The Thermaleer

SAM 600 of Australia Newsletter Issue No.150 July-September, 2019

VARMS OLD TIME ELECTRIC 1/2A TEXACO COMPETITION
at VARMS field Wantirna

Because of the popularity of our first competition in May this year VARMS has decided to run another friendly event on Sunday 20th October, 2019, at the VARMS field.

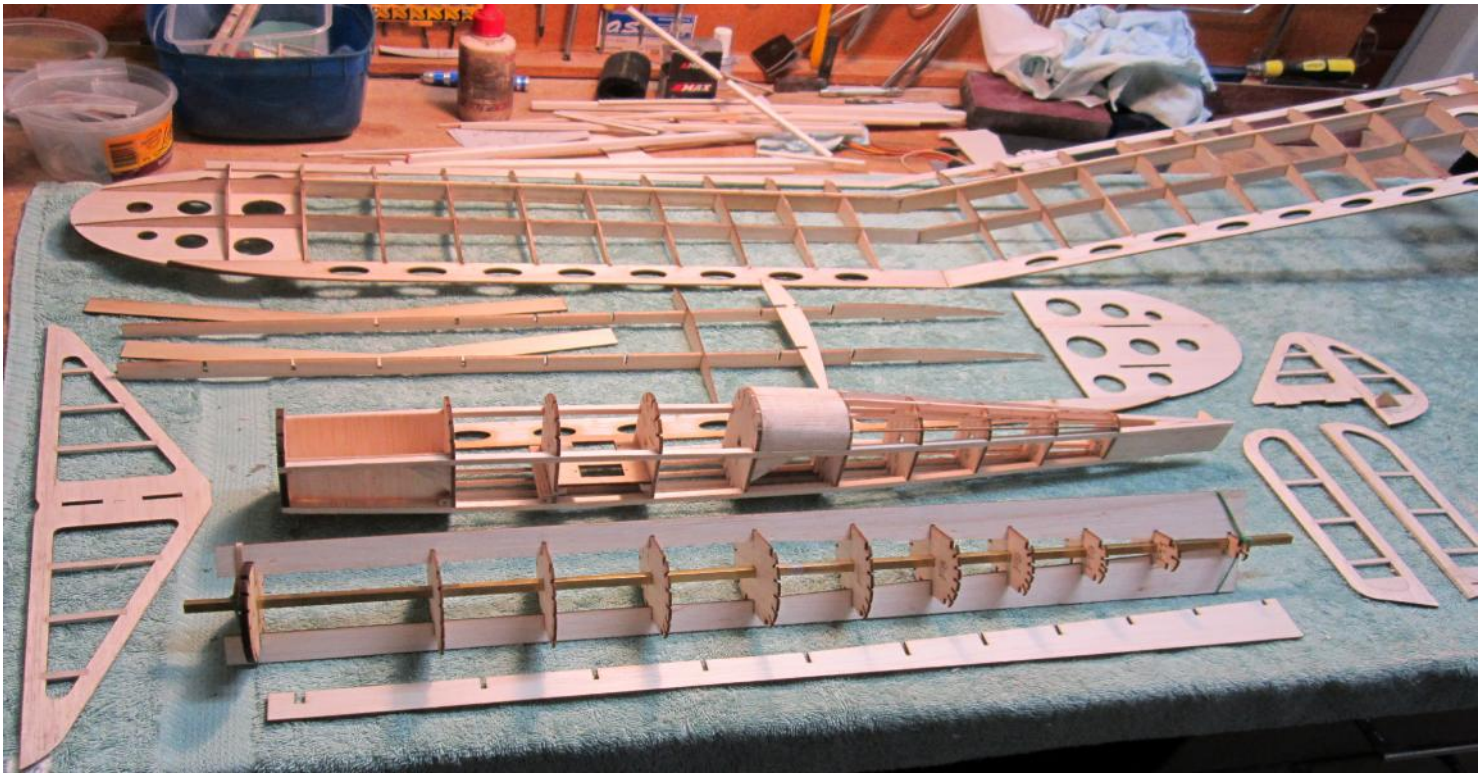
To refresh your memory the rules are:

- **models must have been designed and published before 1956**
- **scale up or down as you wish with maximum wing area not to exceed 450 sq.inches**
- **A 300ma x 3s or 460ma x 2s battery pack.**

There will be rounds and then a flyoff with last down wins.

Lunch will be served at 12noon and flying will begin at 1pm.

Come along and have some fun at VARMS.

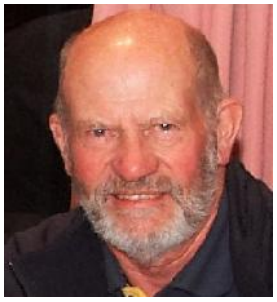


A laser-cut quick and easy build kit of the Shereshaw Cumulus for Electric ½A Texaco from the Kevin Fryer Design Team. Anyone wanting to join in the competition at Varms field on 20th October would find this model very competitive and it is reported that it takes only a few day to build. Contact Kevin for further information.

NEXT COMPETITONS

October 20th	**VARMS Field WANTIRNA 12 Noon** Old Time Electric 1/2A Texaco
November 9th & 10th	**COHUNA Saturday:** 1/2A Texaco, Duration, Burford **Sunday:** Texaco, 38 Antique { Climb & Glide }
November 24th	**BALLARAT** 1/2A Texaco, Climb & Glide, Texaco

SAM 600 Australia - Victorian Old Timers Association Inc. Committee



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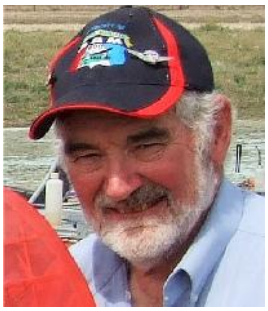

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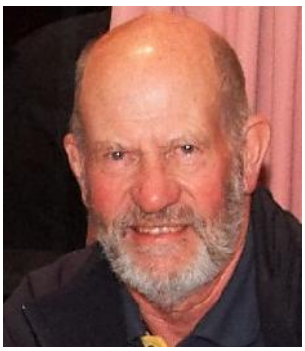
"The Thermaleer" is the official newsletter of SAM 600 of Australia, Victorian R/C Old Timers Association (SAM600) Inc.



FROM THE PRESIDENT Kevin Fryer.

Not much to report as we haven't flown a comp for 12 months, all I can say is that further to the height limit saga Brian Dowie and I have been working with the VMAA to submit a detailed reason for us to have higher height limits on contest days at our selected sites.

We have already put in a proposal to increase our heights and CASA have said they thought it would be OK but needed a much more detailed report before they could give us an official yes or no, an 8 page report has now been submitted.

We can't say when the next comp is, we just have to await their reply, if we do get permission we hope to get a height limit that allows us to fly our models the way we have for the past 41 years. Sorry we can't tell you more, we just have to wait.

CHANGES TO THERMALEER

At Canowindra this Easter an approach was made by SAM 1788 to combine Thermaleer and their Duration Times to make it a two state newsletter and that costs be shared..

After discussion with Brian Laughton and Brian Dowie I thought it seemed a practical idea and we decided the proposal would be put to our committee when we returned home. After consideration by the Committee SAM 1788's proposal was agreed to, including that the cost of production would be shared, and we left it at that.

Since that time the President of SAM 1788 has suggested he approach the other SAM chapters in Australia to see if they also would like to be involved and make it truly a national newsletter which our Committee also agreed was a good idea.

SAM 600 stipulated that "Australian Thermaleer" would be the prominent name of the newsletter and that each State should have a representative that provides complete information to Ian Avery, who produces the newsletter, and not just thrown at him by all and sundry and left for him to sort out and edit. Anything that goes to him must be through the a State representative, ok'd and ready for print.

The benefit to SAM 600 will be an end the "them and us" situation and we will be a combined national fellowship and the cost of the production work will be spread over a large membership.

This Thermaleer, #150, is the last Thermaleer, but does contain a small input from SAM 1788.

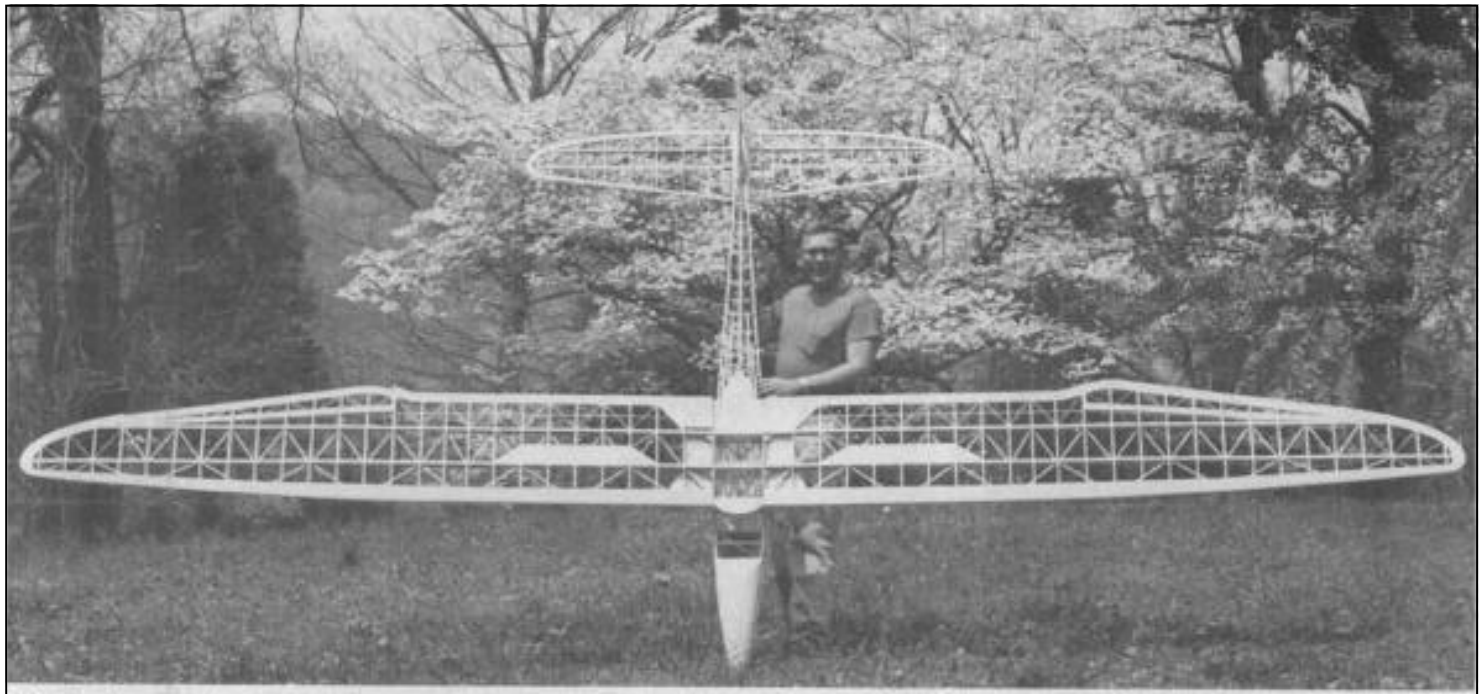
Hopefully the first Australian Thermaleer, a first in the new format, will come out at the end of December, not quite national yet but getting closer.

FINALLY

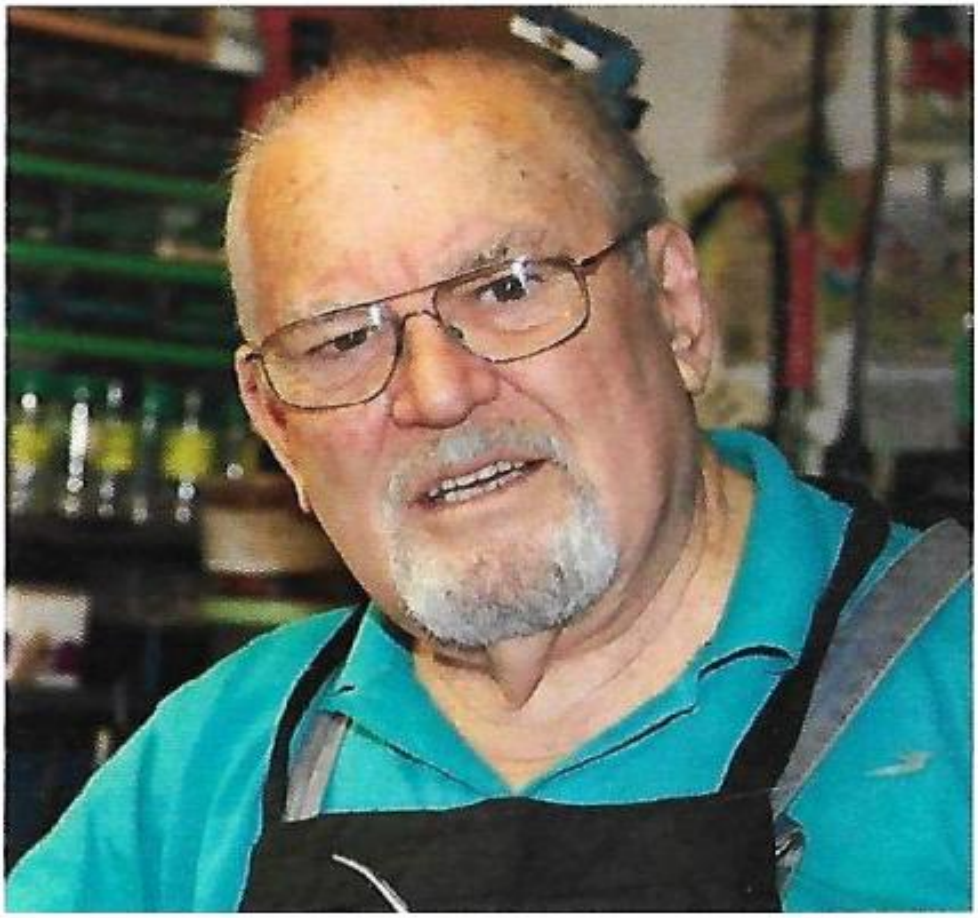
We can't say when the next SAM 600 comp is at this time as we just have to await the CASA reply. If we do get permission, as I said above, we should get a height limit that allows us to fly our models the way we have for the past 41 years.

