

THE VOICE OF CONTROL LINE
AEROMODELLERS FROM
AROUND AUSTRALIA

Number 103



Produced by the Victorian Control Line Advisory Committee

September 2006
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**Copy Deadline for next issue is:
Wednesday 21st September 2006
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 pretyped, and please use a good black ribbon for best reproduction. **Best of all is to send it on a 3.5" disk as a Windows Write, Word for Windows, or as an ASCII TEXT FILE 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:- hbailey@optusnet.com.au



COMING EVENTS



COMING EVENTS



VICTORIAN CONTROL LINE CONTEST CALENDAR

2006

SEP 10	FAI & Combined Speed, 2.5cc Rat race, 1/2A Team race.	CLAMF
SEP 17	Classic Stunt, Vintage Stunt, Aust "A" Team race, Simple Combat. Classic "B" Team race,	MOE
SEP 24	FAI (Stuntmasters) Bendix, Class 2 Team race.	KMAC
OCT 1	C.L.A.G. Country Flying Day "Diesel Day"	KNOX
OCT 15	Classic Stunt, Vintage Combat	BRIMBANK
OCT 22	Vintage Stunt	KMAC
NOV 5	C.L.A.G. Country Flying Day	MOE
NOV 26	Monty Tyrrell Classic Stunt	KMAC
DEC 3	C.L.A.G. Country Flying Day	TRARALGON

Events will be flown in order of printing.

Events in **Bold type** will be flown over hard surface

CLAMF Frankston Flying Field, Wells Rd, Seaford (Melway 97J10),
10.30am start

Events conducted by CLAMF at the KMAC Field (Melway 72 K9)
10.00am start.

Contact :- G. Wilson (03) 9786 8153,

KMAC Stud Rd . Knoxfield (opposite Caribbean Gardens)
(Melway 72 K9) 10.00am start

Contact :- Peter O'Keeffe (03) 9753 3442 kmac@aanet.com.au

CLAG Contact :- Graham Keene (03) 51924485

Details of venues can be found on web site www.clagonline.org.au/home.htm

NOTE - All events at KMAC except Aerobatic events to
be run by CLAMF & DAC members

The third Sunday of each month is the regular "**Brimbank
Club Day**"

CLASII CALENDAR 2005/2006

Flying has continued on Saturdays at the Leichhardt Park
flying site (UBD Map 232 R1)

John D. Taylor,

Secretary/Treasurer CLASII (Ipswich, Queensland)

C.L.A.S. (NEW SOUTH WALES) CONTEST CALENDAR 2006

DATE	CLUB	EVENT
Sun 10 Sep	KMFC	Classic Stunt, Vintage Stunt, Club Racing, Slow Combat, SWAP MEET
Sat 23 Sep	KMFC	CLUB STUNT (Novice)
Sun 24 Sep	SSME	F2B Aerobatics
Sun 15 Oct	KMFC	Gordon Burford Day, Club Racing
Sun 29 Oct	SSME	Phantom, Vintage A, Bendix T/R, Vintage 1/2A
Sat 4 Nov	KMFC	CLUB STUNT (Novice)
Sun 5 Nov	SAT(Kelso Park)	F2B Aerobatics
Sun 12 Nov	KMFC	Vintage T/R, 1/2 A, A and B.
Sun 19 Nov	NACA (Gateshead H.S.)	Classic Stunt & Cardinal Stunt. (I.Smith Ph:024975 2292)
Sun 26 Nov	KMFC	1.6 and Slow Combat, Club Racing
Sun 3 Dec	Doonside (Kelso Park)	F2B Aerobatics
Sun 10 Dec	KMFC	Christmas Party and Fun Fly
27-28 Jan.2007	CLAS.	(Details to be advised) CLAS. CITY OF SYDNEY CHAMPIONSHIPS
DOONSIDE -	(Doonside Model Flying Club) - Kelso Park North, Panania.	
KMFC -	(Ku-ring-gai Model Flying Club) - St. Ives Showground, Mona Vale Rd, St. Ives.	
NACA -	(Northern Area Contest Aeromodellers) - Gateshead H.S., Pacific Hwy, Gateshead.	
REMAC -	(Ryde Epping Model Aero Club) - Peter Board HS, Wicks Rd, North Ryde.	
SAT-	(Sydney Aeromodelling Team) - Kelso Park North, Henry Lawson Dr. Panania.	
SSME -	(Sydney Society of Model Engineers) - Model Park, Luddenham Rd, Luddenham.	
WMFC -	(Werrington Model Flying Club) - Entrance to flying site @cnr. Landers & Walker Sts, Werrington.	
MDMAS -	(Muswellbrook District Model Aero Sports Inc.) - Mitchell Hill Field, New England Hwy, Muswellbrook	
COMSOA -	(City of Maitland Society of Aeromodellers) Raymond Terrace Rd, Metford.	

Notice

**Brimbank C/L MAC will be
holding a Classic Stunt and
Vintage Combat contest on
Sunday 15th October.**

**Start 10:30 BBQ lunch will be
available.**

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necessarily reflect those of the Editor or Committees of
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contained in this publication.



PRESIDENT'S REPORT:

KMAC – “Under New Management”

At the KMAC Annual General Meeting on Thursday July 27, a new committee was elected.
The committee members are as follows:

President - Peter O'Keeffe,
Vice-President – Ken Donelly,
Secretary – Frank McPherson,
Treasurer – Greg Barclay
General committee members – Peter Rowland, P J Rowland and Damien Sammut.

The new KMAC committee members would like to acknowledge the great work undertaken by the previous committee and will continue building up our membership base and ensuring that KMAC serves the broad interests of its members.

Each year, KMAC supports the major Stunt competitions already listed on the KMAC calendar which include the Hearn's Trophy, Yeoman Trophy, Stuntmasters and the Monty Tyrrell classic stunt event as well as the Victoria State Championships. These KMAC competitions are usually held on the fourth Sunday of the month at various times throughout the year. KMAC will now schedule additional flying events so that there is a flying activity on every month. These will include vintage, classic and F2B events together with theme days such as Diesel Day, Profile Day, etc. as well as a range of other activities that will promote greater interest and participation at the KMAC field. Some events will be competition oriented while others will simply be Fun-Fly or theme days.

As KMAC has a very well maintained dedicated Control-line field with 4 flying circles which can be accessed by club members 7 days a week, it is a great facility for anyone interested in control line flying and KMAC would certainly welcome new members.

Focus at KMAC will be on having FUN, SHARING, ENCOURAGING and the PURSUIT OF EXCELLENCE... all in a friendly, social atmosphere!!

To celebrate this focus, KMAC hosted a Fun-Fly Day on Sunday August 27th starting at 10am. A BBQ lunch of sausages in bread was available as well as cans of drink with proceeds towards club funds. During the lunch break, a General Meeting was held for club members to discuss relevant club matters. This format of BBQ lunch and KMAC Members' General Meeting will be adopted at all future monthly events.

Peter O'Keeffe / President – KMAC inc

KURING-GAI M.F.C. presents GORDON BURFORD DAY **SUNDAY 15th OCTOBER**

A tribute to this great contributor to
Australian aeromodelling.

