AERO MODELLER

ANNUAL 1953

AEROMODELLER
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A review of the year's aeromodelling throughout the world in theory and practice; together with useful data, contest results and authoritative articles, produced by staff and contributors of the *AEROMODELLER*

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Typical of a Delta Year! Squadron Leader Laurie Ellis of Debden launching his version of this increasingly popular wing planform. Model is powered with an Allbon Spitfire 1 cc. engine, has Clark Y airfoil section and an all-up flying weight of 30½ ozs.

INTRODUCTION

The Rising Tide of Enthusiasm

IT would be no exaggeration to describe 1953 as a vintage year for aeromodelling. For almost the first time within living memory ideal flying conditions were experienced at the British Nationals conducted so happily at R.A.F. Waterbeach, near Cambridge. Excellent support was given the event, the venue proved to be well placed for participation from most quarters of the country, and our R.A.F. hosts so very welcoming that hopes have been expressed that this may be a regular annual date. Thanks, too, are due to the local area and clubs for their stout organising work.

Flying his Carter Special engined 10 cc. speed model at this meeting Ron Davenport achieved—though did not claim!—a world and British record at 158 m.p.h. when qualifying for the International Speed Contest team to go to Milan. His hopes of equalling it were disappointed in the Milan meeting and he had to be content with second place. Here again glorious Mediterranean weather was enjoyed.

Then followed the climax of the year—another grand meeting at Cranfield for World Power and Wakefield contests. The high standard expected after that long remembered meeting there in 1949 was more than maintained. Brilliant weather greeted the Power Competition on the Sunday, when American Dave Kneeland beat Great Britain's George Fuller into second place. The Wakefield followed to eclipse all other Wakefield Trophies ever, with a triple maximum featuring American, British and Argentinian entries. Again an American, Joe Foster secured the coveted award, with young Hughie O'Donnell over-running his three minutes take-off period to negative his flyoff flight. No happier good-bye could have been given to "old rule" Wakefields than this splendid impeccably organised meeting.

Only in the World Glider Championship in Jugoslavia did disaster overtake our team, when their complete stock of models was lost en route. Here once more, however, British reaction to misfortune turned what could have been a farcial situation into victory in defeat by designing and building two completely new models over-night. This act probably did as much for our prestige as outright winning of the trophy would have done.

The Lesce Bled meeting was the only one of the year where "rain stopped play" in the shape of a colossal cloud burst. "The Last Straw"—as British models were named—suffered in the downpour, but later proved its worth by placing second in the Jugoslav Nationals held the week after.

Final contest event of the year was the International Radio Control Meeting held at Evere Aerodrome near Brussels. This can be truly called the first international meeting in this category to merit the name, with strong teams from Belgium, France, Gt. Britain, Holland and Germany. A gracious gesture by the King of the Belgians in presenting a trophy for annual international competition now places this long neglected branch of aeromodelling on a par with the other accepted groups.

Design has gone ahead during the year in leaps and bounds, particularly with reference to Delta wing models and ducted-fan propulsion. In 1952 experts were saying it would be impossible to build a scale model ducted-fan

Comet. As we go to press we learn that such a model has now been made by Pete Holland, famous for his Brabazon, and may well have passed its flight trials successfully by now. Delta wings are all the rage, seldom a model meeting takes place today without one or two new efforts flying with varied efficiency. Our article in this year's *Annual* on the subject may help towards greater numbers actually airborne.

Another welcome development has been the beginning of what we hope will be a long and friendly association with Pan American Airways, who are sponsoring PAA-load events in this country as they have done in the U.S.A. First fruits of this support was seen at the Nationals when a large and popular class was keenly contested by every shade of variant permitted by the rules. AEROMODELLER is running a design and flying contest for this group, and the ANNUAL has an instructive article on PAA load to help along enthusiasts.

Radio control has firmly established its grip on the minds of nearly every enthusiast out of the beginner stage. Commercially developed equipment is almost at the level where a simple actuator-only receiver can be installed as easily as a domestic sound radio can be set up at home. Tuned reed receivers for multiple channel signals are coming on the market in increasing numbers, though price must, perforce, limit their immediate development to hundreds as against the thousands of actuator-only sets. Equally, the event at Brussels proved how much more practice is needed in Gt. Britain to equal the best continental exponents. We can take cheer then, from the news that at the American Nationals an actuator-only model won the day, indicating that our friends overseas are in much the same boat.

Terrific advances in design and speeds of fullsize jet aircraft have naturally turned every increasing attention towards our own safe jet model propulsion units—Jetex. When first this revolutionary new model propulsion unit came out in 1948 we were vaguely doubtful if it would really take on. How wrong we were to have such doubts, it has established a niche very firmly for itself, and is devoting more and more time and money to valuable research with convincing results. New Jetex motors are coming on the market, old ones are being retooled for higher performance, and a range of auxiliary units and their new "tailored" kits proving that there's always room on the market for a good thing. We are proud to have an article on their development in this year's ANNUAL by ex-Wakefield winner Bert Judge, now conducting the Jetex design and research department.

Some slight changes have been made in the contests of this ANNUAL, by bringing the main international contest reports to the front of the book, and by naming authors of contributed articles where such names give added authority to the views expressed. We should like to take this opportunity of thanking, as we have always attempted in the past, the many and varied sources of material that make this as broad a commentary on the years' aeromodelling as possible. There is hardly an aeromodelling magazine in the world that we have not dipped into in search of items to interest, nor a correspondent however farflung that we have not pestered for reports. The list of our collaborators, then, is nearly page-long and we ask them to accept this blanket note of thanks.

To our readers, who are after all the final arbiters deciding the policy and success of this yearly effort, we would say we hope you like it. If you do, please tell your friends—if not tell us : critical comments in the past have helped us considerably, we really do try and correct our mistakes of omission and commission and invite you all to help us in the future.

WORLD SPEED CHAMPIONSHIPS HELD AT MILAN

Venetian Guid Battistella, World Speed Champion or 1953 with his winning model. Model is just about as functional as could be, with everything tailored down to fit

First of the "one class only" World Speed Control Line Championships was held at Milan from June 12th to 14th. Perhaps the decision to limit world status to a single class—and that in 1953 the least popular 10 c.c.—deterred many countries from supporting the event, only Great Britain, France, and Sweden competing against the sponsoring country Italy.

Nevertheless, ideal weather conditions plus a perfect flying surface and surroundings produced classic flying. Italian ace Guido Battistella, whose 1952 design has already been featured in *Aeromodeller*, proved the winner, flying an almost identical model with the addition of a fin. Much fancied British team man R. F. E. Davenport failed to produce the high speeds that had been attained at home or world records might have been considerably shattered! Fuel troubles afflicted him as his main supply managed to spill itself in his luggage to the detriment of his clothes, and more important left barely enough for contest flights let alone much to spare for test purposes.

In spite of being some 11 k.p.h. behind his best home times, Davenport was a comfortable second behind Battistella, followed by Italians Fanoli and Fiarini. Other British entrants Timms and Skinner had to be content with seventh and eighth places.

Four different engines vied for premier honours, winner sporting the well-tried Dooling 61, Davenport had his usual Carter Special, Fanoli relied on a McCoy Series 20, while Fiorini gave a first outing to a Super Tigre Prototype G24. Labarde of France put his faith in a Micron 60 as did compatriot Serge Malfait. The balance of the field were spread almost equally amongst Doolings and McCoys.

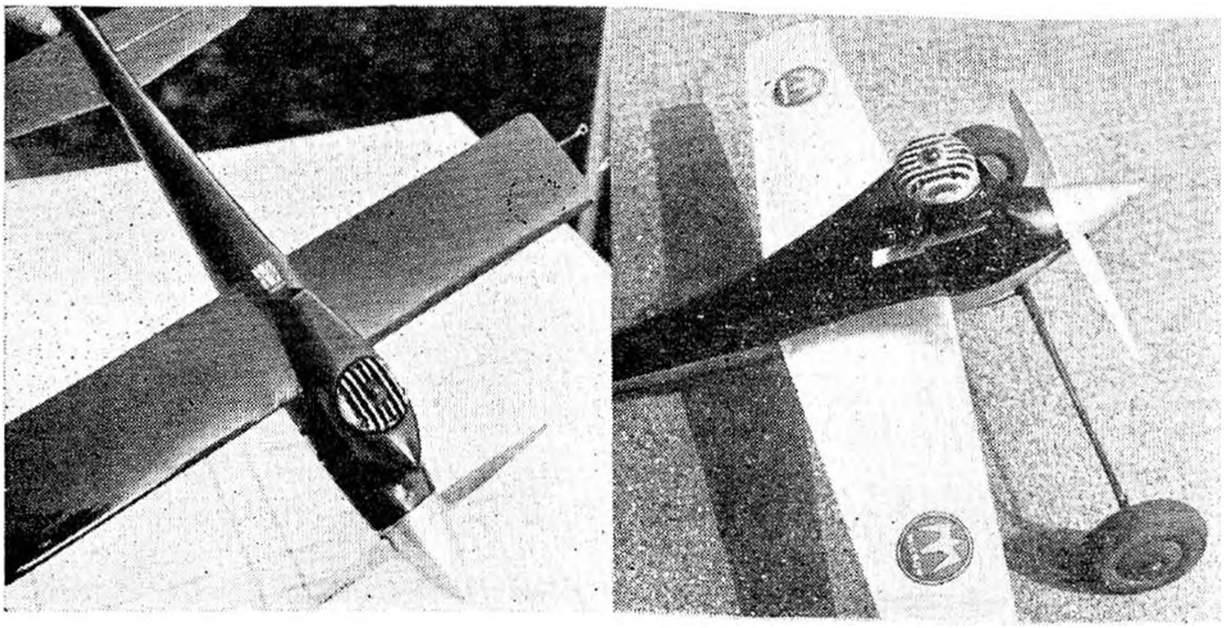
Workmanship throughout was of the highest standard, some models being nearly all metal, including wings, and tolerances for engine location generally were fine enough to entail filing the mounts back to fit!

Candid group picture of British team. Left to right, Harry Timms, Brian Skinner Team Manager Harry Hundleby and Ron Davenport. The trophy is the team prize for second place, and Ron is holding his own individual award

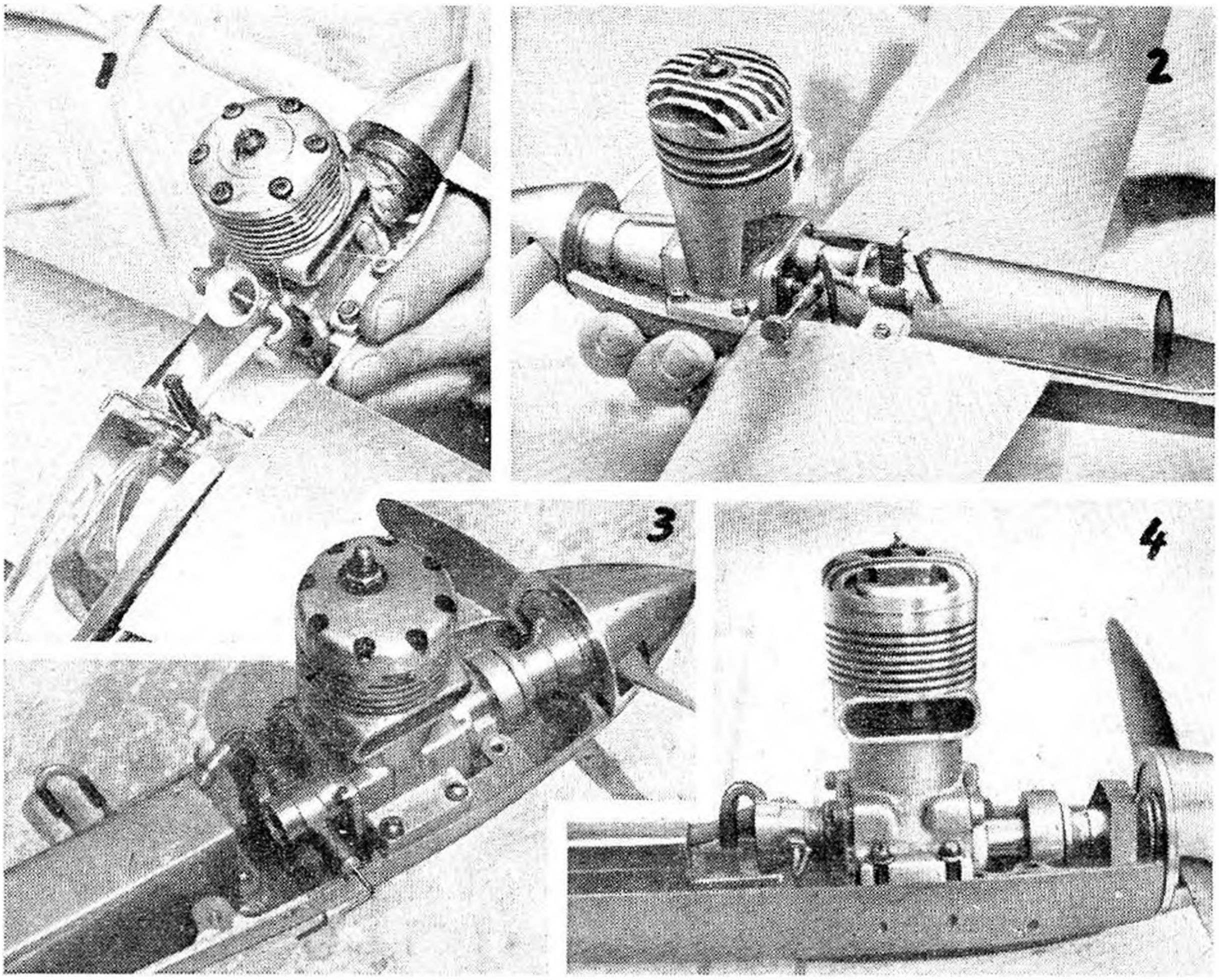
World Speed Championship Class C. 10 cc.

1.	Battistella Guido	(Italy)	250,000	Km/hr.
2.	Davenport, R. F. E.	(England)	244,897	,,
3.	Fanoli Enrico	(Italy)	233,766	,,
4.	Fiorini Gianni	(Italy)	233,766	,,
5.	Ericson Olle	(Sweden)	220,858	,,
6.	Labarde, Robert	(France)	220,858	,,
7.	Timms, I. H.	(England)	210,526	,,
8.	Skinner, B. A.	(England)	200,000	,,
9.	Malfait, Serge	(France)	198,895	,,
10.	Prudent, Jean	(France)	196,721	,,
11.	Eliasson, Eper	(Sweden)	193,548	,,

Team Positions. 1. Italy 2. England 3. France



The two French entries. Left is Malfait's model with conventional wooden wings, and on right Labarde's which had metal wings. Power units in both cases were glowplug Micron 60s.



The leading engines. No. 1 shows Fiorini's prototype Super Tigre G.24. Note balloon tank, and flat filed up cylinder head fins. No. 2 Labarde's Micron 60 using an oval section tank of ample size. Bicycle spoke is a quick release for upper portion of fuselage. No. 3 The Carter Special in Davenport's model. Only original piece of Dooling in this special is crankcase—cylinder head, piston, carburettor assembly and backplate all being fabricated. No. 4 Fanoli's McCoy which fits snugly in its metal underpan.

Ron Davenport with his Carter Special powered model. Spinner is here removed, and it was in this condition that he qualified for the team with a speed of 255.412 k.p.h. at the British Nationals, which, had it only been repeated, would have sufficed to win at Milan!

The successful American team which carried off the magnificent Franjo Kluz cup donated by Jugoslavia. *Left to right:* Stan Hill, Carl Wheeley, Joe Elgin, and *in front* Dave Kneeland, who also won individual honours.

WORLD POWER CHAMPIONSHIPS FOR F.N.A.F.O.M. CUP

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
1	Kneeland, D.	U.S.A.	5:00	5:00	5:00	15:00
2	Fuller, G.	G.B.	4:26	4:50	4:02	13:18
3	Viddossich, G.	Italy	2:54	5:00	5:00	12:54
4	Buskell, P.	G.B.	5:00	4:45	2:45	12:30
5	Lederer, A.	Austria	4:36	3:19	4:32	12:27
6	Hill, S.	U.S.A.	3:18	3:44	5:00	12:02
7	Tasic, T.	Yugoslavia	1:53	5:00	5:00	11:53
8	Woodworth, G.	Ireland	5:00	5:00	1:53	11:53
9	Kempen, C.	Holland	1:49	5:00	5:00	11:49
10	Rupp, G.	Germany	4:53	3:28	3:27	11:48
11	Elgin, J.	U.S.A.	5:00	1:45	5:00	11:45
12	Ferber, M.	Belgium	1:42	5:00	5:00	11:42
13	Lippens, G.	Belgium	4:05	5:00	2:17	11:22
14	Huber, P.	Switzerland	4:35	4:38	2:07	11:20
15	Partinen, J.	Finland	3:39	4:53	2:47	11:19
16	Bacchi, R.	Italy	3:33	5:00	2:04	10:37
17	Barth, J.	Germany	1:27	4:01	5:00	10:28
18	Wheeley, C.	U.S.A.	3:15	2:03	4:57	10:15
19	Zigic, D.	Yugoslavia	5:00	2:36	2:30	10:06
20	Schmitter, P.	Switzerland	2:56	3:29	3:40	10:05

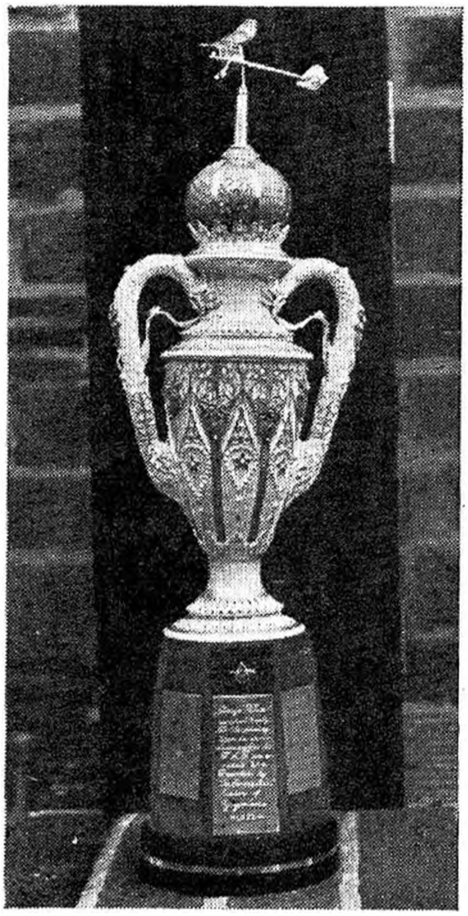
Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
21	Cameron, P.	G.B.	3:11	4:00	2:50	10:01
22	Lefort, P.	France	5:00	1:22	2:30	8:52
23	Marchina, R.	Italy	1:16	3:50	3:40	8:46
24	Kainz, H.	Austria	0:50	3:25	4:23	8:38
25	Proerse, P.	Holland	2:32	2:04	3:58	8:34
26	Leppert, H.	Germany	1:51	2:43	3:37	8:11
27	Goetz, A.	France	5:00	1:40	1:27	8:07
28	Maibach, F.	Switzerland	2:10	3:11	2:41	8:02
29	Bergamaschi, G.	Italy	1:47	3:02	3:08	7:57
30	Storgards, B.	Finland	1:58	3:09	2:41	7:48
31	Auner, C.	Sweden	2:03	2:33	2:51	7:27
32	Krois, E. H.	Germany	2:39	2:15	2:32	7:26
33	Thompson, P.	Ireland	1:45	2:33	3:00	7:18
34	Blomberg, S.	Sweden	1:00	4:19	1:46	7:05
35	Rennesson, A.	France	1:40	2:51	2:30	7:01
36	Upson, G.	G.B.	2:29	1:51	2:12	6:32
37	Mokry, P.	France	1:47	2:06	2:26	6:19
38	Prhavc, J.	Yugoslavia	1:46	1:34	2:55	6:15
39	O'Regan, M.	Ireland	1:45	2:09	2:07	6:01
40	Dahlqvist, N.	Sweden	2:43	—	3:06	5:49
41	Vandermeulen, W.	Belgium	2:13	0:33	2:53	5:39
42	S'Jongers, J. J.	Belgium	1:21	1:24	1:56	4:41
43	Hekking, R.	Holland	0:56	2:14	1:08	4:18
44	Carroll, J.	Ireland	0:56	0:59	2:20	4:15
45	Ericssen, K.	Sweden	0:52	—	0:58	1:50
46	Domberger, H.	Austria	0:54	—	—	0:54
47	Krenn, E.	Austria	—	—	—	—
48	Bodmer, M.	Switzerland	—	—	—	—

G. Vidossich, of Italy, placed third, adjusts his motor critically before taking off. Unlike some of his team mates his model bears strong signs of British and American influence in its layout, including the use of geodetic rib structure to mainplane.