Sorry we can't tell you more at this point in time. We ***still*** will just have to wait.

Kevin Fryer.
President.
SAM 600.



Chris Van Deventer III, Rockford, Tennessee, with his Thermic 210, a three-times blow-up of the classic Thermic 70, designed by Frank Zaic. Not evident in this photo are the built-up ribs for all flying surfaces. Only design change is addition of spoilers and ailerons. Flight report to come.



Brian Warren Winch

14th March 1937 – 22nd August 2019

VALE BRIAN WINCH AUS 17553 (The airborne engineer)

At the Cowra Oily Hand weekend we had the sad news that we had lost another long time modeller. Brian Winch was known to almost everyone by his articles that were published over many years. If you had read an Airborne magazine, or for that matter an Aeromodeller or, RCM&E, you would have read something written by Brian.

Brian was a Hall of Fame member of the MAAA for his long time services to aeromodelling. I didn't know Brian very well but I am sure he loved engines more than most of us. His articles in the many magazines around the world would support me here. He would test engines and give a full and comprehensive report.

May they have 2 & 4 stroke engines where you go Brian.

(Courtesy of NSWFFS Free Flighter Newsletter)

DURATION TIMES

Duration Times is the official Bulletin of SAM 1788
SOCIETY OF ANTIQUE MODELLERS OF AUSTRALIA INCORPORATED

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Members,

- **The Golden West Old Timer Weekend at Parkes is on again on 2 and 3 November.**
- **The field has a 2000' height limit and, as usual, a great competition is assured.**
- **Note there are 6 events in total to be flown.**
- **Details are:**

November 16th and 17th Golden West Old Timer Weekend Parkes - Nelungaloo Field

Events: Saturday: 2cc Duration, Gordon Burford, Duration
Sunday: Cabin Scramble, 1/2A Texaco, Texaco

Phone: Peter van de Waterbeemd 0412 632 470

- This is always a great weekend and enjoyed by all. Early indications are for a decent rollout so be there!
- There is onsite camping with hot showers and power.
- **The event will be catered on the Saturday and Sunday for lunch.**
- **In order to assist with catering numbers could you please let me know by return email or phone if you will be there.**
- See you there!

Cheers, Peter van de Waterbeemd, President

NEW ENGLAND GAS CHAMPS - SAM 1788.

Tamworth, June 15 & 16, 2019

Report from Jim Rae. Photos from Karen Paton. Results from Peter Scott/Dave Brown.

This event was really well supported. A total of fifteen flyers took part with three from Queensland, two of whom brought their better halves and camped on the field.

Brad Turner had an interesting trip down. Towing a trailer his car expired at, I think, near Tenterfield. A local resident towed him to his place because he said if left by the side of the road there wouldn't be much left when Brad got back. Brad sent an SOS to one of the other Queenslanders who was already at the field and he went back up to get Brad and the trailer.

Weather on Saturday was as good as it gets. It was a bit cool early but warmed up quite quickly. There was a very light northerly breeze in the morning which switched to southerly in the afternoon. The sky was clear with very little (no) cloud. Sunday was not quite as pleasant, being cold all day with broken cloud, however the breeze was light and did the same as the day before, northerly in the morning switching southerly in the afternoon.

There was very little carnage. I think I heard one Burford model hit the ground but I don't think there were any others. On Saturday afternoon, after the competition had finished, Gary Whitten was testing a 2 stroke Duration model. Unfortunately it was released without the radio on and proceeded to do a magnificent figure "9" which totally demolished it.

Reference to the results will give an indication of the weather. Every event had a fly-off with all having at least half the field in it. In Burford everyone except one, and it may have been the model that was damaged, qualified for the fly-off. Considering the numbers that made fly-offs the fly-off times were not particularly long, the longest being in Burford at 21 minutes.

At the presentation Brad Turner was crowned Top Gun. If you refer to the results you will see why.

At the 2019 SAM Champs at Canowindra there was no Standard Duration perpetual trophy so Don Southwell constructed a very nice one which was presented to Dave Brown who won the event at Canowindra.

One of the great things which happens at Tamworth is the after flying Happy Hour, particularly on Sunday. This is hosted by the campers who take up residence at the field with particular mention of the Patons, Karen for great food and Dave for a wee drop of red.

There were quite a number of local fliers in attendance over the weekend, many of whom assisted with timekeeping and general assistance. They also took part in Happy Hour which helps make it such a great social event.

Altogether it was a very enjoyable weekend thoroughly enjoyed by all.

Gordon Burford Event

Brad	TURNER	Calypso	BB	900	1271
Alan	SURLEY	Bomber	PB	900	1237
Paul	FARTHING	Pencil Jr 110%	PB	900	1221
Peter	SCOTT	Dream Weaver	BB	900	1052
Garry	WHITTEN	Lil Diamond	BB	900	997
Dave	PATON	Stardust Spl	PB	900	821
Bob	MARSHALL	Zoot Suit	PB(T)	900	754
Basil	HEALY	Zoot Suit	PB	900	477
Geoff	POTTER	Spacer	PB	900	DNS
Anthony	VICARY	Dixielander	PB	300	

Texaco

Dave	PATON	Bomber	OS 62 4/	1800	956
Dave	BROWN	Flamingo	O&R 60	1800	888
Basil	HEALY	Record Breaker	Enya 53 4/	1800	839
Vince	HAGERTY	Bomber	OS 61 4/	1800	770
Brad	TURNER	Bomber	OS 62 4/	1800	730
Garry	WHITTEN	Bomber	OS 62 4/	1768	
Anthony	VICARY	Bomber	O.S. 61 4/	1709	
Alan	SURLEY	Bomber 85%	O.S.40 4/	1552	
Geoff	POTTER	Bomber	Enya 60 4/	1184	

Duration

Geoff	POTTER	Playboy	Nelson 45 2/	1260	986
Brad	TURNER	Playboy 90%	OS 37	1260	826
Basil	HEALY	Red Ripper	Saito 56 4/	1260	664
Anthony	VICARY	Playboy 105%	Saito 62 4/	1260	659
Vince	HAGERTY	Stardust Spl	Enya 53 4/	1260	405
Dave	PATON	Playboy Cabin	Saito 62 4/	1260	230
Grahame	MITCHELL	Playboy	S Tiger 34	1260	DNS
Sonya	GROSSMITH	Playboy	OS61 4/	1238	
Paul	FARTHING	Playboy	OS 40 H 2/	1237	
Jim	RAE	Lion Cub 130%	Saito 56 4/	1206	
Peter	SCOTT	Playboy 112%	McCoy 60	1122	
Alan	SURLEY	Playboy	Saito 56 4/	1018	
Garry	WHITTEN	Playboy	Saito 62 4/	955	
Bob	MARSHALL	Bomber 85%	ASP 61 4/	762	

½A Texaco

Anthony	VICARY	Stardust Spl	1260	832
Brad	TURNER	Bomber	1260	568
Jim	RAE	Big Old Plane	1260	434
Vince	HAGERTY	Bomber	1260	417
Garry	WHITTEN	Stardust Spl	1260	390
Basil	HEALY	Stardust Spl	1260	330
Dave	PATON	Stardust Spl	1260	7
Sonya	GROSSMITH	Megow Chief	1260	L/O
Peter	SCOTT	Baby Burd	1196	
Alan	SURLEY	Airborne	1085	
Grahame	MITCHELL	Stardust Spl	420	

Tomboy

Peter	SCOTT	Mills .75	1270
Bob	MARSHALL	MP Jet	1260
Alan	SURLEY		1228

From Peter Scott

Forecast weather was perfect for the Old Timers, not so much for Slope Soaring, but went anyway. Forcasters got it right.

Results herewith.

Brad Turner was Champion, with dead heat for second, Dave Paton and Basil Healey.

FOR OLD TIMER'S SAKE.

By Don Howie.

Oily Hand Event – 2019 I enjoy going to this weekend in August as we usually have good weather for at least two days. Friday afternoon proved excellent for F/F and I flew my "Request" model (featured later) and Sunday morning was excellent, flying my Keil Kraft "Snipe", also shown.

First three F/F models are Vic Smeed designs from the U.K. and are popular over here for the small diesels of ½cc and less.

The featured model, the R6-B by Allan Rowe from New Zealand, published in 1953 Aero Modeller, was designed for R/C single channel and not very popular with only three models being built (see photos). They were all flown together and if built light, flew quite well.

The control-line model featured was the two "Ringmaster" designs, the most popular being the Sterling kit from 1951, designed by Matt Kania, who designed the Super Quaker in 1941. Thus we had a large number of this very popular C/L model. Geoff Potter had a radio version, rudder, elevator, ailerons and throttle, powered with an OS Max 35 R/C, converted to diesel. The conversion, including a new cylinder and carb, had not been tested and gave a few problems.

Warren Brown from Mt. Evelyn, Vic., builds some great Vintage models with radio control. The Frog Senior Series, rubber models that were only 18 inch span, designed by Charles Buffery, with help from others at International Model Aircraft at Merton, London, the series released in 1952, are still popular today in the U.K.

Warren made it 36 inch span (double size) the low wing "Raven", now fitted with ailerons and elevator was powered with a 0.5cc Oliver Tiger made in the U.K. by Clint Hill Engineering (John Ridley). It is such a great flying model that he now hopes to build a larger version.

John Miles Snr. From Wentworth Falls in the NSW Blue Mountains, had his three boys with him. The two older ones had diesel powered F/F models that were flown by the boys. Ashton flew the 35 inch span "Cardinal", Phil Smith designed Veron kit, easily starting the Mills .75 (Russian copy) diesel. The "Cardinal" is seen climbing away in the photo. Chilton Miles flew a Vic Smeed designed "Courtesan" in German finish, also going very well.

Mike Minty bought about 10 models to fly and one

Darren Lydford (Dubbo) and his Vic Smeed "Poppet" F/F P.A.W. 0.55cc Diesel, 32" span. Polyspan on wings.

Bob Marshall with Vic Smeed "Cherub" F/F V.A. Mills 0.4cc diesel. Old Keith Murray model.

Vic Smeed "Courtesan" by Ian Le Bronne. 26" span Tissue on wings and tail. D.C. Dart 0.55cc diesel.

Nominated R/C model for this year's Oily Hand – 60 inch span, R6-B twin fin powered glider with radio by Allan Rowe, New Zealand. Published 1953 Aero Modeller. Only 3 models at Oily Hand. P.A.W. 1.49cc diesels mainly used.

hardly ever seen was the "Cricket" design by Noel Shennan, published in the Australian "Model News", the magazine before "Airborne". It was powered with a C.S. Redfin 0.8cc diesel with 8x4 prop.

Peter Jackson had many small models, the two shown with radio assist, when needed. Another model flown by Mike Minty was the "Apex" 3 fins model. The E.D. Cadet .98cc diesel side-port fitted, based on the E.D Bee 1cc and designed by George Fletcher.

Converting F/F to Rudder Control. As we get older it is harder to fly F/F models, the long walks are a bit too much. Peter Leaney built the model shown, "Request" by Frank Ehling, published in September 1941 Air Trails magazine. It has been flown F/F by Peter with a P.A.W. .55cc diesel.

I was given the model by Peter, who said he had given up free flight flying. The answer is simple, fit single channel R/C (rudder) so you can bring the model back, near you. The engine was changed to an original Mills P.75 diesel, the "Request" is 44 inch span and the Mills gives a fairly slow climb.

The model with the Mills .75 tended to stall a bit on the glide, when flown F/F, so I fitted a 2 channel AM receiver (J.R. Beat) on 29 Mhz up front (note aerial). The NMH 300mah battery pack is fitted front, top, to get the CofG further forward. A J.R. 371 micro (9 gram) servo is fitted near the CofG and light-weight stranded C/L wire fitted to the servo with small brass tubing, crimped with pliers.

The bulkheads in the rear fuselage were all sheet, so plastic tubes were fitted with epoxy (see photo), note the steel wires going to 1/16" ply control horns, coated with epoxy, drilled 1/16" holes and painted red. One would hardly know it had radio control.

The model was flown on the Friday afternoon at Cowra (NSW) Oily Hand Event. I managed to get some great spot landings.

R/C Ringmaster by Geoff Potter. Matt Kania 1951 C/L design for Sterling Models, USA. OS Max 35 glo converted to diesel.

Warren Brown, Mt. Evelyn, Vic. with his double-size (36" span) "Ravan" – Frog Senior Series 1953 rubber models (semi-scale 18" span). Engine Oliver Tiger (UK) 0.5cc by Clint Hill Engineering, made by John Ridley. All Airspan covering, two channel R/C ailerons and elevator.

John Miles' two elder sons flew their F/F models.

Left: Young Ashton Miles with Phil Smith kit F/F "Cardinal" 35" span. Russian Mills 0.75cc diesel

Right: Chilton Miles with Vic Smeed F/F design "Courtesan" 26" span, green tissue in German finish.

The First Swiss Diesels. Many farm tractors in the nineteen twenties ran on kerosene and in cold conditions, ether was sprayed into the intake to get them started. Ernst Thalheim was a Swiss diesel engineer who produced engines for farm machinery. In December 1927 he submitted a Patent for a moveable contra-piston, much like we use today in our model compression ignition (diesel) engines.

E. Thalheim demonstrated his ETHA engine (based on his name) at the Inventors' Fair at Basel in 1928, the engine being 45cc with adjustable compression. He combined with Jakob Klemenz and Herr Shenk to produce the Dyno I in 1941, and also in 1941, Thalheim made the ETHA I at 2.5cc, hand made in small numbers. The 2.04cc Dyno I was made in fairly large numbers from August 1941 and proved to be the better running and easier to mount in a model aircraft. Also made by Thalheim was the 6cc ETHA II weighing 20 ounces, with difficult mounting, this did not prove to be popular.