Venue:- St Ives showground

All planes this day to use Burford engines

CONCOURS 9 am to 10 am

STUNT (Vintage pattern) 10 am on

SPEED (any plane, any Burford engine, any line
length —combined speed format)

10 am on

ENGINE COLLECTION DISPLAYS all day

CIRCLE DEDICATION 12 noon

\$5 LUNCH 12.30

WINNERS AND RAFFLE DRAW (Burford
engine) around 2.30

****Burford designed WOMBAT kit with full size
plan now available.**

Contact David Owen at owendc@tpg.com.au
subject line: Wombat

cost \$30

For further info call John Nolan on 02 9997 3434

AND MUCH MORE.

**IT'S
ON AGAIN**

**2006
MELBOURNE
MODEL
ENGINEERING
EXHIBITION**

30th September to 1st October

Venue: Engineering Halls, Monash University

Organizing Club:
Melbourne Society Of Model & Experimental Engineers

This Year Celebrating our Clubs 80th Anniversary.

Contacts After hours:
Ian Stewart (03) 9889 7907 or
Robert Jones (03) 98016048



Adelaide Aeromodellers Club

Slow Combat # 1

June 3rd 2006

Slow Combat is proving to be one of the club's more popular events and the rules allow people to fly a wide variety of equipment. However some members who have been campaigning sport type models have had their appetite whetted and are reportedly going to build dedicated combat models for #2 event in November.

The most successful models appear to be sports diesel powered 70s, 80s and later F2D models

1. FAI Line Length ie 15.92 m / 52 ft 6 in measured from model cl to handle cl.
2. Maximum engine size .25 cu.
3. Any model design allowed, ie flying wings OK
4. If a .15 cu. or larger glow motor an effective muffler must be fitted.
5. Diesels will be exempt from the muffler rule but all entries will have to comply with the MASA 96 db at 3m max noise level limit.
6. One model per bout.
7. Maximum lap speed of 3.5 sec per lap with streamer fitted.
8. Pull testing to 10 kg.
9. Handle safety straps to be worn by all pilots.
10. Scoring: 1 point per second airborne, 100 points per cut, 4 minutes per bout.
11. Round robin type event (ie not elimination) to allow each flyer 4 or 5 bouts.

	Round 1	Round 2	Round 3	Round 4
1. Maris Dislers	W	W	W	W
2. Chris Carpenter	W	W	W	L
=2. Rob Fitzgerald	L	W	W	W
3. Mark Poschkens	W	L	L	W
=3. Peter Anglberger	W	L	W	L
4. Greg Roadknight	L	L	W	L
=4. Alan Roadknight	L	W	L	L
5. Brenton Thomas	L	L	L	L

The standout bout was between Maris Dislers and Rob Fitzgerald. It ran the full 4 minutes and was action packed without any incidents. Maris ran out the winner two cuts to one.

Brenton Thomas from Whyalla brought along his coreflute models and despite being hampered poor motor runs all day, but these look to be the ideal entry level model for this event.

Coming Events:

November 4th, at AAC Slow Combat #2
December 2nd at AAC FliteStreak Stunt

AAC Field Unley Rd Adelaide (betw. South Tce and Greenhill Rds, opposite BMX park)

PULSE JETS REAL AND MODELS.

Over the years (the past 56 in fact) a lot of interest has been shown in model pulse jets, but before talking about the model variety a little bit of background information on the real thing may be of interest particularly for our younger modelers.

The Chinese made powder rockets many centuries ago and jet propulsion is an old idea. At the end of World War 1, the Treaty of Versailles restricted Germany in all forms of armament. In 1923 a German professor, Hermann Oberth published a treatise "The Rocket In to Interplanetary Space" with emphasis on liquid fuels. This led to the establishment of Interplanetary Societies in various countries throughout the world. Of particular importance was the formation in 1929 of the German's Army Weapons Dept to undertake research on the possibility of using rocket propulsion for military purposes. The first test stand ever established in Germany for liquid propellant rockets was located at Kummersdorf near Berlin and the first actual test took place on 21st Dec. 1932.

So as you can already gather the idea of the pulsejet goes back a long way.

In December 1934, the Army Group had its first success in launching liquid propellant rockets and after that began the move to Peenemunde and further development of V1 (pulsejet) and V2 liquid fuel rockets took place right up to the end of World War 2. Rockets, information and scientists were seized by Russia and America at the conclusion of hostilities and without the tests and research that originally started back in 1918 in secret (even when the Versailles Treaty inspectors were inspecting the Krupp's Armament Factory), modern rockets and space travel would probably not even exist today.

The operations of the Army Weapons Unit and development of the rockets were under the command of Major General Walter Dornenburger. He due to various factors had transferred further development of the Fi 103 (or V1 as it later became known) rocket engine to the German Air Force in 1940. They quickly produced a jet driven air torpedo which was catapulted from an inclined concrete ramp. The V1 (pulse jet), Doodlebug or Buzz Bomb as it was commonly called during WW2, because of the extremely loud sound was a small 25ft low winged aircraft which delivered a 1 ton payload of high explosive. The V1 had a top speed of 350 miles per hour and a height range of 600 to 6000 feet. During the latter part of the WW2, V1s were also dropped from aircraft towards the targets. The power plant (pulsejet) burned low-grade fuel oil that mixed with oxygen as it moved towards the target the air intake gave intermittent combustion with up to 500 explosions per minute through multiple valve system.

The first V1s were launched towards London on 12th June 1944 and continued until March 1945 by which time a total of 9,300 had been fired against England alone resulting in huge loss of life, untold casualties and enormous property damage. The physiological effect on the civilian population was considerable

In fact, the V1 was the father of the modern Cruise Missile.

Model Pulsejets

This is in reality just a scaled down version of the V1 working on the same principle with the original multiple valve system replaced with a simpler petal valve system. Sgt. Bill Tenny of the US Army built the first model

pulsejets in 1945 after inspecting a V1 on display, with production of 50 model units of the Dynajet in 1946. Since that date, similar models have been produced and sold in various countries of the world with various degrees of success. The original Dynajet is still in production in America and can be purchased for approx A\$300. Other pulsejets such as the Bailey Sport and Fast jet and accessories can be purchased new and second hand models are usually available.

Pulsejets have been mainly used for Control line flying over the years but there have been and still are operational R/C pulsejets in Europe and USA and also here in Australia in the hands of Bob Fry from W.A.