G.B.'s George Fuller inspects the works. As second place man in the contest he displayed the ideal temperament, being one of those happy folk completely unaffected by "contest nerves" and looking really as though he was enjoying every minute of it!

Below: The gorgeous Franjo Kluz Trophy donated by the Jugoslav Aero Club for power team competition. Carried out in gold and silver filigree work, which is a native art, it occupied the whole working time of its maker for a year!

DAVE Kneeland of Hickman Mills, Missouri—a little township within a few miles of ex-President Harry Truman's birthplace—proved a convincing winner of the power event with the only triple maximum of the contest. His model "Vapour Trails" had "Cumulus" wings and tailplane with slightly modified fuselage and fin. Power unit was one of the new K. & B. Torpedo 15s, the first production models of which were passed to the U.S. team for test and ultimate publicity.



Apart from its excellent flying performance, it was also a masterly piece of building, particularly with regard to finish. White fuselage was enamelled with a single coat of Venetian blind paint, an alkali based paint which also acted as its own fuel proofer. We have never seen one coat so white and brilliant. Wings were also well finished in a graduated shade of orange: a colour combination guaranteed to give timekeepers every possible assistance.

Many and varied were the models competing, bringing a welcome breath of variety to a field that has tended to become standardised. Austrian Lederer had a freakish looking forward fin model that took off vertically, and in spite of its unconventional layout took fifth place. Dutch entries featured an unusual engine location in the pylon, with wing above and fuselage below—with this layout, Kempen managed a pair of maxs. Vidossich of Italy, third man, sported a double bladed folding prop, for which over a year's trouble-free service was claimed.

George Fuller of Great Britain did best

Model VTO! There's nothing in fullsize aviation that aeromodellers don't do too! Here is A. Lederer of Austria, fifth, launching his E.D. powered singleblader, which perched on its tail end and took off vertically. Just to be different he also employed a frontal fin, as featured on Di Pietro's Bolide, in *1951 Annual*.

for the home team with his Elfin 1.8 powered "Zoot Suit"—a model very similar to his design in *Aeromodeller Plans Service*.

Pylon designs were predominant amongst British entrants and their nearer neighbours, though a number of shoulder wings were favoured by other countries. Best of these was Stan Hill's "Amazon," a model that we would have tipped as probable winner before the event, but bad luck with his D.T. fuse destroyed his chances of a good score on one flight.

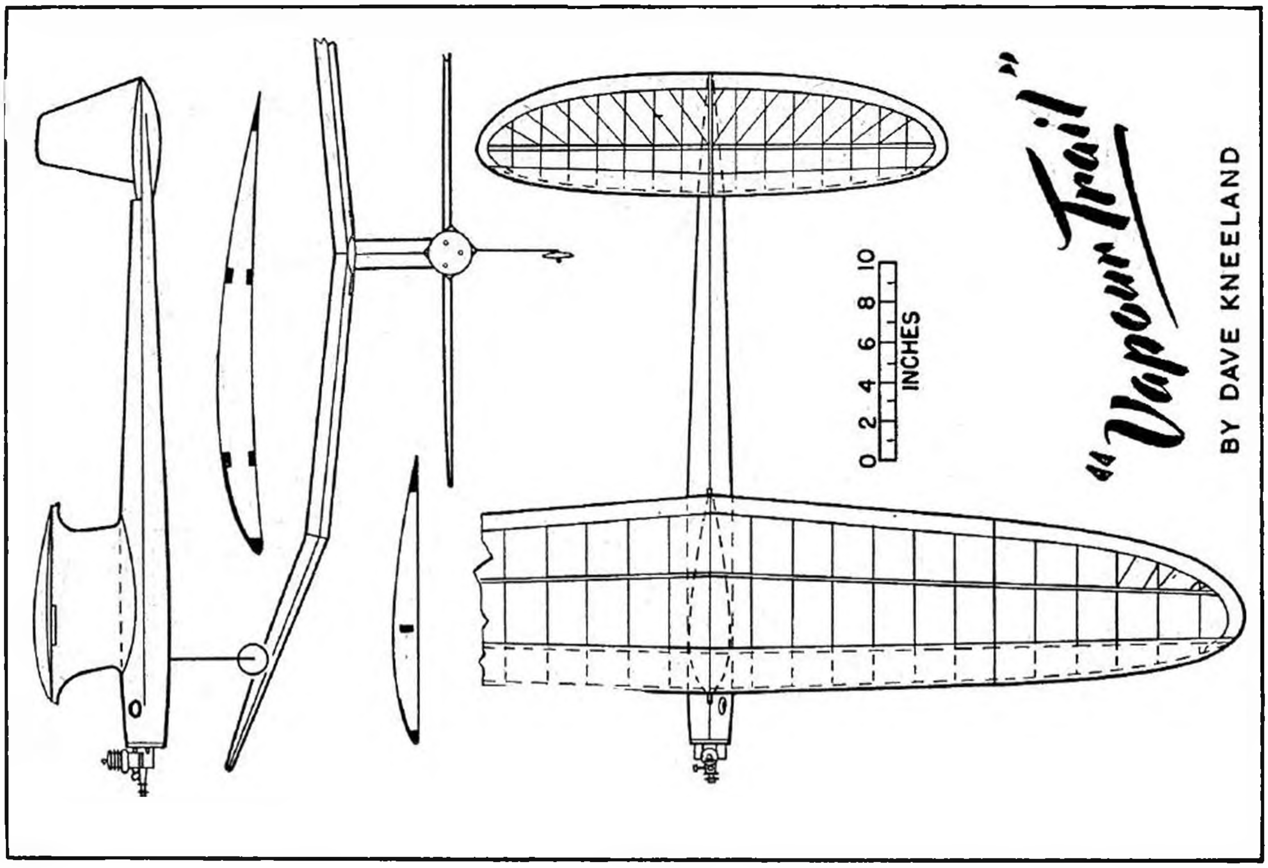
It was pleasant to note that British E.D. 2.46 Racer was the most widely used engine on the field, followed by German Webra, which is virtually a copy of a British engine, the Dutch Typhoon, then Elfin, Allbon and Super Tigre—as well, of course, as the American Torpedoes. Irishman Geoff Woodworth did very well with a modified "Mallard" powered with an Oliver Tiger 2.5 diesel, which has achieved such remarkable records when powering model cars.

This is the first year that Austrian and German teams have competed in England in a power event, and the high standard of their flying and workmanship was much admired.

Altogether the event proved an eye-opener to spectators, and the movement as a whole has received a real tonic which will be surely reflected in increased interest in 1954. Who will be our lucky team to visit U.S.A.?

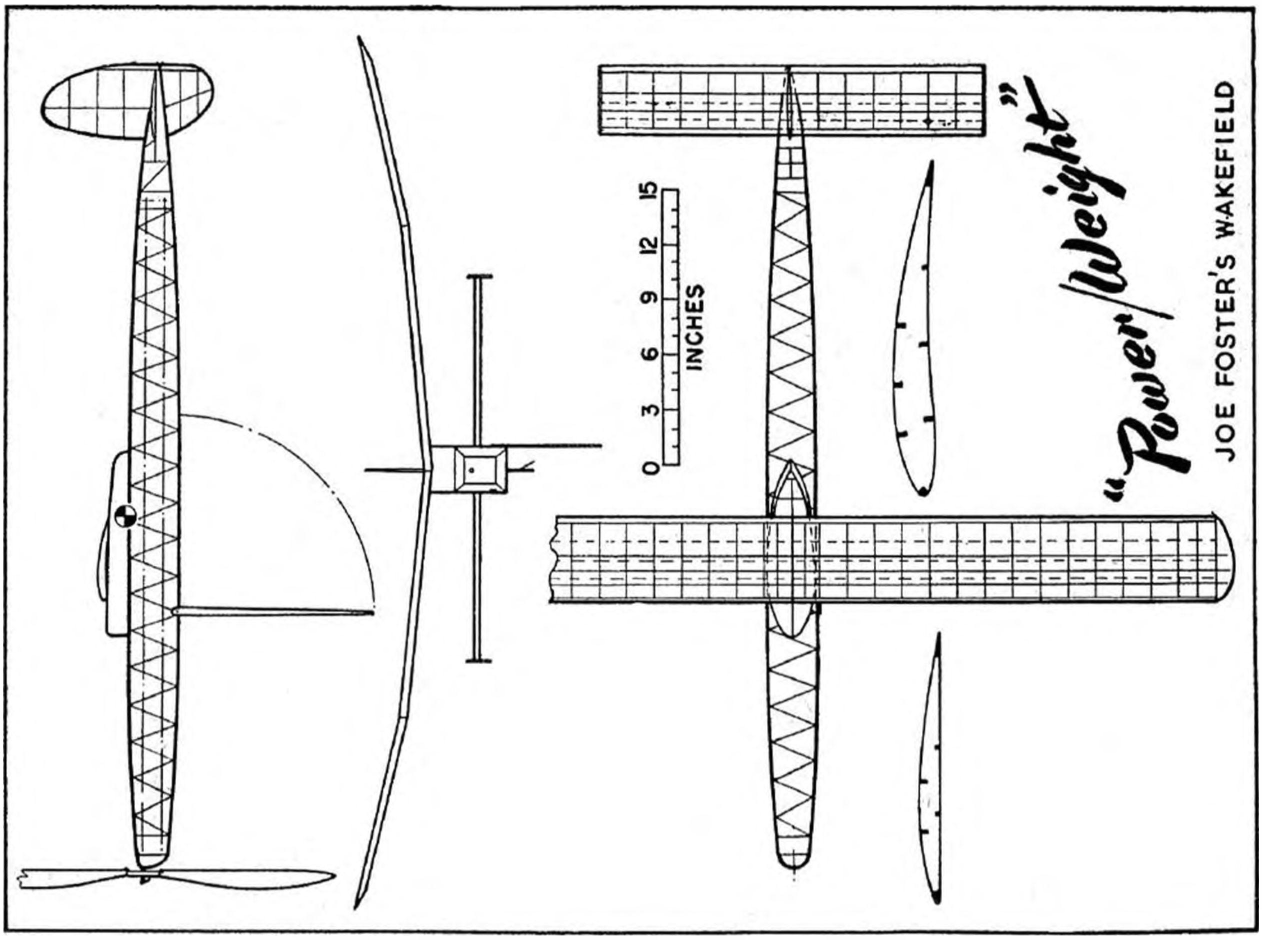
TEAM POWER CONTEST FOR FRANJO KLUZ CUP

		Agg.			*Agg.*
1	U.S.A.	38 : 47	8	Ireland	25 : 12
2	Great Britain	35 : 49	9	Holland	24 : 41
3	Italy	32 : 17	10	France	24 : 00
4	Germany	30 : 27	11	Austria	21 : 59
5	Switzerland	29 : 27	12	Sweden	20 : 21
6	Belgium	28 : 43	13	Finland	19 : 07
7	Yugoslavia	28 : 14			



"Vapour Trail"

BY DAVE KNEELAND



"Power/Weight"

JOE FOSTER'S WAKEFIELD

Argentine team member E. Scotto with his beautifully finished model that shared in the triple maximum. First time that Argentina has ever sent a Wakefield entry, this immediate success should encourage not only future participation, but indeed the whole aeromodelling movement throughout South America.

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
26	Sadorin, E.	Italy	4:08	4:13	3:03	11:24
27	Balasse, E.	Belgium	3:09	5:00	3:14	11:23
28	Heidmuller, B.	Germany	3:40	2:30	5:00	11:10
29	Bethwaite, F.	New Zealand	5:00	4:37	1:24	11:01
30	Goetz, A.	France	3:12	3:39	4:06	10:57
31	Hermes, C.	U.S.A.	2:25	4:08	4:22	10:55
32	Mackenzie, D.	Canada	3:05	5:00	2:29	10:34
33	Mursep, F.	Argentine	2:15	5:00	3:17	10:32
34	Ford, A.	Canada	2:56	5:00	2:28	10:24
35	Knudsen, E.	Denmark	2:11	5:00	3:08	10:19
36	Higgs, H.	Canada	1:52	3:13	5:00	10:05
37	Moberg, C.	Sweden	5:00	5:00	—	10:00
38	Bobkowski, A.	Guatemala	5:00	3:00	1:53	9:53
39	Drew, G.	Ireland	5:00	1:31	3:04	9:35
40	Lipinski, G.	Germany	5:00	2:11	2:19	9:30
41	Campbell, W.	New Zealand	2:58	3:05	3:25	9:28
42	Ferber, M.	Belgium	1:43	5:00	2:36	9:19
43	Kleiman, L.	Canada	2:22	3:04	3:48	9:14
44	Fresl, E.	Yugoslavia	5:00	1:53	2:14	9:07
45	Tomkovic, M.	Yugoslavia	5:00	4:05	—	9:05
46	Prhavc, J.	Yugoslavia	1:14	3:11	4:15	8:40
47	Strattner, W.	Germany	1:31	5:00	1:33	8:04
48	Visser, P.	South Africa	2:33	3:27	2:03	8:03
49	Hewitson, R.	New Zealand	4:13	1:34	1:30	7:17
50	du Toit, D.	South Africa	5:00	0:53	1:20	7:13
51	Morisset, J.	France	5:00	1:57	—	6:57
52	Martins, P.	South Africa	1:53	1:54	2:01	5:48
53	Stojadinovic, V.	Yugoslavia	—	2:07	3:11	5:18
54	Chase, M.	Australia	4:41	—	—	4:41
55	Sandham, A.	Argentine	4:37	—	—	4:37
56	Osbourn, N.	Ireland	2:30	0:54	—	3:24
57	Fitzpatrick, G.	Ireland	2:35	—	—	2:35

* Holds Cup by virtue of winning fly-off.

LAST contest for the "old rule" Wakefield went out in a blaze of glory that will be remembered wherever aeromodellers foregather. For the first time in history it was necessary to have a fourth flight to decide the ultimate holder of the trophy, three men having achieved the coveted triple maximum. It might well have been a dozen, but hard luck stories abound amongst the top scorers, ranging from a lost part of the spare model that, with first machine unrecovered, caused withdrawal of Sweden's Moberg, to a mere second that stopped Reich from sharing the last stage, with every other kind of gremlin perched on someone's wing.

No one would dispute the magnificent effort of Joe Forster; though it is a pity, in our view, that the jury thought fit to interpret the rules in such a way that a triple tie was awarded, only the actual custody of the trophy being decided on the fly-off. However, it did give Argentine, competing for the first time in a world event, the considerable gratification of sharing in the win, and enabled our own young Hughie O'Donnell to have his name for ever associated with the contest.

The event took place in brilliant sunshine and was conducted throughout on what were undoubtedly ideal lines, with the smoothest possible sequence of flights, and the happiest distribution of thermal opportunities throughout the entry. This was achieved by means of a special progress clock, which indicated time left in each round, half an hour being allotted to each competitor, during which his flight had to be made—though order of flight was optional within the team. This enabled clever team managers to switch order if necessary so that members with the best chances could fly when conditions looked most promising.

More maximums were clocked than in any other Wakefield known, at the rate of twenty or more per round. What amazed many was the astonishing skill displayed by the lady contestants, represented by Madame Ferber and Frau Samaan, who finished respectively fifth and eighth—certainly the best feminine showing yet! In fact only five seconds kept Mme. Ferber from sharing the fly-off, while Frau Samaan

It might well have been a ladies' Wakefield. Here is Madame Ferber winding up her model assisted by husband, whom she beat together with the rest of the field bar four!

was only 26 secs. away, both obtaining two out of the three coveted "maxs."

As might be expected from old rule models without limitation of air-frame or rubber weight within the formula, every effort had been made to get the uttermost second of power run, so that long fuselages, with gear trains, and just as much rubber as could be packed in, were the order of the day. It may be significant, however, that many of the leading machines tended towards orthodoxy, in that extremes of design were avoided. In this category could be numbered Scotto's model, and indeed all the Argentine entries, while the British models too showed a high degree of attention to commonsense design rather than the freakish.

The O'Donnell models were their extremely well tested old favourites that have done so well in British contests, and enjoy regular morning outings at home like racehorses training for a Classic race. Bob Copland has a Wakefield style of his own, relying on gradual refinement of a basic streamlined shape, that will need very little alteration, we think, for new rule designs next year. Ted Evans produced his usual Rolls Royce of a design that deserved a better fate than tenth place. Unsighting of his timekeepers on his first flight was one of the most genuine hard luck stores of the contest.

As usual, models came from New Zealand for proxy flying, and again a fine batch of models were expertly flown by enthusisatic substitutes. In spite of the late arrival of models, entailing very little time for test flights, Marsh, as expected, topped their team in 19th place, with two maximums and one less exciting flight. Bethwaite's model was also well flown into 29th place, with one max., a 40 min. and one less spectacular.

An idea of general flying quality can be assessed by comparing total times with other years. In 1953, all down to 37th place had ten minutes or more: in 1952, only the first eleven exceeded ten minutes: in 1951, the first eight only: in 1950, the first six: and in 1949—also at Cranfield *winner* clocked under ten minutes. Again, the 1948 event held in U.S.A., produced winner Chesterton with 19:42 before time limitation was imposed, and only down to sixth place were totals of 10 mins. recorded. It might be argued that in alll these years, weather was against high times, but, while this is to some extent true of the European events at any rate, we note that in general, there has been a steady increase over the years, with a phenomenal jump in 1953. It will be interesting to see what the change in rules limiting rubber weight does to times in 1954. We venture to predict that once again there will be maximums!

TEAM WAKEFIELD CONTEST FOR F.N.A. CUP

		Agg.
1	U.S.A.	44 : 01
2	Great Britain	43 : 19
3	Sweden	43 : 01
4	Italy	41 : 41
5	Belgium	39 : 19
6	Argentine	38 : 49
7	France	36 : 39
8	Germany	35 : 14
9	New Zealand	33 : 16
10	Canada	31 : 03
11	South Africa	27 : 30
12	Yugoslavia	26 : 52
13	Holland	25 : 43
14	Ireland	25 : 04
15	Denmark	10 : 19
16	Guatemala	9 : 53
17	Australia	4 : 41

General Daneels, A.D.C. to S.M. The King of the Belgians and Commandant of the Ecole Militaire, presents the Radio Control Trophy to the Belgian Royal Aero Club on behalf of the king. Mr. Victor Boin is on his left giving a speech of thanks; the cup can be seen in its elegant case in the foreground.

