



THE VOICE OF CONTROL LINE AEROMODELLERS FROM AROUND AUSTRALIA

Number 145

Produced by the Victorian Control Line Advisory Committee



July 2010

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For Sale

Wanted

**Copy Deadline for next issue is:
Wednesday July 21st 2010
PRODUCTION SPECIFICATIONS**

Please remember when submitting copy that if you have access to a PC, or suitable typewriter you can save me retyping by giving me your items pre typed, and please use a good black ribbon for best reproduction.

Best of all is to send a CD or use Email

Contest results should be tab delimited, ie use a single tab between each column of results, if submitted by disk or email. This makes formatting much easier on the editor.

Email address:- hbbailey@optusnet.com.au



COMING EVENTS



VICTORIAN CONTROL LINE CONTEST CALENDAR

| | | |
|---------|--|-------|
| Jul-4 | CLAG Club Day | Moe |
| Jul-11 | Speed, Carrier Deck (International postal comp). | CLAMF |
| Jul-25 | CLAG Club Day, Combined Stunt + AGM | Knox |
| Aug-8 | Speed, Classic Stunt | CLAMF |
| Aug-1 | CLAG Club Day Combined Stunt | Knox |
| Aug-22 | Club Day, Vintage A T/R, Classic B T/R | KMAC |
| Sep-5 | CLAG Club day | Moe |
| Sept-12 | F2F T/R, Classic FAI T/R, Vintage Combat | CLAMF |
| Sep 26 | Combined Speed, Combined Stunt | KMAC |
| Oct 2-4 | NSW State Champs support events | TBA |
| Oct-3 | CLAG Club day | Moe |
| Oct-17 | Speed, Simple R/R, Simple Goodyear. | CLAMF |
| Oct-24 | Club Day | KMAC |
| Nov-7 | CLAG Club Day, Vintage Stunt & Combat | Knox |
| Nov-14 | Triathlon, Speed. | CLAMF |
| Nov-21 | Vintage A T/R, Classic B T/R | KMAC |
| Nov-28 | Monty Tyrrell Classic Stunt | KMAC |
| Dec-5 | CLAG Club day | Moe |
| Dec 12 | F2C T/R, Goodyear. | CLAMF |
| Dec-19 | Club Day, Nationals Practice | KMAC |

Events will be flown in order of printing.
Events in **Bold type** will be flown over hard surface.

CLAMF Frankston Flying Field, Old Wells Rd, Seaford
(Melway 97J10), 10.00am start
Contact :- G. Wilson (03) 9786 8153,
H. Bailey (03) 9543 2259

Email :- clamf@ozemail.com.au
Web site :- <http://clamf.aerosports.net.au/>

KMAC Stud Rd . Knoxfield (opposite Caribbean Gardens)
(Melway 72 K9) 10.00am start
Contact :- Ken Taylor (03) 97380525
John Goodge 0439 972 006
Email :- johnnogo@bigpond.com.au

CLAG Contact :- Graham Keene
Email :- gkeene@wideband.net.au
Details of venues can be found on web site
www.clagonline.org.au

Brimbank Falcons Stadium Drive, Keilor Park Recreation Reserve, Keilor. (Melways ref 15 C 5). Regular flying day 3rd Sunday of each month 10.30am.
BFCLMAC club President is Mathew Shears.
Email: "Mathew Shears" matshears@gmail.com
Ph home 03 5472 3881 Mobile 0432 491 794
Club Secretary is Steve Vallve
email chitwillow@gmail.com, phone:5782 1693.



COMING EVENTS



| DATE | EVENT | CLUB |
|---------------|--|---------------------------|
| Sun 4th Jul | AGM and Club Racing. | KMFC |
| Sun 11th Jul | Vintage B, Vintage C, Diesel Goodyear | SSME |
| Sun 18th Jul | 1.6 and Slow Combat, Vintage Combat | KMFC |
| Sat 31st Jul | CLUB STUNT (Novice) | KMFC |
| Sun 8th Aug | F2B Aerobatics | KMFC |
| Sun 15th Aug | Diesel Goodyear, Sabre Trainer Racing & 2.5 Diesel Speed. | KMFC |
| 29th-30th Aug | 4th OILY Hand Diesel Day. (Contact Ian Cole 0427 015 792) Details TBA. | COWRA MAC. |
| Sun 29th Aug | Combined Speed | SSME |
| Sun 29th Aug | (contact Ron Blombery for details Ph: 9956 5952) | |
| Sun 29th Aug | Electric Powered Stunt. F2B and Novice (contact I.Smith 4975 2292) | NACA |
| Sun 12th Sep | KMFC Triathlon | KMFC |
| Sun 19th Sep | Warbirds Stunt (for details, contact Ian Smith Ph: 4975 2292) | COMSOA |
| Sun 26th Sep | F2B Aerobatics | SSME |
| 2nd-4th Oct | CLAS. NSW C/L STATE CHAMPIONSHIPS. (F2A and F2C) NSW. Venue Twin Cities, Albury | |
| Sun 10th Oct | Gordon Burford Day. (Details TBA) SWAP MEET | KMFC |
| Sat 30th Oct | CLUB STUNT (Novice) and Club Race | KMFC |
| Sun 31st Oct | Phantom, Vintage A, Vintage B, Bendix T/R and Vintage 1/2A | SSME |
| Sun 7th Nov | F2B Aerobatics | SAT (Kelso Park) |
| Sun 7th Nov | Slow Combat and 1.6cc, Vintage Combat | KMFC |
| Sun 14th Nov | Combined Speed | SSME |
| Sun 21st Nov | (contact Ron Blombery for details Ph: 9956 5952) | |
| Sun 21st Nov | Cardinal Stunt and Classic Stunt. (I.Smith Ph:024975 2292) | NACA (Hunter Sports H.S.) |
| Sun 21st Nov | Vintage T/R, 1/2A, A (2 divisions) and Vintage B. | KMFC |
| Sun 28th Nov | KMFC Christmas Party and Fun Fly | KMFC |
| Sun 5th Dec | F2B Aerobatics | Doonside. |
| | To be held at SSME | |
| | COMSOA- (City of Maitland Soc. Of Aeromodellers.) - Don Macindoe Memorial Flying Field, Raymond Terrace Rd, East | |

Maitland. UBD Newcastle map 51

KMFC - (Ku-ring-gai Model Flying Club) - St. Ives Showground, Mona Vale Rd, St. Ives.
NACA - (Northern Area Contest Aeromodellers) - Hunter Sports H.S., Pacific Hwy, Gateshead.
SAT - (Sydney Aeromodelling Team) - Kelso Park North, Henry Lawson Dr. Panania.
SSME - (Sydney Society of Model Engineers) - Model Park, Luddenham Rd, Luddenham.
MDMAS - (Muswellbrook District Model Aero Sports Inc.) - Mitchell Hill Field, New England Hwy, Muswellbrook
DOONSIDE - (to be held at SSME) Luddenham.