The original ETHA 2.5cc was made in very small numbers and they only exist perhaps in small numbers today, perhaps in Switzerland. A replica was made by Richard Gron (Czech Republic) in 2007 and as Maris Dislers collects 2.5cc engines, he has an example. Also, Tony Williams has an original Dyno I, so Maris was able to run this engine.

I was at the test runs and the ETHA 2.5cc obtained 6,000 revs on the Taipan 10x6 prop, after much experimenting with diesel fuel mixes. The Dyno I was a much nicer engine to start and run, the tacho showing 5,600 revs on the Taipan 10x6 prop.

Climbing out - "Cardinal" flown F/F by Ashton Miles.

ETHA 2.5cc replica made in 2007 by Richard Gron, Czech Republic. Engine running on 10x6 Taipan prop. Note front, large radial mount.

ETHA 2.5cc replica, world's first diesel model engine from Switzerland. Note rear copper tank. Taipan 10x6 prop. Engine No.10 (replica).

World's first popular diesel model engine, 2.01cc Dyno, introduced August 1941, made in Switzerland. Running on 10x6 Taipan prop, tacho shows 5,600 revs.

The Dyno fuel in 1941 was Ether 15%, Turpentine 24%, Petrol 24%, Kerosene 24% (often called Paraffin) and lubricating Oil 15%. The low ether content and oil content would have most model diesels hard to start. Maris did not run the Dyno on this mix.

The Dyno I reached Italy, France and Germany in 1942 (the Swiss were neutral in WW2) and many copies were made by the French and Italians during WW2.

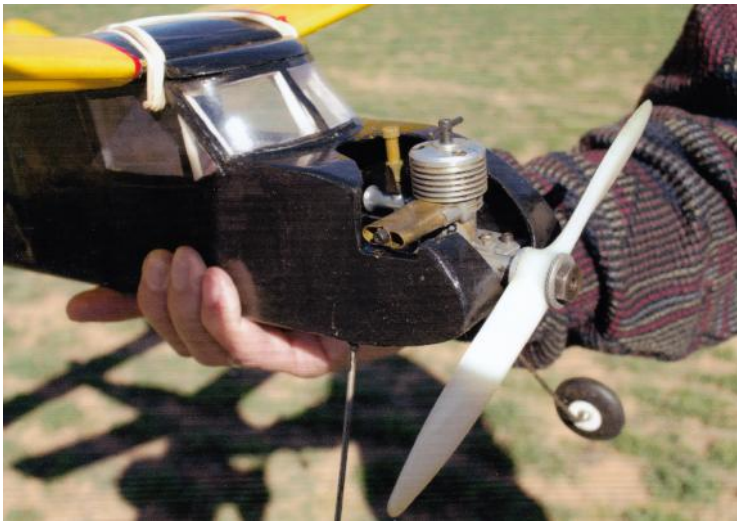
Below some more photo's from the Oily Hand weekend.

Mike Minty (Sydney) and his "Cricket" design by Noel Shennan from Model News magazine (Australia) R/C Assist. C.S. Redfin 0.8cc diesel 8x4 prop. Polyspan covering and paint.

Don Howie (Adedaide) with 1961 KeilKraft "Snipe". Wenmac .449 glo, 6x3 black Cox prop. FF Airspan wings, tail and blue enamel. Over 50 years old. Recovered wings, tail, fin and top of fuselage.

Peter Leaney holds own build F/F "Request" by Frank Ehling. 1941 design published in September 1941 Air Trails magazine. Original model had Bantam .199 spark engine. Peter used a P.A.W. 0.55cc diesel.

Peter Jackson with R/C assist (emergency use only). Left: "Young Thunder" a design from Argentina P.A.W 55 diesel, silkspan on wing, tail. Tissue and blue paint fuselage and fin. Right: Vic Smeed designed "Popett" 32inch span, Redfin Millish .030 (½cc) diesel. Silkspan on wings, tail, tissue and red paint.



Above: *Black and Yellow fifties design "Apex" by Mike Minty. E.D. Cadet 0.98cc (1cc) diesel, 8x4 prop. Note home made muffler.*

Left Top: *F/F "Request" given to Don Howie. Now fitted with Mills P.75cc diesel. JR 371 micro servo fitted for rudder control using C/L light stranded line.*

Left Right: *The "Request" fitted with single servo driving rudder. Model had solid bulkheads so lightweight C/L wire used to connect rudder exits fuselage through plastic tube (ball point refill) to 1/16inch ply control horns.*

by
CHARLES
ZIEHL

THE VAGABOND

The Author with the Vagabond

Scanned From November, 1943
Model Airplane News

HERE at long last is a model that has been so simplified that there is no beginner who need be afraid to undertake its construction and yet every experienced modeller will find it well worth his while to build.

About a year ago the author decided to design a gas model which would come within the capacities of a new modeller. The first requisite would have to be simplicity. Taking this into consideration work began on a highly simplified plane. In so designing, all thoughts of super performance were cast aside in favour of simple, down-to-earth construction. Upon completion of this job a few test flights were required for adjustments and then the plane was given a real trial. Seeing its possibilities, it was entered in a local club contest at Creedmore, Long Island. Its potentialities were realized when it took first place in this contest.

Thinking that even this could be bettered the author then attempted to combine the same construction with a better performance. Drag was considerably lowered by streamlining and a new airfoil was used in the wing. This proved to be better than expectations. At Creedmore the following month, after an hour of adjustments and low-powered flights, she was opened up wide. On a 20-second motor run the plane vanished after 4:09, but luckily was later returned.

Now, after almost a year of constant designing, building, testing and re-designing this is the final product and by all means it not only combines simplicity of design and top-notch performance, but also that all important "eye-appeal."

But, far from being just a contest model, this rugged little ship often provided a day of sport for the mere price of a pair of pen cells by combining a short motor run and a folding prop.

Knowing the model builders' "love" for enlarging plans this has been eliminated as much as possible. The only odd shaped unit is the rudder and follows it's given full size in the diagrams, so why worry?

Arm yourself with a few sheets of paper, a pencil, a compass, ruler and the required building materials, hibernate to a secluded spot and in a few short days you can blossom forth with a model which will guarantee you success.

FUSELAGE: Construction begins with the fuselage which has been simplified to the nth degree.

The only plan required for its construction is the plan of the crutch. This can easily be made by following the dimensions given on the top view in the construction plan of plate one.

The 3/16" by 1/2" pine crutch is constructed directly on this plan. While the crutch is drying the formers, which are given full size on Plate 2, may be traced and cut out. Note that formers 2 and 3 are 1/8" sheet while 4 to 7 are 1/16" sheet. Former 1 is of plywood and is the only former glued in front of the cross brace of the crutch.

When the glue is thoroughly dry on the crutch remove it from the plan and put the formers in place. After all the formers have been glued in position on the crutch the square top and bottom longerons are secured in their respective notches.

When this operation is completed the landing gear and battery box are built into position. The landing gear is bent of 1/16" diameter spring steel according to the plan.

Small holes are drilled in the firewall equi-distant apart in alternating order on opposite sides of the position of the landing gear. The landing gear is put in place and "sewed" in a criss-cross fashion with ordinary strong black cotton thread. Several coats of glue on the thread tend to strengthen the mooring of the gear and complete its installation.

The battery box is constructed of 1/8" pine. A thin brass plate is glued across the back end and two small round head machine screws are inserted in the opposite end of the box, heads inwards to act as contacts. The box is glued in position against former F3 and the crutch according to the plan.

The 1/8" square stringers are now glued into the notches of F2 and F3 and against the sides of the remaining formers. Care should be taken to glue these stringers alternately on both sides of the fuselage to prevent distortion due to twisting.

The pylon which is given full size on Plate 4 is of 3/16" sheet balsa and is inserted into the slot in F2 and glued to the top longeron. The 3/16" sheet wing mount is glued to the top of the pylon and F2. Small 1/8" sheet braces are cut and glued in position to reinforce the wing mount. (See sketch on Plate 1.)

You will notice that the ignition, with the exception of the battery box, is completely enclosed in the fuselage and cannot be tampered with without cutting away some of the balsa covering. This means a perfect ignition must be installed. The coil, on a balsa mount, is glued against the front of F2 for proper balance. All connections should be soldered and made with a good grade of stranded wire.

Cover the fuselage with 1/32" sheet to the rear of F3, covering over the battery box. Cut out the opening later. Glue the lower nose block in place and hollow out to permit the motor to swivel. Shape the outside of the block. At this point glue the 1/4" sheet sub-rudder and wire wing hooks in place. Sand the entire fuselage.

The pylon is covered with wet silkspan or silk. The rest of the fuselage is covered with wet silkspan. The author found red to be the choice colour, since it can readily be seen against both sky and ground. However, since only white silkspan was obtainable the author dyed this with red curtain dye. Try it, its swell!

WING: First draw wing plan to full size. Note that the wing has no taper and the tips are perfect half circles that may be drawn with a 4" compass radius.

The ribs are spaced 3" apart. Cut out 13 ribs to the size given in the plan. Since the ribs are identical, place them in a vise and sand as a unit. Do this before cutting out the notches. Next cut the wing tips out of 3/16" sheet. The tips are then glued to the 3/16" by 3/4" notched trailing edge. Allow to dry. Place this on plan and pin down trailing edge only.

Put ribs into position. Elevate the 1/4" square pine leading edge 3/16" off the plan and glue to ribs. Now raise the front of the wing tip to meet the leading edge and glue in place. Whey dry remove from plan and crack joints for polyhedral.

Then put in 3 spars and brace the centre spar with 1/8" plywood gussets at the joints. Cover the leading edge of the wing up to the top spar with 1/32" sheet balsa. 1/32" by 1/4" capstrips are added on the top and bottom of all ribs. Note that the capstrips terminate at the trailing edge. A small piece of pine fitted into the centre of the trailing edge acts as a reinforcement against chafing by the rubber wing tie.

Thoroughly sand all parts of the wing and cover with double tissue or silkspan. However, if double tissue is used be sure to cross the grain of the layers.

STABILIZER: Here again simplicity was maintained to the greatest extent. Since the elevator is a perfect ellipse with its major axis on the spar it will not be necessary to make a squared-off diagram of it. If the builder doesn't prefer the following method he may proceed to draw the elevator from the plan by enlarging it 4 times. However, the following is advisable:

Draw a straight line. Mark off the span of the elevator. Construct the perpendicular bisector of this distance. From the intersection of these two axis swing a semi-circle above the major axis with a radius of 2-3/4". From the same point swing another semi-circle below the major axis with a radius of 4-1/4". Divide radius into any number of parts and semi-span into a corresponding number of parts. With dividers take distance "AB" and lay off on elevator plan as labelled. Mark off the points as shown. Complete with a french curve for the tips and a slightly bent strip for the rest.

Note that the elevator has a lifting section. The airfoil in this section is not critical and is constructed very simply. The main spar is 3/16" by 1/8" and tapers to the tip as shown on the plan at which point it is 3/16" square. The taper is from the top, the bottom of the spar remaining flat. The outline is of 3/16" sheet, and all the ribs are 1/16" sheet. The leading edge is hard 1/4" square.

After the main spar is shaped, pin it to the plan. Cut the tip and trailing edge outline to shape and pin to the plan. Add the leading edge and cement all joints. Ribs vary in camber according to the taper of the spar. These ribs are only as high as the spar and are cut in two pieces, one extending from the leading edge to the spar, the other from the spar to the trailing edge. Do not form them until they have been cemented in place and the cement has thoroughly dried. After it has dried take a sanding block and a little elbow grease and sand the ribs to shape. Note that the finished product is a slightly lifting airfoil.

RUDDER: The rudder is conventional. The outline is 3/16" sheet and the spars are 3/16" square. When the assembly is dry sand the leading and trailing edges to a streamlined section. Cement to the elevator after both units have been covered.

SWIVEL MOUNTS: Motor mounts are made of hardwood and are bolted to the pine crutch with a single bolt to permit the motor to swivel in the case of a hard landing. There is no necessity for a peg in the rear of the mount if the bolt is properly tightened. This will usually save the prop in the case of a rough landing.

