The Thermaleer

SWANHILL 2005.

PETER HOSKING'S FULL REPORT AND RESULTS INSIDE

DAVE MARKWELL WINNER OF THE BEST MODEL AWARD.

Vale: Unfortunately Aeromodelling lost two of it's most experienced members since the last edition of the Thermaleer, George Himbury and Norm Garrett. SAM600 extends its sincere condolences to George and Norms Families for their lose.

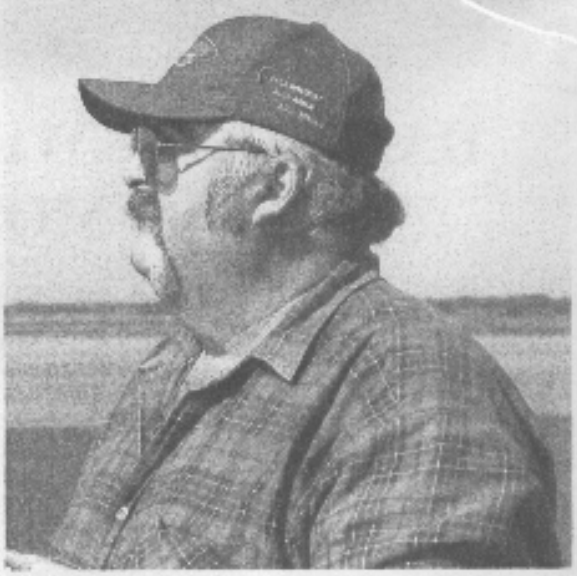
Presidents Report.

Hi folks,

Once again Swan Hill was a great event and those who were able to attend had a great weekend apart from Good Friday being very windy. Unfortunately the Sunday at Haddon was a blow out but the Saturday more than made up for it. A postal contest will be arranged for the events that were concelled.

Leopold re-schedule will be held on the 14th and 15th of May with no normal canteen but Lillian will take orders for lunch and collect for us. A toilet will be on site,Drinks will be available on site so hope tosee you all there.10o/clock start.

Regards Chris.



Editors Column.

By the time you read this we will have flown Leopold, weather permitting, and another season will be over. Too many contests have been lost due to the weather this year but at least the ones we have flown have been really great. Cohuna was too windy for me but for the more experienced fliers it was an excellent event. I only flew 1/2a and launched in round one with the engine running in reverse, exit one RC-1. Swan Hill is my favourite event as even if a day is lost due to weather there are so many things to do in the town it is a fun weekend. I had a faulty transmitter aerial in the fly-off so exit another RC.1
Haddon was kind to us on the Saturday and I tried out my new and slightly smaller RC-1 which is only 12oz all up. A low battery alarm in the tranny forced a landing after only 9min 50sec or so in the fly off. The new RC-1 only took 5 days to build which for me is a record. My slowest build is my Verou Viscount which I started in March 1963 and finished in March 2003, 40 years. I have yet to get game enough to fly it. At least the weather and lady luck was kind to me up at Springhurst in the Victorian Free Flight State Titles where I managed a win in Vintage Rubber and a second in Vintage Glider. I must thank Peter Hosking for the contest reports he has provided over the past season and all the other people who have sent in articles for the newsletter. Without their help the job would be almost impossible. At times I've felt like throwing in the towel but each edition is easier and more fun so if you are happy with the newsletter I'll carry on after July for another year. The thought struck me the other day that the Oct/Nov 2005 "Thermaleer" will the 100th Sam 600/Vota newsletter and that maybe this occasion should be recognized with a special edition. Think about it and let me know at the next meeting which will be on Thursday 26th May at Tony Cincotta's Saturn Hobbies.
Starting in this newsletter is a series of articles on building a 2.5cc diesel called the Sugden Special from 1954. Drawings are included in the series and castings are available from Andrew Coholic in Canada for C$15-00. You'll find him on the internet under "The Engine Boys". Andrew also has castings and drawings for the "Sparey 5cc" diesel which is a genuine antique engine. It would be quite something to front up at a contest with a "38 Antique" model and engine you had built yourself.

Webmaster Report www.Sam600.com

For contest calendar, meetings, results and coloured photos our website is proving very popular. Check our index you will find many SAM chapters through out the world. Our sponsors also are displayed and we encourage other sponsors to advertise and enjoy this world wide read news letter / website. If you would like us to display a photo of your choice or add your website please let us know as we will be happy to oblige.

Thanks for viewing our efforts,
Graham Scott and Peter Hosking
Email peterh@webaxs.net

For Sale:
Sal Taibi "Pacer" 110%. Ideal for Duration. $50-00 see Chris.

Wanted:
Copy of book, " De Havilland" The Golden Years 1919 to 1935, by Richard Ryder 1982.
See Fred.
Copy of plan, Keil Kraft " Chief " Nordic A2 glider.
See Fred.

13th Annual Easter Fly In at Swan Hill 2005

The contestants who travelled to Swan Hill on Thursday enjoyed almost perfect weather. This set the mood for our Easter Competition. When we woke on Friday morning we were amazed the weather had changed and strong cold winds cancelled all events.

Saturday was back to normal with sunshine, lift and light winds aiding our events. By flying reduced rounds in both Texaco and Duration we were able to fly 1/2A Texaco which made for a busy but enjoyable day.