Pulse jets are extremely noisy and as such are usually only flown at Air shows and Special public displays where they are extremely popular and create enormous interest bringing the crowd from far away and encouraging them to ask many questions about the pulse jet in particular and aeromodelling in general. Competition fliers operate Control line models in speed events at State and National Competitions and at other non sensitive noise sites just for the sheer pleasure of hearing them and flying their usually look alike V1s or Scale models. Speeds of up to 200mph have been recorded in C/L models in recent times but even back in 1959, the world speed record was 300kmph. I understand that an R/C model powered by no less than three Pulsejets has been flown at well over 400 kmph in Europe in recent times and still flies on special occasions. The picture of the model, which was in last month's edition of this magazine, was built by Peter Morandini and is a sport display model, which flies at approx 100 mph for about 2 to 3 minutes on a fuel mixture of 80% methanol and 20% MEK. The model was last flown at the PRAMS Air show. Peter who is a member of the Control Line Aeronautical Society of Ipswich has been building and flying pulsejet models for over twenty years and currently owns OS and Dynajet pulsejets, which are nearly 40 years old. Other jet modelers in Qld own speed models that should be seen in action at the next MAAA NATS at Albury. These belong to John Taylor. More sport models are currently being built.

The current revival in jet interest in Australia has been largely due to the efforts of Bob Fry in WA and a long time stalwart David Axon. Because of their efforts, "Pulse Jet Aeromodellers of Australia" was formed a few years ago with representatives in most States.

Bob Fry's email address is bob.fry@wpcorp.com.au The Queensland rep is John Taylor phone 0733927679 email - johndt@iprimus.com.au

We know there are other modelers in Qld who have pulse jets gathering dust in their sheds. Why not contact us and get them in the air again? We are currently negotiating a new site for use and maximum exposure to the public for the benefit of C/L.

In addition, on a sad note Earl Bailey, manufacturer of the Bailey Sport and Fast Jet recently passed away following a stroke. Another of the pioneers of aeromodelling and in particular control line pulsejet fliers has left us. I understand that the family is closing down the pulsejet part of the business and that three or four Fast jets will be listed on ebay in the near future.

We offer our sincere condolences to all his family.

John D. Taylor

PULSE JET Aeromodellers

of Australia

Knox Model Aircraft Club – Aug 2006



REPORT: Yeoman Trophy Stunt Competition – July 30th 2006

Well, the Yeoman Trophy Stunt competition has come and gone once again... but this time, in trying circumstances for the stunt competitors at the Knox Model Aircraft Club flying field. A good turnout of prospective competitors assembled around the Contest Director, PJ Rowland around 10:30am as he prepared to determine how many would be doing battle for the trophy. Anyone prepared to fly would have to face a fairly stiff Northerly wind with rather nasty strong gusts blowing through at irregular times. It was going to be an overcast day with a top temperature of 15 degrees but at least no sign of rain. Only other consolation was that flyers would have the sun behind them for their manoeuvres.

Out of the group of assembled flyers, only 4 felt confident enough to consider testing their models against the elements... Doug Grinham, PJ Rowland, Dave Nobes and Damien Sammut were going to be the brave contenders for this competition. Judges, Andrew Frith and Kim Laughton settled into their chairs with clipboards and scoresheets held tightly in hand for fear that the wind would blow everything into the next suburb.

To settle the judges in and give everyone an idea of wind conditions, PJ fired up his Nobler / Stalker 61 combo and took to the sky. It became evident very early on in the F2B pattern that the wind gusts were going to be a problem, even causing some slack lines and scary moments for a well-regarded and seasoned flyer like PJ as he completed the pattern.

Frank McPherson was in his regular, and much appreciated, role as official scorer with the task of recording the scores on the computer and the first flyer courageously stepped up to the flight line. Flying the F2B pattern in gusty conditions would preclude high scores generally, with models getting bounced around in the turbulent air. Major difficulties were in vertical and overhead parts of the pattern with a few aborted manoeuvres by almost all flyers due to poor line tension and imminent disaster. In the first round, PJ had an awkward moment at the bottom of the 3rd outside loop as his Nobler was blown down onto the grass and skidded to a halt. Only damage to the model was a broken prop, grazed canopy and customised (read: severely shaved...) rudder but he was adamant that he would be able to continue into the second round with a replacement prop and lots of skill in place of the missing rudder. Maybe he was out to prove that rudders are highly over-rated anyway!

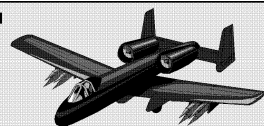
All flyers struggled with the wind conditions but showed great skill and determination in guiding their models through the F2B pattern. Doug had a couple of 'moments' with his new green and red model to show that even expert flyers have some difficulty at times. Damien Sammut flew a PAW .19 diesel-powered profile model called a Pretender and showed his special skill at setting these engines up to perform well in stunt ships.

At the end of the second round, scores were finalised and a formal presentation by PJ was a fitting end to the competition. It was held in the KMAC pavilion with competitors and spectators gathering to witness the ceremony. Prizes were awarded to the first three place-getters with Doug Grinham and his new design 'Starcraft' / Stalker 61 combination holding off all challengers to win the 2006 Yeoman Trophy contest, with a score of 992, from last year's winner PJ, who came in second with a score of 890.5. Dave Nobes flew his own design Livewire stunter with an OS LA46 engine and did an admirable job of keeping his model intact throughout his flights and he took out a very commendable Third Place with a score of 735. Judges and Score Tabulator were also presented with tokens of appreciation for their valuable work. In his role as CD, PJ invited Judge Andrew Frith to clarify the origin of the Yeoman Trophy as many of the assembled flyers and spectators may not have been aware of the history of this stunt event. Many thanks to PJ for the formal presentation of prizes and his CD duties which also included gathering of prizes and co-ordinating the event to ensure a smoothly run and successful day for all.

While everyone was gathered in the pavilion, Peter O'Keeffe, in his new role as KMAC club president, explained the composition of the new KMAC committee that was elected the previous Thursday at the Annual General Meeting and outlined the focus of KMAC for the next 12 months. He also informed everyone of a KMAC Fun-Fly Day scheduled for Sunday August 27th with BBQ lunch and drinks available on the day.

Peter O'Keeffe / KMAC - Victoria

CONTEST RESULTS



Results of the SMAC (ex-SMAC?) Vintage Combat contest held at KMAC 6th August 2006

Some hardy combat flyers braved a cool day and occasional showers to exercise their various vintage designs. The ground was decidedly wet underfoot, but at least that softened the blow from any "unintentional" landing - so we found other ways to damage models! A number of mid-air collisions were seen, none so final as that between Mark Ellins and John Hallowell which left hardly any large pieces to actually carry to the rubbish bin! Such accidents and a variety of engine/tank gremlins eventually thinned out the field to leave a final bout between Ken Maier and Tony Caselli, with Ken taking the honours in the end.

Place	Pilot	W	W	W	L	W
1st	Ken Maier	W				
2nd	Tony Caselli	L	B	W	W	L
3rd	John Hallowell	W	L	W	Draw/withdrew from refly	
4th	Mark Ellins	B	W	L	Draw/withdrew from refly	
5th	Matt Shears	W	L	L		
6th	Graeme Wilson	L	L			
7th	Stephen Reeve	L	Withdrew			



AAC Peacemaker / FliteStreak Stunt #1 August 5th 2006

This event came about as an attempt to encourage as many sport flyers as possible into having a go at aerobatics competition. Most CLers and many 'radio flyers' have one of these models. If not, the usual excuse of 'I don't have a suitable model' won't wash as the FliteStreak ARF is currently in stock at a well known Adelaide model shop. The Vintage pattern and simple equipment help to level the playing field, which was reflected in close scores on the day.