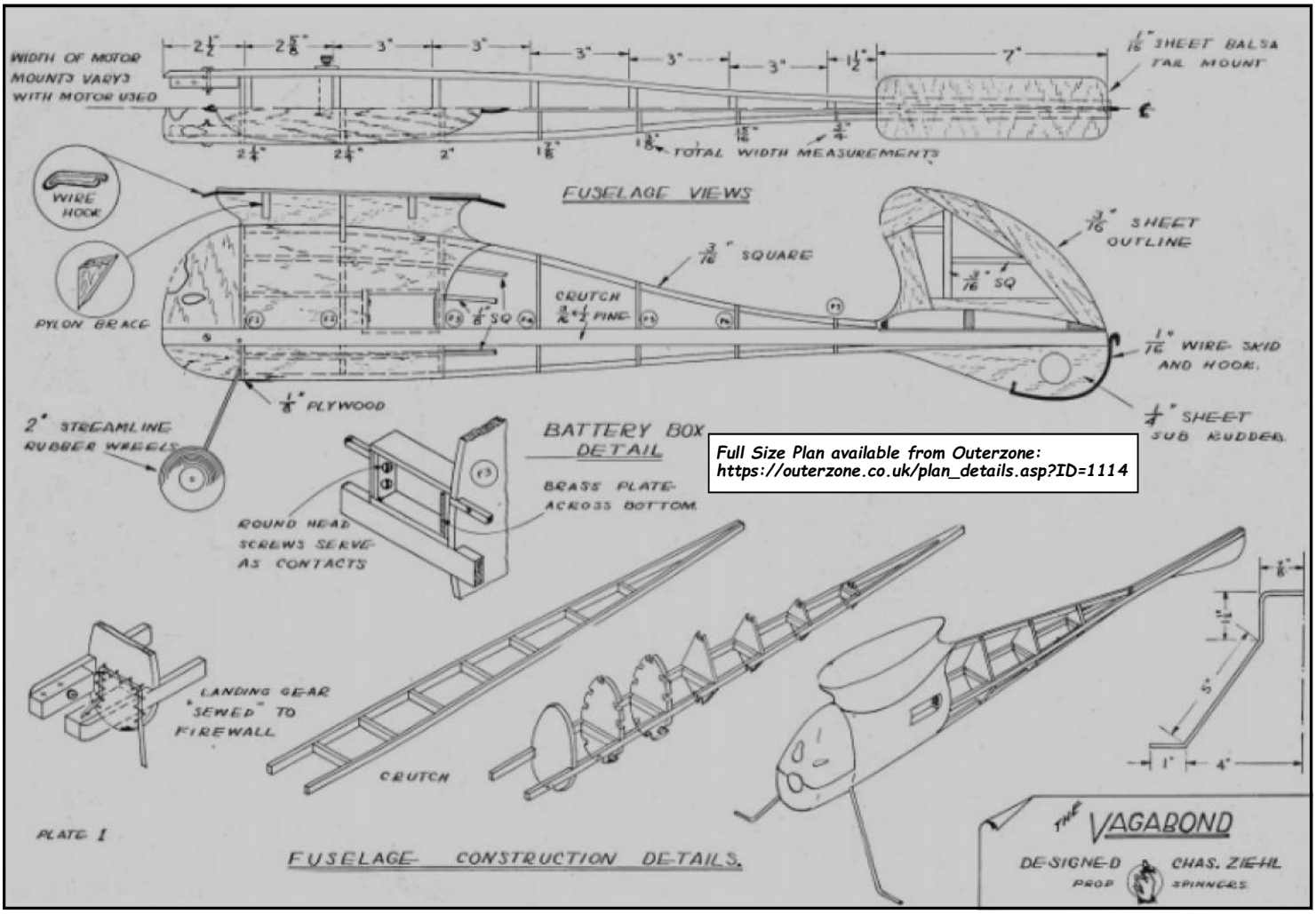
COWLING: The cowling is drawn to scale making it necessary to enlarge the drawing. (Note) The cowling shown in the drawings is for a Bantam engine. Slight alterations may be necessary if another engine is used. The cowl is best carved from a single block. After squaring two edges, lightly glue the block against the

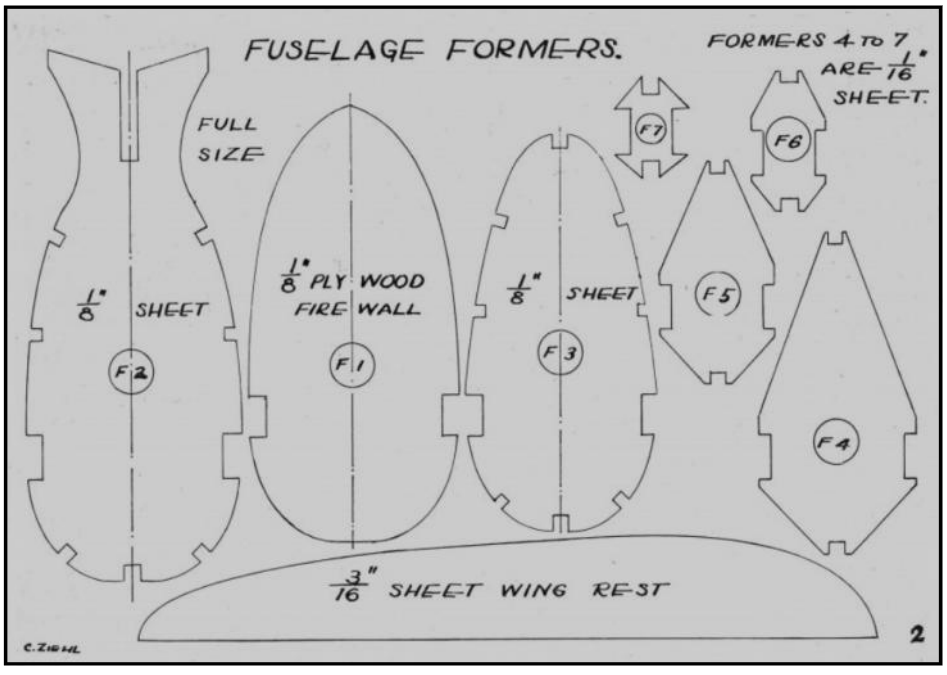
firewall and the motor bearers and shape the outside. Remove and hollow to a wall-thickness of 1/4" all around. A layer of tissue and several coats of coloured dope finish the job.

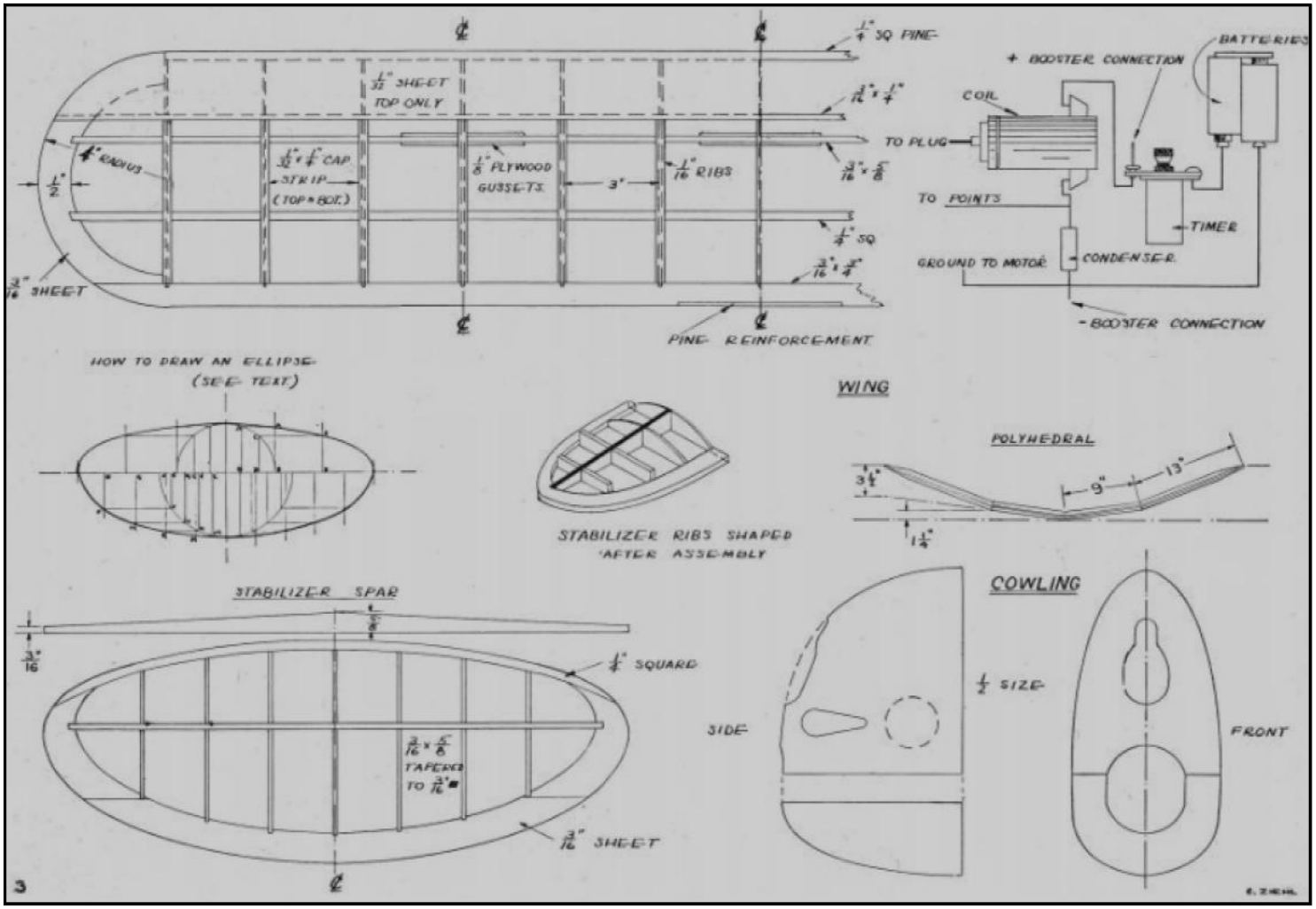
FINISHING: Be sure to sand all exposed wood surfaces thoroughly before doping. The wing and tail require three coats of dope and the fuselage about five coats of dope. Coloured dope is used on the nose block and silk pylon to insure oil-proofing.

FLYING: Glide the model several times, adjusting the rudder until a slight right turn is obtained. For the first power flight set the timer for ten seconds and use very low power. Under power the model should climb to the left and circle to the right. The only adjustment necessary may be a slight amount of down thrust which can easily be taken care of by loosening the two motor mount swivel bolts, tilting the engine and re-tightening the bolts.

If you have followed the instructions and made your adjustments carefully you now have a model that will afford you hours of enjoyment and an excellent chance in any contest.







From Phil Bolderson. Courtesy of Sticks & Tissue.

As mentioned last time we conversed, I've been slowly building a modest 'fleet' of early R/C aerobatic models.

Having reached the conclusion that I can no longer 'do' C/L and, despite having several of the beasts, I find that I am actually am not too fond of gliding, a reversion to type seemed logical.

Once the 'conversion' to C/L occurred in the early sixties and the progression was made to what control line fliers now call 'Precision Aerobatics' via combat flying, having moved on to aerobatic flying little else has been considered.

Indeed, although it didn't end up that way, when I started learning to fly aircraft one could sit in, it was with the intention of doing that too for sporting reasons. Before moving on to commercial stuff I did several seasons of aerobatic competitions, starting off on Stampes and the little Fournier RF4 before buying an unlimited machine, which allowed one to progress on to the higher levels of competition. None of which has much to do with aeromodelling, besides which I really wasn't that good at the 'full-size' competitions.

The enclosed files should show two of the current projects - photographed just now between showers, so, apologies if they aren't terribly good - the Astro-Hog isn't very photogenic at the moment so I didn't bother to photograph it.

The "Kwik-Fli" is one model I never 'got around to', back in the day, so was a logical place to start. This one was put together from the long deleted Graupner kit and took a bit of tracking down. It's powered by a brushless outrunner motor of French manufacture that one of my clubmates was importing at the time; swinging a 13" 'Xoar' electric wooden prop. The metal 'gizmo' you may be able to see poking out of the cowling is a Great Planes cradle-mount for the motor. The model came out encouragingly light and, powered by only a 2700mAh 6S pack of Thunder Power's 25C LiPo's, it is pretty ballistic. With sensible use of throttle, flights of seven minutes plus are easily attainable.

The "Caravelle" is a model I always rather fancied back in the sixties but could never quite justify building.

This one too comes from a long deleted Graupner kit and was so light that it is only powered by a mid-size Axi brushless outrunner; running on only three cells. Of course the arithmetic has to balance and the 3S packs for the Caravelle weight virtually the same as the 6S packs for the Kwik-Fli. As Axi sell rear-mounts for most of their motors everything fits neatly inside the cowling of the Caravelle and there is a 12X6 Xoar on the front.

The designer of the Kwik-Fli is pretty well known as he was also responsible for the Kraft Radios which bore his name.

The designer of the Caravelle is, by comparison, almost an unknown. This is something of a pity as Gustav Samann, of

Germany, was quite a modeller in his day. In 1955, aged 28, he was World "Wakefield" Champion and he obviously came from a modelling family as his wife had placed 8th in 1953; also in the World Wakefield Championship of that year.

In the R/C Aerobatic World Championships, held in Switzerland in 1960, he placed second with a model which is clearly the forerunner of the Caravelle design.

When the WAC 1962 was flown at Kenley in England Gustav Samann was flying the Caravelle and placed seventh; two places behind Fritz Bosh - whose name may be more familiar to British modellers, like Phil Kraft and for similar reasons.

Gustav Samann died aged 84 in 2006 but his design lives on.

ETA 15D

Ron Warring test - Aeromodeller - December 1960

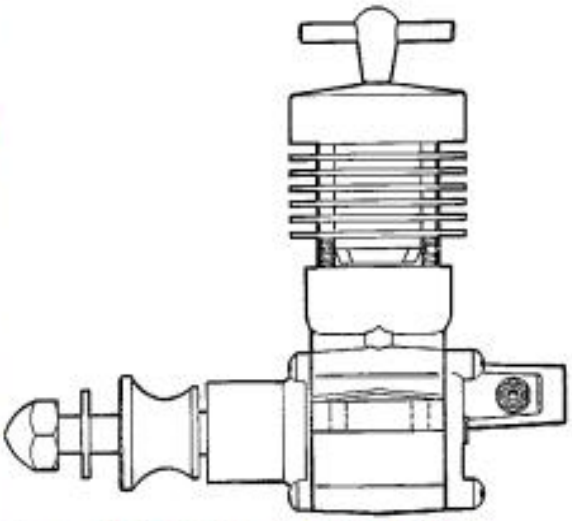
Heaven alone knows how many man-hours have been spent on design and development in the 2.5 cc class, striving for that little extra in performance. A world standard was set several years ago with the Oliver Tiger whose performance, in the tuned version, has been the "figure to beat". Several manufacturers have come close, to the point of claiming comparable performance, but no other engine has yet replaced the Oliver as the standard of 2.5 cc performance. Such is the merit - and reputation - of that original design. The ETA 15D would appear to be the exception. Direct comparison of different makes of engines is normally avoided, but since the Oliver is as much a tradition as a commercial product, it must be justified in this case. The ETA has obviously been designed and developed to set a new, higher standard in the 2.5 cc diesel class and, on our test figures, it achieves this rating. Without in any way flattering the performance a peak bhp of .345 was achieved on test at 16000 rpm, power output being all the more remarkable for the high figure achieved right through the rpm. range tested. Nor do we think this outstanding figure to be peculiar to a specially picked out engine for test. The superb handling and running qualities, together with the general design and construction, speaks of a layout which should be consistent throughout a production batch with some proving even more outstanding. All this, too, is achieved on a production model which does not require special tuning, largely due to the unique method of producing the cylinder as a casting.

