify that by pulling back on the left throttle control. If performance suddenly tanks, we’ve probably pulled back on the wrong throttle control. But if there is no change to the way the airplane feels and flies, we’ll pull the prop control back to the feather position on the dead engine.

The checklist goes something like this

POWERUP — FLY the airplane
MIXTURES RICH
PROP CONTROLS FULL
THROTTLES FULL
CLEANUP — FLY the airplane
BOOST PUMPS ON
FLAPS UP
GEAR UP
FEATHER — FLY the airplane at the blue line
IDENTIFY (dead foot — dead engine)
VERIFY (pull back on dead throttle)
FEATHER (pull back on dead prop control)

Club Info

Web Site

www.hcrf.co.nz



Search, Hibiscus Coast Radio Flyers

Committee Contacts

President

Pete Denison
president@hcrf.co.nz
(09) 426 2455

Secretary/Treasurer

Henny Remkes
secretary@hcrf.co.nz
027 441 1484

Club Captain

Nigel Grace
clubcaptain@hcrf.co.nz
(09) 420 3182

Frequency Officer

Jim Hall
jimh,geo@clear.net.nz
(09) 426-1478

Committee

Wayne Drinkwater
wdrinkwater@hotmail.com
021 177-5175

Editor

Robert Berger
editor@hcrf.co.nz
021 969159 - (09) 4274541

Whats Next ?

- **Club Night.**
Monday 1st August at 7.30
Monday 5th September at 7.30
Last month saw some very interesting things on the “show-n-tell” table. A home-built Twin Glow Motor perfectly crafted by Ross Purdy and a 2 metre wingspan twin engine Piper Comanche. What will be there this month?
- **Winch Gliding at the field.**
(First Saturday of every month)
Saturday 6th August. 8.30am until 12.00.
Saturday 3rd September. 8.30am until 12.00
- **Indoor Flying.**
(3rd Sunday of the month)
Sunday 21st August. 7.30pm to 9.30pm
Sunday 18th September. 7.30pm to 9.30pm
This is held in the Hibiscus Coast Youth Centre 214D Hibiscus Coast Hwy (next to the Bowling Club) Orewa. \$5.00 per pilot.
- **Flying Days**
These are Saturday, Sunday and Wednesday every week, weather permitting.
Wainui Pony Club Field, Wainui Rd.
8.30am until noon.

August - September Calendar

Pony Club Rally days are every Tuesday afternoon at the field starting September 2016.

As usual our fixed flying times are every Wednesday, Saturday and Sunday morning.

Date	Day	Event	Where/When
1 August 2016	Mon	Club Night	Whangaparaoa Guide Hall 7-30 pm
6 August 2016	Sat	Winch Gliding	Wainui 8.30 am - 12.00 noon
21 August 2016	Sun	Indoor Flying	H.B.C. Youth Centre 7.30 - 9.30 pm
3 September 2016	Sat	Winch Gliding	Wainui 8.30 am - 12.00 noon
5 September 2016	Mon	Club Night	Whangaparaoa Guide Hall 7-30 pm
18 September 2016	Sun	Indoor Flying	H.B.C. Youth Centre 7.30 - 9.30 pm
1 October 2016	Sat	Winch Gliding	Wainui 8.30 am - 12.00 noon
3 October 2016	Mon	Club Night	Whangaparaoa Guide Hall 7-30 pm
5 October 2016	Wed	Twilight 1	Wainui 5-00 pm
12 October 2016	Wed	Twilight 1 Rain Date	Wainui 5-00 pm

Modelair is New Zealand's oldest model shop , established in the early 1920's



Shop Hours
10am to 5:30pm weekdays ,
10am to 4pm Weekends.

Stocking Balsa , Ply , Glue & Finishing products for all models.

Full range of Dubro & Sullivan products to order and experts in building & painting plastic display models

Adam has been flying for over 32 years now and working in a retail model shop for almost 21 years so is very happy to help people with any model projects, (Adam works Tuesday to Saturday) so come in and have a chat.

12 Kent St, Newmarket , Auckland. Phone: (09) 520 1236. modelair@xtra.co.nz