The event was open to all profile models of 0.40 cu or less. FliteStreaks and Peacemakers were rewarded with 5 and 10 points bonus per round respectively.

A good turnout and excellent weather ensured a very enjoyable day. The gusty northerly breeze abated by the end of round 1 resulting in ideal conditions. However the day was not without drama. During practice Alan Roadknight crashed and badly damaged what was arguably the best set up FliteStreak in the competition. His back up model lost its fuel tank after the soldered brackets broke off at the start of his round 3 flight.

Chris Carpenter (in his own words) 'dorked' his Peacemaker late in Round 3 but the model sustained only superficial damage. Max Newcombe had a premature motor cut in round 2 but managed to bring his Blue Pants, given honorary profile status on the day, down to a safe landing. John Witzke experienced a similar premature end to his flight in Round 3, also fortunately without damage.

Mal Dyer confounded the stunt 'experts' with a superb motor run in each round, using a bog stock LA 25 complete with RC throttle and an open vented non uniflow tank! Mal has improved greatly in the last few months. John Witzke and Mike Davies will also soon threaten the leaders as they both have improved steadily over the last few months.

Results:

Contestant:	Round 1	Round 2	Round 3	Best 2 of 3	Model / Motor
1. Peter Anglberger	175.5	183.5	183	366.5	FliteStreak / OS LA 25 S
2. Maris Dislers	181.5	181.5	DNF	363	Peacemaker / AM 25
3. Greg Roadknight	177.0	175.0	179.0	356	FliteStreak / OS Max 25
4. Mal Dyer	151.5	154	160.5	314.5	FliteStreak / OS LA 25
5. John Witzke	155	156	112.5	311	FliteStreak / OS Max 35
6. Mike Davies	141	145.5	151	296.5	'Maxi Slow' / ASP 15
7. Max Newcombe	145	133	140.5	285.5	Blue Pants / ED Racer
8. Chris Carpenter	133	123.5	140.5	273.5	Peacemaker / Taipan S71 2.5
D 9. Alan Roadknight	128.5	144.5	128.5	273	Peacemaker Variant / OS 35 FP

Thanks to Alan and Anne Roadknight for catering, Russell Bond for judging and Bernie Shinks, Mal Dyer and John Witzke for all their help. This event proved so enjoyable that a second event has been scheduled for December 2nd. 2006.

Next year will be the Peacemaker's and FliteStreak's 50th birthday, so stay tuned for details of an expanded competition to celebrate George Aldrich's second and third most popular designs.



Line up of models in the pits



Contestants at the end of an enjoyable day

Round 'n' Round the World!

CONTROL LINE RACING is alive and well across the Pacific, especially in sunny California. The second Northern California C/L Racing Champs were held at the J.F. Kennedy Park in Napa. Thanks to Jim Persson for the report and Les Akre for the pictures.

Les reports that BTR is going ahead in leaps and bounds and the B final was the highlight of the 2 day meet. The fastest heat was 'only' 3.25, but I hear that Don Burke and Ron Duly have already been under 3 minutes for the 70 lapper. With the type of ball race racing motors used, that's not at all surprising! B Class racing legend Vic Garner came out of retirement and produced a scorching 35 lap time of 1:24.98 to prove he hasn't lost his touch.

US Rules say that 'Each entrant will compete in a 35 and 70 lap heat. The resulting heat times shall be added together and the 3 entrants will the lowest times shall comprise the 140 lap final'. They also say 'There will be an award for the best appearance' at every contest.

Winner Mike McCarthy's sleek design with the shark fin type reverse flow wingtips has an MVVS 26 which made really good starts.

Back in Oz, the new and lighter Rocket (Below) has been test flown with encouraging signs for Albury. Shaving almost 5 oz from a models weight makes quite a difference on take off! The model is up to speed really quickly and the improved acceleration must gain a few seconds in a 140 lap race. Overtaking is also better as the racer is more responsive to direction changes. Theory says a lighter model will also pull a little more pitch. We'll see! The 20% weight saving has been achieved mainly by using much lighter wood and a lot less paint!



Classic B in Albury is shaping up to be the best ever. Murray Wilson and Lance Smith are out to prove making the Nats final in SA was just the start of a roll. Lance's continuing work on special fuels is now paying dividends for speed and laps. This is what the top teams used to do way back in the 1960's. Some things never change, particularly if you want to do well. There is just no substitute for hard work and practice.

Now for some hot news. My global intelligence network says there is a special version of an FP 25 being prepared by a *very well known* American motor tuner.... Now just who could be getting that work done?? Right! You point and I'll whistle... ☺

With Steve Rothwell gradually getting his hand built R250's spread evenly among interstate teams, Vintage A is quickly becoming a very level playing field. The recent WA State Champs record final time of 6. 59.4 by Richard Bellis and Dave Gannon proves this beyond doubt. And surely there's lots more improvement to come. In January '07, it's going to be a real challenge to make the last three at Alexander Park in Albury.

I still say the Vintage A final at the last SA Nats was the best I have flown in. It was fast, but controlled, not furious and in the end, just so close. It really was about where each of the three R250's stopped in the circle before landing. American control line racing people who have viewed Jim Stivey's video of the final have said there would only be half a dozen pilots in the US who would be capable of flying 3 up at that rotational speed.

It's not easy in the middle, that's for sure. Graeme Wilson has said that VTR at the Albury Nat's will still be on the Rule Book length 46' 8". However, most teams support the NSW initiative of going to the FAI length of 52' 2.1/2" as soon as possible. If I'm not mistaken, they did that way back in the very late 50's when the first FAI models took over from the old A Class racers. We may be turning the full circle...

We have used 46' 8" in Australia since that very first race at Moorabbin Airport in October, 1988. In a few months time you'll be able to say "Next year, Vintage A will be 20 years old in Oz! The race has evolved to the point where most think it's now time for a line length change. It could even be argued that with today's higher speeds, safety is now an issue. In the early 90's most racers circulated at 23 -24 for 10. Now, with the advent of the R250 and other hand built specials, sub 20's are almost the norm! 3 or 4 seconds for ten might not sound much, but believe me, there's a huge difference!

Here's Jim Persson's Napa report.

John Hallowell
VH 1984.

Northern California Control Line Racing Championships, August 5-6 '06

The 2nd Annual Northern California Control Line Champs came off with great success. The weather was good, with windy conditions on Saturday afternoon. But all in all not too bad. We had most of the top flyers and teams on the West Coast - from the North and from the LA area - even Les Akre from Edmonton, Alberta, Canada.

Saturday we got off to a late start waiting for some flyers and didn't get the first heat off until 10:45 (It won't happen again.) First event was AMA Goodyear. There was some good competition with Jim Holland taking the final with a very clean 6:08.

Second event was Clown. The competition was good with three three-up heats. The Burke-Duly team scored at 160

laps, Bush-Persson 158 laps, and Jim Holland - Bill Cave 150 laps. In the final things got a little crazy when Jim Persson snagged the Burke-Duly airplane on landing and B-P was DQ'd. Burke-Duly continued and had a half-wingover launch and crashed. Jim Holland went on to win with a very respectable 308 laps.