INTERNATIONAL RADIO CONTROL CONTEST, EVERE AERODROME, BRUSSELS

AEROBATICS — POWER MODELS

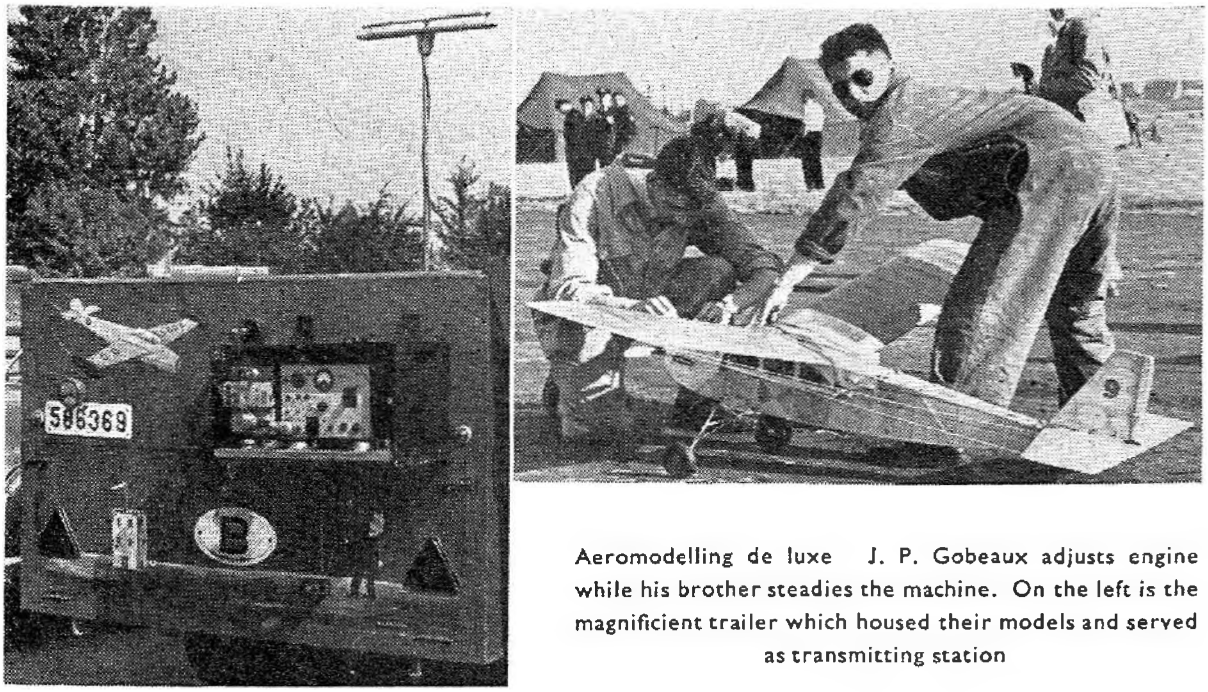
Placing	*Name*	*Country*	*Points*
1	Gobeaux, J. P.	Belgium	773.3
2	Wastable, A.	France	647.3
3	Stegmaier, K.	Germany	620
4	Lichius, H.	Germany	369
5	Goededecker, F.	Germany	321
6	Robertson	Great Britain	309
7	Sills, E. C.	Great Britain	289
8	Dzeich, C. K.	Germany	186.1
9	Vandermeulen	Belgium	139
10	Goodfellow	Great Britain	136
11	Honnest-Redlich, G.	Great Britain	106
12	De Hertog	Belgium	94.3
13	Veenhoven	Holland	81.3
14	Bigalke, B.	Germany	38
15	Cooke	Great Britain	28

AEROBATICS — GLIDERS

1	Pfister (proxy for Hoffman)	Germany	77
2	Bumler	Germany	71
3	Mabille	Belgium	62.6

PARACHUTE DROPPING

1	Wastable, A.	France	344
2	Gobeaux, J. P.	Belgium	315
3	Stegmaier, K.	Germany	314



Aeromodelling de luxe J. P. Gobeaux adjusts engine while his brother steadies the machine. On the left is the magnificient trailer which housed their models and served as transmitting station

THE FORGOTTEN army of radio control flyers have now achieved recognition by the presentation of The King of the Belgians Cup by King Baudoin, for annual competition in the country of the previous year's winner. Appropriately enough, the first winner proved to be the redoubtable "Equipe Gobeaux," with young Jean-Pierre, Gobeaux Fils, acting as pilot.

It was a triumph of perfect preparation combined with complete understanding and mastery of the model which gained this convincing victory against such experts as Albert Wastable and the new group of contenders from Germany. The Gobeaux model, one of a squadron of twelve identical machines all fitted with Micron 60 engines, was an E.D. Radio Queen, with tuned reed multi-channel receiver, built from E.D. material in the flyer's family workshop. Unlike other leading contenders, it had no engine speed control, flying with elevator and rudder movements only.

The winning flight was carried out mainly at an elevation of several hundred feet directly over the heads of judges and appreciative spectators—so high indeed that it was hard for the pilot to maintain that delicate contact necessary for perfect loops and other regular pattern manoeuvres. That he succeeded effortlessly speaks volumes for the hours of practice that must have preceded the contest.

Albert Wastable came second flying the Berkeley Buccaneer style of model that he had already demonstrated at the disappointing Southend meeting in this country. It is no reflection on the winner to say that Wastable threw away his chances of victory by giving the crowd a running commentary on the microphone provided instead of concentrating on announcing his next pattern to the judges. He flew much lower than Gobeaux and really went through "the book"—much of it, alas, unpointed for the contest!

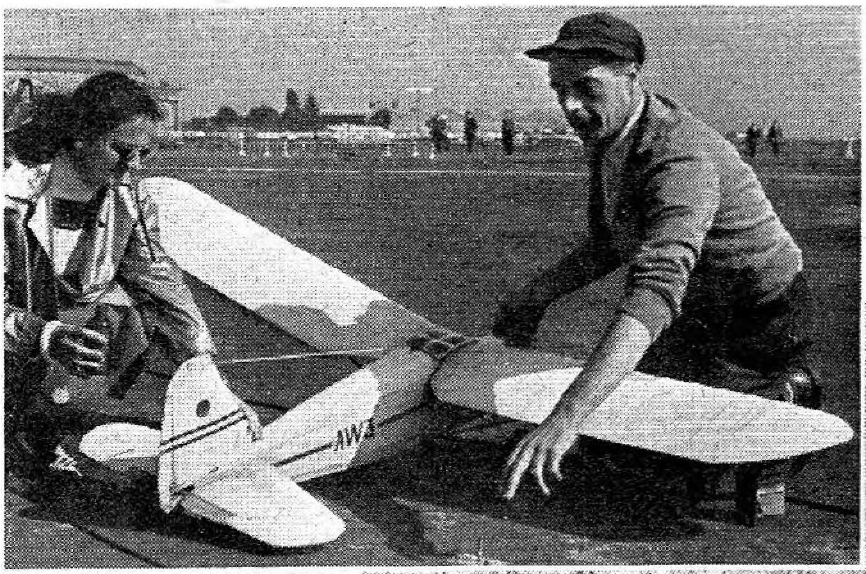
Surprise of the meeting was the splendid show put up by the German team as a whole. Had there been a team prize they must have won it. Apart from a scale Feiseler Storch by Hans Lichius, their models were old-fashioned, almost pre-war in appearance, but they performed immaculately. In common with Wastable they had two speed engine control in addition to elevator and rudder movements. K. Stegmaier flying RC1 had the most interesting radio set-up, with an eight channel receiver, using a super het. personal portable type of valve, plus an additional boost valve. All actuator movements, however, were operated by air vacuum, with a moving rubber diaphragm that gave direct, that is uncranked, movements to controls. The air tank was fed from the engine like a suction windscreen wiper. When the engine cut out an electro-magnet operated a single electric circuit with the only non-radio battery installed and enabled any dead-engine movements to be carried out. Engine was a war-time Eisfeld 6 c.c. diesel, with modified air intake and choke, having two butterfly valves, each with a separate jet, so that speed control was quite clean, not messy as in most diesel adaptations seen.

B. Bigalke, also of Germany, had the most interesting model—a twin boom pusher. This was catapult launched, but unfortunately dropped a wing after take-off and was too damaged to continue.

The first five places were all multiple channel reed operated models. First of the escapement only group, in sixth place was Robertson of Great Britain. His performance would probably have won most events in this country, but was clearly out of his class against this international competition. Ted Sills came next with his clipped wing Sparky.

A few gliders were entered by German and Belgian flyers, but only served to show that the glider is not the ideal medium for radio control. With the same chance of points, except only the 100 take-off points, power winner gained 773.3, glider winner less than a tenth of this with 77 only!

Albert Wastable made up for his second place in the King's Cup by taking the Parachute Dropping event from Gobeaux. This was really only a subsidiary competition run between the main event flights, but seemed to attract public interest. After twenty abortive efforts to get anywhere near the target, the balloon attack contest was abandoned, as being too difficult.



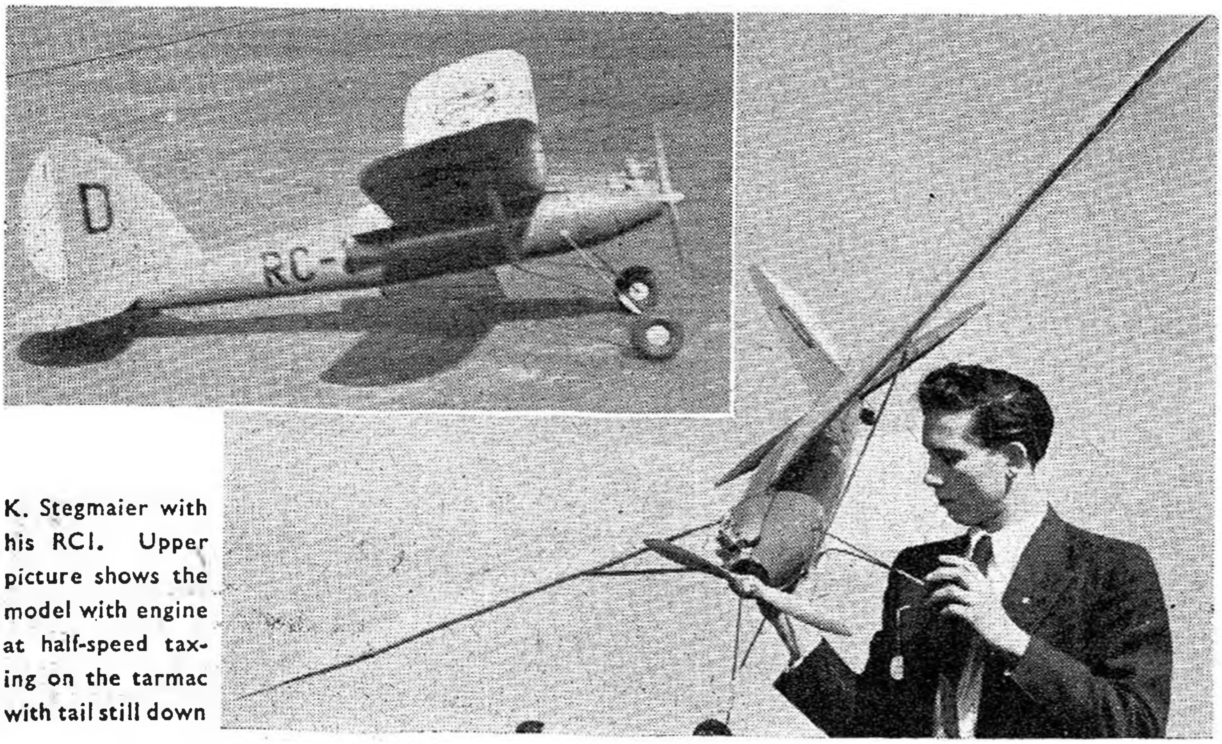
Left: Albert and Madame Wastable prepare their second place model, which taxied off at half speed before getting the gun and leaping off the tarmac

Right: Hans Lichius with his remarkable Feiseler Storch, which in spite of low scale-wingloading was maneouvred splendidly at low level against a fairly strong wind

B. Bilgalke and crew prepare to catapult launch the twin boom pusher. Catapult elastic will be seen in bottom right foreground

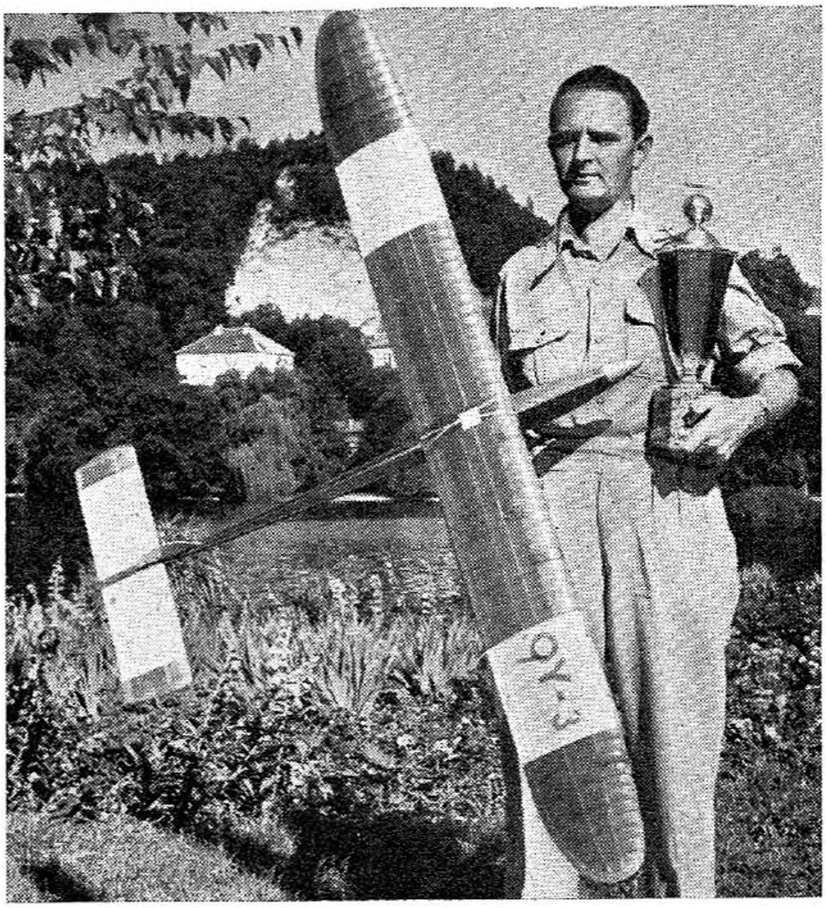
Great benefit of this first truly international event yet held, so far as British entries are concerned, must be the opportunity of seeing what other people are doing. It is very clear that last minute efforts to match foreign reed equipment and multiple controls was worse than useless. George Honnest-Redlich had produced equipment equal to anything opposed to him, but had only had at the most two practice flights beforehand. Ironically enough, he had the morbid satisfaction of seeing E.D. equipment which he had developed used so successfully against him. Apart from home-made equipment—limited in the main to transmitters—the only commercial material in use appeared to be of E.D. origin. No American material was noted, though war surplus material was much in evidence in transmitters. In the same way, airframe design was not sensational, Rudderbugs, E.D. Queens and similar machines being usual.

Final reflection: in over fifty marked flights not a single machine failed to respond to radio signals, and only three landed outside the aerodrome!



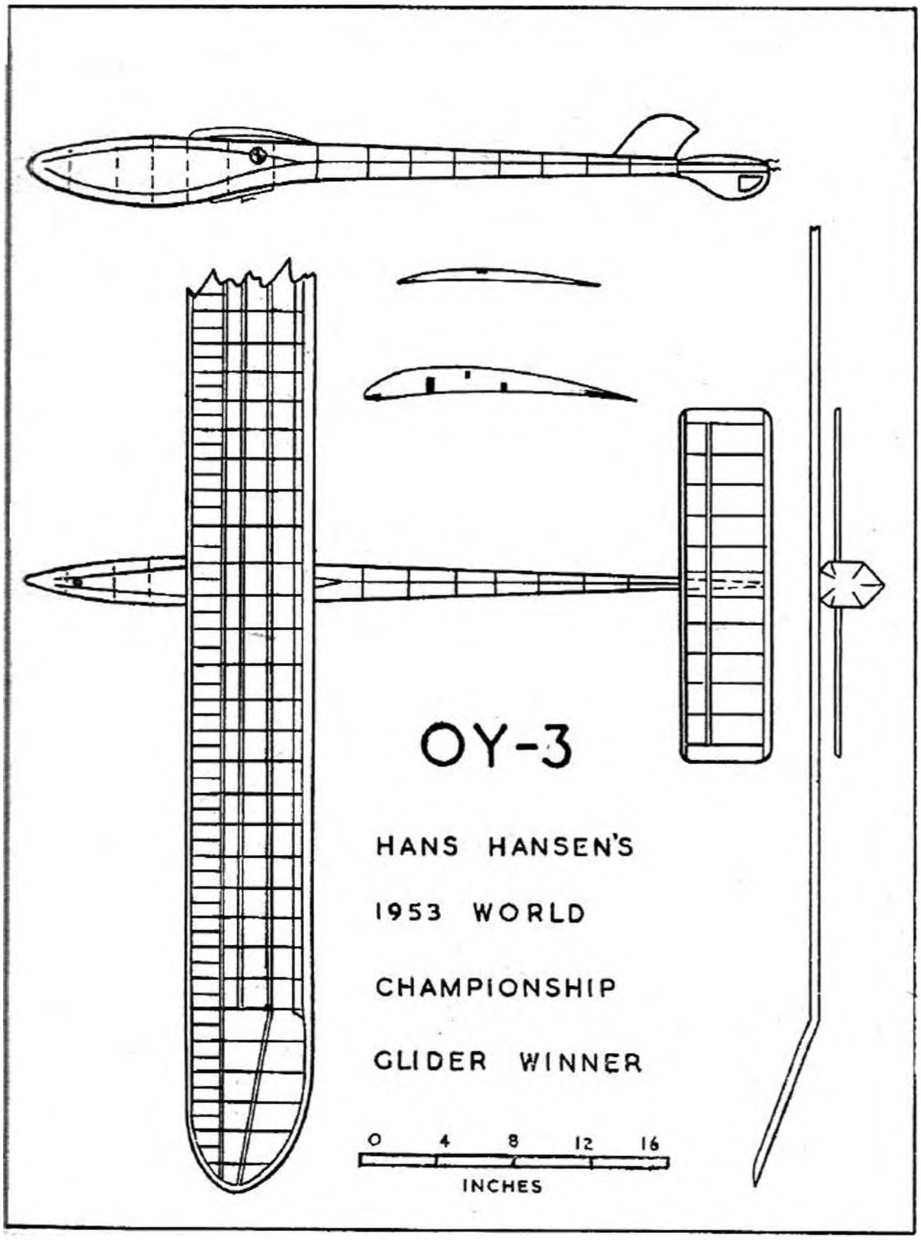
K. Stegmaier with his RC1. Upper picture shows the model with engine at half-speed taxing on the tarmac with tail still down

SWEDISH GLIDER CUP WORLD MODEL GLIDER CHAMPIONSHIP



Copenhagen clubman Hans Hansen with his world championship glider winner OY-3. Model is a series developed design that justified the time and trouble spent upon it. Its pleasing lines may well set a fashion for future winners.