Texaco was first and attracted 21 entries. Four of these were forced to withdraw with various problems. First Place went to South Australia's Don Howie's Enya powered Lanzo Bomber. Second Placed was Cohuna's Lyn Clifford flying a Lanzo RC 1 powered by an OS .61 FS and third Place went to Geelong's Peter Hosking's Saito .65 powered 85% Lanzo Bomber.

1/2A Texaco was selected next and Brian Stebbing (Stardust Special) a Victorian who now lives in South Australia proved superior with a fly off time of 1738 seconds. Second place went to Cohuna's Robert Taylor also flying a Stardust Special and third place went to South Australian's Dave Markwell flying the popular Stardust Special.

Duration was as always a most exciting event with the McCoy's screaming skywards. Ian Promnitz's Playboy finished first with Mark Collins Cumulus Second and Lyn Clifford's YS .63 FS powered Cumulus was placed third closely followed by father and son Fred and Brian Stebbing's .36 Thunder Tiger powered Stardust Specials finishing fourth and fifth.

Sunday's weather again favoured the contestants and '38 Antique started a most enjoyable day. OK Super .60s filled the first 3 places but Fred Stebbing gave notice that his Super Cyclone .60 would be a force in the future. Peter Leaney was first flying a Lanzo RC 1 closely followed by Don Howie's Miss America and Dave Markwell flying a Cadet only 85 seconds in arrears from winner finished third.

2CC was slotted in to catch up on the two events blown out on Friday and of course contestants accepted reduced rounds to accommodate the extra Sunday event.

Lift had become harder to find which made the contest very close with place getters finishing within 57 seconds from first to third. Dave Markwell's Cipolla powered Playboy Cabin finished first then Ian Promnitz's Tryo powered Lanzo Bomber was second closely followed by South Australia's Lanzo Bomber expert Ron Adamson flying a Cresendo in third place.

Gordon Burford was next and eight contestants were rewarded with good air and close results. Brian Stebbing flew his father (Fred's) Swiss Miss into first place using a plain bearing motor. Ian Promnitz using a ball bearing engined Lanzo Bomber was second with Ron Adamson's Cresendo using a plain bearing motor closely followed in third place.

Sunday evening we all gathered at the Commercial Hotel for our get together meal. Must confess I didn't count but estimate 30 to 40 in attendance. This choice of venue proves very popular because you can choose your menu at very reasonable prices. The get together is a big part of our weekend as it gives a chance to talk to other competitors and wives who we only see once a year.

Monday morning we once again gathered at the flying field to contest Nostalgia. The wind was strong at first but then died down which allowed us to fly. It was disappointing to only have five entries which were reduced to four when the cut off servo in Dave Markwell's Ultra Hogan became disconnected. First was John Whittaker's K&B .40 powered Spacer. Second place went to Ron Adamson's OS .40 MAXH powered Cresendo and Chris Lawson finished third with his 1944 Playboy powered by a K&B .40.

Presentations were then made by Chris Lawson. Our generous sponsors made it possible for all first place getters to receive top rewards which consisted of a choice of a kit,

Swan Hill cont.

engine, micro servos, micro receivers and props. All other place getters received a goody bag containing a prop, wheels and a fuel tank.

Champ of Champs was Peter Leaney from South Australia and best model was awarded to Dave Markwell.

Ida Lawson received a card signed by all contestants and a gift for helping Swan Hill Club in the canteen on all four days. Chris Lawson was thanked for organising another very successful Easter Fly In at Swan Hill.

Please say thankyou by supporting our sponsors who this year were Model Engines, Model Flight, Saturn Hobbies, Niddrie Model Aircraft Supplies, Model Draughting Services, Bolly Products, Tates Performance Hobbies and B&W Model Hobbies in USA.

Regards,

Peter Hosking

Chef Supremo

Haddon Oldtimer Fly In Contest Report

16th – 17th April 2005.

As always Ballarat Aeromodellers Inc made our members very welcome. This even included supplying a fire place and firewood for the campers at the field so they could keep warm on the chilly nights.

Saturday, with blue skies and plenty of lift, made our two events a pleasure to contest. 1/2A Texaco attracted 13 contestants and all but one flew in the fly off. Because of this unusual situation it was necessary to divide the fly off into two groups due to lack of time keepers. First was Fred Stebbing with a 41 minute 29 seconds flight. Second placed Peter Bennett flew 36 minutes 31 seconds and Fred Roberts finished third with a new RC 1 he had built the previous week.

Duration had 11 entries and because the lift had become patchy only 4 managed to contest the fly off. Fred Stebbing maintaining his good form was First with 11 minutes 11 seconds, Second placed Brian Laughton flew 9 minutes 9 seconds and Kevin Fryer with 8 minutes 39 seconds finished third.

Saturday night get together was at the Snake Valley Hotel and all reported great meals and good company.

Sunday morning found the weather forecasters had erred again and a stiff, cold north wind caused that day's flying to be cancelled and arranged to be flown as a postal competition.

Thanks for the excellent catering provided by the Ballarat members.