Next was SCAR Formula Unlimited. The first heat was an all biplane race, and as it turned out, Mike MacCarthy and Dave Dawson both made the final against the Bush-Persson entry — a new first-time-out Persson-original Buster with Thunder Tiger GP40 power. They put in a very good 3:31 heat and took the final with a 7:08.

Final event of the regular scheduled Saturday events (we had started with the clown final on Sunday due to the excess wind) was Super Slow Rat / Fox Combined (no Foxes). Les Akre posted a great 5:26 heat, Bush-Persson a 5:41, and Dave Hull a 6:05. In the final B-P started off great and were very fast but had restart problems and ended up third. Hull and Dawson finished second with a 6:23. Les Akre topped the field with a very fast 5:27 with his OSFP-powered Artesian.

In 15 Rat there were only two entries. Les Akre took the final with 8:07 flying his Moki-powered Goodyear.

B Team Race seems to be getting more popular here in the West with eight models present (only four flew). Vic Garner came out of retirement to post a smoking' 1:24 35-lap heat but had some restart problems in the 70 lapper, In the final Mike MacCarthy posted a 7:00, followed by Dave Dawson with a 7:06 —very close racing. The Pilots Choice B Team Race beauty event was won by Dave Dawson's fine model.

In SCAR Goodyear Dave Hull took first with a 6:09 followed close by Dave Dawson at 6:20.

By the time TQR came along, we had only three planes to a 140-lap final. The start was great with the Bush-Persson entry having a slight speed advantage, but they had one missed pit and half-lap chase to relaunch — ending with a 6:49 and second place. Dave Dawson had some starting problems and finished third clocking 8:23. Les Akre had a very clean run and topped the field at 6:46.

All in all we had a pretty good weekend with the weather holding off on Sunday so we could catch up with the Saturday events. We may reorganize the schedule for next year.

The very unique trophies were awarded and the overall champ was Les Akre. He flew in six events and also helped out — a true sportsman.

I would like to thank everyone who helped. Mainly Randy Bush who helped with everything and Darrell Albert who ran many of the events I was participating in. Also the Alameda Aer-O-Nuts George Ellison who headed up the Food Patrol along with John Gomez. We had a fine barbecue lunch both days. It was great. All contestants received a large bundle of contest balsa— donated by John Gomez.

Thanks again to everyone who participated and helped to make this a fun event. Hope to see you next year.

Jim Persson

Results of 2nd Annual Northern California C/L Racing Championships

*Overall Champ — Les Akre
B Team Race Pilots Choice (Appearance)—
Dave Dawson*

Flying Clown

Entry	Heat 1	Heat 2	Final
1.Jim Holland	150	—	308
2.Ron Duly	158	160	146
3.BP Racing	158	154	45 DQ
4.Dave Hull	123	142	
5.Les Akre	138	141	
6.Bill Cave	130	71	
7.Dave Dawson	87	39	
8.Don Burke	78	2	
9.Bob Murphy	2	36	

AMA Goodyr.

Entry	Heat 1	Heat 2	Final
1.Jim Holland	4:00.50	DNF	6:08.55
2.Hass-Murphy	4:05.00	3:36.73	7:17.08
3.Les Akre	4:16.15	3:52.10	8:01.17
4.Bill Cave	2:59.92	112 laps	
5.Dave Hull	4:28.27	4:07.92	

Formula Unlim.

Entry	Heat 1	Heat 2	Final
1.BP Racing	3:31.84		7:08.58
2.Mike MacCarthy	4:06.77		9:56.98
3.Dave Dawson	4:45		12:54.07
4.Dave Hull	4:57		
5.Jim Holland	4:58.09		

SuperSlow Rat

Entry	Heat 1	Heat 2	Final
1.Les Akre	5:26.21	5:27.40	
2.Dave Hull	6:05.14	6:23.39	
3.BP Racing	5:41.89	6:34.34	
4.Dave Dawson	8:28.58		

15 Rat

Entry	Heat 1	Heat 2	Final
1.Les Akre			8:07.25
2.Dave Dawson			9:14.14

B Team Race

Entry	Heat 1	Heat 2	Final
1.Mike MacCarthy	1:41.70	3:27.58	7:00.81
2.Dave Dawson	1:40.34	3:35.73	7:06.08
3.Vic Garner	1:24.98	4:06.03	
4.Les Akre	2:11.87	3:25.93	

SCAR Goodyr.

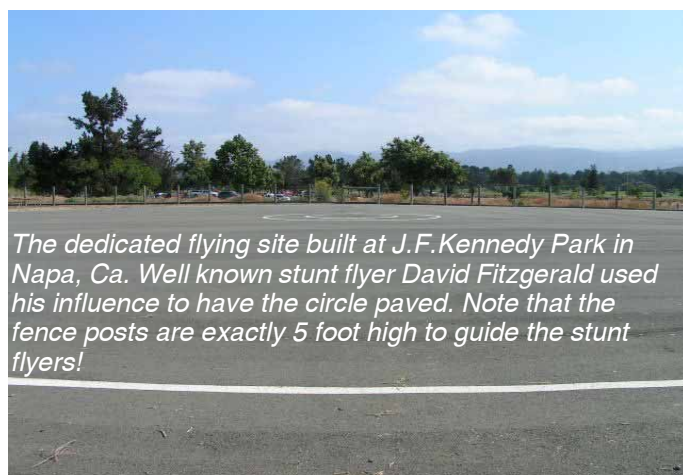
Entry	Heat 1	Heat 2	Final
1.Dave Hull			6:09.64
2.Dave Dawson			6:20.78
3.Jim Holland			20 laps

Texas Quickie

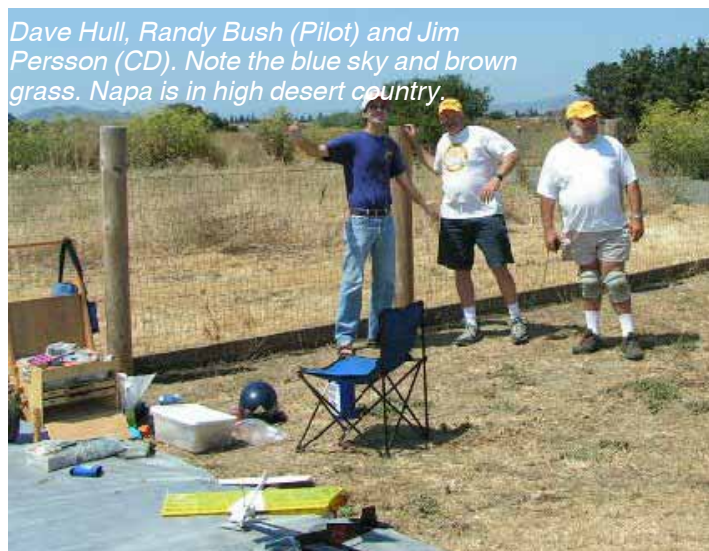
Entry	Heat 1	Heat 2	Final
1.Les Akre			6:46.82
2.BP Racing			6:49.00
3.Dave Dawson			8:23.05



Pit area (Left) shows Super Slow Rats with OS 25FP's in the foreground



The dedicated flying site built at J.F.Kennedy Park in Napa, Ca. Well known stunt flyer David Fitzgerald used his influence to have the circle paved. Note that the fence posts are exactly 5 foot high to guide the stunt flyers!