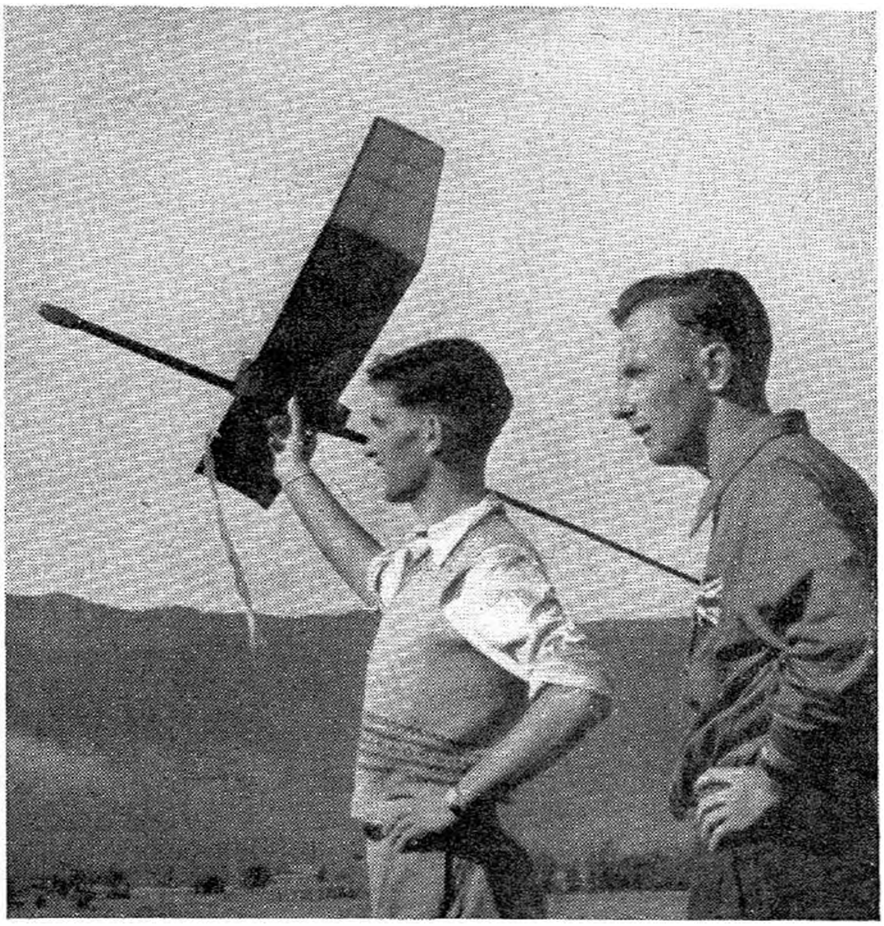
Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
1	Hansen, Hans	Denmark	300	300	300	900
2	Denzin, Heinz	Germany	285.4	300	258	843.4
3	Templier, Jen Pierre	France	300	235	300	835
4	Gunic, Bora	Yugoslavia	300	270	254	824
5	Bausch, L.	Holland	300	251	265	816
6	Skala, Gerald	Austria	200	300	300	800
7	Schonborn, Walter	Saar	211.7	288	300	799.7
8	Federici, Giovani	Italy	152	300	281.3	733.3
9	Persson, Lenart T.	Sweden	300	243	189	732
10	Hansen, Borge	Denmark	242	292	195	729
11	Schnabel, Hans	Switzerland	128	300	300	728
12	Van Loo, J.	Holland	209.2	271.4	266.6	707.2
13	Bickel, Alfred	Switzerland	131	300	272	703
14	Hacklinger	Germany	187.1	300	215	702.1
15	Kadmon, Naftali	Israel	276	159	245	680
16	Fresl, Emil	Yugoslavia	206	182	290	678
17	Maes, Henri	Belgium	180.2	247	225	652.2
18	Schenker, Rudolf	Switzerland	300	172	162	634
19	Goetz, Andre	France	143	270	190	603
20	Wummel, Gerhard	Germany	300	170.5	132	602.5
21	Dupuit, Pierre Follete	Monaco	129	271	184	584
22	Neumann, Fritz	Denmark	—	300	282	582
23	Lensi, Valdemaro	Italy	212.4	152.1	217	581.5
24	Persson, Kurt	Sweden	246.6	196	123.5	566.1
25	Hauenstein, Werner	Switzerland	300	175	90	565



TEAM RESULTS

1	Denmark	2211
2	Germany	2148
3	Switzerland	2065
4	Holland	2040.6
5	France	1934.5
6	Yugoslavia	1847
7	Sweden	1841.9
8	Italy	1816.9
9	Saar	1793.7
10	Belgium	1676.6
11	Austria	1665
12	Israel	1638
13	Monaco	878
14	Great Britain	788
15	Greece	390.3
16	U.S.A.	329

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
26	Knoll, Rudi	Saar	35	300	214	549
27	Anderson, Rune	Sweden	155.6	203.6	184.6	543.8
28	Katz, Shraga	Israel	254.4	70.8	211	536.2
29	Avonts, Eduard	Belgium	276	218	138	532
30	Hecking, J. F.	Holland	—	300	217.4	517.4
31	Pisani, Cassio	Italy	108.5	234.3	162	504.8
32	Czepa, Oskar	Austria	300	101	98	499
33	Lefort, Pierre	France	133	190	173.5	496.5
34	Maes, Jean	Belgium	118.2	145	229	492.2
35	Toni, Luciano	Italy	90	162.4	213.1	465.5
36	Claesens, Christian	Belgium	108	229	119	456
37	Lindner, Rudolf	Germany	147	187	119.5	435.5
38	Weintraut, Herbert	Saar	151	129	165	445
39	Byrd, G. C. M.	Great Britain	—	300	147	437
40	Sandberg, Kurt	Sweden	97	139	173.4	409.4

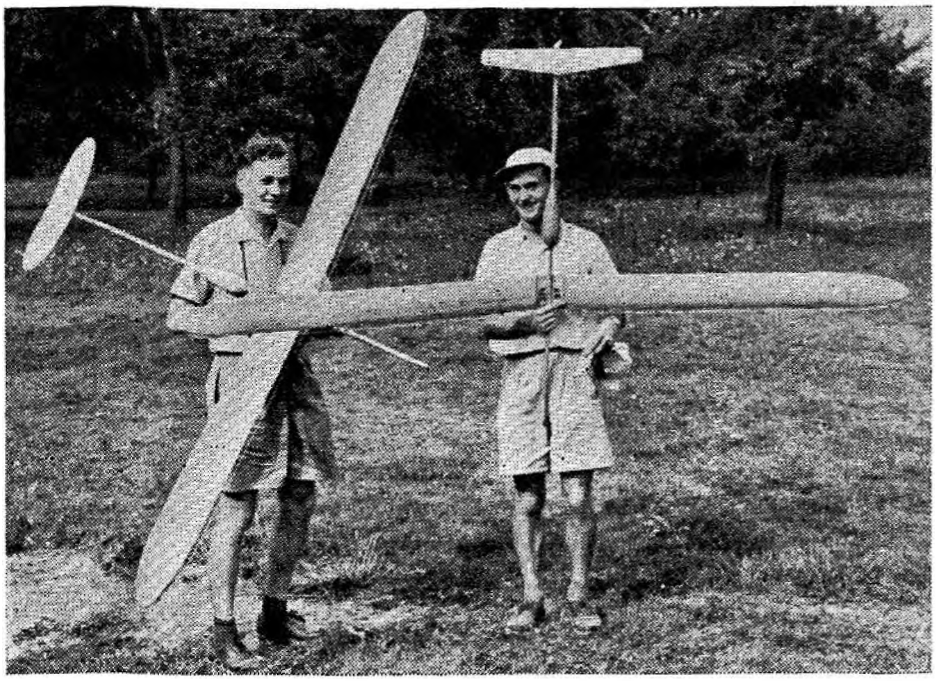


Linford and Brooks with the British midnight oil design, "The Last Straw," built in a few hours after their own models were mislaid. It went on to take a second place in the Jugoslav Nationals held in the week following the A/2 event.

ONCE again a strong entry was received for the A/2 World Glider Championship, held in the already well-known beauty spot of Lesce Bled. This year Danish Hans Hansen proved the winner with a classical design of glider that flew as well as it looked. Heinz Denzin of Germany took second place with his KHD 137, which appears on page 34, and is typical of modern German trend.

British participation was unfortunately well down the list, for, almost

Placing	Contestant	Country	1st Flight	2nd Flight	3rd Flight	Total
41	Teunissen, A. A.	Holland	22	208.6	161.2	391.8
42	Sakellarakis	Greece	42.6	192	155.7	390.3
43	Schober, Josef	Austria	219.8	43	103.2	366
44	Brooks, A. J.	Great Britain	—	211	140	351
45	Zidek, Fritz	Austria	20.4	153	174	347.4
46	Smole, Joze	Yugoslavia	—	185	160	345
47	Nesdam, Ove	Denmark	135	86	123	344
48	Fontaine, J.	France	16	130	187.5	317.5
49	ben Shaher, Zeev	Israel	42	169.6	105.6	317.2
50	Dore, Henry	U.S.A.	35.4	41.6	133	210
51	Novaro, J.	Monaco	208	—	—	208
52	Fried, Meir	Israel	114	57	33	204
53	Perryman, George	U.S.A.	16.8	70	49	119
54	Aubertin, Roger	Monaco	—	86	—	86
55	Pinter, Ladislav	Yugoslavia	—	—	80.5	80.5



Eppler and Lindner of Germany with their interesting models. These both featured the bulbous pod that brings the "stick" to specification, and employed turbulator wires for the full span of the wings, for which considerable advantages have been claimed, initially by Scandinavian modellers, but now enthusiastically in Germany and Austria.

unbelievably, the models had contrived to get lost on the way! In the same fashion the New Zealand box of models to be proxy flown, had arrived safely in England, only again to be misplaced in transit across Europe, turning up the day after the contest. References to King John and his historic misfortunes in The Wash were tactfully withheld, and only the slightest tinge of reproach appears in the happy christening of the model designed and built during a night before the first round as "The Last Straw." This model, incidentally, was flown the following week in the Jugoslav Nationals and won second place—surely a tribute to British improvisation in the face of apparent disaster.

A torrential storm disrupted the first day's flying, making it necessary for second and third rounds to take place on the day following, which happily proved fine though still damp underfoot.

Following Oskar Czepa's win in 1951 with his now famous "Toothpick" the Continental trend was very much towards infinite variations on this theme. Austrian enthusiasts tended to locate the necessary bulge to make the specification frontally, whilst their German neighbours placed it more nearly amidships. Shortness of time made a similar style almost a necessity for "The Last Straw," whose hardwood fuselage could be whipped like a bow.

It was quite refreshing to consider such models as American George Perryman's with polyhedralled main and tailplanes, developed from his Wakefield series.

Newcomer to international contests was Greece with Sakellarakis representing them with a pleasing model, complete with glassed cabin, somewhat reminiscent of Gosling's Ivory Gull layout. One wing carried an immense flap. Israel were happily able to attend in person with Kadmon, Katz and Ben Shaher. This young country is intensely aeromodelling minded, and are doing a great deal to sponsor its development through their aero club.

Generally, honours were very evenly divided amongst competing nations, as the first nine places all went to different countries. Next year Denmark will, for the first time, be hosts for the event and competition to make the team for this trip should be keen throughout the aeromodelling world.

DUTCH FLYING SAUCERS

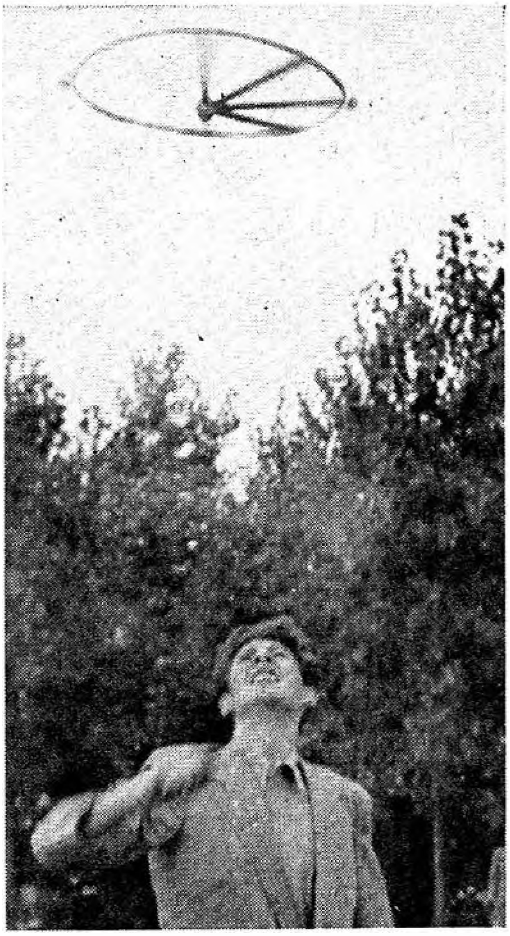
By Claude R. de Vries

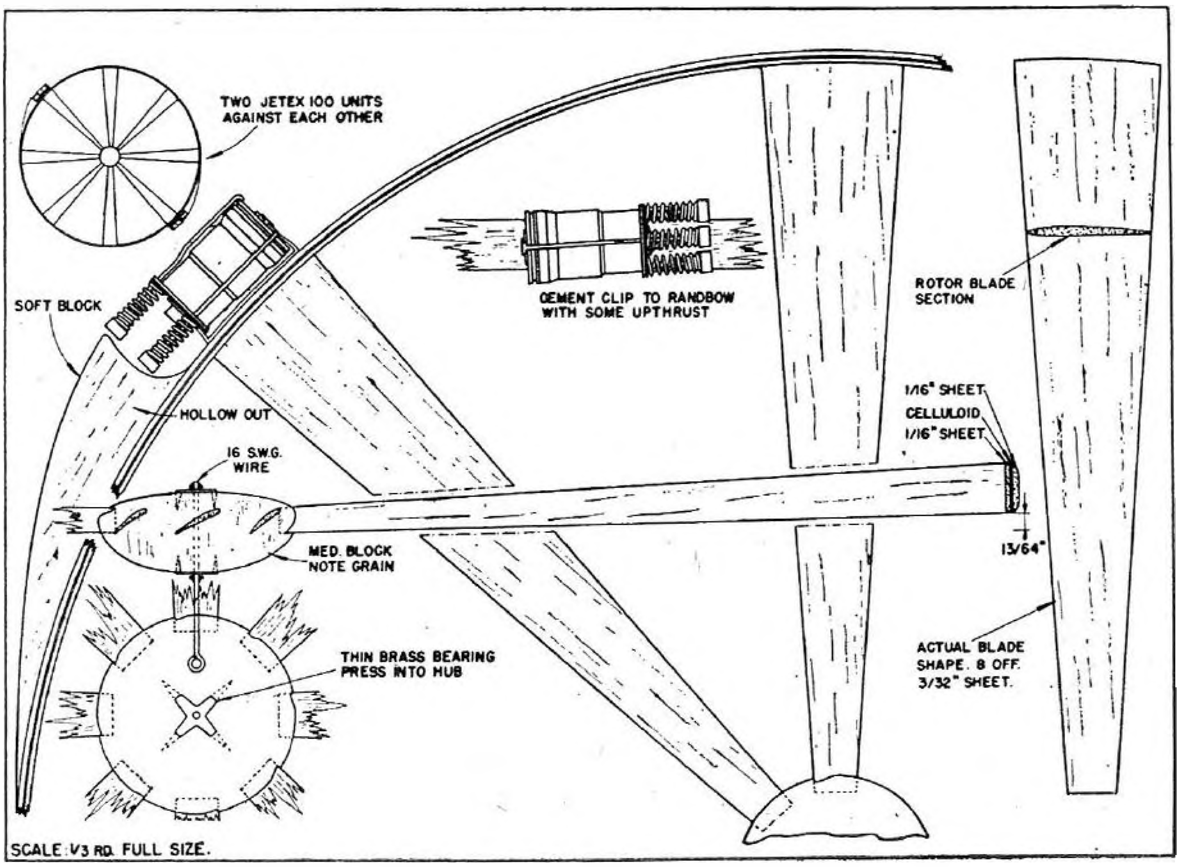
Building procedure for either the 50 or 100 Saucer is identical, and commences with the outline. A strip of $\frac{1}{16}$-in. $\frac{3}{8}$-in. medium balsa is soaked and wound round a suitable former (an oil drum or dustbin, etc.), the ends being bevelled and cemented. A second, similar strip is then laminated over the first.

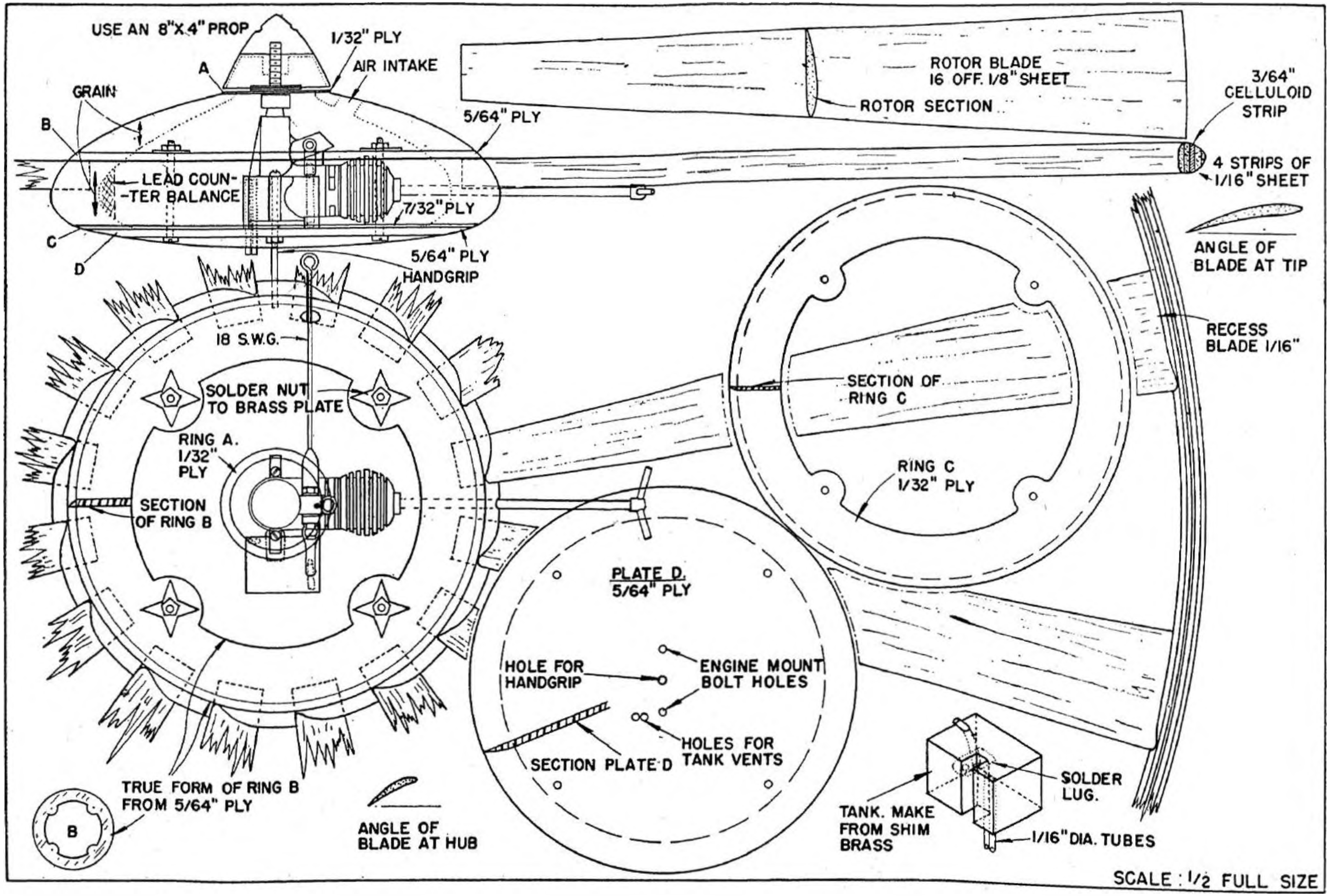
Rotor-blades are of $\frac{1}{16}$-in. sheet sanded to a thin airfoil section. The hub of the rotor is fashioned from a disc of medium balsa, blade positions being carefully marked off and their receiving slots cut. Accuracy here is essential. The Jetex clips are cemented to the outline and bound in place, ensuring that a little upthrust is incorporated. The construction of a hand-grip completes the model.