Regards, Peter Hosking

13th Annual Easter Fly In
March 25th – 28th 2005 at Swan Hill

Place	Name	Model	Engine	Climb	Rd1	Rd2	Rd3	Rd4	F/Off	Total	Freq
			1/2A Texaco								
1	Brian Stebbing	Stardust Special	Cox .049		360	360	-	-	1738	2458	649
2	Robert Taylor	Stardust Special	reed valve		360	360	-	-	720	1440	629
3	Dave Markwell	Stardust Special	5 cc tank		360	360	-	-	695	1415	645
4	Fred Stabbing	Stardust Special			-	360	360	-	695	1415	36
5	Ian Prommitz	Playboy Cabin			360	360	-	-	688	1408	620
6	Peter Hosking	RC 1			360	360	-	-	648	1368	20
7	Chris Lawson	Lanzo Racer			-	360	360	-	577	1297	28
8	Peter Leaney	Lanzo Bomber			-	360	360	-	551	1271	617
9	Don Howie	Cumulus			-	360	360	-	538	1258	24
10	Fred Roberts	RC 1			-	360	360	-	53	773	655
11	Steve Gullock	Polly			322	-	255	-	-	577	
12	Ron Adamson	Stardust Special			360	-	-	-	-	360	615
13	Norm Campbell	Stardust Special			OOB	-	-	-	-	0	641
			Texaco								
1	Don Howie	Lanzo Bomber	Enya .45 FS	12 cc	600	600	600	-	993	2793	647
2	Lyn Clifford	Lanzo RC 1	OS .61 FS	18 cc	600	600	600	-	962	2762	641
3	Peter Hosking	Lanzo Bomber 85%	Saito .65 FS	15 cc	600	600	600	-	917	2717	34
4	Steve Gullock	Lanzo Bomber	OS .52 FS	15 cc	600	600	600	-	903	2703	14
5	Peter Leaney	Lanzo Bomber	OS .61 FS	18 cc	600	600	-	600	868	2668	631
6	Mark Collins	Lanzo Bomber	OS .60 FS	21 cc	600	600	600	-	839	2639	613
7	Dave Markwell	Lanzo Bomber	OS .60 FS	18 cc	600	600	-	600	799	2599	645
8	John Whittaker	Lanzo Bomber	OS .46 FS	15 cc	600	600	600	-	744	2544	22
9	Ron Adamson	Lanzo Bomber	OSD .61	15 cc	600	600	600	-	690	2490	615
10	Rod Spurrier	Lanzo Bomber	Enya .53 FS	15 cc	600	600	600	-	685	2485	655
11	Robert Taylor	Cumulus	OS .61	15 cc	600	600	600	-	230	2030	629
12	Fred Stebbing	Rambler	OS .40 diesel	10 cc	600	600	600	-	63	1863	641
13	Max Heap	Lanzo Record Breaker	OS 52 FS	12 cc	500	600	600	-	-	1700	
14	Robin Yates	Lanzo RC 1	OS .52 FS	12 cc	-	600	600	485	-	1685	645
15	Lyle Baker	Berryloyd	Mag .52 FS	15 cc	406	584	600	-	-	1590	22
16	Norm Campbell	Lanzo Airborne	OS .61 FS	18 cc	516	532	-	-	-	1048	32
17	Trevor Taylor	Lanzo RC 1	OS .48 FS	15 cc	455	-	-	-	-	455	633
			Duration								
1	Ian Prommitz	Playboy	McCoy .60	30	-	420	420	-	1776	2616	629
2	Mark Collins	Cumulus	McCoy .60	30	420	420	-	-	1436	2276	617
3	Lyn Clifford	Cumulus	YS .63 FS	25	-	420	420	-	800	1640	641
4	Brian Stebbing	Stardust Special	T Tiger .36	25	420	-	420	-	750	1590	649
5	Fred Stebbing	Stardust Special	T Tiger .36	25	420	420	-	-	659	1499	641
6	John Whittaker	Lanzo Bomber	McCoy .60	30	420	-	420	-	475	1315	22
7	Peter Leaney	Playboy	McCoy .60	30	420	-	420	-	444	1284	631
8	Ron Adamson	Lanzo Bomber	McCoy .60	30	420	420	-	-	286	1126	615
9	Steve Gullock	Little Diamond	Enya .41 FS	30	420	395	-	-	-	815	14
10	Max Heap	Lanzo RC 1	GMS .32	25	355	420	-	-	-	775	605
11	Chris Lawson	Vespa	McCoy .60	30	-	420	346	-	-	766	28
12	Robert Taylor	Stardust Special	YS .63 FS	30	420	293	-	-	-	713	30
13	Dave Markwell	Lanzo Bomber	Saito .56 FS	30	230	419	-	-	-	649	645
14	Brian Dowie	Playboy	OS .40 FX	25	219	255	-	-	-	474	639