Dave Hull, Randy Bush (Pilot) and Jim Persson (CD). Note the blue sky and brown grass. Napa is in high desert country.



Don Burke uses an electric starter for his Fora Combat powered .15 Rat



Don's pilot Ron Duly with his shady hat on.



'B' Team Race lineup for the traditional 'beauty contest'. The winner was Dave Dawson with his checkered wing design. Note own design bi-plane with Gee Bee influence.



American .15 Rat Racer

This page has a chain of some amusing Combat related "Poetry" that was started by **TIMH** on the Barton Model Flying Club Control Line Forum.
<http://www.controlline.org.uk/phpBB2/index.php>
The ACLN Editor was amused, added one of his own and thought that some were worth printing here.

"Talking about Dominators, I have some pretty grim memories of them, fuel sodden little things that droned round and begrudgingly staggered round maneuvers and simply would not break properly".
So I had this great idea. I'm sure everyone has a favorite and least favorite model, so why not write an ode in tribute to them. I'll start

Dominator you're an ugly thing,
With silly stumpy little wing
Still you taught me how to fly an eight
Way back in 1968.

I built you red and green and blue
I think there was a black one too
One had a twisted out board wing
And wouldn't fly, the bloody thing.
Timh

Once I had an Early Bird,
it had a badly soldered tank,
it handled like a spaniels turd,
suffice to say that it was w#nk!
H. Walker

A Phantom Mite, a Phantom may,
A DC Merlin - "Quick start"..hey!
Short thin cotton flying string,
Plastic handle, ugly thing.
Round and round and round it went,
Hit the ground but never bent.
"Learn to fly": my dad was right;
A Phantom may, a Phantom Mite

Choppersimon

I really like the Ruteress.
I know it's pretty sad,
Of all the ones I built and broke
It's the best I ever had.

It took a kid an age to build
It made me want to holler
With all that sixteenth balsa sheet
But looked a million dollars

I saw them at the Yeovil Nats,
Flown by Mr. Wilkens
I don't think they were nylon then
No I think that they were silk uns (OK..OK)

I built one later on in life
Equipped with G15
It was the devil's job to start
But I was plenty keen

We got it going in the end
We had a bit of luck
But when the darn thing hit the ground
I shouted out "Oh Blimey"
Timh

I fly my little Razor Blade and circulate with zest
but if it were not for Guinness I would have to stop and rest.
It's motive powers an Ollie and its made from silk and wood
My motive power is Guinness and it does me very good.
Boom Boom.

Red Frog

First there was my fathers Talon,
I thought it would turn tight,
it weighed about one hundred weight,
but still we thought it might.
It had a dead smart pilot,
his teeth were painted white,
but when we took it to the field,
it flew like it was on rails and manoeuvred beautifully, very
stable indeed, a great trainer!!!!
H Walker

From a non Combat flier who still has a grimy old Dominator
lurking somewhere.
To the tune of Sir Joseph Porter's song, from HMS Pinafore.

When I was a lad I flew for a spell,
With a Goldberg Globug and I did quite well,
My Elfin pulled it around at speed,
And it taught me how to crash indeed,
I flew it so often that now you see,
They've made me a Vintage Team Race CD.
(Chorus) Yes he crashed it so well that now you see,
They have made him a VTR CD!

Now C/L fliers where ere you may be,
If you want to climb to the top of the tree,
Just cock up a few races and look a right fool,
Then you can follow this golden rule,
Don't do any flying, just talk a lot see,
And you could be the next VTR CD.
(Chorus) Just talk the talk and then you'll see,
They've made you the next VTR CD!
Terry McDonald

In my youth I was eager
to fly at the Nats and be an achiever.
With plans in hand, a balsa beaver
my choice of model was the Cleaver.

The contest alas did not go well
due to a flat battery cell.
The Veco .19 would not start,
would not cough, not a f#rt.

Two no start losses what a pain
my hopes and dreams were all in vain.
Maybe I'm silly maybe insane
but forty years on I tried again.

This time at a Nats in a different land
my engine starts, I take my stand.
Oh the joy to fly the Cleaver,
Super Tigre power, the smell of ether.

Since this story had begun
I've learned a lot, had a lot of fun.
But no more Cleavers, I'm looking forward.
Going to be a winner with a Warlord.
Harry Bailey

**Think You can do better on any C/L subject?
Send your Poems for printing in ACLN to the
Editor.**

Restoration of old C/L Stunt ringed motors by honing.

By Joe Supercool

My regular readers may recall my obsession with overcoming the engine problems of my delinquent youth. Perhaps I should say, middle age, as these engines were typically produced in the 1970's. This is a progress report bearing on piston/cylinder fits.

The engines in question are the ST G21/46, Enya 45 I 6001 and Enya 45 II 6002. Diamond lapping the rings in the ST G21/46 and Enya 45 I 6001 produced very good results. The above mentioned Enya 45's have very similar intake, transfer and exhaust timings to the Super Tigre engine: This has led me to puzzle why the Enya's as supplied did not run with the superb ST 46 burble.

The folklore goes something like this. The Enya 45 6001 was popular with stunt fliers in the early 70's: the 45 6002 was not up to scratch for stunt and had therefore been changed to suit R/C fliers, while the ST46 remains the yardstick by which to judge more modern engines. Well, in view of the timings I have measured, none of this really makes sense. Since I also have a dud ST46, there must be some underlying, dare I say intransigent, factor at work. Further, the observation was made that ringed motors are run out as soon as they are run in! (non-Dykes)

As noted above, lapping the rings to improve compression seal was a great step forward: indeed the Enya 6001 now does run with a superb rich burble, thereby validating my hypothesis concerning the way these motors run. The tendency of these motors to go lean and stay lean has been eliminated, the engines breaking back rich after manoeuvres with a satisfying regularity.

Well with all this joy bursting out, it was time to bring out the Enya 45 6002. This engine had been zero-timed, thanks to the unbelievably fortuitous circumstance that Model Flight in South Australia had in stock a new piston/cylinder/ring set, which I hungrily snapped up. This for an engine that came out in the mid-70's!

I gave it 45 minutes on the running-in stand, put it in the beat-up old Firecracker, whereupon the joy-bubble promptly burst. The run was unbelievably bad: untuneable, poor power, sagging power, RPM everywhere. This was essentially a new motor: how could this be happening to me? My previous life must have been sinful indeed.