The "100" model differs in using 3/32-in. sheet rotor blades and a reinforcing strip of celluloid cemented round the outline.

Construction of the Frog 50 powered Saucer commences with the outline, which is made around an oil-drum or





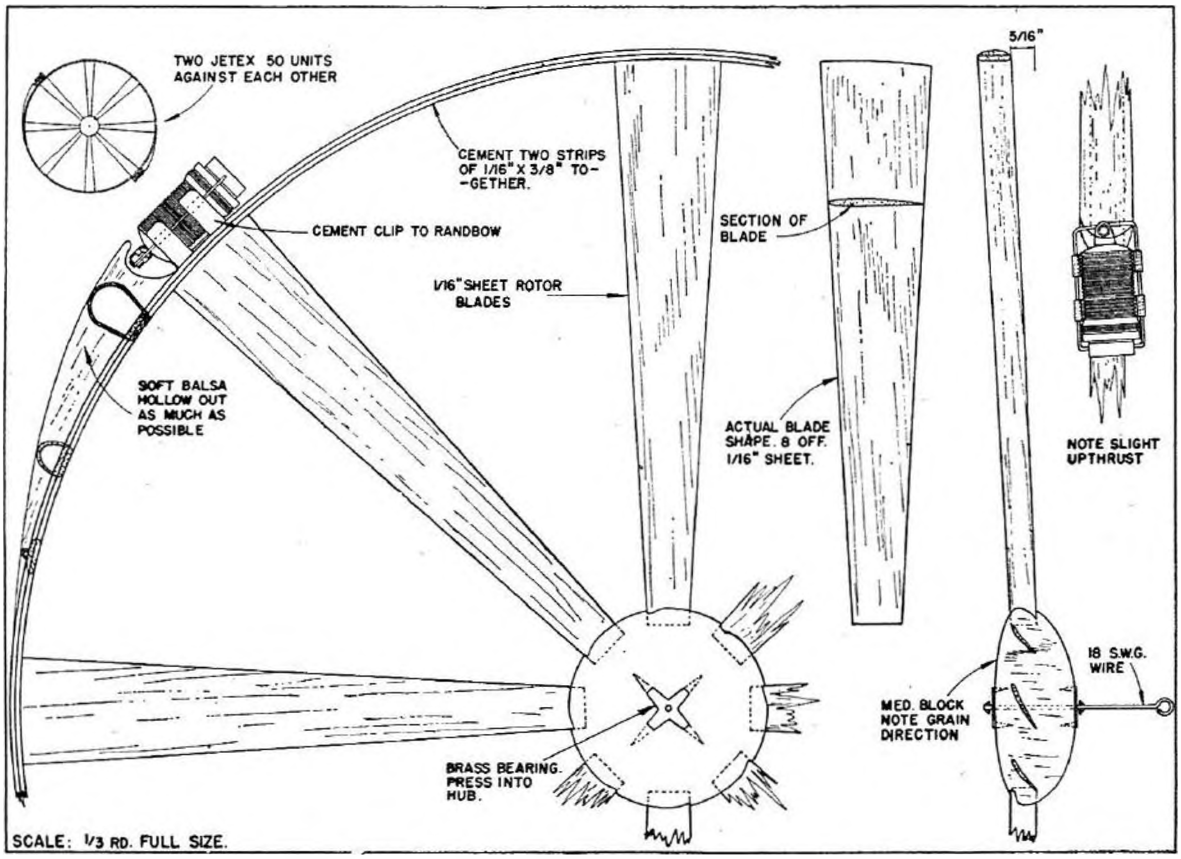

USE AN 8"X4" PROP
1/32" PLY
A
AIR INTAKE
GRAIN
B
LEAD COUNTER BALANCE
7/32" PLY
C
D
5/64" PLY
5/64" PLY
HANDGRIP
ROTOR BLADE 16 OFF. 1/8" SHEET
ROTOR SECTION
3/64" CELLULOID STRIP
4 STRIPS OF 1/16" SHEET
ANGLE OF BLADE AT TIP
RECESS BLADE 1/16"
18 S.W.G.
SOLDER NUT TO BRASS PLATE
RING A. 1/32" PLY
SECTION OF RING B
SECTION OF RING C
RING C 1/32" PLY
PLATE D. 5/64" PLY
HOLE FOR HANDGRIP
ENGINE MOUNT BOLT HOLES
HOLES FOR TANK VENTS
SECTION PLATE D
TRUE FORM OF RING B FROM 5/64" PLY
B
ANGLE OF BLADE AT HUB
TANK. MAKE FROM SHIM BRASS
SOLDER LUG.
1/16" DIA. TUBES
SCALE : 1/2 FULL SIZE

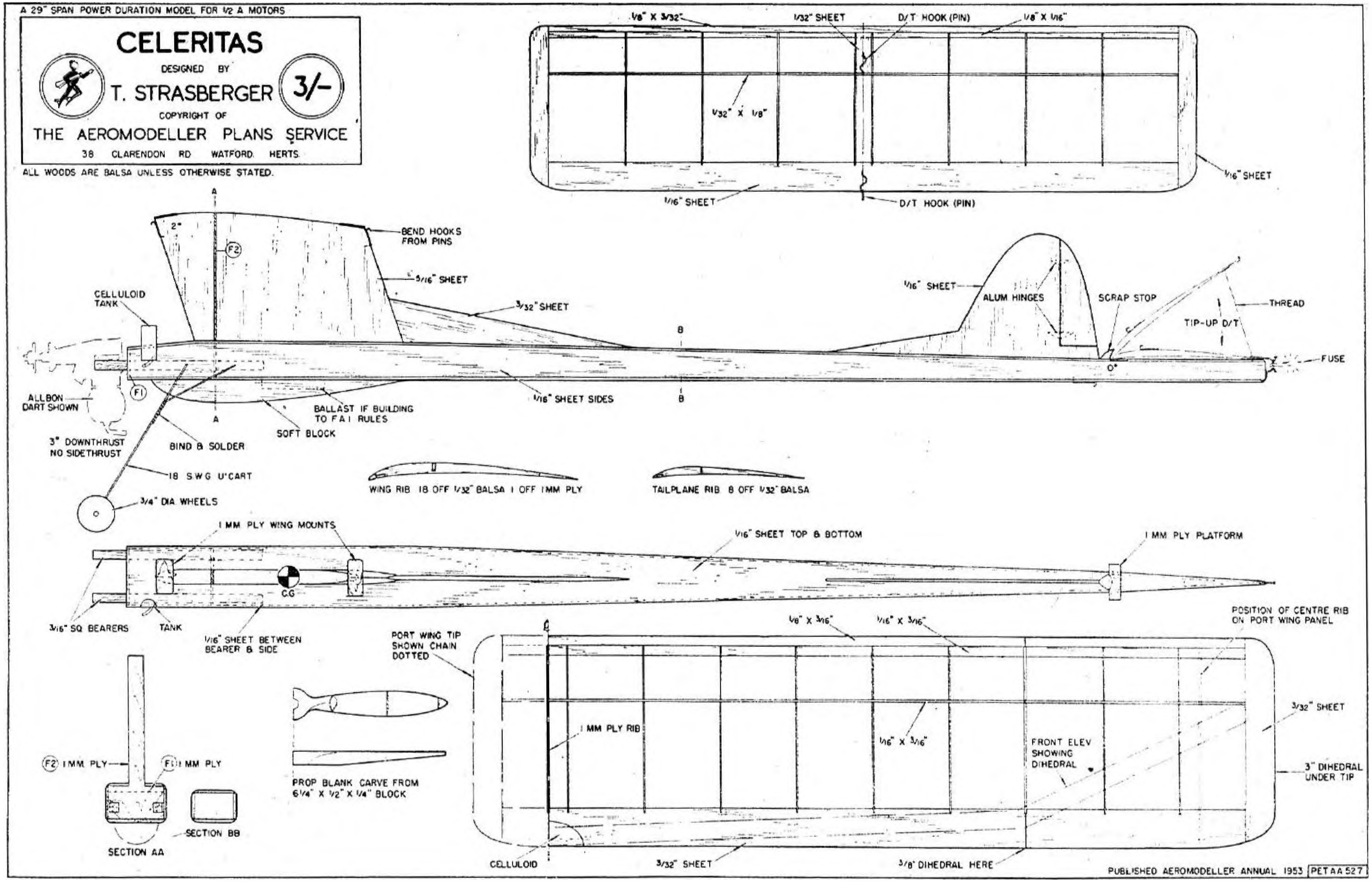
similar cylinder. The outline is built exactly as on the plan.

Shape the $\frac{1}{8}$-in. sheet rotor-blades and the ply rings A, B and C, and the plate D, drilling or cutting out the necessary holes. Ring B now requires fitting with the brass plates shown (solder nuts on before fitting) before sandwiching between A and C and the two balsa distance discs. When dry, the rotor blade slots must be accurately marked and cut. On this step depends the line-up of the whole machine.

Hollow out the "body" as shown on the drawing and drill holes for the air intake, fuel and compression needle. Cement the blades into their slots in the hub and attach the outline, aligning everything carefully and cementing thoroughly, blade tips being inset $\frac{1}{16}$-in. into the outline.

The tank, made from shim brass, completes the constructional work, but before flying the "Disc" must be balanced. Fit a long bolt with a length of tubing and screw into the tank-bolt position. By holding the tube in the hand the disc can be rotated and a small block of lead fitted in the body on the lighter side.





A 29" SPAN POWER DURATION MODEL FOR 1/2 A MOTORS

CELERITAS

DESIGNED BY

T. STRASBERGER

3/-

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THE AEROMODELLER PLANS SERVICE
38 CLARENDON RD WATFORD HERTS

ALL WOODS ARE BALSA UNLESS OTHERWISE STATED.

PUBLISHED AEROMODELLER ANNUAL 1953 PET AA 527

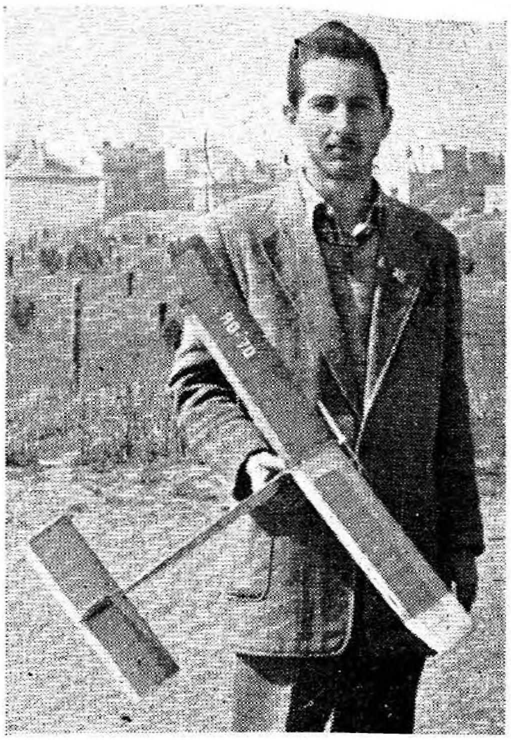
CELERITAS

Jugoslav Power Model

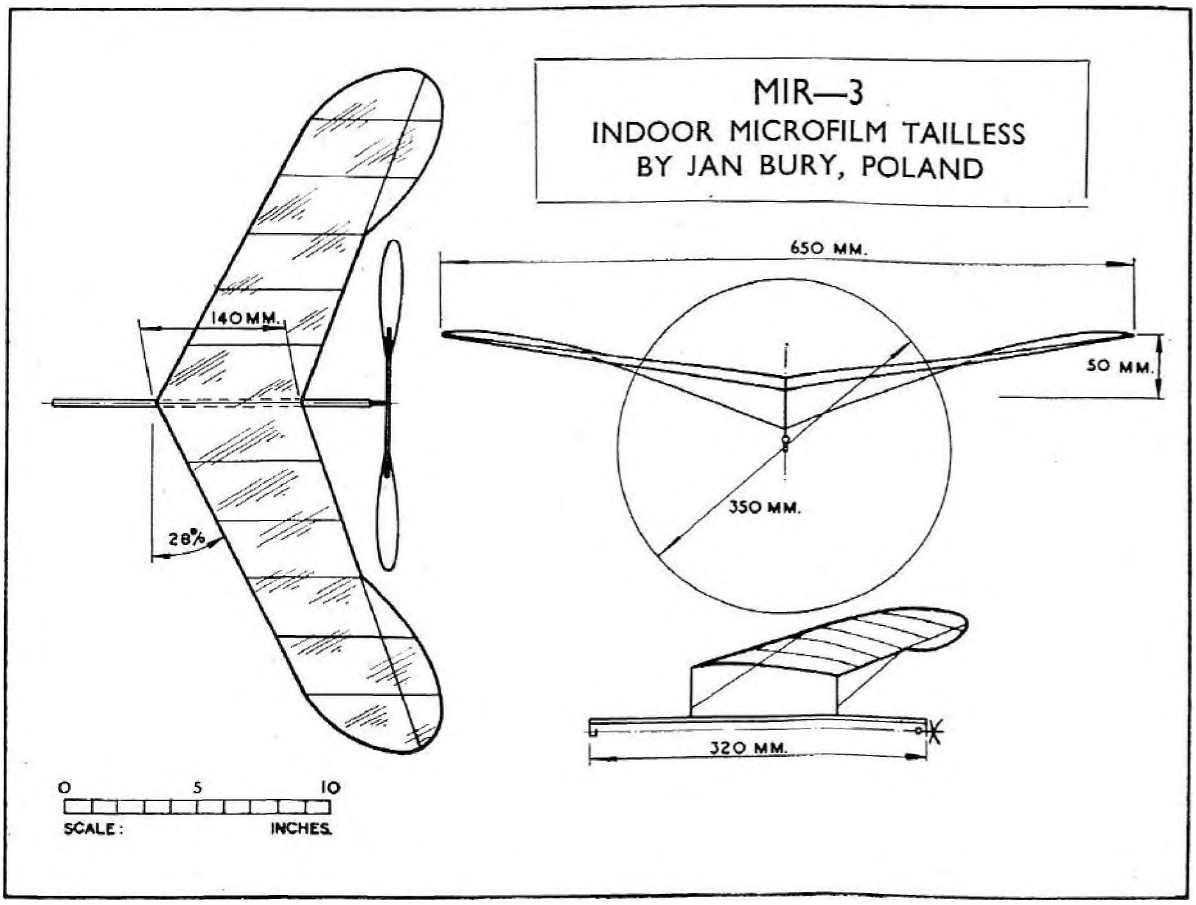
By T. STRASSBERGER

Celeritas is designed round the Allbon Dart, a treasured possession of contributor T. Strassberger from Jugoslavia. It follows conventional lines, and indeed should be a very suitable small contest model for the novice to attempt. It is important, however, to keep to prescribed weight. Bare weight of complete job, with motor but without ballast, is 105 gms., a further 30 gms. (just over an oz.) must be added where shown, bringing the flying weight up to 135 gms., about $4\frac{3}{4}$ oz.

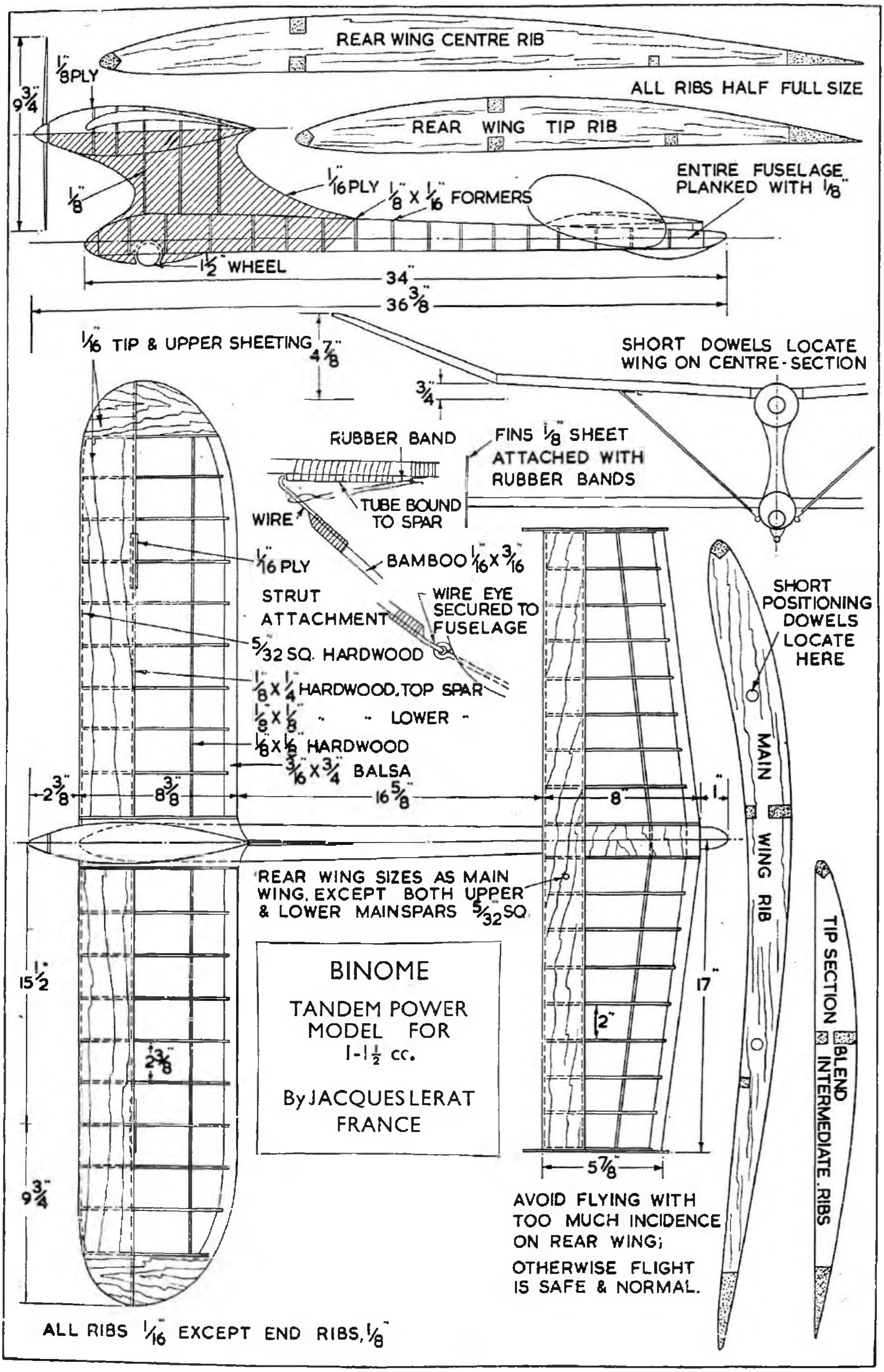
By thus keeping weight well down, and pylon fairly high, a good degree of pendulum stability is achieved. Normal flight pattern gives a circling climb for 17-19 sec., attaining about 450 feet or more, which will then normally result in a time of 210-240 seconds.



It is worth making the special propeller that designer offers as this gives it that little extra urge. However, lazy builders may prefer a similar commercial pattern, in which case they must be content with slightly less performance.