The cylinder in EN8 steel is produced as an investment - moulding which is a highly accurate method of duplicating the finished form required. Thus the final porting required, complete with chamfered lead and overlap, is produced in the one casting, eliminating the additional machining and hand work commonly called for in reworking a "tuned" engine. Four shallow transfer passages run up the outside of the cylinder opening into deep, rectangular ports angled upwards to overlap the exhaust ports by some 85 per cent. Four exhaust ports are formed in the cylinder flange, transfers opening into the "pillar" areas, as is conventional practice. Location of the pillars against the screw hole on the crankcase casting ensures that the cylinder transfer passages match the cast-in passages in the crankcase itself. Reworking of the cylinder after casting consists of hardening and grinding, inside and out, followed by honing the bore to extremely close limits. The bore is very well finished and truly circular whilst the general rigidity of the cylinder itself ensures freedom from distortion. Cylinder o.d. at the top is nominally .75 inches, and at the bottom .685 inches, giving some 90 thou. upper wall thickness and 60 thou. bottom wall thickness. The flange locates in the crankcase casting and the cylinder is held down by four screws through the finned jacket.

The piston is of Meehanite, flat topped and with relatively thin walls. Bosses are machined to provide a generous bearing surface for the 3/16-in. diameter hollow gudgeon pin, the latter being a press fit. The contra piston is also of Meehanite, a rather unusual feature being that the bottom surface is domed (i.e. concave). Designer Ken Bedford says that this was found to provide a sort of "cushion" effect to minimise any tendency for the engine to start backwards. In point of fact experiments have shown that a concave contra piston surface with a flat topped piston usually tends to promote smoother running generally, so there are definite advantages to this form. The compression screw is large (1/4 in. diameter) and hollow with a somewhat bulbous top and short tommy bar. It gets painfully hot for adjustment for bench running and could possibly be lengthened,

or the tommy bar lengthened, with some advantage (to the operator). The connecting rod is machined from solid and is of circular section with bronze bushed big and little end bearings. An oil hole is provided in the big end bearing. A spacing washer is included on the gudgeon pin, presumably to limit any movement in this direction so that the connecting rod can never foul the rotor.

Piston assembly on the original production models, incidentally, differed in that the gudgeon pin was retained within the piston thus presenting an unbroken rubbing surface. Adhesive bonding with Araldite was used on the piston assembly, giving satisfactory results. The limitation was that if a replacement connecting rod was called for, this necessitated a new piston and matching cylinder as well. Hence the more conventional assembly now standard.



The crankcase is a really clean lightweight yet sturdy casting, with transfer passages already incorporated (and presumably calling for a collapsible core during casting). Very little machining is done on this unit. The front cover and bearing housing is a separate casting into which are press-fitted a standard heavy-duty ¼-in. Hoffmann ball-race for the rear bearing and a lightweight ¼-in. ballrace for the front bearing. An intermediate bearing surface about half the distance between the ball races appears to provide an adequate oil seal although this is actually a very loose fit and hardly rubbed (it is, in fact, roughly finished and obviously not intended as a rubbing surface). The back cover is a hard aluminium casting, anodised black. This incorporates the choke tube with venturi entry and the housing for the rear rotor. The rotor, machined from Tufnol, is mounted on a steel pin screwing into the back cover with a left hand thread and with a shoulder depth allowing a generous clearance fore and aft. Rotor timing gives port opening about 50° after BDC, closing at 45° after TDC. A neat touch is the raised lip on the rotor housing and the accurate running fit of the rotor in the housing. Both front and rear covers are a tight "plug" fit into the crankcase casting and each are held with four Phillips head screws. Gaskets are used to provide a seal. The crankcase is symmetrical so the covers can be assembled either way round. Mounting lugs are of very substantial section. The crankshaft is machined from 8% tungsten steel, hardened and then core-refined to relieve brittleness. Main diameter is ¼ inch, stepping down to 3/16 inch diameter and tapped with a 2 BA thread. The shaft is ground between centres to finish. Crankpin and web are also ground, the web being shaped with a crescent-form counter-balance. The dural propeller driver locks on a steel collet on the 3/16 inch diameter length whilst the propeller nut takes the form of a 3/16 inch diameter sleeve and spinner nut combined, screwing onto the threaded length of shaft. The length of sleeve needs cutting down considerably to accommodate free flight propeller sizes, unless washers are used to pack out the propeller hub.

Workmanship throughout is of the highest order and particular attention has been given to arriving at accurate and consistent running fits. The piston-cylinder fit is slack by diesel standards and, in fact, there is a virtual absence of compression on a run-in engine. This in no way detracts from starting performance and can only be beneficial as far as running friction is concerned. Starting and

handling characteristics are first rate. Despite the fact that the ETA 15D is a racing engine, it is as easy to start and adjust as a "beginner's" type, and it has virtually no vices in this respect. The controls, too, are particularly non-sensitive and the engine can be brought "on tune" with a minimum of delay or trouble. Hand-starting remained easy and positive, even with 7-inch diameter propellers. With the compression backed well off, the engine invariably picked up in a few flicks after finger-choking and then brought to best running by the compression screw. Faster running demanded a slight increase in needle valve opening, but otherwise this control could be left very much alone. The needle is of the straight-through type instead of the usual spraybar with needle housing screwing into one side of the venturi and the fuel connector and jet into the other side, diametrically opposed. A smaller nipple size, incidentally, would make it easier to fit standard size fuel tubing.

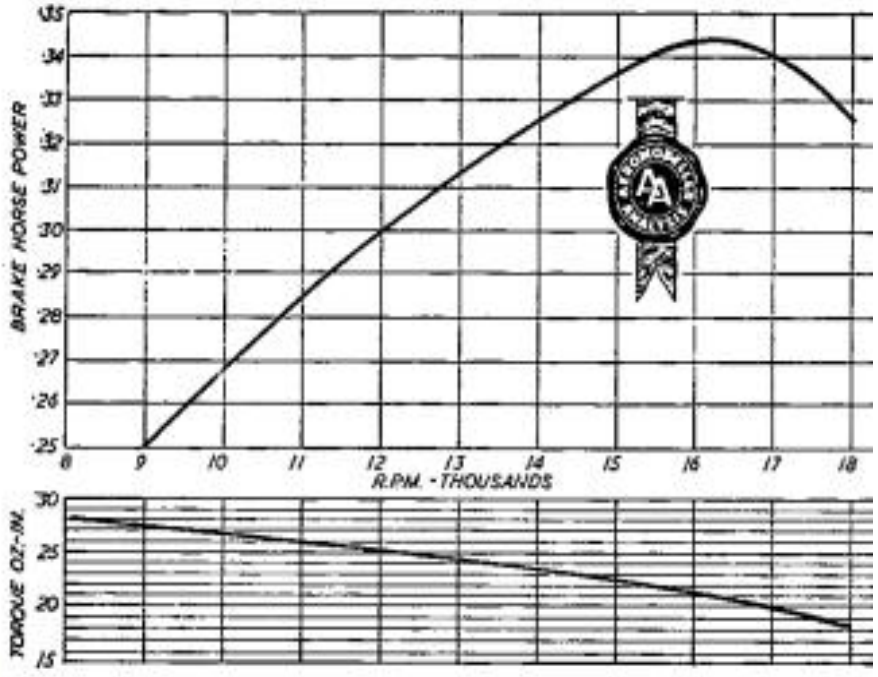
Running at all load speeds was exceptionally smooth and steady. The speed range tested with propeller loads was from 8000 rpm to 18000 rpm and the ETA was just as happy at either end. Its capacity to swing a large diameter propeller is outstanding whilst the sweetness of running at 15000 rpm and above showed that it had all the desirable qualities of a good racing engine. We have seldom experienced an engine in the high power class which did run so well and requireso little adjustment to get on tune.

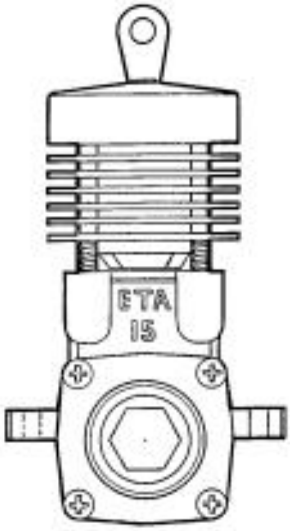
Summarising, the name ETA alone is a guarantee of high quality workmanship and good performance, but the test figures speak for themselves in that here is outstanding performance in the 2.5 cc class. It would appear to be a "preferred" choice for both free flight and control line contest work, but its handling and running characteristics make it an equally excellent choice for any modeller. And the contest boys, in particular, get "tuned" motor refinements at the normal production price. The only point we would dare to criticise on this outstanding engine is the crankshaft. This does appear rather on the small size, with consequent risk of breakage in "rough and tumble" handling.

PROPELLER—R.P.M. FIGURES

Propeller dia. x pitch		*r.p.m.*
11 x 4	Trucut	8,800
10 x 6	Trucut	8,600
10 x 4	Trucut	9,000
9 x 6	Trucut	9,800
9 x 4	Trucut	11,900
8 x 6	Trucut	11,500
8 x 4	Trucut	15,400
10 x 6	Frog	9,200
9 x 6	Frog	10,800
8 x 4	Frog	14,600
9 x 6	Keil	9,300
9 x 4	Keil	13,000
8 x 6	Keil	12,600
8 x 4	Keil	15,000
7 x 6	Keil	18,000
9 x 5	Stant	10,400
9 x 4	Stant	11,800
11 x 4	Top Flite	8,600
10 x 3½	Top Flite	10,400
9 x 6	Top Flite	9,800
9 x 4	Top Flite	12,200
8 x 6	Top Flite	12,400
8 x 4	Top Flite	15,300

Displacement: 2.48 cc (15 cu. in.).
Bore: .558 in.
Stroke: .620 in.
Bore/Stroke ratio: 1.1:1.
Bare weight: 5¾ ounces.
Max. bhp: .345 at 16000 rpm.
Max. torque: 28.5 oz-inches at 8000 rpm.
Power rating: .153 bhp per cc.
Power/Weight ratio: .06 bhp per ounce.
Manufacturers: ETA Instruments, 289 High Street, Watford, Herts.
Retail Price: £5 1s.0d. + 18s 11d. PT.
Fuel used: Paraffin 50%, Ether 30%, Castor Oil 20% + 3% Amyl Nitrate.





Material specification:
Crankcase: Light alloy die-casting.
Front cover/bearing housing: Light alloy die-casting.
Rear cover/rotor housing: Light alloy die-casting (anodised black).
Cylinder: EN8 steel investment casting, hardened, ground and honed.
Piston: Meehanite.
Contra piston: Meehanite.
Con. rod: Dural
Crankshaft: 8% tungsten steel, hardened and ground.
Main bearings: ¼-in. heavy duty ball race (rear), ¼-in. light duty ball race (front).
Prop. driver: Dural (collet lock) (anodised red).
Cylinder jacket: Dural, anodised light blue.
Needle valve: Jet and needle housing brass, nickel plated: nickel plated thimble and spring ratchet lock.
Compression screw: Hollow, light alloy (anodised black).

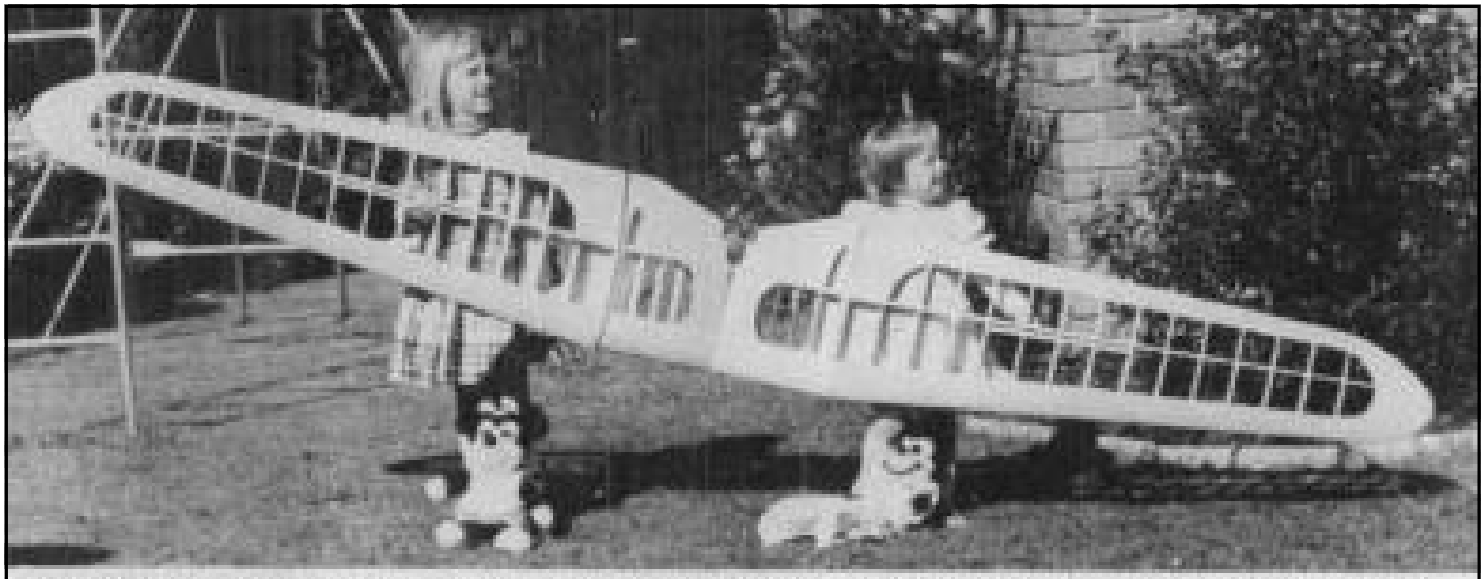


Photo No. 4. Lynette and Judith Buckmaster, daughters of *Airborne* model magazine editor Mervin Buckmaster, show off the wing of their Dad's latest project, a Shereshaw XP-3.