Resisting the urge to duck out to the shed for a quick diamond lap, the time to set the old mind into gear appeared to have arrived. Nothing much happened, but a chink in the corner of my poor stroke-addled, tinnitus riddled brain was screaming "piston/cylinder/ring fit". Well, if I were not to do the lap, what was the right course to take? Would it be possible to find the problem by actually measuring the shape of, say, the cylinder? Many years ago I had mounted a Rossi 15 cylinder in a lathe chuck, with a dial gauge mounted on the tool post. This particular dial gauge had a little finger sticking out of it, so it was indeed possible to measure the bore taper in the Rossi.

Well, I have a nice new lathe, but lack the dial gauge and funds to buy one. Was there another way? Would I ask this question if there were not? Dear reader, this is not an attempt to insult your intelligence, just an attempt to indicate the slow and torturous way my brain works. Remember, this is all happening 30 years too late to be of any help to my competition record!!

My CNC milling machine is essentially a giant 3-dimensional micrometer with digital read-outs. The spindle normally holds a cutting tool, but there is no reason why it should not hold a finger, just like the dial gauge. The position resolution of the machine is .005 microns in each of the 3 axes, which is about 0.2 thousandths of an inch. Hopefully, this would be enough: in the event, barely, but better than nothing.

So the Enya 6002 cylinder was mounted vertically, flange down on a piece of perspex, as shown in the photos. The required finger was machined up out of brass, with extra diameter at the measurement point. My multimeter has a setting which goes "beep" whenever the probes are placed across a low ohmic resistance, so one probe went to the finger, the second to the cylinder. By moving the spindle down, the finger could be made to find the bore at any given depth, simply by moving the finger sideways until the meter went "beep". This procedure worked splendidly, so that after an hour of measuring the bore front to back and transfer to exhaust, I was able to make some observations.



Between top-dead-centre (TDC) and the exhaust ports, the bore was out-of round by 0.8 thou. There was no (detectable) bore taper front to back, but 0.4 thou taper across the ports. Below the exhaust ports, the cylinder was 0.4 thou out of round, with taper front-to back of 0.7 thou and 0.4 again across the ports.

What did these numbers mean? These are small dimension errors: could they cause the motor to run badly? One assumes the cylinder was intended to be perfectly round, with no tapers. In this fashion, the ring could be expected to seal, even though it is not pinned and does rotate while the engine is running. Further, with no taper, the ring would not need to expand and compress with every stroke: surely desirable.

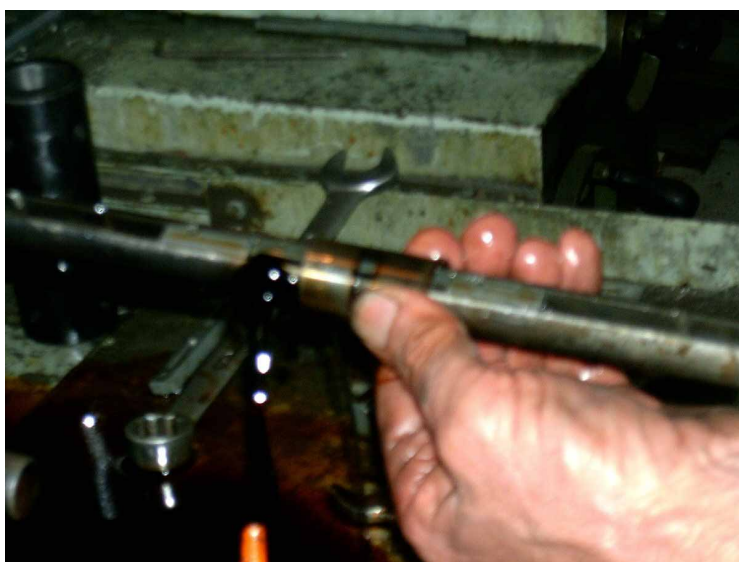
Not having a clue myself, it was off to see the Oracle at Delphi, or should I say, the Cestone at Gosnells (aka Charlie Stone, model engineer and aeromodeller extraordinaire!). Charlie has been battling with piston rings himself, as Norm Kirton, like myself, tries to restore the glories of his (Wharfedale) past, viz getting the ETA 29 back up to 120 MPH, as was done so readily 50 years ago. Charlie has some nice machines, including a filing machine, an item I had never heard of before, but which I instantly desired!

His work included trade secrets, which I cannot divulge here. However, he was able to describe to me the means and principles of honing cylinder bores, in sufficient detail to frighten me off from such a demanding task. In my fantasy world, I had planned to machine up a hone on my nice new Taiwanese lathe. Having spent half a day trying to get the swarf out of the geared head oil bath, I really needed a project to justify the frustration plus the \$4200 expenditure. However, I was further disillusioned by Ian Thompson, silver medallist in Aussie team place F2C at the recent (2006) Spanish W/C, when he asked me if I had lined up the spindle with the lathe bed. You mean they sell them not in alignment?

This was starting to get embarrassing, when Charlie dropped the name of F2B/F2C guy Richard Morrow.. Very kindly, he invited me around to his factory, wherein were no less than 7 honing machines.

Whistling bravely, with my hands firmly placed inside my pockets, I wandered in. There was this huge hydraulic cylinder, being firmly and repetitively penetrated by what looked like a large sex machine. Evidently this is called "honing", but I do know other words for it. Dick wandered up to greet me, so I shook his left hand and we got down to business. This was a man who knew honing. He even had tiny little hones for making gudgeon pin holes, so it was time to listen and keep my thoughts to myself.

Producing my miscreant Enya sleeve, I passed it to Dick who proceeded to look it up and down, round and about, in a manner I can only describe as disgusted. Eventually, he went to his Delapina honing machine, installing the appropriate Sunnen hone: with the hone turning at 300 RPM, and the cylinder drenched in what looked like treacle but which I assumed to be honing oil, he proceeded to improve on Mr. Saburo Enyas' factory product.



"with the hone turning at 300 RPM, and the cylinder drenched in what looked like treacle but which I assumed to be honing oil, he proceeded to improve on Mr. Saburo Enyas' factory product."

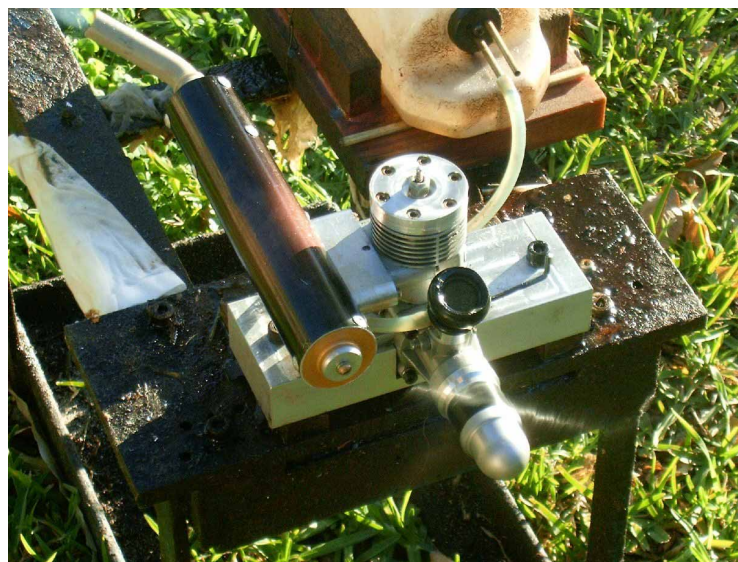


To cut a long story short, on re-measurement, the cylinder had indeed changed its dimensions. Above the exhaust, the out-of-round had reduced to 0.2 thou, an improvement by a factor of 4. The taper in both axes was reduced to nothing. Below the exhaust, the out-of-round had increased slightly, while the tapers were basically unchanged.