Adelaide Aeromodellers Club

2010 Events Calendar



July 24th Grass Rat Racing
Aug 8th Novice and F2B Aerobatics #2
Aug 14th/15th TBC by Whyalla MFC
Whyalla Show CL Competition
Sep 11th Vintage Combat #2
Oct 9th Vintage A Team Racing
Nov 6th Peacemaker Flite Streak Stunt
Dec 11th Novice and F2B Aerobatics #3
Provisional Dates for Scouts Air Activities Weekends at Armstrong near Blanchetown:
22nd and 23rd May – Flinders Park Scouts
21st and 22nd August – Hope Valley Scouts

Notes:

1. All AAC events at Unley Rd are on Saturdays, dates are provisional
2. Start time of all competitions is 11.00 am. Practice from 9.00am
3. All AAC events to be held at the AAC field, Unley Rd City opposite BMX Park
4. All entrants must be MASA members and with valid FAI licence
5. Safety straps required on all handles in all events.
6. Mufflers mandatory on all glow motors 2.5cc and above

For more info contact Peter Anglberger, tel 8264 4516



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CONTROL-LINE STUNT EVENTS, HUNTER REGION, 2010

In and near Newcastle, NSW, we are increasing our control line stunt activity. This year the Northern Area Contest Aeromodellers (NACA) will hold two events at its flying ground in the Hunter Sports High School, Pacific Highway, Gateshead, whilst the City of Maitland Society of Aeromodellers (COMSOA) will have one event at the Don Macindoe Memorial Flying Field, Raymond Terrace Road, East Maitland.

The NACA events are

Electric Powered Stunt (F2B and Novice Patterns) on Sunday August 29th, and the Cardinal (F2B) and Classic events on Sunday November 21st.

COMSOA will have an event for "Warbird" (semi-scale) and normal F2B stunts on Sunday September 19th with a concours award for the best looking Warbird.

There will be certificates and prizes for all events.

Hope to see you there.

Contact me if you need.

Ian Smith

19 Hastings Road. Balmoral. NSW 2283

Tel (02)4975 2292 email coliansmith@ hotmail.com



Control Line World Championships.

The Control Line World Championships take place in Hungary from 24th July to 31st July.

The Australian team consists of the following members and supporters :-

F2A Andy Kerr

F2B Joe Parisi, Murray Howell, Frank Battam

F2C Rob Fitzgerald/Mark Ellins, Murray Wilson/Mark Poschkens, Trevor Letchford/Steve Walton, Hugh Simons/Grant Potter (reigning World Champs)

F2D Michael Comiskey, Bruce Bellis, Peter Krenske, Tom Linwood (Junior), Andrew Linwood (Mechanic)

Team Manager Graeme Wilson, Assistant Team Manager David Simons.

Supporters Geoff Potter, Rosa, Karen, Paul Cameron, Jim & Lorraine Stivey, David Gannon, Jenny Walton, Fiona & Rebecca Wilson.

ACLN wishes the team all the best, that you achieve the highest results possible & show the rest of the world that Aussie fighting spirit, good luck to all.

Subscribers are reminded that they can receive Australian Control line News by email at no extra cost. This option would allow you to view the pictures in colour as soon as it is ready to be sent to the printers for publication.

If you would like to use this option just make a request to the Editor by email.

WA CONTROL LINE STATE CHAMPIONSHIPS 2010

F2C TEAM RACE

| | rd 1 | rd 2 | rd 3 | rd 4 | final |
|-------------------------|---------|---------|---------|---------|---------|
| 1.R.Fitzgerald/M.Ellins | 3:14.81 | 3:46.06 | 3:08.75 | 3:19.41 | 6:37.35 |
| 2.M.Wilson/M.Poschkens | 3:15.60 | 3:12.50 | Dq 69 | 3:18.94 | 6:44.47 |
| 3.G.Wilson/D.Gannon | 3:25.61 | 3:24.47 | 3:37.31 | 3:28.75 | 7:33.56 |
| 4.T.Letchford/S.Walton | 4:31.63 | 3:37.60 | 3:27.35 | 3:34.03 | |
| 5.R.Leknys/R.Morrow | 3:44.16 | 4:06.97 | 3:29.34 | 3:51.47 | |
| 6.R.Hoogenkamp/C.Leknys | Dq 26 | 3:40.15 | Dq | Dq | |
| 7.S.Leknys/A.Taylor | 5:02.41 | 4:45.37 | 5:22.81 | 4:53.50 | |
| 8.M.Sherburn/A.Dyson | DNS | Dq 34 | DNS | DNS | |

F2F TEAM RACE

| | rd 1 | rd 2 | rd 3 | rd 4 | final |
|---------------------------|---------|---------|---------|---------|---------|
| 1.M.Wilson/M.Poschkens | Dq | 3:55.04 | 3:55.57 | DNS | 7:55.28 |
| 2.G.Wilson/M.Ellins | 5:00.41 | 4:39.28 | 4:04.40 | DNS | 8:25.81 |
| 3.R.Bellis/D.Gannon | Dq | 4:26.47 | 4:15.22 | 4:08.59 | dnf 134 |
| 4.S.Leknys/A.Taylor | Dq 37 | 4:14.03 | 5:08.22 | 4:17.18 | |
| 5.T.Letchford/S.Walton | dnf 28 | Dq 92 | 4:21.69 | Dq 34 | |
| 6.R.Fry/N.Kirton | Dq | 4:23.50 | 4:26.85 | 4:30.22 | |
| 7.R.Hoogenkamp/C.Leknys | 4:29.59 | 4:26.73 | 4:44.03 | Dq | |
| 8.M.Sherburn/A.Dyson | 4:44.02 | 6:22.50 | 4:26.84 | Dq | |
| 9.K.Parks/D.Nolan | 5:03.50 | 4:56.50 | 4:41.53 | Dq 32 | |
| 10.P.Templer/R.Fitzgerald | 6:04.41 | 5:18.15 | dnf 43 | DNS | |
| 11.R.Leknys/R.Morrow | dnf 62 | DNS | DNS | DNS | |

The photo is a special one. Where in the world in the last thirty years has there been an F2C race with two guys aged 21 and another 18 years old.