MIR—3
INDOOR MICROFILM TAILLESS
BY JAN BURY, POLAND



BINOME

TANDEM POWER MODEL FOR 1-1½ cc.

By JACQUES LERAT FRANCE

ALL RIBS HALF FULL SIZE

ENTIRE FUSELAGE PLANKED WITH 1/8"

SHORT DOWELS LOCATE WING ON CENTRE-SECTION

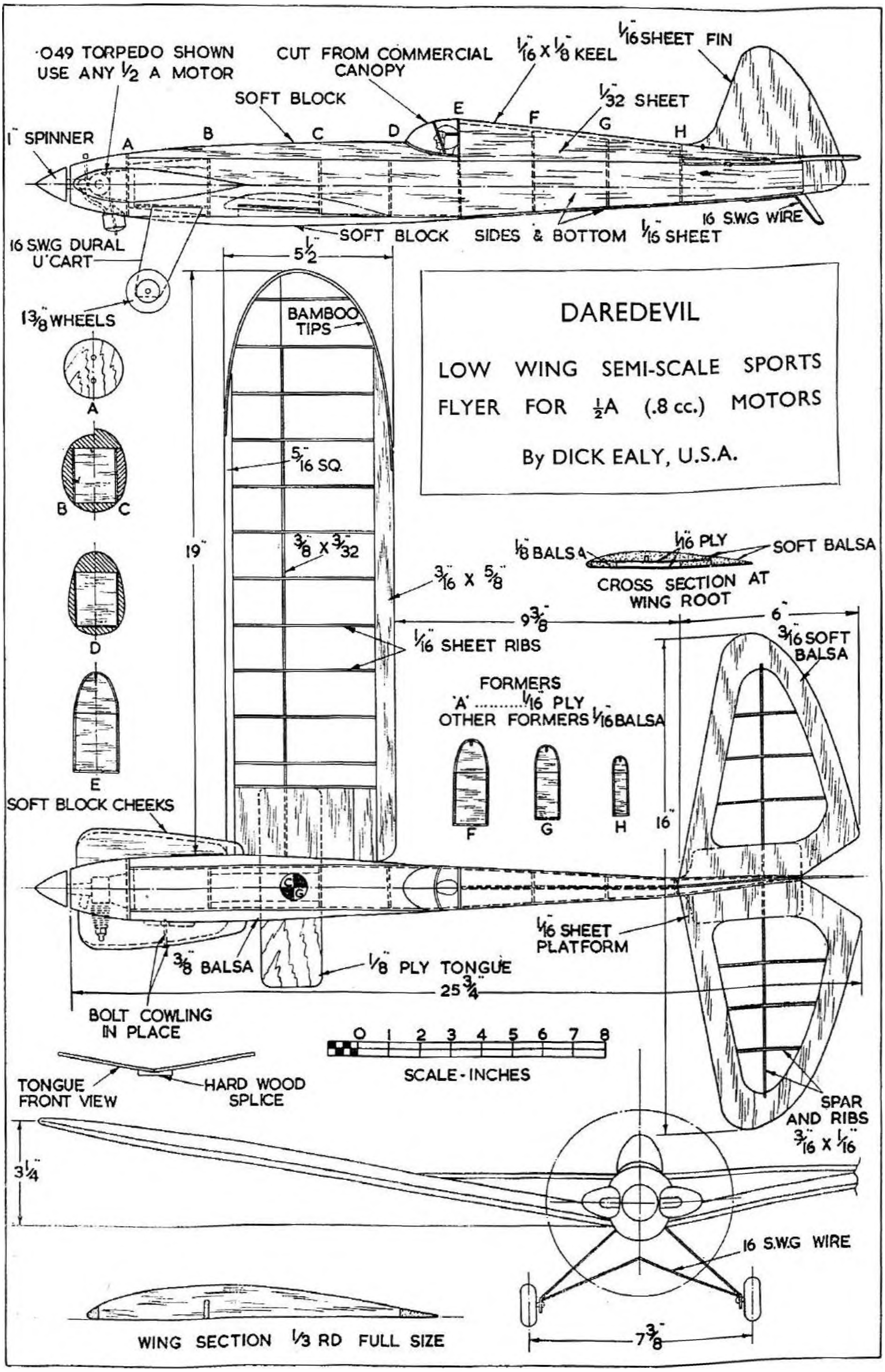
FINS 1/8" SHEET ATTACHED WITH RUBBER BANDS

SHORT POSITIONING DOWELS LOCATE HERE

REAR WING SIZES AS MAIN WING, EXCEPT BOTH UPPER & LOWER MAINSPARS 5/32" SQ.

AVOID FLYING WITH TOO MUCH INCIDENCE ON REAR WING; OTHERWISE FLIGHT IS SAFE & NORMAL.

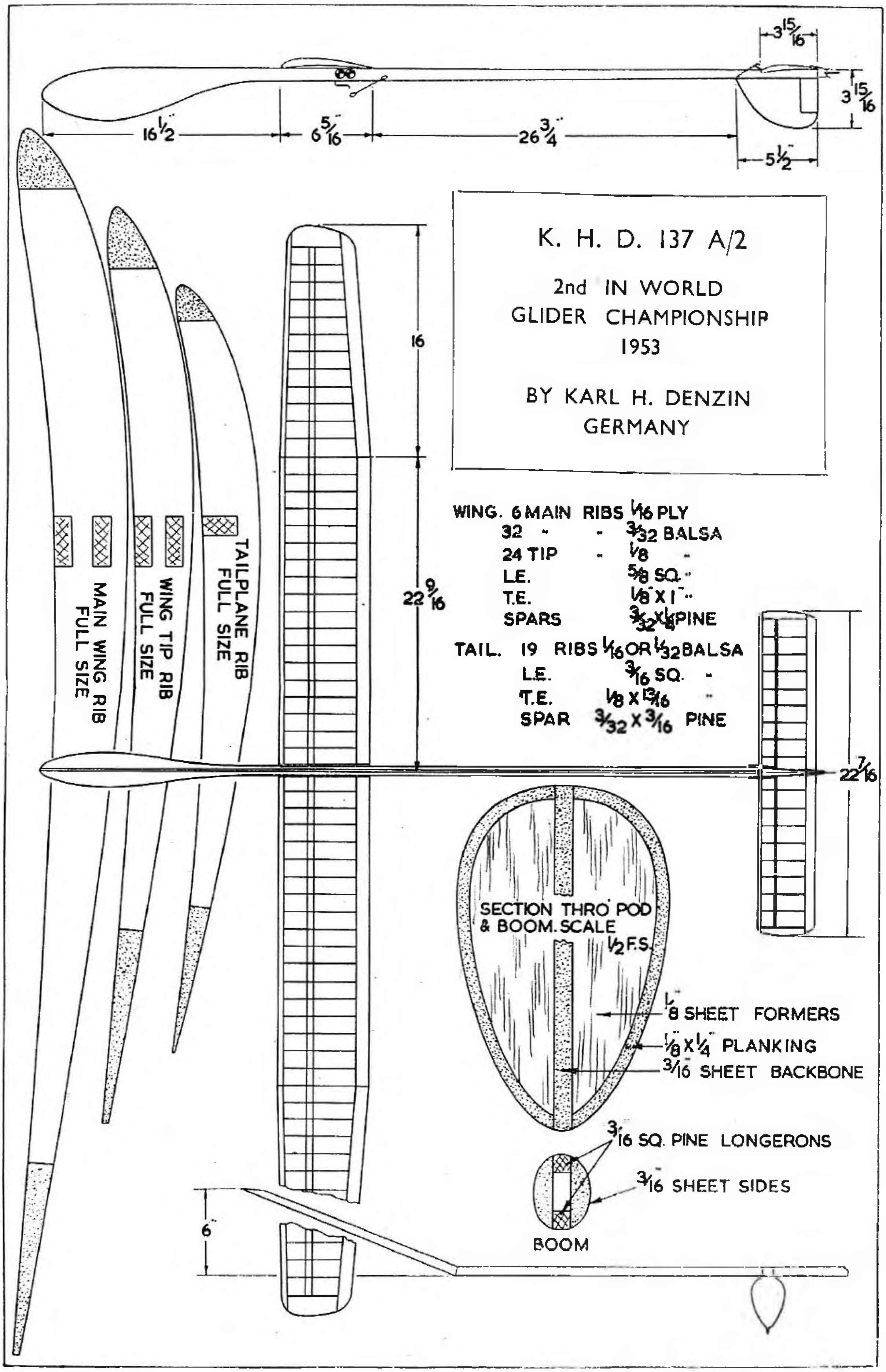
ALL RIBS 1/16" EXCEPT END RIBS, 1/8"

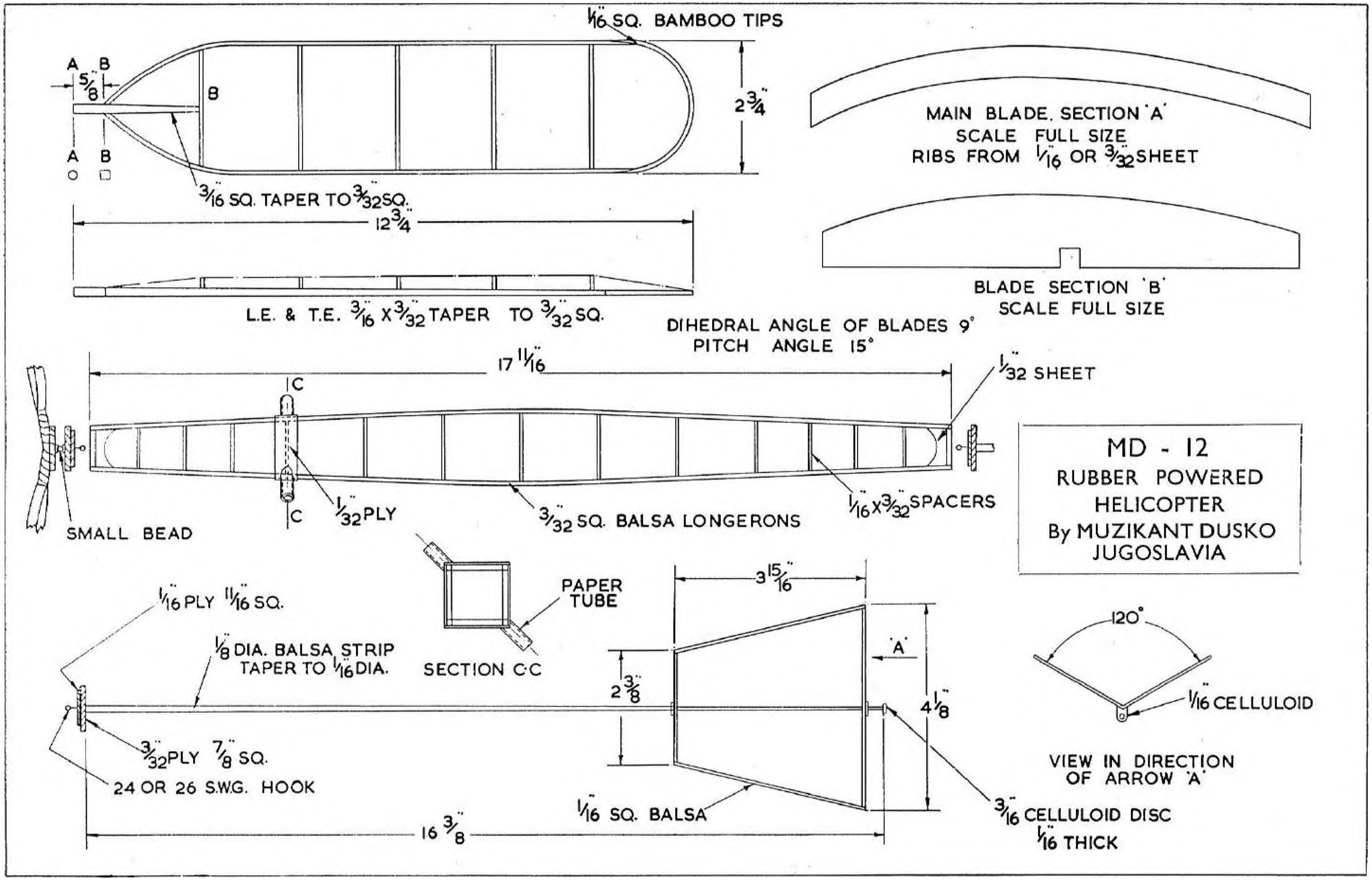


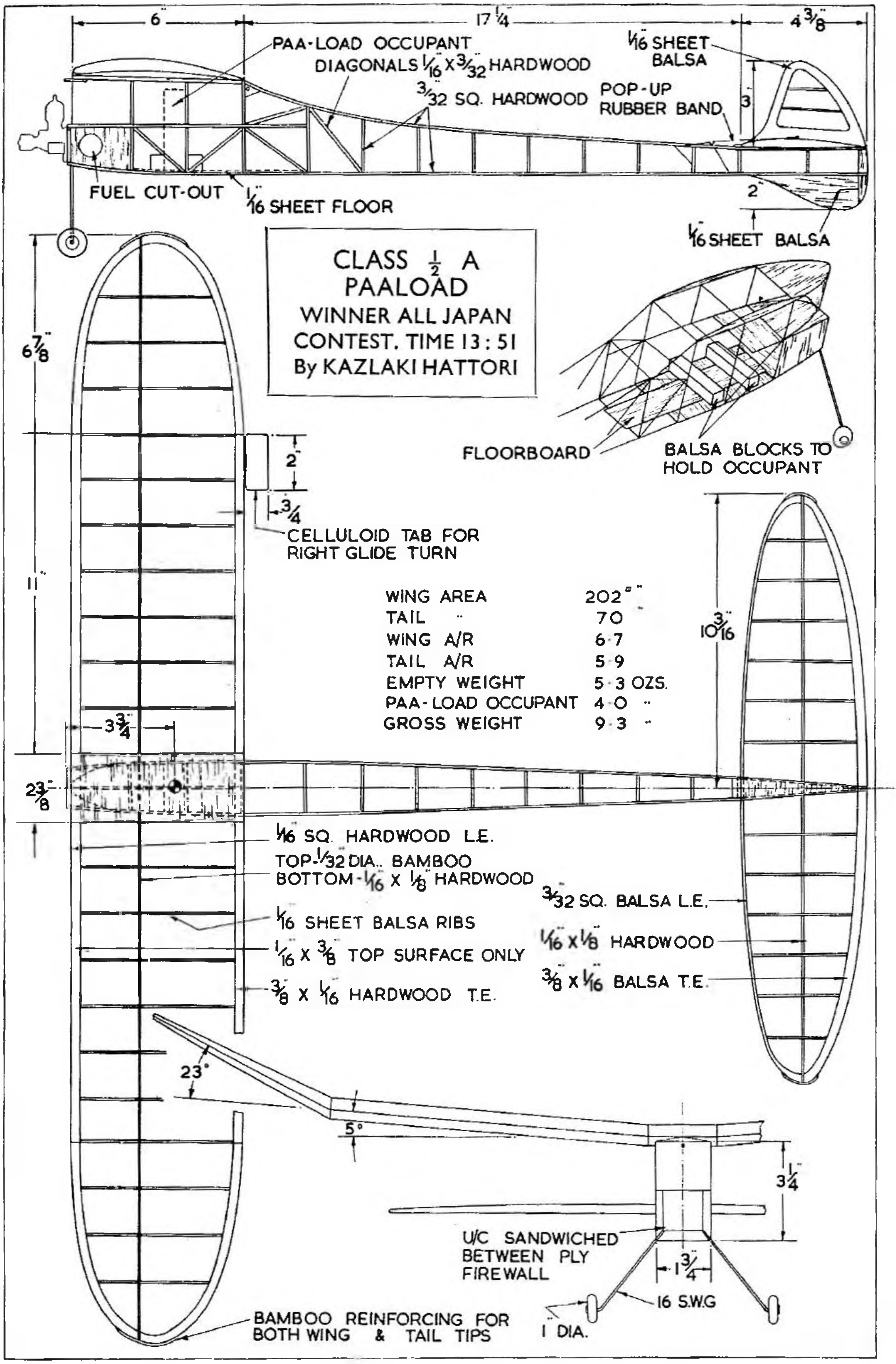
DAREDEVIL

LOW WING SEMI-SCALE SPORTS FLYER FOR ½A (.8 cc.) MOTORS

By DICK EALY, U.S.A.

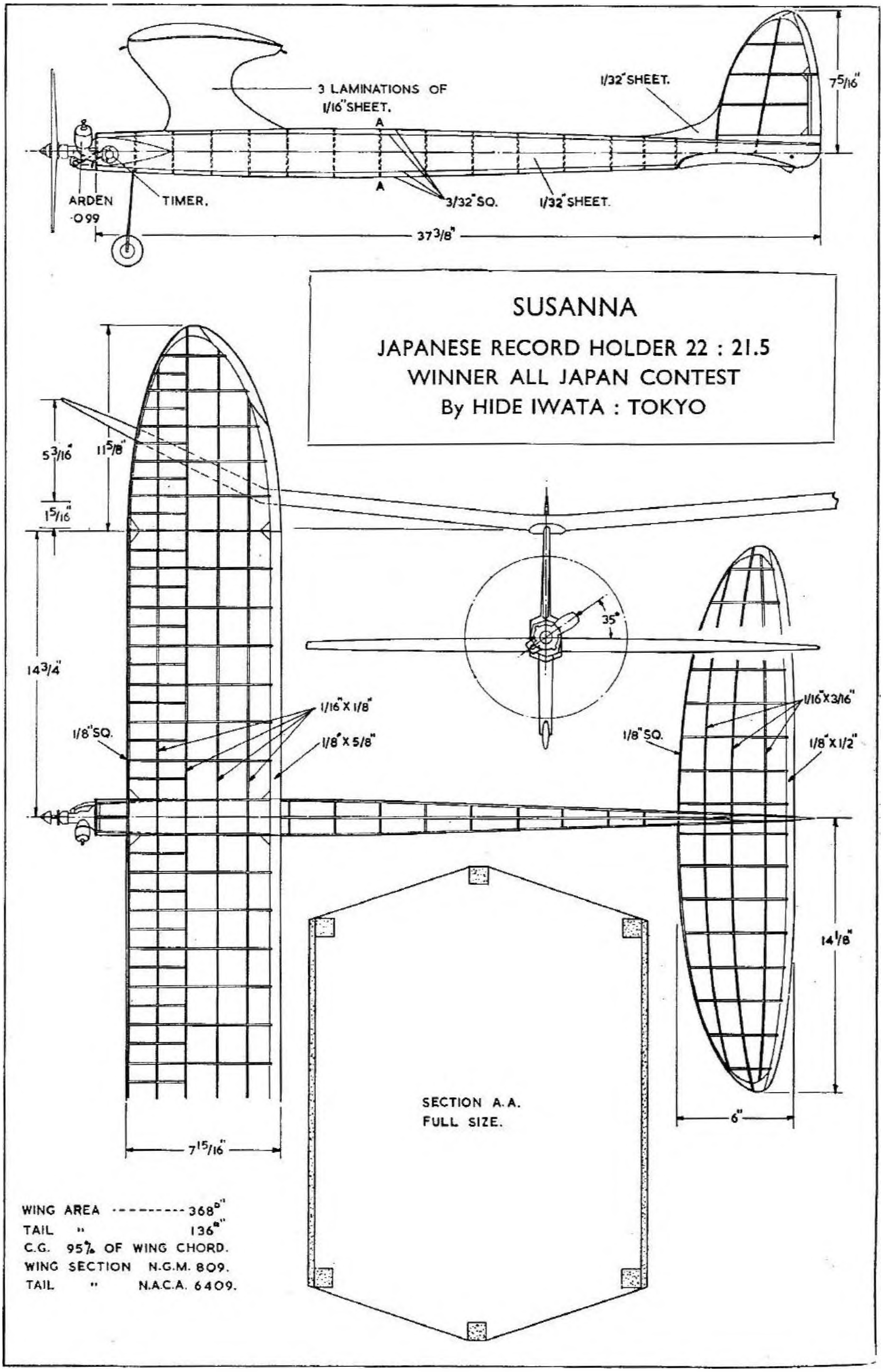

K. H. D. 137 A/2
2nd IN WORLD GLIDER CHAMPIONSHIP 1953
BY KARL H. DENZIN GERMANY
WING. 6 MAIN RIBS 1/16 PLY
32 " " 3/32 BALSA
24 TIP " 1/8 "
L.E. 5/8 SQ. "
T.E. 1/8" X 1" "
SPARS 3/32 X 1/4 PINE
TAIL. 19 RIBS 1/16 OR 1/32 BALSA
L.E. 3/16 SQ. "
T.E. 1/8 X 13/16 "
SPAR 3/32 X 3/16 PINE
3 15/16
3 15/16
16 1/2"
6 5/16"
26 3/4"
5 1/2"
16
22 9/16
22 7/16
MAIN WING RIB FULL SIZE
WING TIP RIB FULL SIZE
TAILPLANE RIB FULL SIZE
SECTION THRO' POD & BOOM. SCALE 1/2 F.S.
1/8" SHEET FORMERS
1/8" X 1/4" PLANKING
3/16 SHEET BACKBONE
3/16" SQ. PINE LONGERONS
3/16" SHEET SIDES
BOOM
6"