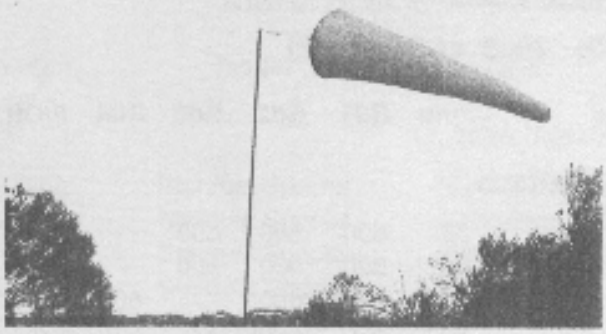
13th Annual Easter Fly In

March 25th – 26th 2005 at Swan Hill

Place	Name	Model	Engine	Climb	Rd1	Rd2	Rd3	Rd4	F/Off	Total	Freq
			'38 Antique								
1	Peter Leaney	Lenzo RC 1	OK Super .60 S	88	600	600	600	-	636	2436	621
2	Don Howie	Miss America	OK Super .60 S	132	600	600	600	-	589	2389	647
3	Dave Markwell	Cadet	OK Super .60 S	110	600	600	-	600	550	2350	645
4	Fred Stebbing	Powerhouse	Super Cyc .60 S	90	500	600	-	600	-	1701	641
5	Steve Gullock	Polly	GB 5cc diesel	145	536	541	600	-	-	1677	613
6	Chris Lawson	AM Cyclonic	DC W/cat 5 cc D	87	251	267	193	-	-	711	28
7	Ron Adamson	Lanzo RC 1	OK Super .60 S	88	600	OOB	-	-	-	600	615
8	Don Cameron	Candid	EDHunter 3.5ccD	96	225	226	-	-	-	451	36
			Gordon Burford								
1	Brian Stebbing	Swiss Miss	GB PB	45	300	300	300	-	854	1754	641
2	Ian Promnitz	Lanzo Bomber	GB BB	35	300	300	300	-	807	1707	629
3	Ron Adamson	Cresendo	GB PB	45	300	300	300	-	800	1700	615
4	Peter Leaney	Swiss Miss	GB BB	35	300	300	300	-	656	1556	617
5	Rod Spurrier	Lanzo Bomber	GB PB	45	300	300	300	-	456	1356	655
6	Chris Lawson	Lanzo RC 1	GB PB	45	-	300	300	300	385	1285	28
7	Dave Markwell	Atomiser	GB PB	45	300	-	254	300	-	854	645
8	Steve Gullock	Little Diamond	GB BB	35	300	211	300	-	-	811	613
			Nostalgia								
1	John Whittaker	Spacer	K&B .40	25	360	360	-	-	769	1489	22
2	Ron Adamson	Cresendo	OS .49 Max H	25	360	360	-	-	679	1399	615
3	Chris Lawson	Playboy 1944	K&B .40	25	360	360	-	-	660	1380	28
4	Don Howie	Spacer	OS .40 Max H	25	360	360	-	-	395	1095	647
			2cc								
1	David Markwell	Playboy Cabin	Cippola .09	30	-	300	300	-	-	600	645
2	Ian Promnitz	Lanzo Bomber	Tyro	30	-	300	268	-	-	568	629
3	Ron Adamson	Cresendo	Tyro 1.8	30	-	243	300	-	-	543	615
4	Don Howie	Playboy	Tyro	30	-	300	196	-	-	496	647
5	Chris Lawson	Zephyr	Tyro 1.8	30	191	-	300	-	-	491	28
6	Peter Leaney	Dixielander	Tyro	30	-	300	185	-	-	485	645

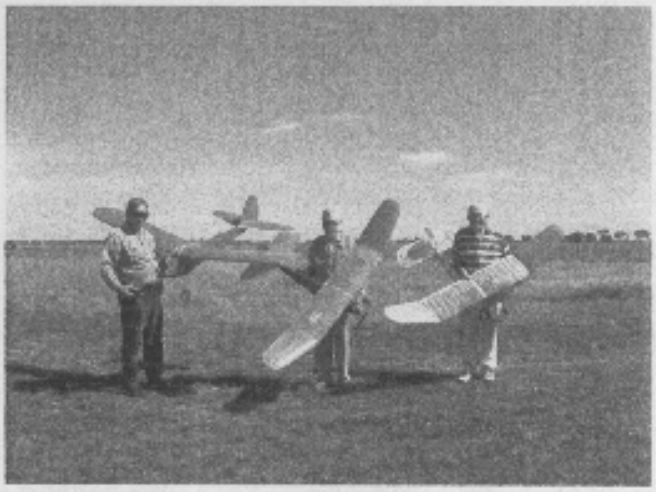
CONTEST CALENDAR

Leopold Annual Fly-In Westcoast Soarers Field, Matthews Rd. Leopold. 14 & 15 May 2005.
Sat 14th. 1/2a Texaco. 10-00am. Duration. 1-30pm.
Sun 15th Texaco. 10-00am. Burford/Nostalgia Combo. 1-30pm
Toilet will be on site. $5-00 per event or $15-00 for all 4 events.
Important. All events to be flown to current MAAA rules.
Arrangements have been made with a Leopold takeaway shop to provide food as per menu below.
Hamburgers. Plain $3-50. The lot $5-50. Steak Sandwich. $4-50 or $6-50 with the lot. Souvlaki. $5-50.
Fish and Chips. [Flake] $6-40. Scallops. $1-20ea. Calamari Rings 70c ea. Potatoe Cakes 50c ea.
Orders and money to be given to Lillian by 11-30am for delivery to the field by 12-30pm.
Drinks available on the field.
Meeting # 97: Thur. 26 May. Meeting # 98: Thur. 28 July.