Ryan Leknys is in middle with Murray & Shane Leknys is just taking off.

Picture by Trevor Letchford.



Elevator power hinging.

by Joe Supercool

A decade or so back, my daughter Remy and I passed thru Bakersfield, where we took the chance to see the Republic F84H Thunderscreech. This exotic aircraft was a gate guardian at Bakersfield Municipal Airport. I gather it is not there anymore, having been moved to the Airforce Museum in Dayton, Ohio.

From there we headed to Van Nuys airport, in the North-Western approaches to Los Angeles, where some of the heavy metal Reno race planes were hangared. Imagine my surprise, then, to find a rubber-powered man-carrying ultra-light in one of the hangars!

Now this could all be irrelevant to our modelling needs if it weren't for just one thing. This aircraft, the Rubber Bandit, had an electronic flight control system. Well, not really. The stab and rudder were moved by ordinary R/C servos, with the pilot using a regular R/C transmitter to operate them! Not so remarkable, perhaps, if it were not for the fact that the fully-flying rudder was at least 8 feet high and 2 feet wide!

So I bought a T-shirt and asked George Heaven, the designer, how he expected the servo to move such a huge control surface. It seems there is a trick to this: but first, did it work? Well George had mounted this rudder on the back of a pick-up truck, and used it to steer the vehicle down the Van Nuys Runway! All by a crummy little R/C servo.

Here is the trick. The rudder (no fin) was hinged at the 25% chord position. The rudder was a rectangle, so figuring out the 25% location was a no-brainer. Also, the airfoil section was symmetrical. Now it turns out that if you do this, there is no effort required of the pilot (or servo) to turn this surface against air loads, yet the rudder is fully effective at steering the airplane! Truly amazing!

I had to try this for myself. I restored the Bat flying wing and fitted Voodoo type elevators, which you can see in the photo. But I also hinged them at 20% of mean chord. I don't know how much all this moved the C/G back, but I can tell you the elevator was extremely effective, to the point of the model being hard to fly. I halved the elevator throw and was then pleased with the handling. There is still a need to move the C/G forward a little.



There was another unexpected result. Previously, the model would glide like a brick: there was no way it would glide for the lap required by the F2B rules. In fact, it was down in 1/3 of a lap from full speed! I thought this was the draggy muffler and engine hanging out in the breeze. But with the new elevator, 2/3 lap glide was no problem at all. It seems that the Dominator style slab elevator hanging onto the trailing edge was very draggy, both losing lift and adding drag.



So this is something to take on board and think about before you build your next yo-yo. Certainly it is a fun thing to try!

TRADE STALLS AND MUCH MORE.

10TH ANNIVERSARY



**2010
MELBOURNE
MODEL
ENGINEERING
EXHIBITION**

2nd and 3rd October 2010

Venue: Engineering Halls, Monash University, Clayton

| | | |
|----------|------------|-------------------|
| Saturday | 2/10/2010: | 9.00 am – 5.00 pm |
| Sunday | 3/10/2010: | 9.00 am – 4.00 pm |

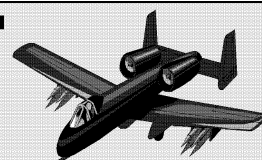
Organising Club:
Melbourne Society of Model & Experimental Engineers

Contacts after hours:
Ian Stewart (03) 9889 7907 or John James (03) 9528 4878

More details at www.msmee.org.au

YEOMAN TROPHY NOVICE STUNT 23-5-2010

CONTEST RESULTS



| | | |
|-----|------------|----|
| 1ST | G.OPPERMAN | 52 |
| 2ND | M.HANEY | 33 |
| 3RD | K.TAYLOR | 13 |



STUNTMASTERS KNOX 23-05-2010

| | | | | | |
|-----------------|------|-----|---------|---------|--------|
| DOUG GRINHAM | 1030 | 985 | 1025 | TOTAL= | 2055 |
| CRAIG HEMSWORTH | 1053 | 957 | 998 | TOTAL= | 2051 |
| MARK ELLINS | 1010 | 964 | 974.5 | TOTAL = | 1984.5 |
| PETER KOCH | 947 | 857 | 923 | TOTAL= | 1870 |
| DAVID NOBES | 801 | 888 | 962.5 | TOTAL= | 1850.5 |
| ROBIN HIERN | 848 | 754 | D.N.FLY | TOTAL= | 1602 |



16 May 2010 at Frankston

Combined Speed

| Pos | Name | Class | Engine | Flight 1 | Flight 2 | Flight 3 | Fastest | Km/h | % |
|-----|----------|---------------|--------------------|----------|----------|----------|---------|--------|--------|
| 1 | R Hiern | Class 5 | Novarossi 21 | 14.83 | D.N.S. | D.N.S. | 14.83 | 242.75 | 94.54% |
| 2 | M Wilson | Class 1 | OS CZ11 PS | 16.42 | NT | 16.64 | 16.42 | 219.24 | 83.07% |
| 3 | R Hiern | Class 1 | OS CZ11 PS | 16.55 | D.N.S. | D.N.S. | 16.55 | 217.52 | 82.42% |
| 4 | N Wake | Proto | Force .21 | 30.60 | D.N.F. | D.N.S. | 30.60 | 189.33 | 78.84% |
| 5 | R Hiern | Class 2 | Super Tigre G21/29 | 13.21 | D.N.S. | D.N.S. | 13.21 | 219.29 | 75.70% |
| 6 | H Bailey | Class 1 | Asp 12 | 21.97 | 22.74 | D.N.S. | 21.97 | 163.86 | 62.08% |
| 7 | N Wake | Vintage Proto | Magnum 25 | N.E.L. | D.N.S. | D.N.S. | | | |