1/16" SQ. BAMBOO TIPS
A B
5/8"
B
A B
2 3/4"
3/16" SQ. TAPER TO 3/32" SQ.
12 3/4"
L.E. & T.E. 3/16" X 3/32" TAPER TO 3/32" SQ.
MAIN BLADE. SECTION 'A'
SCALE FULL SIZE
RIBS FROM 1/16 OR 3/32 SHEET
BLADE SECTION 'B'
SCALE FULL SIZE
DIHEDRAL ANGLE OF BLADES 9°
PITCH ANGLE 15°
17 11/16"
1/32 SHEET
C
C
1/32" PLY
3/32" SQ. BALSA LONGERONS
1/16" X 3/32" SPACERS
SMALL BEAD
MD - 12
RUBBER POWERED
HELICOPTER
By MUZIKANT DUSKO
JUGOSLAVIA
PAPER TUBE
SECTION C-C
1/16" PLY 11/16" SQ.
1/8" DIA. BALSA STRIP
TAPER TO 1/16 DIA.
3/32" PLY 7/8" SQ.
24 OR 26 S.W.G. HOOK
16 3/8"
3 15/16"
2 3/8"
'A'
4 1/8"
1/16" SQ. BALSA
3/16" CELLULOID DISC
1/16" THICK
120°
1/16" CELLULOID
VIEW IN DIRECTION
OF ARROW 'A'



CLASS ½ A
PAALOAD
WINNER ALL JAPAN
CONTEST. TIME 13 : 51
By KAZLAKI HATTORI

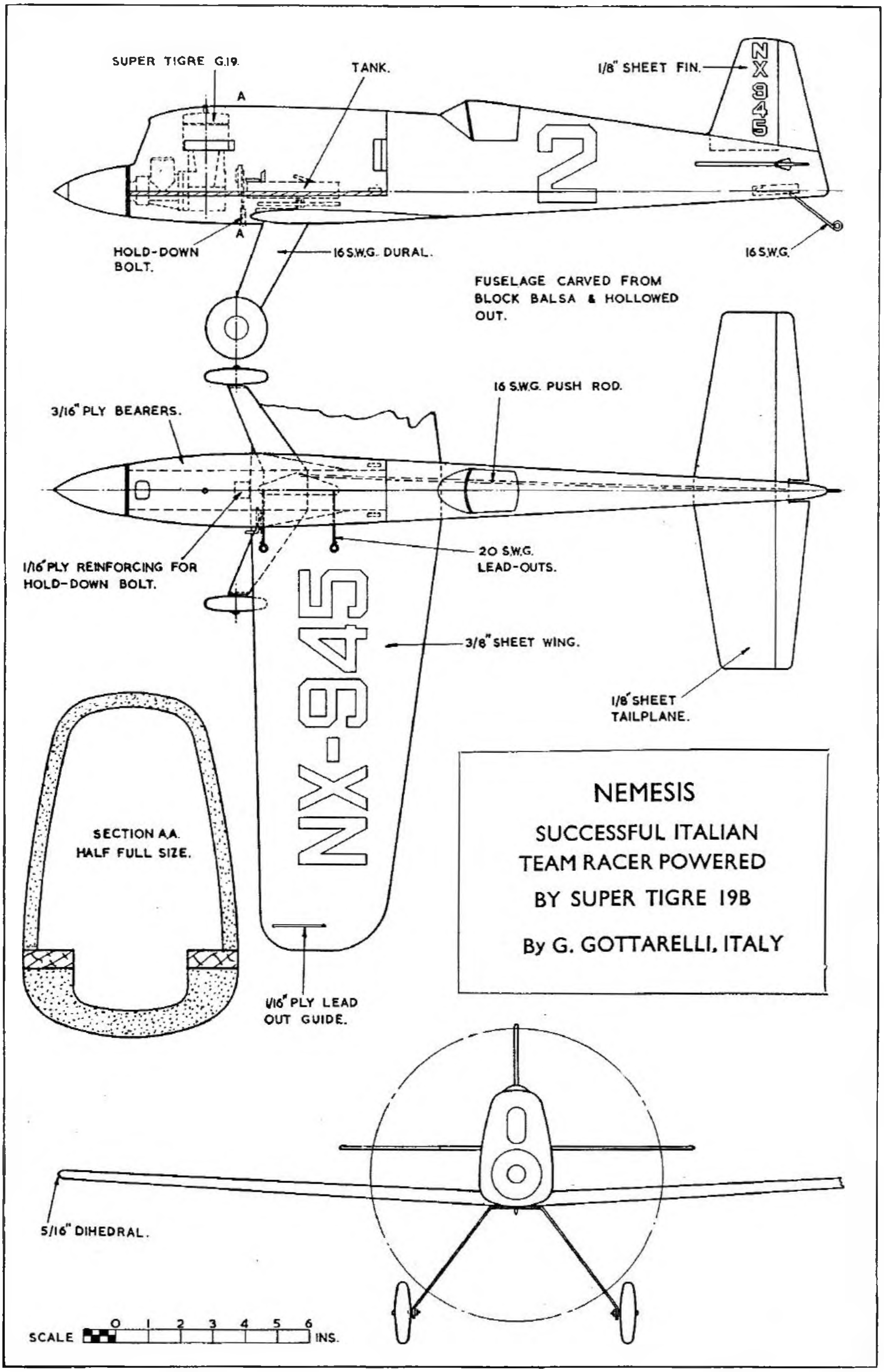
WING AREA	202 sq."
TAIL "	70
WING A/R	6·7
TAIL A/R	5·9
EMPTY WEIGHT	5·3 OZS.
PAA-LOAD OCCUPANT	4·0 "
GROSS WEIGHT	9·3 "



SUSANNA

JAPANESE RECORD HOLDER 22 : 21.5
WINNER ALL JAPAN CONTEST
By HIDE IWATA : TOKYO

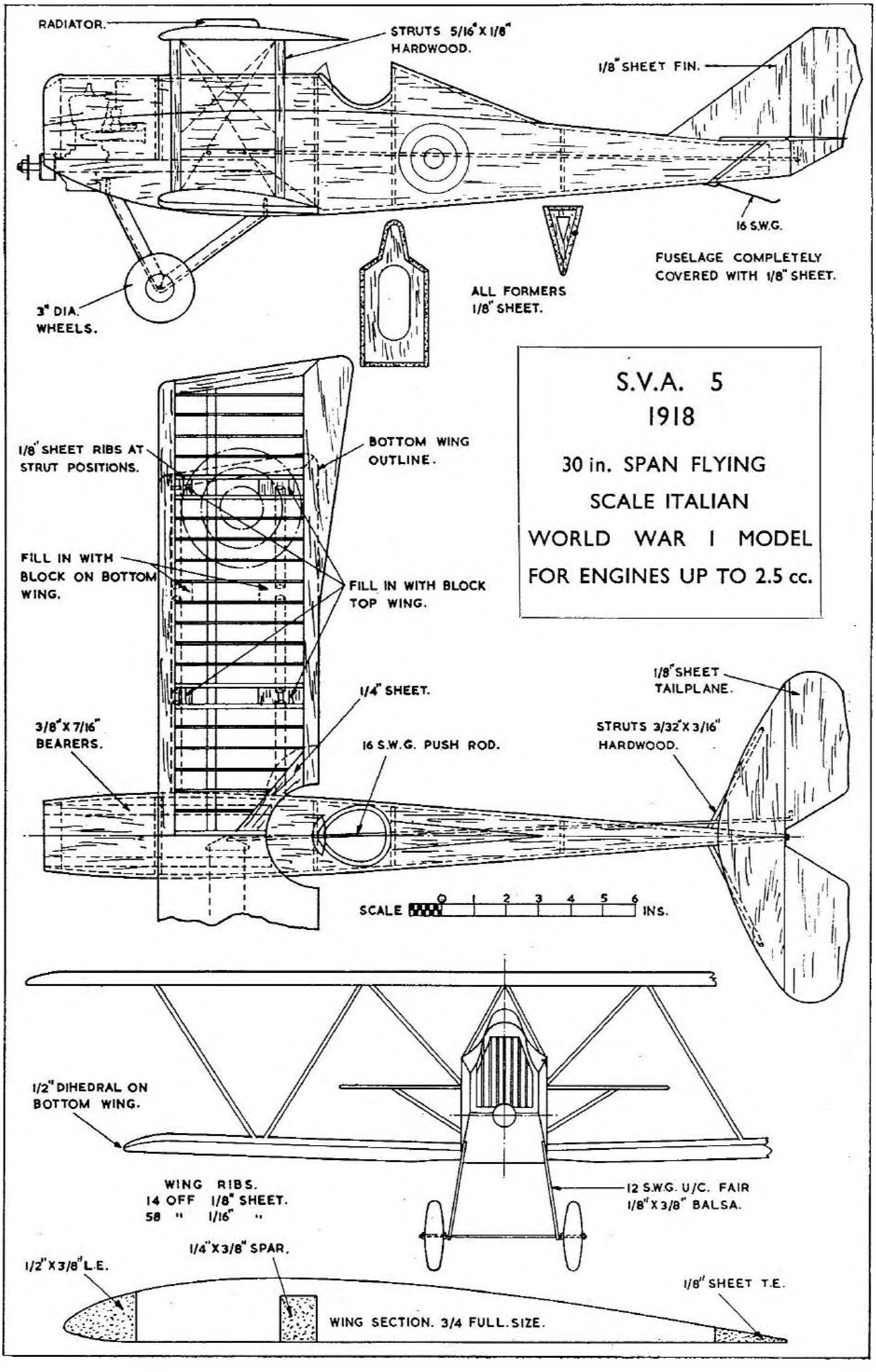
WING AREA ---------- 368□"
TAIL " 136□"
C.G. 95% OF WING CHORD.
WING SECTION N.G.M. 809.
TAIL " N.A.C.A. 6409.



NEMESIS

SUCCESSFUL ITALIAN
TEAM RACER POWERED
BY SUPER TIGRE 19B

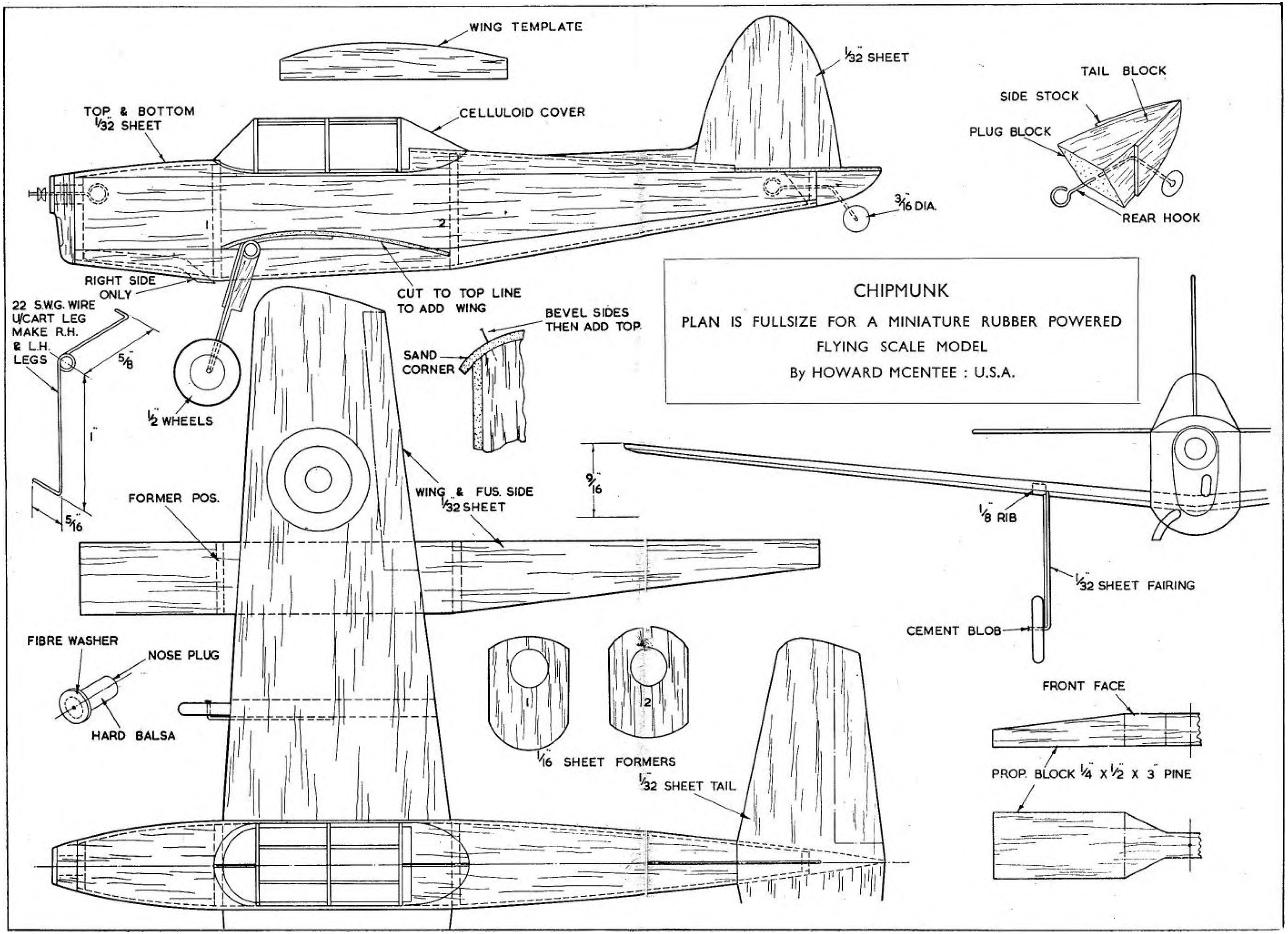
By G. GOTTARELLI, ITALY



S.V.A. 5

1918

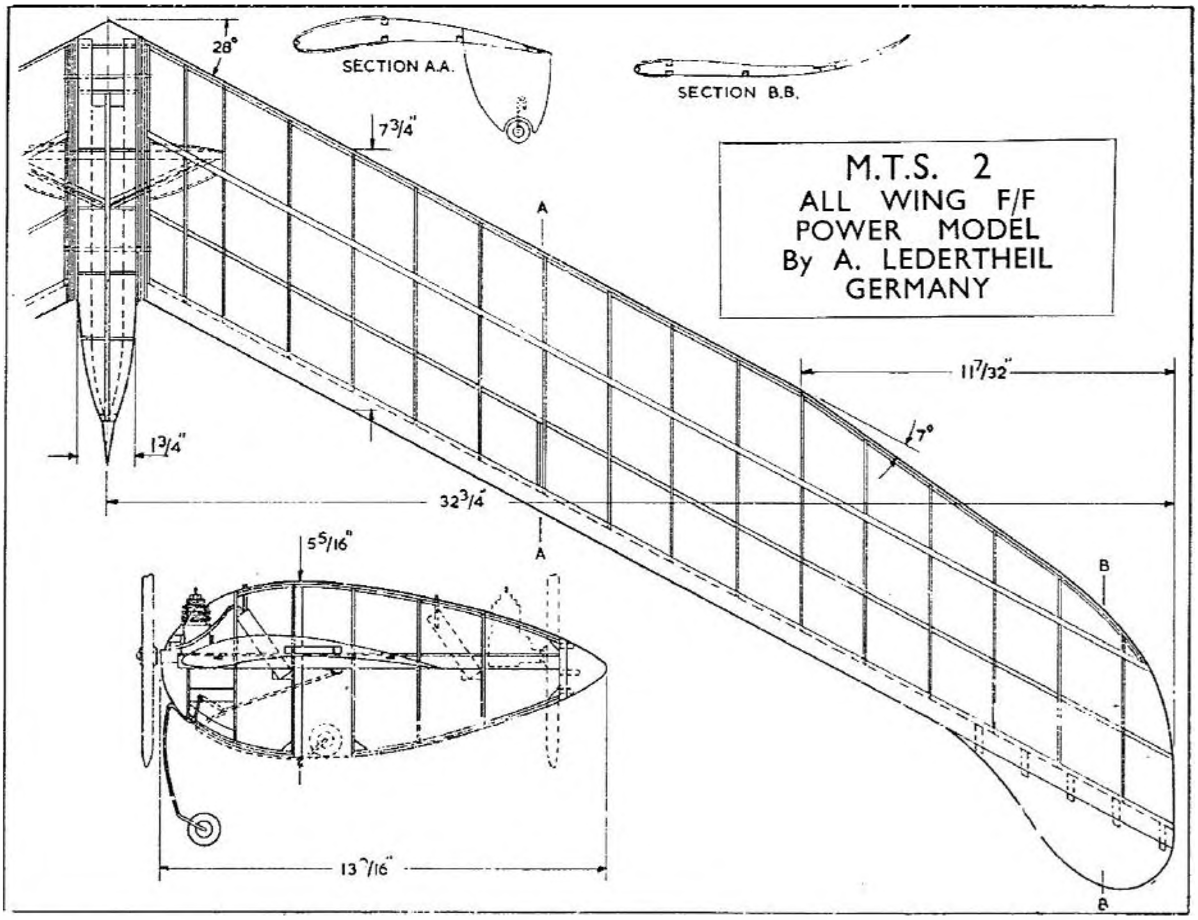
30 in. SPAN FLYING SCALE ITALIAN WORLD WAR I MODEL FOR ENGINES UP TO 2.5 cc.