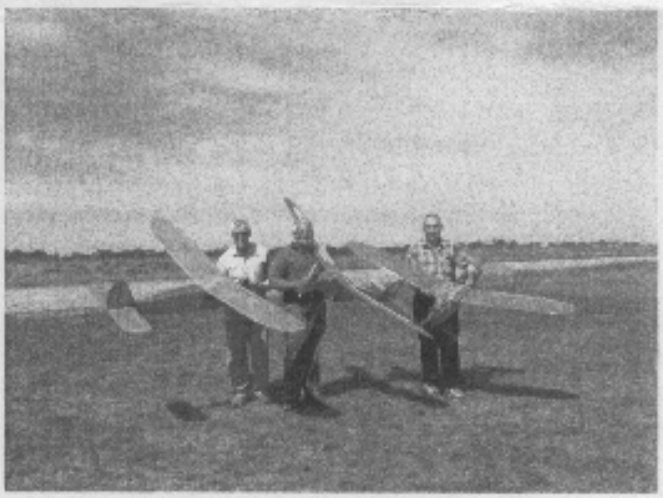
SAY NO MORE

Chris our C.D.

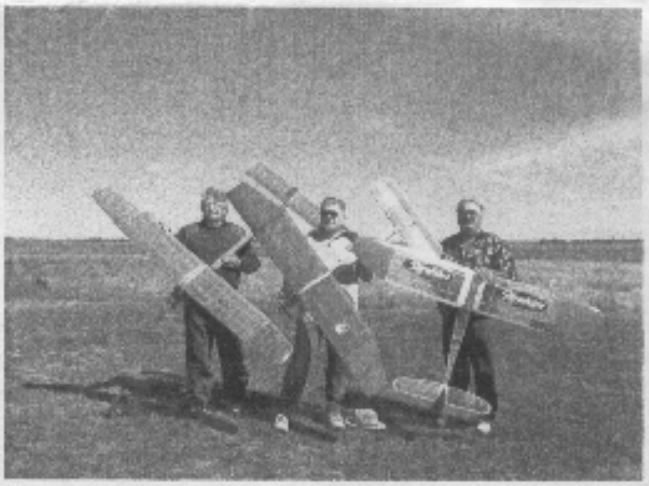


Texaco. 1st Don Howie, 2nd. Lyn Clifford and 3rd Peter Hosking.

1/2A 1st Brian Stebbings, 2nd Robert Taylor and 3rd Dave Maxwell..



38Antique. 1st Peter Leaney, 2nd Don Howie and 3rd Dave Maxwell.



Nostalgia. 1st John Whitaker 2nd Ron Adamson and 3rd Chris Lawson.

BAI Annual Haddon Fly In

April 16 – 17th 2005 at Haddon

Place	Name	Model	Engine	Climb	Rd1	Rd2	Rd3	Rd4	F/Off	Total	Freq
			1/2A Texaco								
1	Fred Stebbing	Stardust Special	Cox .049		360	360	360		2489	3569	36
2	Peter Bennett	Red Ripper	reed valve		360	360	360		2191	3271	643
3	Fred Roberts	Lanzo RC 1	5 cc tank		360	360	360		647	1827	655
4	Kevin Fryer	Atomiser			360	360	360		417	1497	631
5	Peter Hosking	Lanzo RC 1			360	-	360	360	372	1452	20
6	Paul Neville	Playboy			360	360	360		236	1316	643
7	Brian Laughton	Red Ripper			360	360	360		229	1309	621
8	Greg Jenkinson	Stardust Special			360	360	360		225	1305	20
9	John Western	Lanzo RC 1			360	360	-	360	216	1296	30
10	Barry Barton	Stardust Special			360	360	360		213	1293	16
11	Steve Gullock	Polly			360	360	360		181	1261	18
12	Chris Lawson	Panther			360	360	-	360	160	1240	28
13	Norm Campbell	Lanzo Bomber			-	283	267	253	-	803	641
			Duration								
1	Fred Stebbing	Stardust Special	T/Tiger .36	25 s	420	420	420		671	1931	641
2	Brian Laughton	Playboy	Ervine .36	25 s	-	420	420	420	549	1809	621
3	Kevin Fryer	Playboy 110%	McCoy .60	28 S	420	420	420		519	1779	631
4	Greg Jenkinson	Lanzo Bomber 85%	OS .52 FS	30 S	420	420	420		381	1641	639
5	Peter Bennett	Josephine	YS .63 FS	28 S	-	420	382	420	-	1222	643
6	Barry Barton	Playboy 110%	Saito .65 F	32 S	364	-	420	420	-	1204	16
7	John Weston	Lanzo RC 1 85%	Saito .65 F	32 s	-	420	420	298	-	1138	623
8	Steve Gullock	Little Diamond	Enya .41 F	32 s	-	420	420	295	-	1135	14
9	Dave Sampson	Lanzo Bomber	Enya .30 T	25 s	420	281	370	-	-	1071	641
10	Chris Lawson	Lanzo RC 1	Amco D 3.5	28 s	-	420	364	263	-	1047	28
11	Norm Campbell	Super Quaker	McCoy .60	28 s	-	-	-	-	-	-	32

South Australian Oldtimer State Championships
April 30th and May the 1st 2005.

Congratulations to Robert Taylor for winning 1/2A Texaco at his first SA State Champs and being the only Victorian to place.

Commiserations to Ron Adamson who had achieved the best climb and longest flight time in Duration but *#^+### landed out of bounds.

Thanks to South Australia for inviting us to compete, their camaraderie and excellent catering provided at Monarto. Thanks to Dave Markwell for photos and information.