Perky

| Pos | Name | Motor | 1st Flt | 2nd Flt | 3rd Flt | Fastest | KPH |
|-----|-----------|-----------------|---------|---------|---------|---------|--------|
| 1 | N Wake | Force 15 | 42.94 | 43.00 | D.N.S. | 42.94 | 134.92 |
| 2 | P Stein | Super Tigre G15 | 56.92 | 52.18 | 55.50 | 52.18 | 111.03 |
| 3 | V Marquet | ED 2.46 | 68.91 | 64.68 | | 64.68 | 89.57 |

Average Time: 53.20SEC.

Closest to average Winner = Paul Stein

F2F Team Race

| | | | |
|----|-------------------------|---------|---------|
| 1. | H. Bailey / M. Wilson | 4:03.22 | 5:43.66 |
| 2. | G. Wilson / M. Ellins | 8:07.06 | 4:36.16 |
| 3. | K. Hunting / J. Hunting | 5:00.12 | 4:58.68 |

The recent rain has given the Frankston field a lush green colour and combined with a pleasant warm day with minimal wind it all made for a pleasant flying day.

The Speed fraternity were early on the scene and quite a few models were put through their paces.

A social sausage sizzle took place at lunchtime to feed the hungry.

After lunch the F2F team racers were in action on the concrete and some general sports aerobatics also took place on the grass along with some Classic B testing flights.

With the ideal flying conditions it was an opportunity not to be missed.

The Secret Life of Squish

It has nothing to do with lime and a gin and tonic, but Squish is a very misunderstood thing in two-stroke engine building. As recently as 2000, Professor Gordon Blair, who has undertaken considerable research in high speed two-stroke racing engine design, has lamented that it was a highly under-utilised technique by which engine designers could run their engines at the highest possible compression ratios and thereby obtain greater torque and horsepower. Now that engines have done away with complex and unwieldy piston and head baffle designs, the cylinder heads of modern diesel and glow engine lend themselves to the full development of the squish effect.

What is 'squish' and what is a 'squish band'?

Simply put, squish is the effect of the high velocity of gas developed between the top of the piston crown and the underneath of the cylinder head in the combustion chamber. As the piston nears top dead centre, the gas mixture is squeezed by the piston. If you imagine looking down on the combustion chamber, you will also realise that as the piston moves closer to the TDC position not only is the gas compressed but it also tends to move radially at an ever-increasing speed towards the central combustion dome. If the flat area (squish band) of the cylinder head close to the piston at TDC takes up a reasonable proportion of the combustion chamber, then the longer distance the gas has to travel along the cylinder head to get to the combustion space, the faster the gas will travel. If the piston-to-cylinder head clearance setting is decreased, then this speed will increase even more for the same piston position.

So what?

Well, this is really a big deal. It has been observed, by very sneaky real-time gas flow analysis, that as the layer of gas squeezes itself, at the right speed, past the fixed gas boundary layers between the piston and head, the leading edge of this layer becomes very turbulent, or, as Prof. Blair puts it, vigorously disturbed.

As the gas mixture with its highly turbulent edge flows into the combustion chamber, it helps to mix the fuel more effectively, and also increases the efficiency of heat transfer to the piston and cylinder head. At the same time this extra-efficient mixing ensures they are fewer pockets of poorly mixed fuel that are likely to cause detonation. Careful measurement has also shown that the average squish gas velocities reached are similar to or greater than the flame speed found in the engine, thus contributing to more even combustion.

The Big Guy states that direct research observation 'reinforces the view that the squish velocity has a very pronounced effect on the rate of burning and heat release in two-stroke engines'. Furthermore 'the design message from this information is that high squish velocities lead to rapid burning characteristics and that rapid burning approaches the thermodynamic ideal of constant volume combustion'.

Want more?

Prof. Blair also asserts that 'the designer has available a theoretical tool, to tailor this effect to the best possible advantage for any particular design of two-stroke engine. One of the beneficial side effects of squish action is the possible reduction of detonation effects. The squish effect gives high turbulence characteristics in the end zones and, by inducing locally high squish velocities in the squish band, increases the convection coefficients for heat transfer. Should the cylinder walls be colder than the squished charge, the end zone gas temperature can be reduced to the point where detonation is avoided, even under high bmep and compression ratio conditions. For high-performance engines, such as those used for racing, the design of squish action must be carried out by a judicious combination of theory and experimentation. A useful design starting point for gasoline-fueled, loop-scavenged engines with central combustion chambers is to keep the maximum squish velocity between 15 and 20m/s at the peak power engine speed. If the value is higher than that, the mass trapped in the end zones of the squish band may be sufficiently large and, with the faster flame front velocities engendered by a too-rapid squish action, may still induce detonation.'

Just a note: One of the disadvantages of high squish velocities in larger engines is noise. On an air-cooled 250 cc two-stroke engine, or even a car diesel for that matter, you can hear the distinct rattle or high-pitched ring of the piston thumping the gas mixture against the squish band. Because of the bore dimensions of a small model engine, these noises are in the inaudible high frequency range and are not a bother.