An Engineer dies, and goes to Hell. Dissatisfied with the level of comfort down there, he starts designing and building improvements. After a while Hell has air conditioning, flush toilets and escalators. The engineer is a pretty popular guy. One day God rings down and asks Satan,"So, how's it going down there?" Satan says, "Hey things are going great. We've got air conditioning and flush toilets and escalators, and there's no telling what this engineer is going to come up with next." God is horrified. "What? You've got an engineer? That's a mistake - he should never have gone down there! You know all engineers go to Heaven. Send him back up here!" Satan says, "No way. I like having an engineer on the staff.. I'm keeping him". God says, "Send him back up here or I'll sue". "Yeah, right," Satan laughs, "and where are you going to find a lawyer?"

At the Golf Club.

Several men are in the locker room of a golf club. A mobile phone on a bench rings and a man picks it up with the speaker phone on and begins to talk. Every one else in the room stops talking.

MAN: "Hello."

WOMAN: "Hi Honey ,it's me. Are you at the club?"

MAN: "Yes."

WOMAN: "I'm at the shops now and found this beautiful leather coat. It's only $ 2,000. Is it O K if I buy it."

MAN: "Sure go ahead if you like it that much."

WOMAN: "I also stopped by the Lexus dealership and saw the new models. I saw one I really liked."

MAN: "How much?"

WOMAN: "$50,000."

MAN: "OK, but for that much I will want it with all the options."

WOMAN: "Great! Oh, and one more thing ... I was just talking to Kate and found out that the house I wanted last year is back on the market. They're asking $980,000 for it."

MAN: "Well then, go ahead and offer them $900,000. They'll probably take it. If not, we can go the extra $80,000 if its what you really want."

WOMAN: "OK. I'll see you later! I love you so much."

MAN: "Bye! I love you too."

The man hangs up. The other men in the locker room are staring at him in astonishment, mouths wide open.

He turns and asks, "Anyone know who's phone this is?"

TRIVIA

Drones In Australia are frequently damaged by?

Aboriginal Hunters	Sugar Gliders
Kangaroos	Eagles

Answer →

Answer: *Eagles*

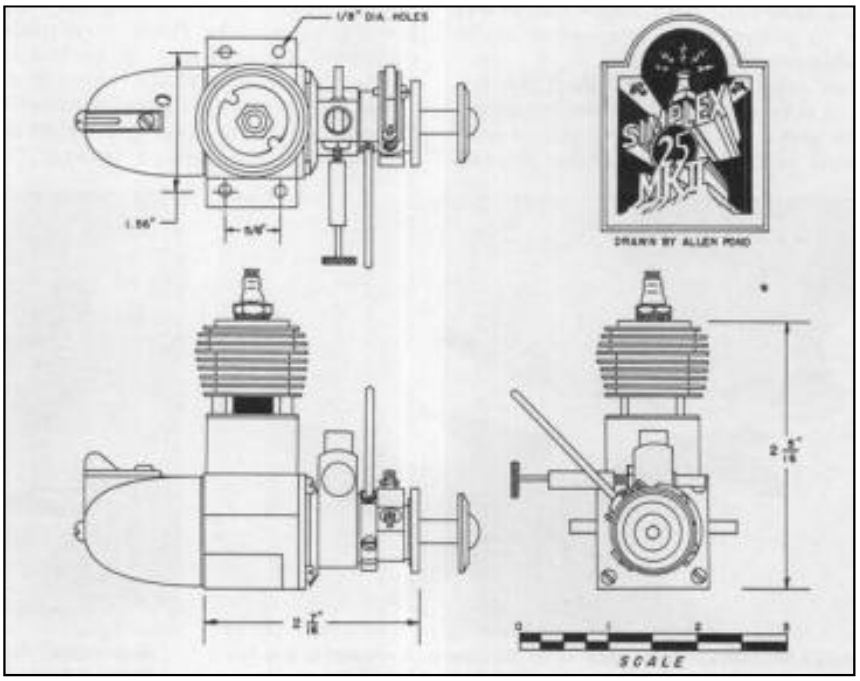
Australia is home to a wide range of interesting animals, including the large wedge-tailed eagle. The eagles typically weigh around nine pounds and have an average wingspan of about eight feet. These dark-coloured eagles use their massive wingspan to full advantage and often spend hours upon hours gliding at high altitudes (often a mile or more above the ground).

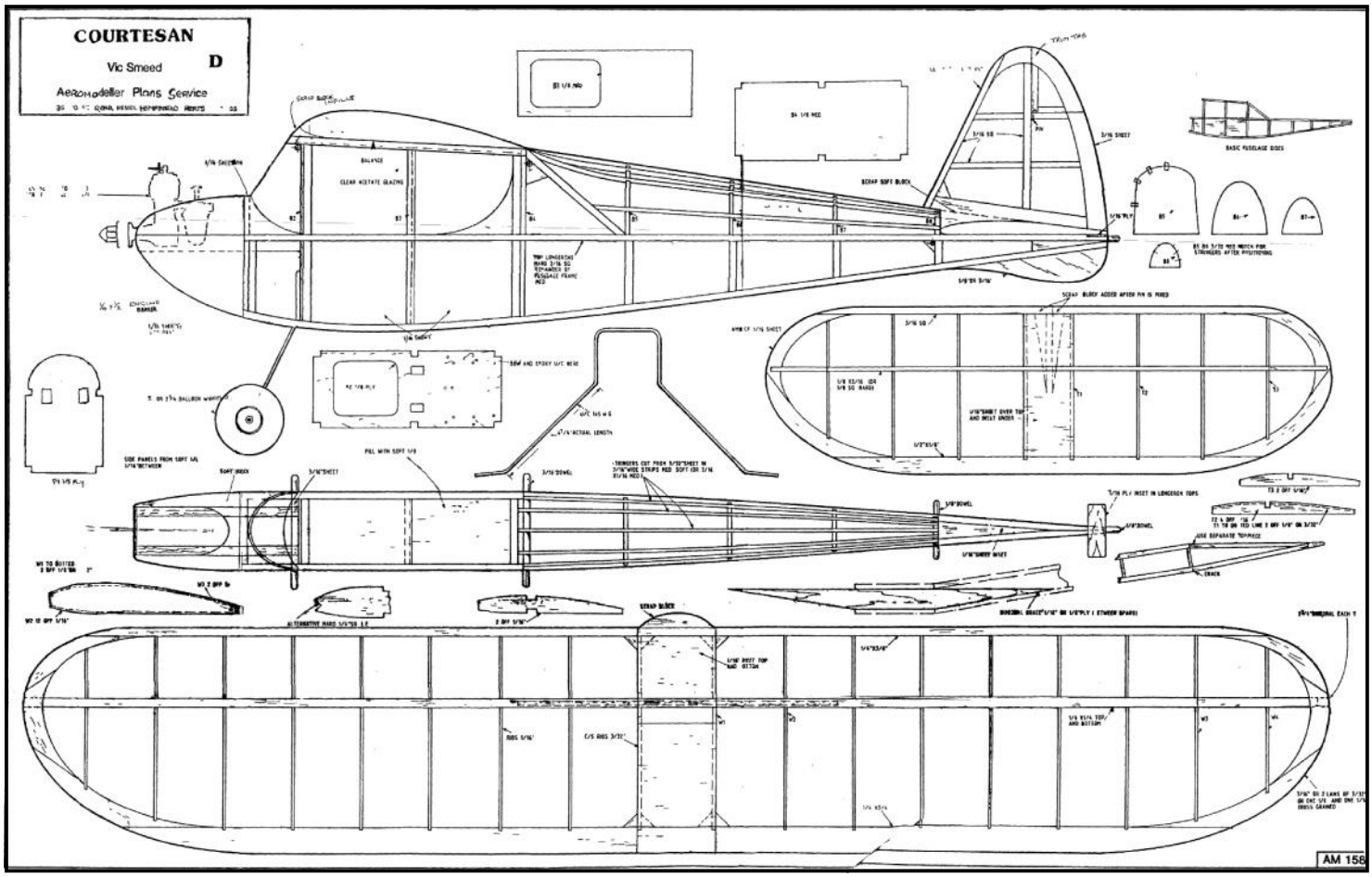
Wedge-tailed eagles are fearsome predators and the largest bird of prey found in Australia. They'll eat everything from small animals like rabbits to larger animals like small kangaroos. In addition to their size and status as the largest aerial predator on the continent, they're also very notable for their territorial aggression. Each breeding pair maintains a large territory around their nesting spot that can range from four to forty square miles in size. The wedge-tailed eagles are nothing if not fierce when it comes to defending the boundaries of these territories and will attack anything they perceive as a threat including not just other birds, but paragliders, radio-controlled planes, and survey drones.

The latter are used extensively to survey Australia, but over the last few years, eagle attacks have damaged countless drones. The eagles dive-bomb the drones and tear into them with razor sharp talons, a manoeuvres that is both costly (many of the drones can cost up to $80,000) and potentially catastrophic to the already endangered species - the birds are used to attacking soft targets like other birds, not giant rigid structures like the large mining drones. As a result, the survey companies have tried a variety of tactics to deter the attacks including changing the colours of the drones and flying them at different hours of the day, but so far to little avail.

"Say that again. I open what? Then click on what? Then type in what? Then save to what...?"

Ser. No. 47 of the 50 Mk II Simplex engines built and being sold by John Morrill. Text has details. Morrill photo.





PDF Plan: https://outerzone.co.uk/download_this_plan.asp?ID=7680

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RED RIPPER

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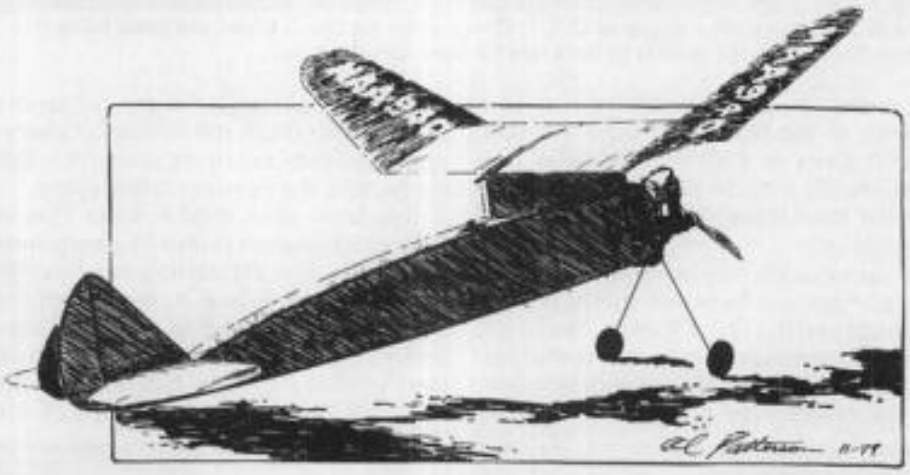


OLD TIMER Model of the Month

Designed by: Jerry Peeples

Drawn by: Al Patterson

Text by: Phil Bernhardt

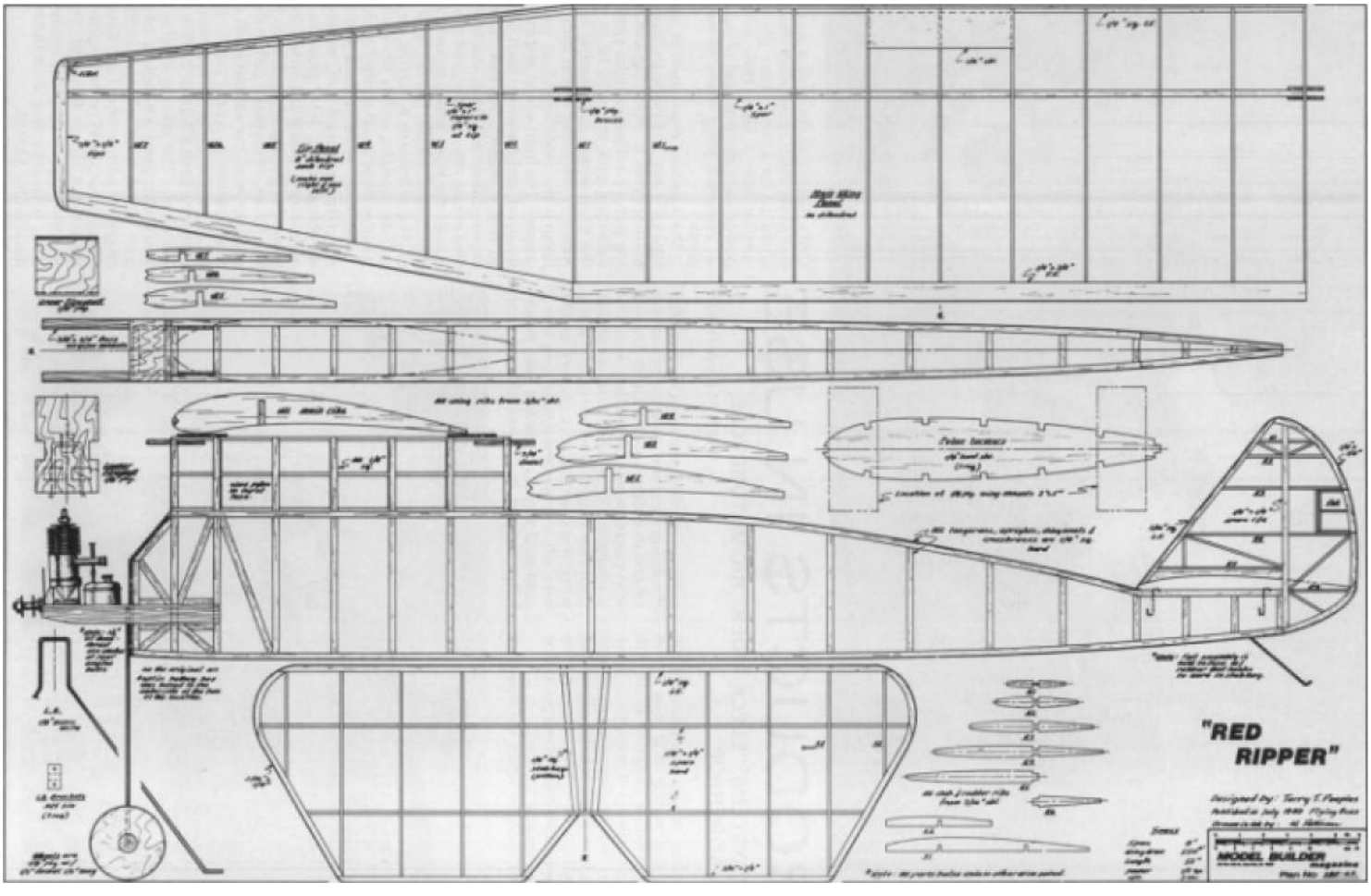
****

• The Red Ripper is a seldom seen gas job from the July 1940 issue of *Flying Aces*. Jerry Peeples was the fellow responsible for it, and I suspect that Jerry designed the airplane only to be functional and simple to build, because if there is any part of the model that is pretty, I must have missed it. When you get to studying it, though, the Red Ripper looks like it could be made to fly pretty darn well. It has lots of wing area, a highly undercambered airfoil for a good glide, and a fairly light framework that shouldn't make it too hard to get the model down to the 8 oz. minimum wing loading.