Texaco 1st Stan Gurr 2nd Ron Adamson 3rd Dave Markwell
Duration 1st Stan Gurr 2nd Brian Stebbing 3rd Bill Britcher
1/2A Texaco 1st Robert Taylor 2nd Brian Stebbing 3rd Bill Britcher

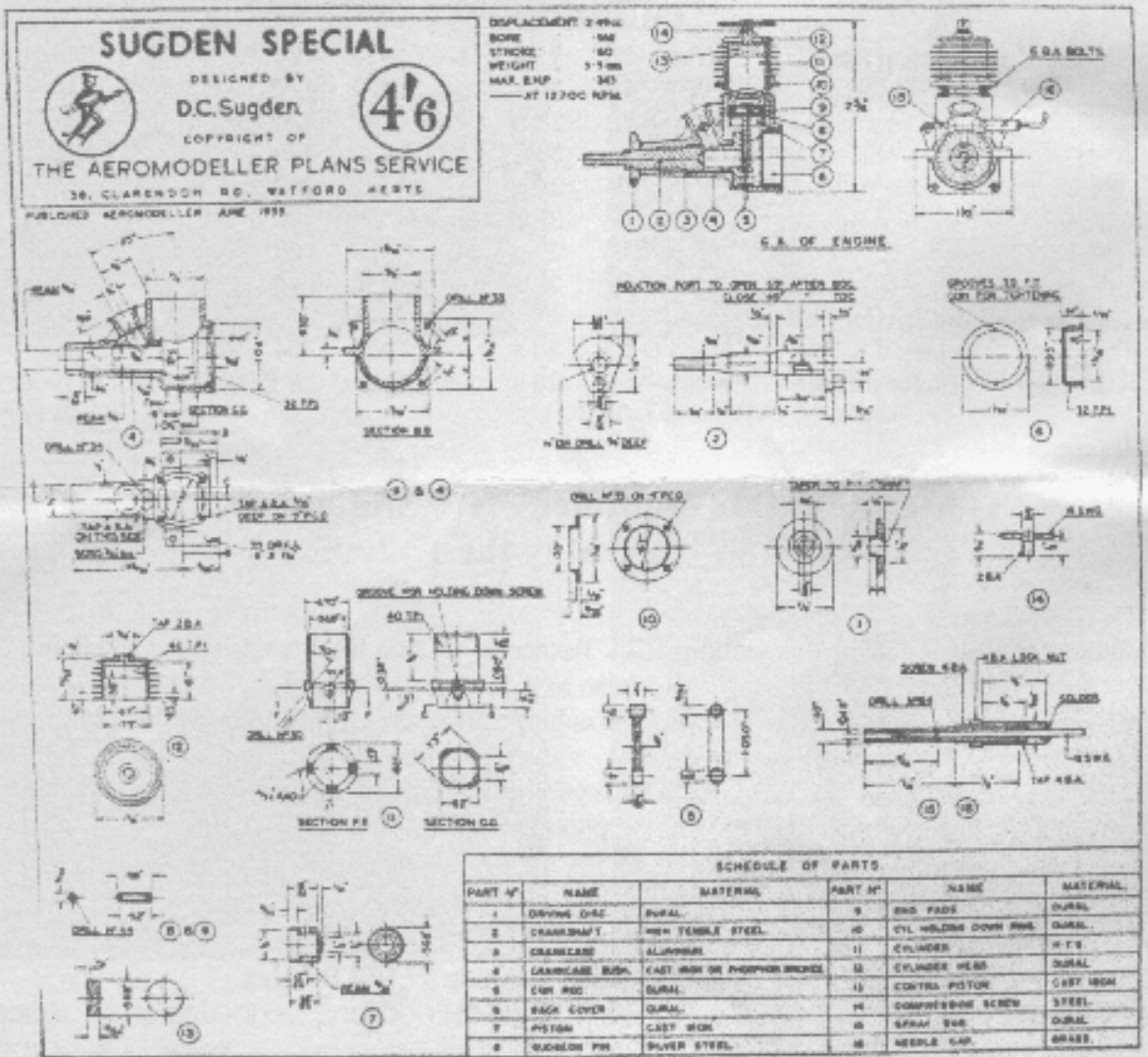
Regards, Peter Hosking

Culmination of DAVE SUGDEN'S Making your own Engine series

THE

Sugden Special

A 2.5 c.c. PLAIN BEARING
HIGH PERFORMANCE DIESEL
WITH MODERN FEATURES



FULL-SIZE COPIES OF THIS DRAWING ARE AVAILABLE FROM A.P.S. PRICE 4/6 POST FREE. DIE-CAST CRANKCASES READY FOR MACHINING ARE AVAILABLE PRICE 6/- POST FREE

IN DESIGNING this engine the requirements were: high power output, low weight and easy construction. The first implies Oliver type porting and low friction crankshaft bearings whilst the others rule out ball races. The effectiveness of the compromises made is indicated by the test results, i.e., the internal shape of the engine is satisfactory, but the output could be raised with ball races for racing purposes.

Design and Development

The stroke/bore ratio was chosen small enough to produce a light compact design with docile starting characteristics, but large enough to prevent the internal stresses from being excessive. A value of 1.06 was obtained when a stroke of .6-in. was chosen.