And even more

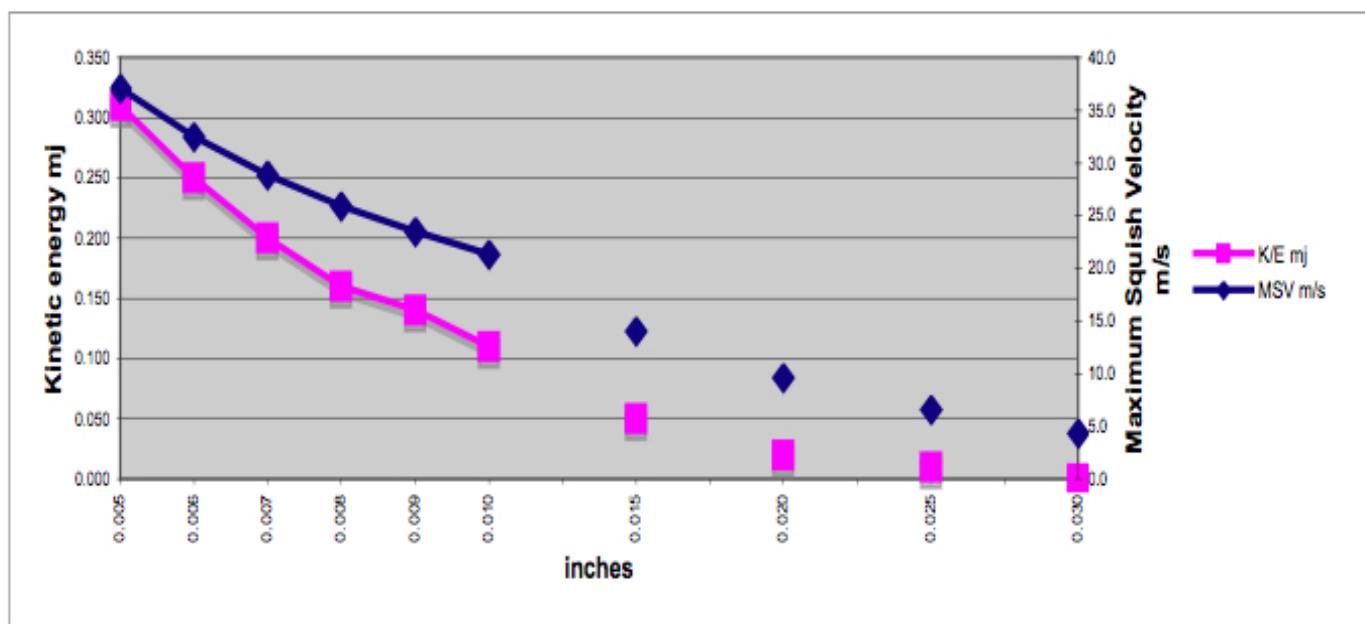
Finally, the good Prof. says that 'squish velocities higher than 30 m/s would be advantageous to assist with the combustion of a fuel which is notoriously slow burning. As with most design procedures, a compromise is required, and that compromise is different depending on the performance requirements of the engine, and its fuel, over the entire speed and load range.'

We therefore have a powerful tool to engineer a feature into the engine that will reduce detonation and increase the efficiency of the engine if used carefully.

His last comments are very important for model engine builders and re-builders, as nitromethane/methanol mixes have retarded (slower) burning properties. This means that higher compression ratios/squish velocities may in fact be employed successfully in small engines when compared to petrol-powered engines.

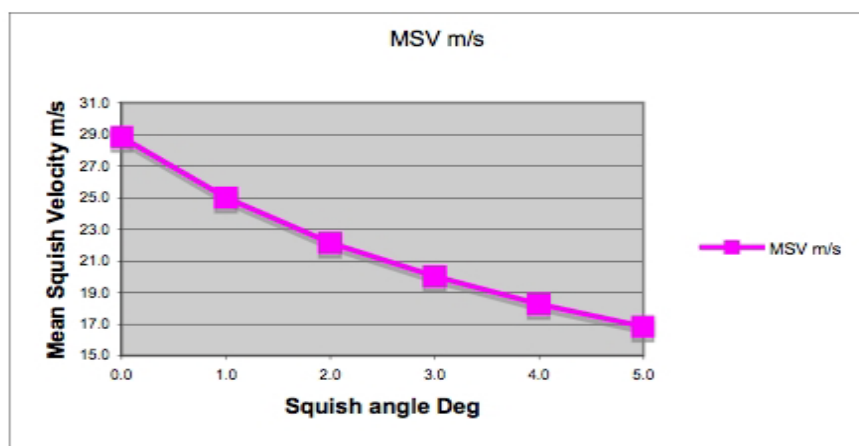
If we take a modified OS 25FX B racing engine we can look at the dimensions of the engine and see where we are with the 'squish factor'. All calculations below are based on a modified OS 25FX, running a 11.2:1 trapped compression ratio.

Figure 1. OS 25FX, 22000RPM, 50% Squish area, 0 deg squish angle



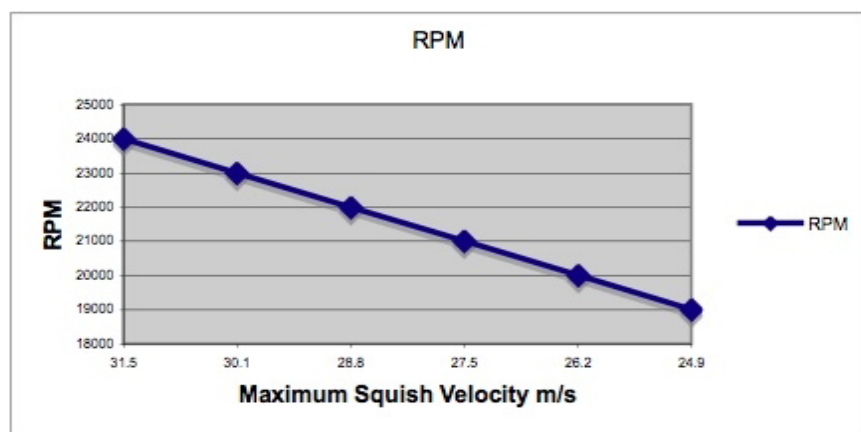
In this graph it can be clearly seen that if the head clearance is set between 5 and 8 thou, the maximum squish velocity will exceed 25 meters/second. Note that the kinetic energy is not so great; it decays to ½ its original value when the head is set at 8 thou from 5. The kinetic energy is the pushing power of the gas flow. The good news is the kinetic energy calculations are based on rich petrol: oil mixes. There is no way I can do the kinetic calculations for nitromethane:methanol:ethanol:xylene:IPB:IPA:oil mixtures as they are too complex, but the actual numbers are much better for us as the glow fuel is a lot denser. From our testing, a 5 thou head clearance shows no tendency to detonate or blow plugs on 15–30% nitromethane fuel, even with substantial xylene and IPA added.