The Red Ripper's structure, though light, is a bit on the crude side even for 1940. One design feature that could be a potential problem is the rather sharp bend of the top fuselage longeron as it goes back toward the tail. We would definitely recommend laminating the longeron out of at least two pieces of 1/8x1/4, preferrably four pieces of 1/16x1/4, so that it has the required curve built in. Otherwise, if you use a regular piece of 1/4-inch square, the fuselage side will be under considerable stress and will go *SPROING!* as soon as you take it up off the board, and it won't look like a Red Ripper anymore.

Another part of the model that needs a little fixing up is the pylon. This is a paper or silk-covered open structure affair that is built separately from the fuselage, then is *glued right to the fuselage top without any sort of tie-in structure at all!!* This, of course, is just asking for trouble, especially if the model happens to loop under power. We wouldn't want to be around when it happens.

If you decide to build a Red Ripper, we'd be interested in finding out how it performs. Send a photo, if possible, and while you're at it, let us know what Old Timers you would like to see featured in future issues. •

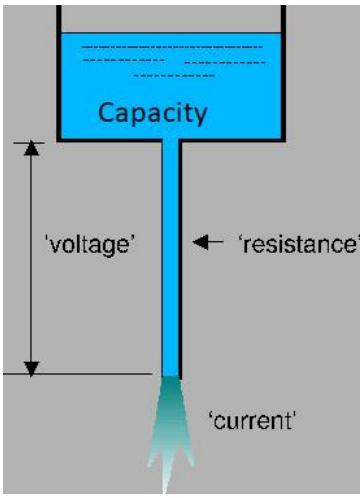


LiPo Batteries and Safety for Beginners

John Reade January 9, 2018

Electrical Basics

The most important terms to understand in an electrical circuit is **voltage**, **resistance**, **current**, and **power**. A simple analogy used to understand these terms. Think of the battery's circuit as a pipe we are trying to pump water through, like the picture:



- Voltage is the *water pressure* that is pushing the water down the pipe. Voltage is measured in volts and represented as V
- Resistance is the *size of the pipe*. If the pipe is wider, more water will flow through. When the pipe is smaller, there is more resistance. Resistance is measured in ohms or Ω.
- Current is *how much water* comes out of the pipe. Current is measured in amperes, amps or A.

If you know any of the 2 numbers you can calculate the third:

- Voltage = current x resistance
- Current (Amps) = voltage /resistance
- Resistance = voltage /current

Another important concept is **electrical power**. This is simply voltage x current. Think back to the water analogy: you're taking the voltage, or the water pressure, and multiplying it by the current, or how much water is actually coming out. Power is a measure of **how 'hard' the water is coming out of the pipe.**

Why is this important? It tells us how much work we can actually do with the electricity.

Imagine you're trying to put out a fire with a firehose.

- If a lot of water comes out of the pipe but comes out slowly (no pressure), then you can't put out a fire.
- If the water comes out quickly but there's very little water, then you can't put out a fire.
- If the water comes out quickly (**high voltage**) AND there's a lot of water (**high current**), then you can put out a fire.

Electrical power is like the ability of your firehose to put out a fire. Power is measured in Watts (W).

- Watts = Volts x Amps
- Amps = Watts / Volts
- Volts = Watts / Amps

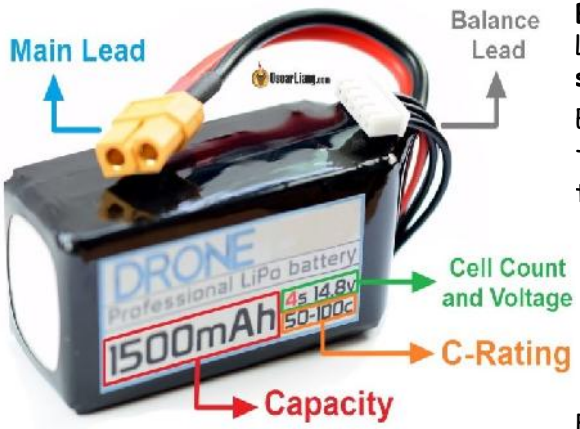
Another important item to know about electrical systems is the difference between a **series** and **parallel** circuit.

- In a **series** circuit, the current through each of the components is the same, and the voltage across the circuit is the sum of the voltages across each component.
- In a **parallel** circuit, the voltage across each of the components is the same, and the total current is the sum of the currents through each component.

LiPo Battery Basics

Lithium polymer batteries, more commonly known as LiPo, have high energy density, high discharge rate and light weight which make them a great candidate for RC applications.

By learning the basics about LiPo batteries, you will be able to read and understand their specifications.



Battery Voltage and Cell Count (S)

LiPo batteries used in RC are made up of individual **cells** connected **in series** so the battery's voltage is the sum of the voltage of the cells.

Each cell in a standard LiPo battery has a nominal voltage of **3.7V**.

Therefore battery voltage is often referred to as how many cells in the battery (aka "S")

1S	=	1 cell	=	3.7V
2S	=	2 cells	=	7.4V
3S	=	3 cells	=	11.1V
4S	=	4 cells	=	14.8V
5S	=	5 cells	=	18.5V
6S	=	6 cells	=	22.2V

For example, we call a 14.8V battery a "4-cell" or "4S" battery.

Voltage affects brushless motors RPM directly, therefore you could use higher cell count batteries to increase your model's speed if your motor/ESC and other electronics support higher voltage. But a battery with more cells of the same capacity is heavier since it contains more cells.

- A LiPo battery is designed to operate within a safe voltage range, from **3V to 4.2V.**
- **Discharging below 3V could cause irreversible performance lost and even damage to the battery.**
- **Over-charging above 4.2V could be dangerous and eventually cause fire.**

However it's advisable to stop discharging when it reaches 3.5V for battery health reasons. For example for a 3S Lipo, the max voltage is 12.6V, and you should land when the voltage reaches 10.5V (at 3.5V per cell).

LiPo Battery Capacity and Size

The capacity of a LiPo battery is measured in mAh (milli-amp hours). "**mAh**" is basically an indication of how much current you can draw from the battery for an hour until it's empty.

For example, for a 1300 mAh Lipo, it would take an hour to be completely discharged if you draw a constant 1.3A current from it. If the current draw doubles at 2.6A, the duration would be halved (1.3/2.6=0.5). If you draw 39A of current non-stop, this pack would only last 2 minutes (1.3/39=1/30 of an hour).

Increasing your battery capacity might give you longer flight time, but it will also get heavier in weight and larger in physical size. There is a trade-off between capacity and weight, that affects flight time and agility of the aircraft.

Higher capacity could also give you higher discharge current as you will see in the next section.

C Rating (Discharge Rate)

Lipo batteries for models these days all come with a C rating. By knowing the C rating and capacity of a battery, we can calculate the safe, continuous **max discharge current** of a LiPo battery.

Maximum Discharge Current = C-Rating x Capacity

For example an 1300mAh 50C battery has an estimated continuous max discharge current of 65A.

Some batteries come with two C-ratings: "continuous" and "burst" ratings. The Burst rating is only applicable in short period of time (e.g. 10 seconds).

Although C rating could be an useful tool, it has become mostly a marketing tool and is not always accurately reported.

If C rating is too low, the battery will have a hard time delivering the current to your motors, and your quad will be underpowered. You could even damage the battery if current draw exceeds the safety rating.

Connectors

Rule of thumb, the battery connector should match the one you are using on your model. If you don't own a model yet, choose one, and stick with it.

All Lipo batteries come with 2 sets of wires/connectors: a **balance lead** and a **main lead or discharge lead** (Except for 1S batteries which only have a main lead). There are quite a few different connectors used in LiPo batteries. The main differences are shape, weight and current rating.

1S Battery Connectors

1S connectors are tiny and have very low current rating. They are commonly used in brushed micro models.

LOSI (Typically cheaper "toys" have this connector

Pico blade ("The original "Tiny Whoop" connector)

JST-PH (Newer "Power Whoop" connector)

2S-6S Battery Connectors

You will find a lot more different types of battery connectors in this category, in fact not all are listed here. But majority of them are not used that often so you don't need to ever worry about them. For most models, the most popular connector is probably the **XT60**.

However since XT60 is only rated at 60A, and some models are running at higher and higher current and voltage, we might soon see a change in the popular connector used.

JST		**Mainly 2S**
CS30		**Mainly 2S and 3S**
CS60	**Similar to above only bigger**	**Mainly 3S and 4S**
CS90	**Similar but even bigger**	

HXT-4mm	
EC3	
EC5	**Similar to above but bigger**
Deans (T)	

Balance Lead

Balance lead is mainly used for balance charge to ensure all cell voltages are equal. It also allows you to monitor the voltage of each cell.

The number of wires in a balance lead starts at 3 for 2S LiPo, and for every increment in cell count, the number of wires also go up by 1.

LiHV

LiHV is a different type of LiPo battery, HV stands for "high voltage". They are more energy dense than traditional LiPo battery, and allow to be charged up to **4.35V per cell**. However there are mixed reviews out there regarding the longevity of LiHV, as they might have decrease in performance sooner than normal LiPo's.

When you charge LiHV batteries like standard LiPo to only 4.20V per cell, they perform pretty much similar. However when you charge them fully to 4.35V per cell you get the following advantages:

- With a fully charged HVLi battery, voltage is higher than normal LiPo's (on a 4S, HVLi is 17.4V, LiPo is 16.8V), therefore your motors will run harder at higher RPM, and your model can fly faster theoretically.
- Secondly, LiHV can store more energy than LiPo per weight, so theoretically (again) you get longer flight time. Hyperion (the company that makes these HVLi batteries I am testing) states there is a 10% increase in capacity than standard LiPo's of the same size and weight.
- Lastly, good quality HVLi has lower voltage sag on high throttle

Can you charge your normal lipo to 4.35V?

So you might wonder: "can I overcharge my normal lipo to higher voltage like 4.30V or even 4.35V, to get more power and longer flight time?" **The answer is NO!!!** That's extremely dangerous and very likely to cause fire because of the different cell chemistry.

How to Charge LiPo. Type of charging:

- **Balance charge** – The charger monitors the voltage of each cell, and can charge them individually while trying to keep them at the same voltage level. This is the safest and most recommended way of LiPo battery charging.
- **Direct charge** (fast charge) – You are charging through only the main lead, and the charger isn't monitoring the voltage of each cell. This is normally faster, but it could result in unbalanced cell voltages and the battery might not be 100% charged.
- **Storage charge** – The charger brings each cell of the battery to their storage voltage, which is 3.80-3.85V.
- **Discharge** – The charger attempts to drain the Lipo battery (very slowly, even slower than charging).

Why Balance Charge?

Every cell in a battery is slightly different. After the battery is discharged, you might find that the cell voltages are all different.

If we were to direct charge this unbalanced battery without monitoring voltage of each cell, chances are some cells might end up under 4.2V (not fully charged), and what would be worse, some might go **OVER 4.2V**. If you remember, LiPo cells should never exceed 4.2V or they will become dangerous. **Remember, overcharged = dangerous!**

Most decent modern Lipo chargers are programmable and allow balance charging, and they should take care of this automatically.

Safety Rules:

Incorrect handling of LiPo batteries could potentially cause fire. Please take your time to read through these safety rules before handling/charging batteries.

- Pick up a LiPo battery by its body, not the leads – the wires could be pulled off from the fragile solder joints.
- Charge at safe places – It's very important to find a fire-proof location to charge your batteries. Using a Lipo-safe bag is a good option, some even build a bunker for it. An ammo box is a cheap yet effective solution.
- Don't charge your battery immediately after using it, wait until it has completely cooled down.
- It's advisable to charge your battery at 1C or less.
- Never charge your battery unattended – regularly check if the battery is getting warm or starts to swell, if so stop charging immediately.
- Never use or charge a damaged battery – don't charge if it is swollen (puffy) or has any other visible signs of damage.
- Ensure the number of cells and battery type are set correctly on your charger to match the cell count and type of your battery.
- Don't overcharge, although this is normally taken care of by the charger, it is a good idea to check cell voltages regularly.
- Don't leave a battery in the sun or a hot car.

AERO MODELLER 156 April, 1959

PDF Plan: https://outerzone.co.uk/plan_details.asp?ID=1824

Pprincess

A 36 in. SPAN CONTROL-LINE AEROBATIC MODEL FOR A WIDE RANGE OF ENGINES FROM 1 c.c. to 2·5 c.c.