With Oliver transfer ports it is not very practicable to screw in the cylinder, a feature making for lightness, and on the first prototype motor a system of studs was devised which has been superseded by the method shown here. The cylinder is prevented from rotating by the holding down screws which locate in the grooves between the exhaust ports. The cylinder head then screws on in the normal fashion.

A floating bush was used to replace a ballrace at the web end of the crankshaft on the first engine. This bush, made from Immadium VI bearing metal, was the width of a standard ball race and itself rotated in a high tensile steel outer bearing. It proved to be tricky to make and wore rapidly with the result that the crankcase compression leaked past the crankshaft, thus causing the motor to become rather thirsty. The second prototype consequently had the short plain bearing, shown on the drawing, which has proved to be quite satisfactory. A separate inserted front bush used on the first engine was made integral with the crankcase on the later designs since this bearing is lightly loaded.

The exhaust ports were reduced from the 80 thou. depth of the first to 60 thou. depth on the second engine and the slightly lower power output of the latter unit could be attributed to this modification. 80 thou. ports were used on the third and final engine.

The second and third motors had the carburettor intake drilled ¼-in. diameter for the simple reason that a suitable smaller size drill was not available. This did not appear to affect starting which is easy on all three engines. Alternative beam mount lugs were provided on the third motor.

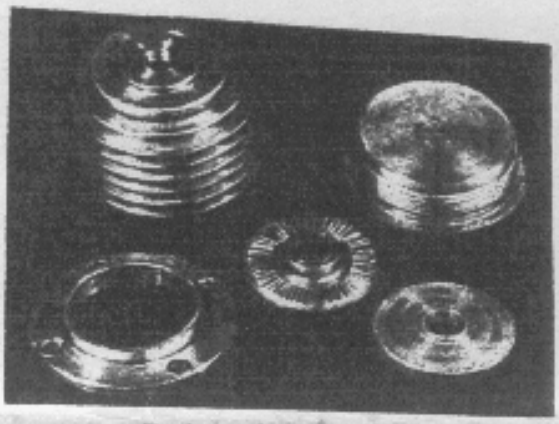
Construction

Tolerances are not indicated on the drawing since the design is not intended for mass production. As a matter of principle all dimensions should be produced as accurately as possible and if the order of working as followed below is used, all parts will fit accurately and errors will be eliminated.

The **pattern** required much care to make and as many parts as possible were turned on a Wolf drill lathe. An additional ⅛ in. was allowed on the faces to be machined. The local foundry did the casting.

The **back cover** was turned from dural as described in Part V (April issue).

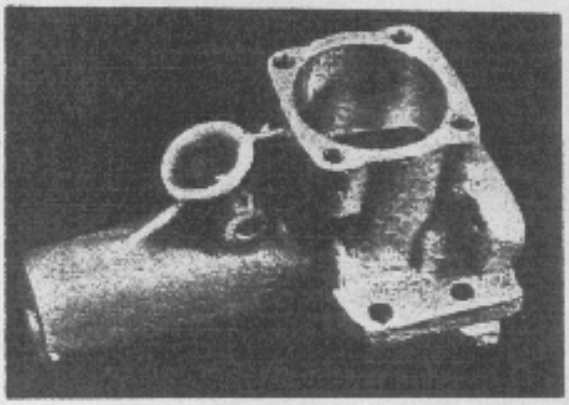
The **con-rod** was milled from a piece of DTD 610 ¼-in. dural plate which despite its rather low strength has proved adequately strong and wear resistant. The holes were drilled and reamered, and the milling on one side completed at one setting up on the vertical slide to ensure good alignment of the rod, which is important. The remainder was easily filed.



Simple turned parts from Dural

The **cylinder head** and **holding down ring** were machined, the finning being completed before the boring and screw cutting were commenced.

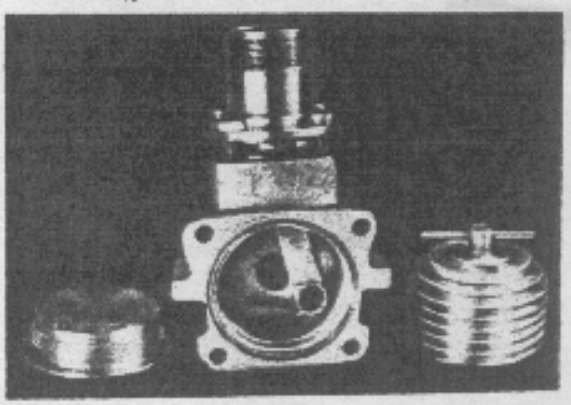
From a piece of S11 stock, sufficiently long to allow 1 in. for chucking, the **cylinder** was machined and drilled ¾ in. dia.