Figure 2. OS 25FX running at 22000 and 007 thou squish clearance. 50% squish



This diagram shows that angling the squish band back to the combustion chamber dome reduces the maximum squish velocity (MSV) quite substantially and suggests quite strongly that a flat squish band is the way to go. The substantial angle on the original OS 25FX head has been completely machined off and the head adjusted to give zero squish angle.

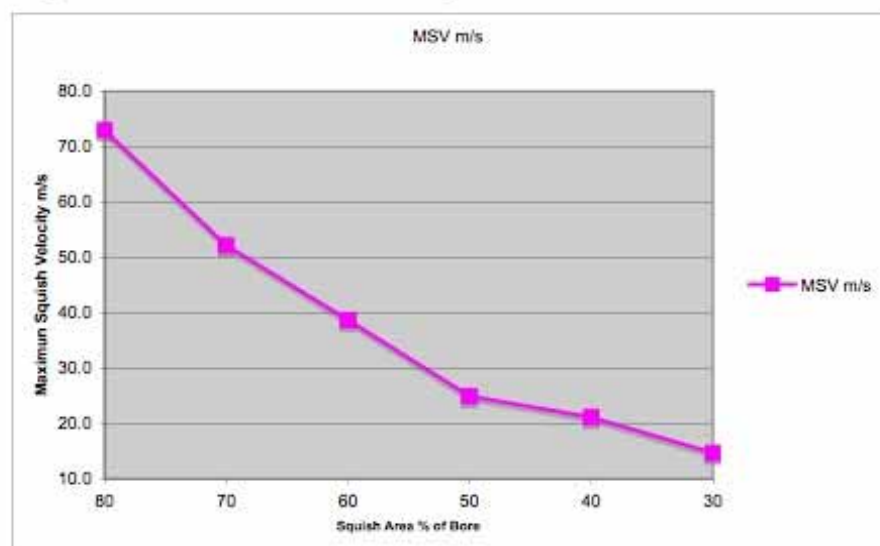
Figure 3. OS 25FX RPM V MSV for 50% Squish, 0 Deg. Squish angle and 7thou Head Clearance



This graph shows that between 18 000 and 24 000 rpm for the OS 25FX, the MSV does not appear to change substantially when the engine is set to 7 thou H/C.

This is an excellent finding as it suggests the head has a setting where the engine is going to pull well during wind-up after restarts and is therefore reasonably well optimised. The squish velocity can be easily increased by resetting the head closer.

Figure 4. OS 25 FX % Squish area V MSV at 22000RPM and 007 H/C



As expected, the squish velocity goes up substantially with the increase in the overall squish area in the cylinder head. In practical terms, a 50% squish area is more comfortable for a 25 racing engine using a modified standard head. To go to a higher per cent squish area would require a completely new fabricated cylinder head. We consider 25m/s to be a reasonable figure but this could easily be increased by lowering head clearance. Going to 6 and 5 thou increased the MSV to 32.5 and 37.1 m/s respectively so that was a much better solution.

Practical considerations

If one takes a standard off-the-shelf 25 and reduces the head clearance it is possible to find the engine detonating when running at high speed. The temptation is to shim it up a few thou to a point where the detonation stops and leave it at that. In this case the engine has reached a point where the compression ratio increase has caused premature detonation and the squish speed is still too slow to provide any usable benefits to the engine. This happens to some engines but not all; there is a good reason for it, which I will come to later.

Going from 25 thou to 8 thou in a 25 resulted in X-engine looking like a bad case of sandblasting to the piston and cylinder, overheating and blowing plugs after 1–2 tanks of fuel in the air. Melted balls of platinum were sticking to both piston and head reducing clearance to zero, or less than zero by the look of the dents. Shim it back to 10 thou and it still blows plugs every 2–3 tanks now, but the detonation appears to have gone. It must still be there silly because you are blowing plugs!

Only a brave man would suggest reducing the head spacing down to 5–6 thou, but that is exactly what you should do. Look at the graphs: with the improved squish velocity the detonation went away. In this specific case the actual per cent squish area was quite poor (35% of cylinder area) and one needed less clearance to get the squish velocity up to operational speed. It really is a case of looking at all the factors.

Conclusion

With next to no re-fabrication, a standard OS 25FX can be turned into a racing engine with good combustion dynamics. Thanks to Prof. Blair's advice, we can extract a pretty good performance increase from the fairly standard sports engine by just following some simple rules to optimise the combustion burn, which is indeed the heart of any engine. Thanks to Mr. OS's careful engineering, and Mr Rothwell's excellent carburation, this engine appears to be able to take it and respond, which is all the better!

Examination of the basics of a range of most other 25 sports engines suggests that they too can and do benefit significantly from these basic modifications.

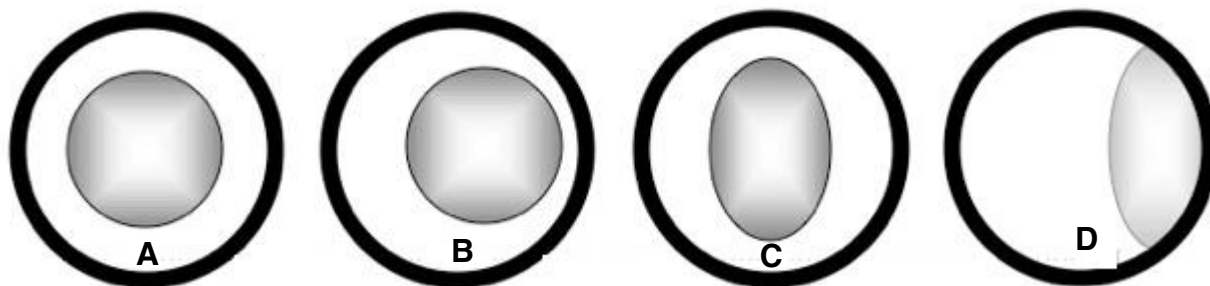
Improvements using the basic theory of squish

Looking at what is happening and the theory itself can lead to some very interesting conclusions. Many two-stroke head designs are just crap for racing. This includes many racing engines of yore, big and little, and even, unfortunately, some high-performance engines today. Squish bands are often narrow and very highly angled towards the combustion bowl, and often the lead-in to the bowl has a large radius. All these things tend to promote poor running and bad air/fuel mixing. Sadly, engine designers are very conservative. Why should they change the design of things that in the past worked in a tried-and-true formula? There is a good reason; engines just work more efficiently if the head is optimised first. GP engine figures prove this. 'Engine design on the edge' has gone from 50% thermal efficiency to the astounding figure of 75% in less than 30 years and, initially, two-stroke design led the charge.