Hopefully, the "above exhaust" measurements were the important ones.

So I reassembled the motor, without touching the ring. No point changing 2 variables at once: the idea was to see how important the bore was, and by what amount the out-of-round needed to be reduced.

With the engine on the test stand, I was somewhat alarmed to find it had no compression worth mentioning. Hand starting was not going to work, so I hit it with the electric starter. Stopping it after 5 minutes of very rich running, I found good hot compression, which was rewarding. After a further half-hour, with the compression fully restored, into the model and off to Whiteman Park. Sure enough, the motor ran beautifully, including the Super Tigre burble.

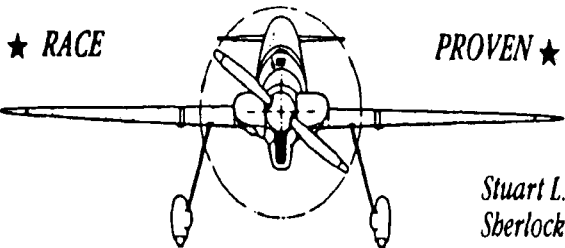


Draw your own conclusions on all this. But here are some useful snippets. Dick has a Mitutoyo bore gauge: if I heard him right, it reads down to 1 micron, which is down where you need to be for model engines. The gauge is useful, but I got the impression that honing is largely done by "feel": that must mean the human hand can detect movements less than 1 micron. Clearly my next step was to buy my own hone. This idea didn't get far; the starting price for a Sunnen hone assembly is \$1000. With ringed motors such as these, the bore is parallel. How you would ever control the honing of tapered bores, I cannot begin to imagine.

So there you have it. Watch this space.

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0.01mm	=	0.0003937
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60th Nationals Program of Control Line Events.

DATE	C/L GRASS FIELD	C/L HARD SURFACE FIELD
THU 28	REGISTRATION	NO EVENTS
FRI 29	F2B AERO ADV & EXP RD 1	F2C TEAM RACE RD1,2&3 1/2A TEAM RACE
SAT 30	F2B AERO ADV & EXP RD 2	F2C TEAM RACE SEMI & FINAL, CLASS 2 TEAM RACE
SUN 31	VINTAGE STUNT STATIC, JNR 2.5cc COMBAT, F2D COMBAT	COMBINED SPEED & JET,
MON 1	F2B AERO ADV & EXP - RD3, JNR 2.5cc RAT RACE	GOODYEAR, MINI GOODYEAR
TUE 2	F2B AERO ADV & EXP - RD4, VINTAGE A TEAM RACE	2.5cc RAT RACE, OPEN RAT RACE
WED 3	OPEN COMBAT	F2A SPEED F2F TEAM RACE
THUR 4	VINT STUNT, CLASSIC B TEAM RACE, BENDIX	F4B & SOS
FRI 5	CLASSIC STUNT, VINT COMBAT	NO EVENTS
SAT 6	NO EVENTS	NO EVENTS

PRE-ENTRY COMPETITORS CAN REGISTER THE DAY BEFORE THE EVENT.

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Approximately 54 sheets of quality balsa wood in 1.5mm, 2.5mm and 3.5mm thicknesses x 4 inches wide and 4 feet long + balsa strips etc. at bargain prices. **"Half shop price"** Must be collected! \$200

Other control line items including electric starters also for sale. Telephone seller for details.

Seller giving up the hobby due to age and health reasons.

Telephone Ray on (07) 3372 9165
Forest Lake 4078
Brisbane

WANTED

Merco 40 in any complete order (consider for spares)
Contact Ray 02 69532311 evenings.

Gary 14 C/L learner requires diesel engine 1.5cc - 2.5cc to fit 1" bearer spacing (Sabre trainer). Reliable order but not a collection price.

Please contact Gary 02 69552323 evenings

I am on the hunt for a Modern 1/2A T/R model that was built for a Sesqui in reasonable condition that someone may want to clear out of the shed.

Contact :-
Duncan Bainbridge
17 Bowling Green Lane
London EC1R 0QA
duncan.bainbridge@austinsmithlord.com

Information on where I can buy Piano wire, Control line wire in various sizes.

Also wanted .29 size tuned pipe.

Reply to:- M. N. Bell
P.O. Box 438
Dubbo
N.S.W.

Newsletter Editor

Harry Bailey.
Unit 1
4 Lagoon Court
Churchill 4305
Queensland
Tel (07) 32819318

2006 EASTCOAST CHAMPIONSHIPS

The events listed below if adequately subscribed will be held at the control line model aircraft flying fields of the Aeromodellers of Logan City Inc. adjacent to Chetwynd St, Loganholme Qld 4129 as follows:-

Saturday 30th September:

2.5cc Slow Combat

Sunday 1st October:

2.5cc Fast Combat

Sunday 15th October:

2.5cc Eastcoast Rat Race

Classic B Team Race

Vintage A Team Race

Goodyear

Bendix

Except for Juniors who will be half price, Entry Fees remain at \$10.00 per individual entrant per event. Although fees may be lodged by 9:00am on the day of each event, Expressions of Interest on a Possible/ Probable/Definite basis should be tendered as soon as possible, please. If required, additional information may also be obtained from:-

The Registrar, 2-24 Appaloosa Ct, Munruben Q 4125
Telephone (07) 3200 1308

2.5cc SLOW COMBAT will be run to NSW rules with the following exceptions:-

- One model per bout flown in a modified round Robin format with no 2 minute forfeit if not airborne.
- 5 bouts per entrant should be possible.
- Lightweight Laystrate steel lines may be used.
- 10kg pull test to apply.
- Electric starters will be available for use.
- Muffler pressure permitted if the factory supplied muffler is used.

2.5cc FAST COMBAT will be run to MAAA F2D Modified rules with the following exceptions:-

- One model per bout flown in a modified round Robin format with no 2 minute forfeit if not airborne.
- 5 bouts per entrant should be available.

2.5cc EASTCOAST RAT RACE is an umbrella event encompassing all plain bearing engine categories such as Junior, CLASI, Simple and Fun Rat.

- Heats (2 of) will be of 5 minutes duration with the Final of 10 minutes
- Engines must be structurally unmodified 2.5cc plain bearing types. Fuel delivery must be via suction from a tank mounted outboard of the fuselage centre line, refuelling must be only by squeeze bottle or syringe.
- Mufflers are not required but if the standard silencer is fitted then muffler pressure is permitted.
- Line length is 15.92 metres (+ 40mm).
- Pull test of 10kg will apply.

CLASSIC B T/R, VINTAGE A T/R, GOODYEAR AND BENDIX will be conducted in compliance with MAAA requirements.

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