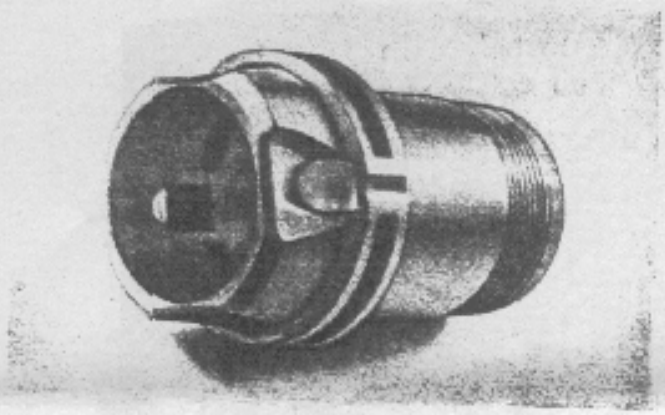


Prototype sand cast ejease fully machined

Marks are made at 90 degrees intervals round the exhaust ring. The work was marked at No. 1 jaw and transferred to the vice on the vertical slide for milling the transfer grooves. These could be filed out if necessary. A ¼ in. end mill was used although an old drill carefully

Dismantled, from the rear, shows cylinder retaining method





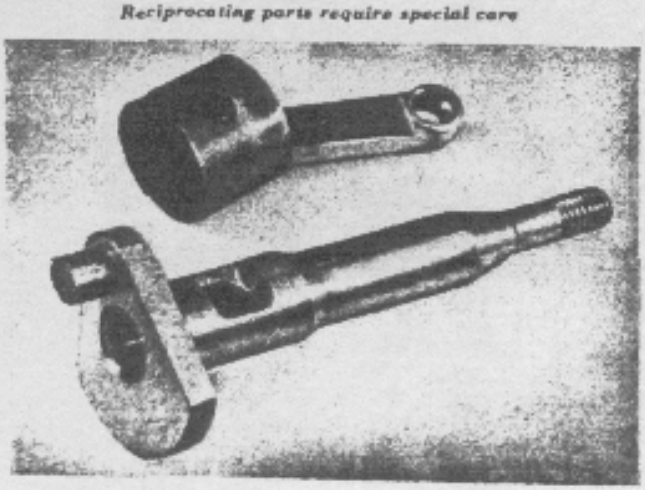
Cylinder fully machined, showing ports

ground for the purpose would do, and the grooves were located by the 90 degree marks as also was the drilling for the transfer ports. It was not found necessary to use a jig here and with the cylinder set across the lathe bed at 40 degrees, a centre drill and drills No. 40 and 30 completed the hole. This was squared off between the exhaust ports after they had been milled as described in Part V. The milling has been taken to the correct depth when the tool is on the point of breaking through the cylinder bore (½ in. dia.). The work was then returned to the chuck, trued up, and bored to 1½ thou. undersize. A half-hour of filing remained to complete the porting, after which the liner was parted off. The lap was machined to a tight fit and the cylinder was tapped on for screw cutting the 40 T.P.I. thread. A few minutes lapping with coarse and then fine grinding paste completed the cylinder. It is not recommended that this cylinder design be subjected to the stresses of case hardening.

The **piston** and **contra piston** were made as previously described in April issue.

Next the **crankshaft** was machined from a piece of S.11 55 tons H.T. steel. The machined bar was mounted with the correct amount of eccentricity in a 3-jaw chuck which had had No. 3 jaw offset by 2 or 3 revolutions of the scroll, using shim packing for the final adjustment. My chuck could not "swallow" the full length of the bar and after checking for alignment with the lathe bed, a ¼-in. centre drill hole was made. The overhanging end was stabilised with the tailstock centre during subsequent machining of the crankpin. The remainder of the crankshaft machining was carried out

Reciprocating parts require special care



as described in April issue. The induction port was milled out to port opening and closing lines scribed through the carburettor intake hole as shown in the photograph on p. 203, April issue.

The rear face of the **crankcase** casting was centre popped and the chucking boss was filed until the casting nipped true to this centre. The inside was drilled, bored and the threads cut to fit the back cover. Finally the hole was drilled and reamed to take the crankshaft before parting off. Care was needed to see that these holes were all true and concentric. The journal bearing was turned to a push fit, drilled and reamed, ensuring that this hole also was true, and parted off exactly to length. This section may be done before the crankshaft is turned.

The angle plate was bolted on to the face plate $\frac{3}{16}$ in. below centre level and the crankcase was bolted on, by means of a tie bolt through the crankshaft hole, squarely at distance X from the end of the plate (again see Part V). The hole was bored so that the cylinder was a good fit and the cylinder seating machined to the appropriate distance from the top edge of the back cover recess, a convenient reference point.

The angle plate, complete with crankcase, was trans-

Testing engine No. 2, Eric Hook, Dave Sugden and Ron Warring discuss the Eddy-current dynamometer

ferred to the vertical slide for drilling the cylinder holding down screw holes. With the cylinder fitted, a No. 35 drill was used to simulate the screw for obtaining the correct centres. Holes were drilled in the holding down ring at the same setting by slipping it on to the cylinder in the appropriate position. The carburettor holes were drilled with a similar set up. No. 34 drill was used for the spray bar hole which was only tapped on one side.

Having thoroughly cleaned all the parts the motor was assembled without difficulty, although care was required to ensure that the cylinder tightened down evenly. Starting is normally achieved after a choke and a couple of flicks. After the first burst, put the piston up on to compression and check that the con rod is running true on the crankpin. It is possible for the rod to run on the end of the pin, which results in a damaged big end and possibility of failure of the shaft due to the greatly increased bending moment. A cure for this trouble is to turn the rod from back to front.

Having completed all the processes with success, you should be the proud owner of one of the hottest plain bearing engines available. All the very best of luck.

As a service to Sugden Special makers, die-cast crankcases have been made and are available with the engine drawing price 12/6, or separate at 8/- each. References to Part V in April issue where "Machining operations" were detailed will be helpful. Back Numbers of this issue are available price 1/6d. from Watford offices.