If one take the standard design, wide squish with the combustion bowl plonked in the middle it gives us a simple and effective design to try our Squish Velocity theory.

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Clayton 3168
Victoria
Tel (03) 9543 2259

According to Prof. Blair, we can improve the design just by simple inspection.



If we pretend these are cylinder heads, then:

A represents the standard layout with the combustion bowl dead centre,

B an offset combustion chamber,

C a bathtub type design (a variation of this design would be the merged double type, where two hemispheres are merged together) as represented by the image to the right, and

D a bathtub side (completely offset) combustion chamber head.



It is therefore no surprise that designs (B) and (C) have at least a 50% greater squish velocity when compared to the standard design, but not a significantly higher squish kinetic energy. The offset design (D) has a 100% higher squish velocity than the standard design and significantly higher squish kinetic energy (even at very large head clearances); in fact, five times the energy at the same head setting as design (A).

These simple designs with advanced features of high average squish velocity and high squish kinetic energy are worthy of consideration. None of these designs B, C and D would be beyond modern production techniques or even a home workshop with a lathe or mill to manufacture. Considering their advanced design features and significant advantages over the standard head design, it is difficult to understand why more use has not been made of these cylinder head layouts in all two-stroke engines.

If we want to go faster and have engines that are more thermally efficient and employ higher compression ratios, which is quite logical, then the squish effect needs to be applied to exploit squish velocity and squish kinetic energy. These designs, put forward over 15 years ago and based on empirical, scientific evidence, seem to fit the bill nicely.

References:

- [1] Prof. G P Blair, 2008. 'Fundamentals and Empiricism in Engine Design, Back to Basics', (027) *Race Engine Technology Magazine*, Dec/Jan 2008.
- [2] G.P. Blair, 1998. 'Design and Simulation of Four-Stroke Engines', *Society of Automotive Engineers*, SAE reference R-186.
- [3] G.P. Blair, 1996. 'Design and Simulation of Two-Stroke Engines', *Society of Automotive Engineers*, SAE reference R-161.

Article by Lance Smith 31 May 2010



The latest Bulletin #2 for the MAAA Dalby Nationals is available at the web address placed below.

Lots of information on the locality and the flying sites is included.

<http://www.maaa.asn.au/maaa/nationals/64nats/64th%20NATIONALS%20BULLETIN%202.pdf>

Theres a program in there...

Apologies to our NSW readers for the lack of reports from the recent NSW State Championships.

I have not as yet received any of them for publication.
Ed.

New Models



John Hallowell's new Bendix Racer.

It's been a while coming, I know... Will be ready for a test fly as soon as 18 thou. solids arrive from MBS in the next few days. With the N.36 on full song, just might be holding my breath on that first take off. :-)) If it's as fast as Keith's superb original Nemesis, then I'll be a very happy chappy!

Meeting held at Moe on Sunday May 16th 2010

Disappointingly, our 2nd additional day was also not very well attended. However, the five of us who did turn-up had a very enjoyable day and got in plenty of flying.

Helping to make up the numbers was Gavin Opperman, who made the trip up from Beaconsfield. Gavin put in several fast flights with an elderly Ken Taylor built "Cobra", powered by an OS.46LA.

Doug Black set himself up on a separate circle and assisted by "Mr Good Vibes" put in many flights with his Aeroflyte "Viper" combat wings. Initial flights saw the engines off-song a little but by the end of the day all were running sweetly.



Yours truly got to fly all three models that I brought along. The Paul Richardson built "Master/Doctor" flying nicely in the fine conditions and also my all sheet biplane the "Stunt Grunt". While flying my "Demon" I couldn't resist buzzing a magpie that refused to move, no matter how close I got he/she didn't flinch. I should have taken this bravado as a warning.

Taking a break from flying, we were in the club house looking at a new "Messerschmitt ME109" plan. Gavin ducked out to check on the models but quickly returned saying, "Graham a Magpie is eating your plane". What the...??? The photo tells the story, part of the "Demon" tailplane was devoured and several holes were pecked in the wing – moral,don't tease Magpies.

"Rocket Ronny" put in a lot of flights; his Fox .35 powered "Ringmaster" flying very nicely and his Goodyear model with ASP.15, looking great and also flying well. Unfortunately, later on he wrote-off his trainer while attempting a loop; we'll get you there "Rocket".

In all a great day, but I question the need to have additional days if they are to be so poorly attended. Come on guys, you couldn't have got better weather and despite the "killer" birds, the venue was also first class.

Graham Keene Sec./Treasurer CLAG Inc.



....don't tease Magpies.

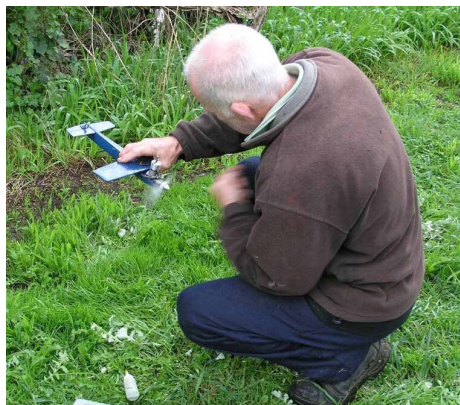
VICTORIAN CONTROL LINE STATE CHAMPIONSHIPS 2010



The remaining four events from the Victorian State Championships took place on June 6th at the Frankston field.