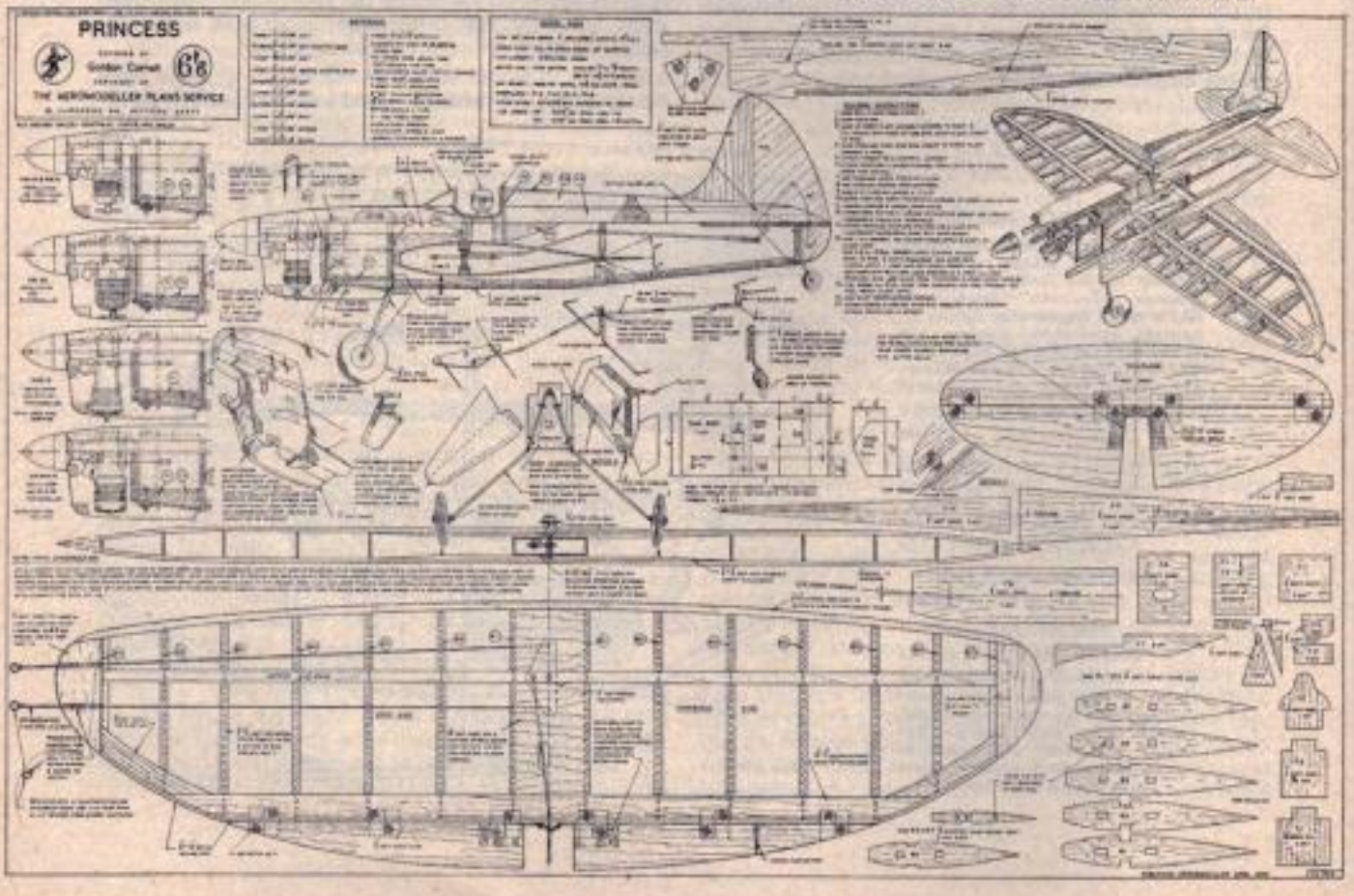
BY GORDON CORNELL

Super-detailed plans for this elegant design which has an enviable reputation for smooth flying on low power

"Princess" is one of the most advanced small stunt designs to date, and has been developed through a series of designs capable of completing the S.M.A.E. Stunt Schedule. The plans show the very latest version as flown in the World Championships at Brussels, 1958, where it earned plaudits for very smooth performance with such a comparatively small engine as the Frog 150. Whilst its appearance might suggest a difficult model to build, its construction is relatively simple making it eminently suitable for the intermediate modeller and since the plans are very comprehensive, let's get down to the facts that will make your model a success.

Almost any 1 to 2·5 c.c. engine is suitable, the originals have been powered by the new Frog 150R and a K & B15. If you choose to use 1 c.c. keep the weight down to approximately 13 oz. The tank may appear unconventional but it is theoretically correct; when a few more modellers use this type we will see far less overruns due to the engine leaning out—it gives most consistent feed in flight. Make the cowling exactly as shown on the

FULL SIZE COPIES OF THIS 1/7TH SCALE REPRODUCTION ARE AVAILABLE PRICE 6/6 PLUS 6d. POST AS PLAN CL724 FROM A.P.S.



plan giving plenty of airspace around crankshaft and cylinder, otherwise you will have the overheating troubles I experienced at Brussels.

A brief word on materials, select each piece carefully for the job it is to do, making sure it is the correct cut and texture as stated. Since balsa varies in weight from 6 lb.-16 lb. per cubic ft. here is the difference in weight between being light or heavy. There is a lot of balsa in this model, be careful. Use plenty of cement, it does not weigh enough to cause concern, at least not measurable.

When finishing, do not spare dope and *fuel proofer* since this little extra weight soon pays off. An under-doped or unproofed model soon suffers from ingress of fuel and up goes the weight above the well-finished model, at the same time becoming completely unreliable. Spare no expense, it is cheaper in the long run.

Flying the Princess is easy, but do not take any chances. The undercarriage shown on the plan is for *grass*, if the model is to be flown over tarmac fit a longer tailwheel assembly to make model sit almost level on ground (this tailwheel assembly will not allow the model to take off on grass so choose warily). Line length required will vary according to weight and speed should be between 45 ft.-50 ft. (It was flown in the Gold Trophy on 55-ft. lines.) Use only steel lines ·008 in. to ·010 in. diameter.

Use a good commercial grade of fuel and retain the same engine settings for starting and running for every outing, by so doing you will soon find reliability.

Enclosed cockpit for this Frog 150 variant of the Princess

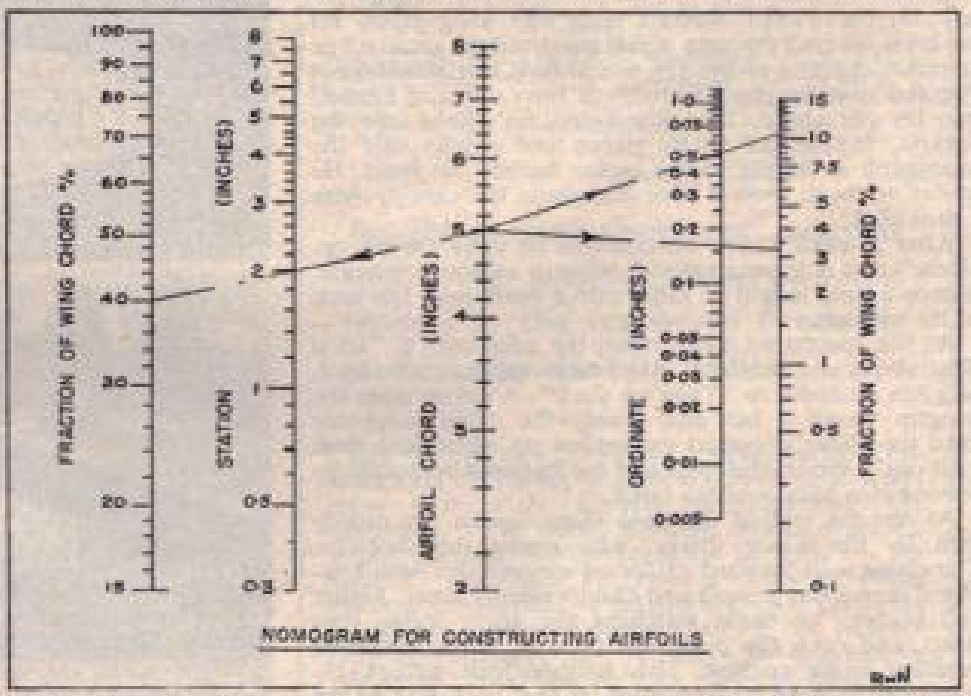
The flight record in contests last year were:

Fifth: Gold Trophy.
Second: Enfield Controline Rally (lost by ½ point).
Fourth: British Team Trials.
Second: Wanstead Controline Rally.
Thirty-second: World Championships (Brussels).
Third: Southern Area Rally.

The plan has been specially drawn to cope with a wide variety of engine sizes and has full instructions to enable the modeller with at least one controline type under his belt to follow the building stages without cause for query. We *know* the "Princess" is going to be a number one favourite among plan builders with the popular A.M.15, Frog 150 and newly introduced (to British shops) Enya, Fox and OS15's. For smoothness, the "Princess" is a beauty deserving of its regal name as you'll soon find out in that first exciting lap.

An easy way to obtain airfoil sections

described by R. W. NEW



NOMOGRAM FOR CONSTRUCTING AIRFOILS

THIS NOMOGRAM is designed to assist in drawing out airfoil sections. In the case of wings where the airfoil chord is not constant, numerous calculations may be involved, and this reduces the number of computations.

To illustrate its use consider the Benedek section B-8556-b, published last month. Assuming a wing chord of 5 inches, find the dimensions involved at the following positions.

Station	...	...	40 per cent. chord
Upper	...	...	10·5
Lower	...	...	3·2

Draw a straight line from the point 5 inches on the centre scale, to the extreme left hand scale at the position marked 40 per cent. Read off the value in inches at the intersection with the station scale, namely 2 inches.

Similarly, draw a straight line from the centre scale to the extreme right hand scale at position 10·5 per cent., and a further line to position 3·2 per cent. Read off the values at the intersections with the ordinate scale, namely 0·53 inches and 0·16 inches respectively.

Normally, accuracy to two decimal places is sufficient.

Contest Calendar 2019

SAM 600 Australia
Victorian Old Timers Association Inc.
10 Cunningham Drive
Endeavour Hills
Vic 3802

Contests commence at 9 am, unless otherwise stated.

The 2017 MAAA Rules apply

Climb & Glide in brackets will be flown only if time permits

The CD for all SAM600 events will be nominated on the day of the event

General Meeting Echuca 8.30am March 17th / AGM Echuca 8.30am September 22nd

All 1/2A, Duration &Texaco events will have the electric equivalent (except State Champs & Nats)

October 20th	**VARMS Field WANTIRNA 12 Noon** Old Time Electric 1/2A Texaco
November 9th & 10th	**COHUNA** **Saturday:** 1/2A Texaco, Duration, Burford **Sunday:** Texaco, 38 Antique { Climb & Glide }
November 24th	**BALLARAT** 1/2A Texaco, Climb & Glide, Texaco

Balsa Wood Weight Matrix

Use this chart in the following manner:

1. **Weigh your balsa sheet**
2. **Find the sheet size on the left hand side of the table below**
3. **Move across the row to the value closest to the weight of your sheet.**
4. **Move up the column to find the weight per cubic foot of balsa.**

			pounds per cubic foot													
thickness		sheet	2 lb		4 lb		6 lb		8 lb		10 lb		12 lb		14 lb	
fraction	decimal	size	grams	ounces	grams	ounces	grams	ounces	grams	ounces	grams	ounces	grams	ounces	grams	ounces
1/32	0.0313	2x24	0.788	0.028	1.575	0.056	2.363	0.083	3.150	0.111	3.938	0.139	4.725	0.167	5.513	0.194
		3x36	1.772	0.063	3.544	0.125	5.316	0.188	7.088	0.250	8.859	0.313	10.631	0.375	12.403	0.438
1/20	0.0500	2x24	1.260	0.044	2.520	0.089	3.780	0.133	5.040	0.178	6.300	0.222	7.560	0.267	8.820	0.311
		3x36	2.835	0.100	5.670	0.200	8.505	0.300	11.340	0.400	14.175	0.500	17.010	0.600	19.845	0.700
1/16	0.0625	2x24	1.575	0.056	3.150	0.111	4.725	0.167	6.300	0.222	7.875	0.278	9.450	0.333	11.025	0.389
		3x36	3.544	0.125	7.088	0.250	10.631	0.375	14.175	0.500	17.719	0.625	21.263	0.750	24.806	0.875
3/32	0.0938	2x24	2.363	0.083	4.725	0.167	7.088	0.250	9.450	0.333	11.813	0.417	14.175	0.500	16.538	0.583
		3x36	5.316	0.188	10.631	0.375	15.947	0.563	21.263	0.750	26.578	0.938	31.894	1.125	37.209	1.313
1/8	0.1250	3x36	7.088	0.250	14.175	0.500	21.263	0.750	28.350	1.000	35.438	1.250	42.525	1.500	49.613	1.750
5/32	0.1563	3x36	8.859	0.313	17.719	0.625	26.578	0.938	35.438	1.250	44.297	1.563	53.156	1.875	62.016	2.188
3/16	0.1875	3x36	10.631	0.375	21.263	0.750	31.894	1.125	42.525	1.500	53.156	1.875	63.788	2.250	74.419	2.625
7/32	0.2188	3x36	12.403	0.438	24.806	0.875	37.209	1.313	49.613	1.750	62.016	2.188	74.419	2.625	86.822	3.063
1/4	0.2500	3x36	14.175	0.500	28.350	1.000	42.525	1.500	56.700	2.000	70.875	2.500	85.050	3.000	99.225	3.500
5/16	0.3125	3x36	17.719	0.625	35.438	1.250	53.156	1.875	70.875	2.500	88.594	3.125	106.313	3.750	124.031	4.375
3/8	0.3750	3x36	21.263	0.750	42.525	1.500	63.788	2.250	85.050	3.000	106.313	3.750	127.575	4.500	148.838	5.250
7/16	0.4375	3x36	24.806	0.875	49.613	1.750	74.419	2.625	99.225	3.500	124.031	4.375	148.838	5.250	173.644	6.125
1/2	0.5000	3x36	28.350	1.000	56.700	2.000	85.050	3.000	113.400	4.000	141.750	5.000	170.100	6.000	198.450	7.000
fraction	decimal		grams	ounces	grams	ounces	grams	ounces	grams	ounces	grams	ounces	grams	ounces	grams	ounces