First event on the hard surface was Midge Speed

| MIDGE SPEED | rd 1 | rd 2 | rd 3 | best | engine |
|-------------|-------|-------|-------|-------|----------------|
| 1.K.Hunting | 9.97 | DNS | DNS | 9.97 | PAW |
| 2.J.Hunting | 12.17 | 12.54 | 11.87 | 11.87 | Taipan 67 |
| 3.C.Ray | 13.60 | DNS | DNS | 13.60 | Taipan 65 |
| 4.N.Wake | 24.21 | 14.92 | DNS | 14.92 | Silver Swallow |



John Hunting warms up the Taipan.



Colin Ray gets assistance from Murray Wilson.



A Silver Swallow with a broken tail.

| 1/2A TEAM RACE | final | engine |
|-----------------------|---------|--------|
| 1.C.Ray/P.Stein | 7:46.91 | Ctah |
| 2.K.Hunting/J.Hunting | dnf 144 | CS 09 |

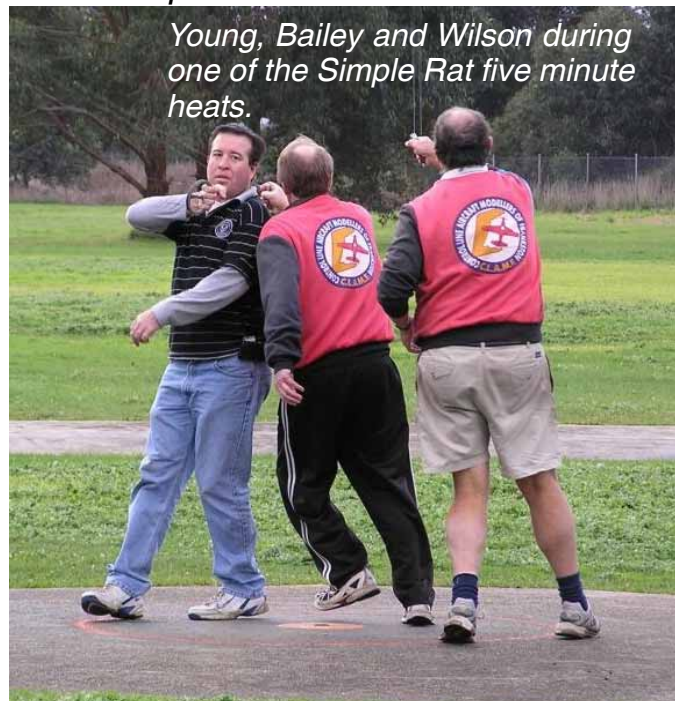
Colin Ray (pictured here with the winning 1/2 A model) teamed up with Paul to take the CTAH over the line in first place.



Bryce Young had his new Simple Rat model in action. It was powered by a Norvel, that had the speed edge on the other competitors but re-starts were a problem and he missed out on the final.

| SIMPLE RAT RACE | rd 1 | rd 2 | final | engine |
|------------------------|-------------|-------------|--------------|---------------|
| 1.C.Ray/J.Ray | 95 | 104 | 216 | OS FP 15 |
| 2.H.Bailey/P.Roberts | 91 | 102 | 191 | OS FP 15 |
| 3.G.Wilson/M.Wilson | 89 | 106 | 171 | OS FP 15 |
| 4.J.Hunting/K.Hunting | 91 | 99 | | OS FP 15 |
| 5.B.Young/M.Ellins | 83 | 74 | | Norvel 15 |

Right:- The three teams from the Simple Rat Race ten minute final.



A break for lunch before Mini Goodyear took place.

| MINI GOODYEAR | rd 1 | rd 2 | final | engine |
|-----------------------|-------------|-------------|--------------|---------------|
| 1.H.Bailey/P.Roberts | 4:17.65 | 5:52.6 | 8:56.81 | OS CZ11PS |
| 2.J.Hunting/K.Hunting | 4:04.53 | dns | 9:05.25 | OS CZ11PS |
| 3.C.Ray/J.Ray | 4:19.90 | dns | 12:20.62 | OS CZ11PS |
| 4.G.Wilson/M.Ellins | dnf 19 | 4:54.13 | | OS CZ11PS |
| 5.M.Wilson/P.Stein | dns | dns | | OS CZ11PS |

Mark Ellins and Graeme Wilson usually have a monopoly in Mini Goodyear with a quick model and slick pit stops. Today was not their day as a troublesome tank filler valve made engine tuning an impossibility.

At the other end of the scale, Bailey/Roberts have been plagued with Mini Goodyear tuning problems for years, but today it all started to work for them and Harry had to put on his running shoes and get some rigorous exercise in the centre circle.



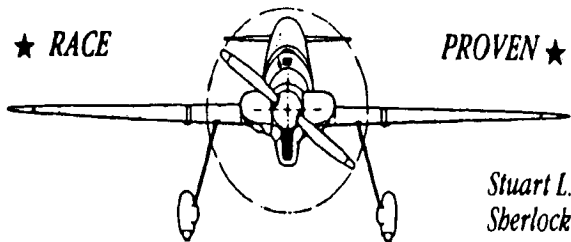
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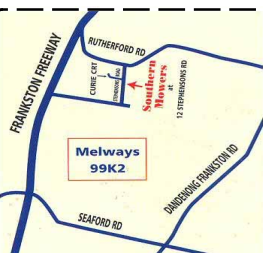
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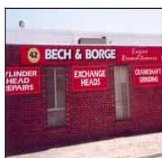
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Engine Reconditioning Specialists



The CLAMF Website continues to be updated at regular intervals and has plenty of pictures to view of events club members have been involved in.

This includes the recent Victorian State Championships.

They can be viewed at the CLAMF Aerosports website

<http://clamf.aerosports.net.au/>

Tell your friends about "Australian Control Line Nostalgia", the most comprehensive summary of Australian Control Line on the World Wide Web.

Ron Chernich has installed a new control line discussion forum as an adjunct to ACLNostalgia. Looking a bit like the Barton forum (it's powered by a new version of the same free software), we hope that in time it will grow to become a worthwhile Australian contribution to the aeromodeling scene. See it at www.dkd.net/forum and register to check out all its features.

Back issues of ACLN are archived, indexed, and may be searched here.

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