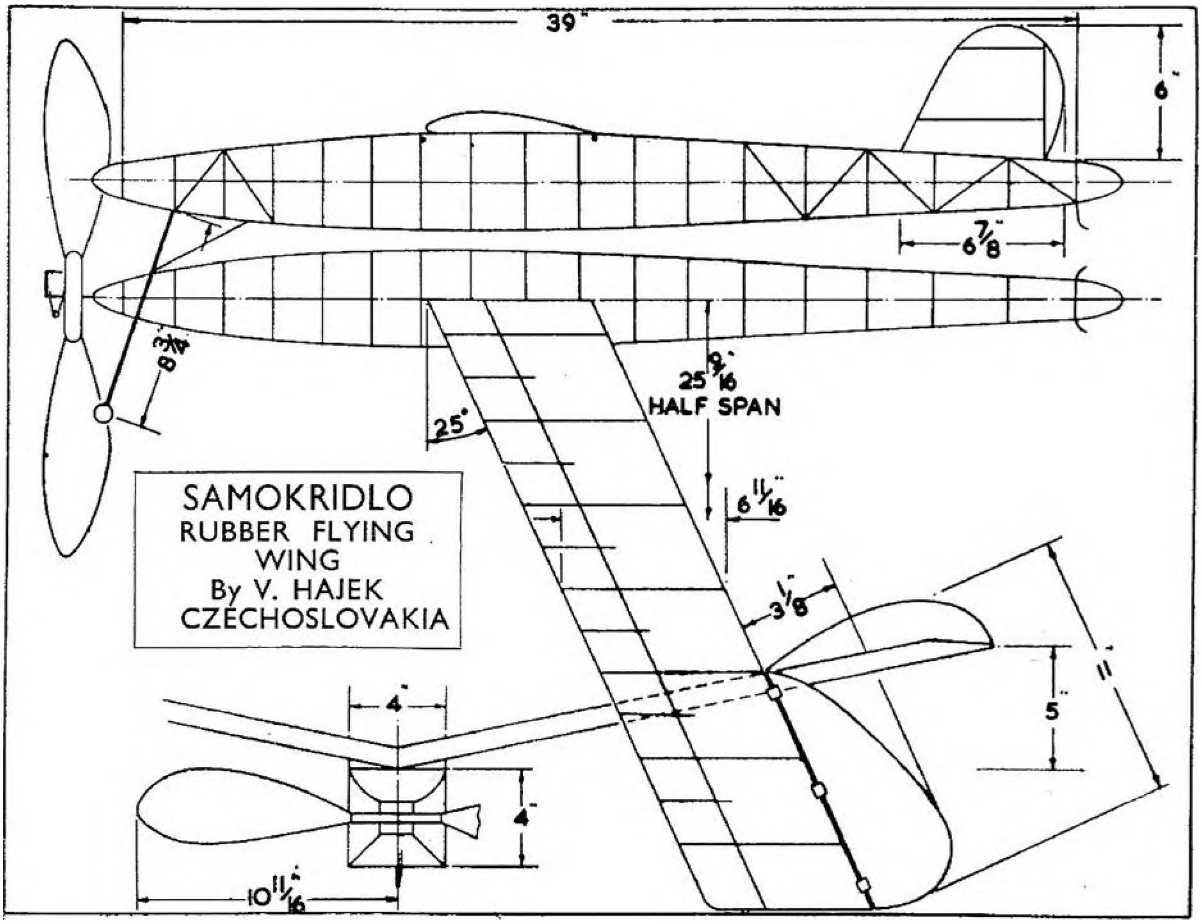
CHIPMUNK

PLAN IS FULLSIZE FOR A MINIATURE RUBBER POWERED FLYING SCALE MODEL

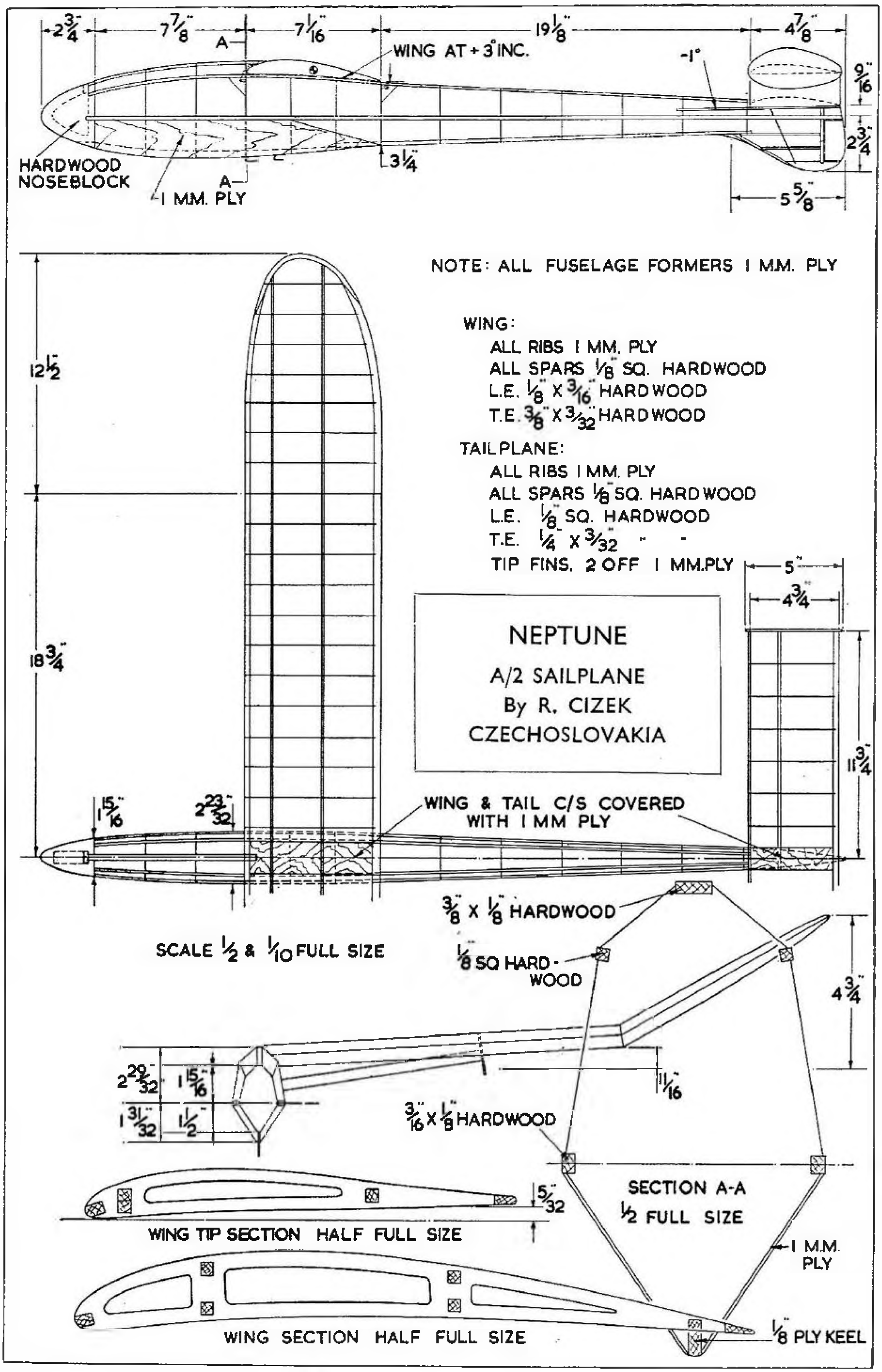
By HOWARD MCENTEE : U.S.A.



M.T.S. 2
ALL WING F/F
POWER MODEL
By A. LEDERTHEIL
GERMANY



SAMOKRIDLO
RUBBER FLYING WING
By V. HAJEK
CZECHOSLOVAKIA



NEPTUNE

A/2 SAILPLANE

By R. CIZEK

CZECHOSLOVAKIA

NOTE: ALL FUSELAGE FORMERS 1 MM. PLY

WING:
ALL RIBS 1 MM. PLY
ALL SPARS 1/8" SQ. HARDWOOD
L.E. 1/8" X 3/16" HARDWOOD
T.E. 3/8" X 3/32" HARDWOOD

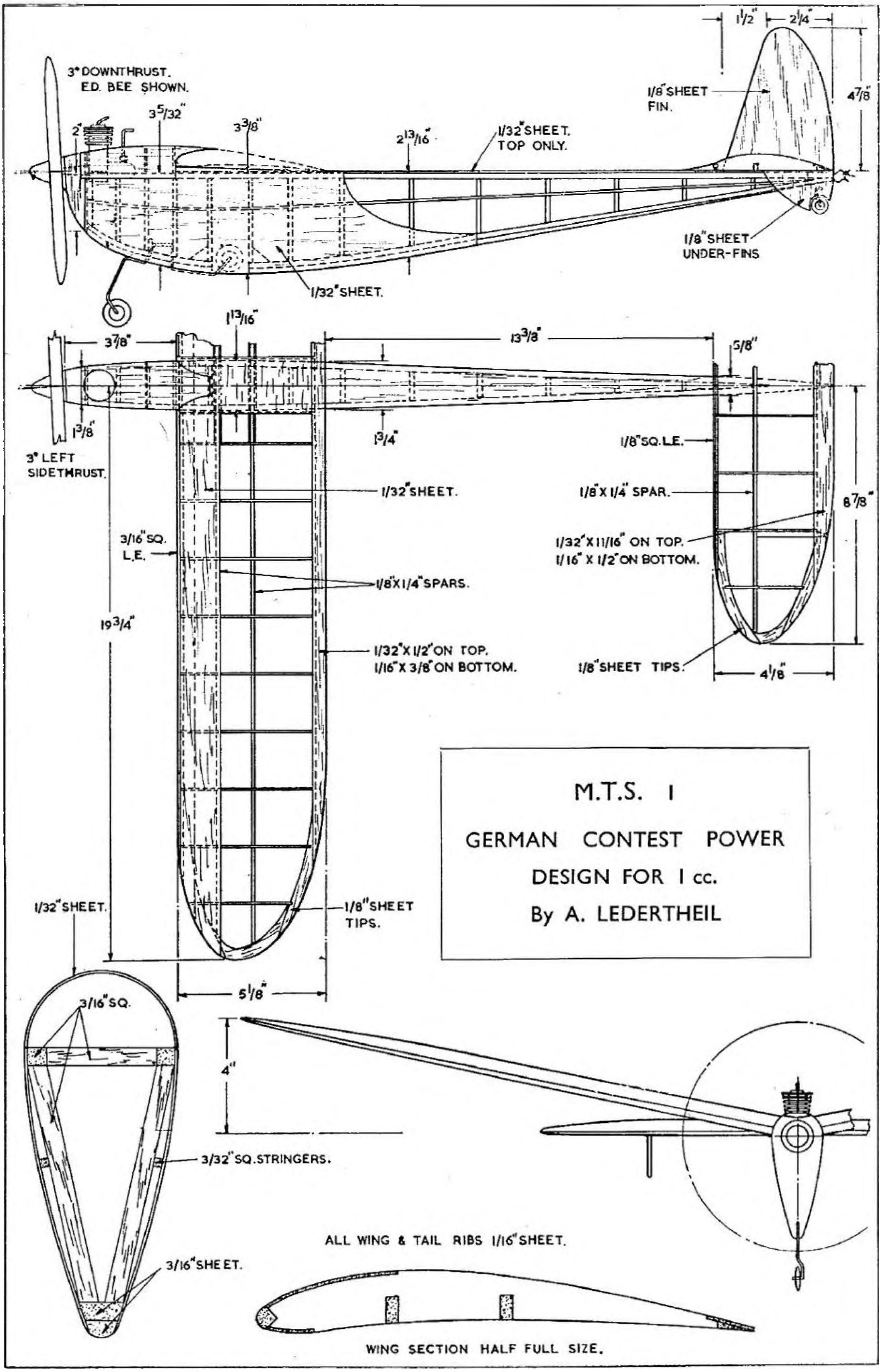
TAILPLANE:
ALL RIBS 1 MM. PLY
ALL SPARS 1/8" SQ. HARDWOOD
L.E. 1/8" SQ. HARDWOOD
T.E. 1/4" X 3/32" " "
TIP FINS. 2 OFF 1 MM.PLY

SCALE 1/2 & 1/10 FULL SIZE

SECTION A-A 1/2 FULL SIZE

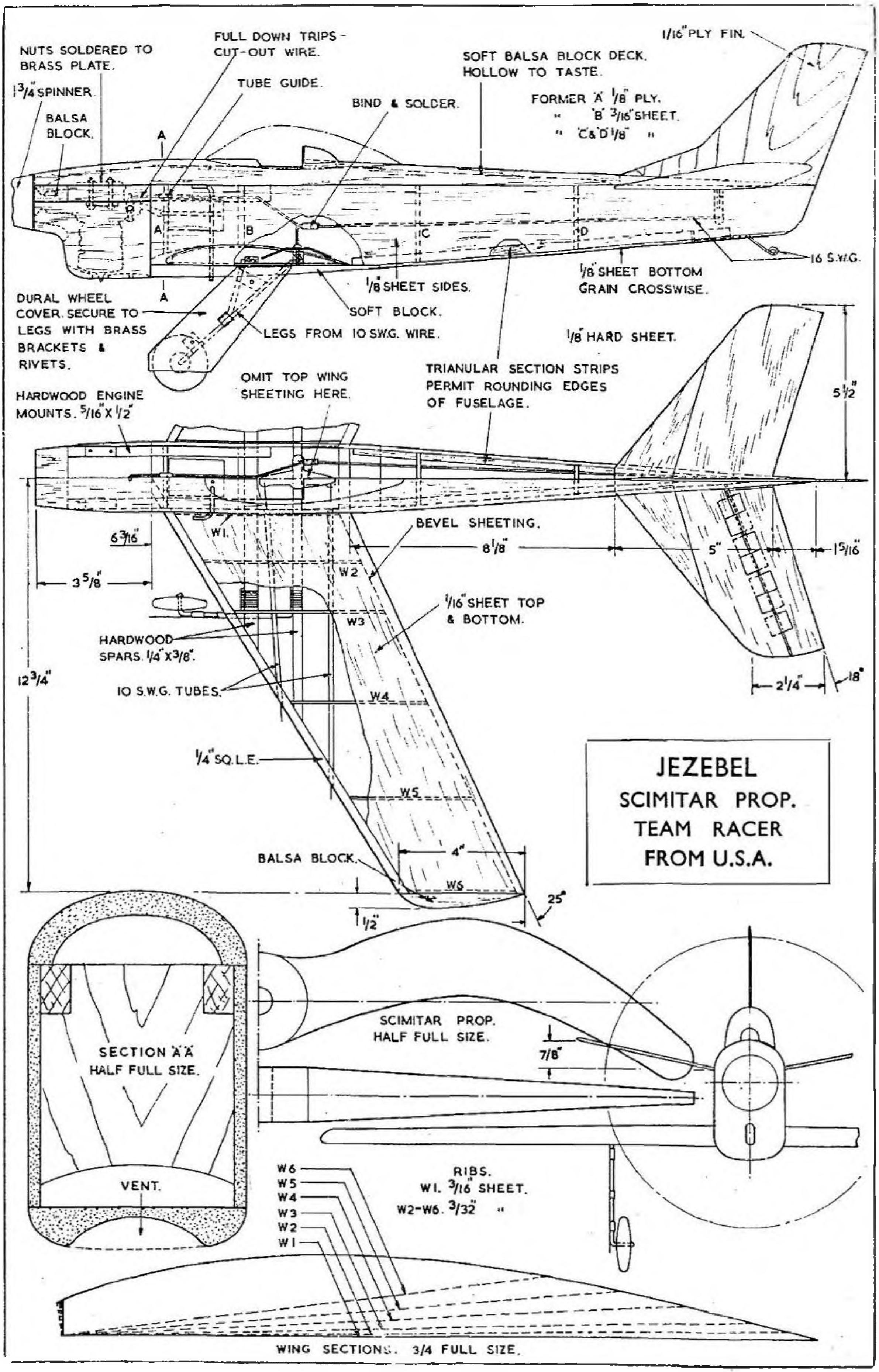
WING TIP SECTION HALF FULL SIZE

WING SECTION HALF FULL SIZE

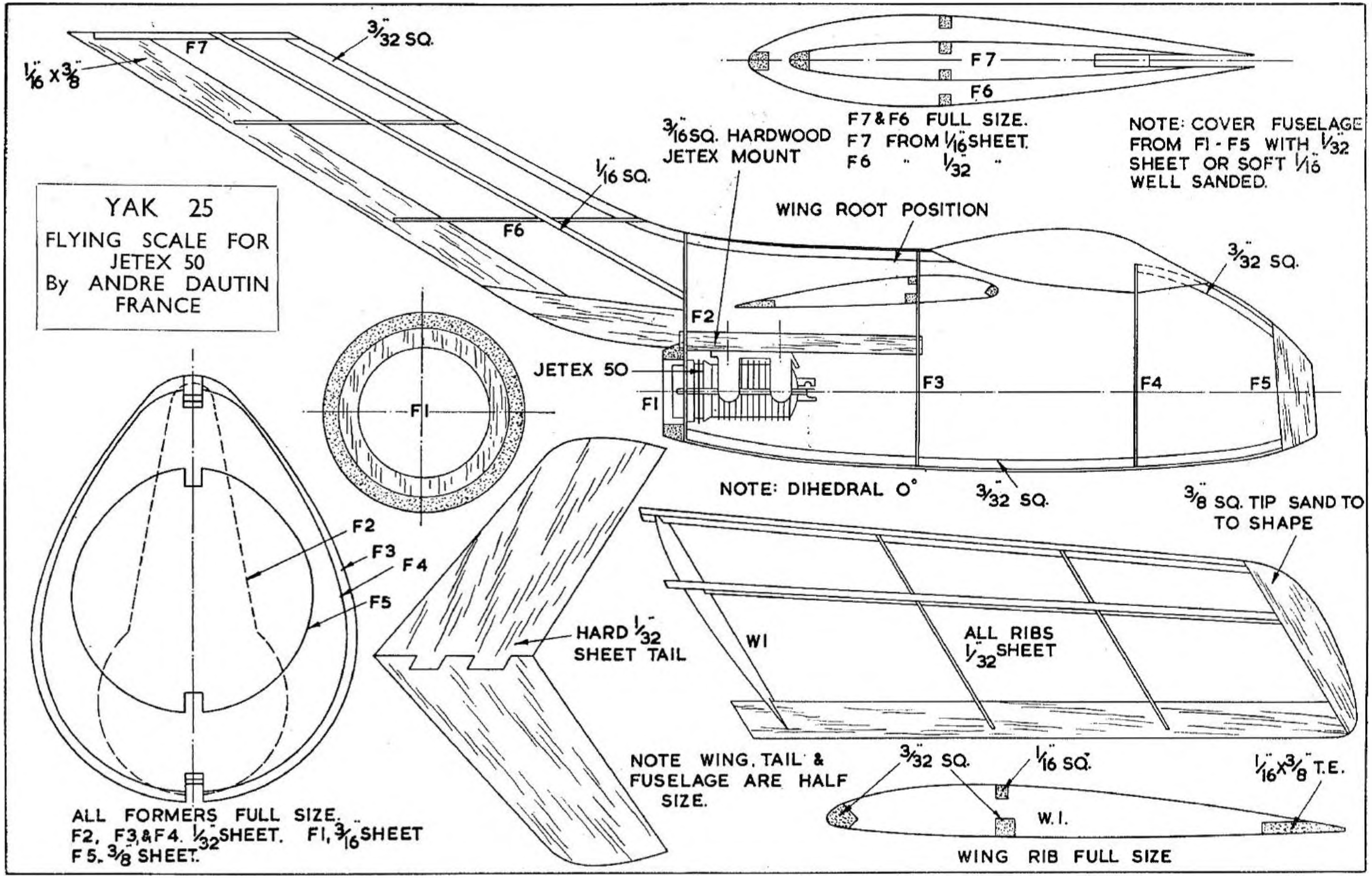


M.T.S. I

GERMAN CONTEST POWER
DESIGN FOR I cc.
By A. LEDERTHEIL



JEZEBEL
SCIMITAR PROP.
TEAM RACER
FROM U.S.A.



YAK 25
FLYING SCALE FOR
JETEX 50
By ANDRE DAUTIN
FRANCE

F7 & F6 FULL SIZE.
F7 FROM 1/16" SHEET.
F6 " 1/32" "

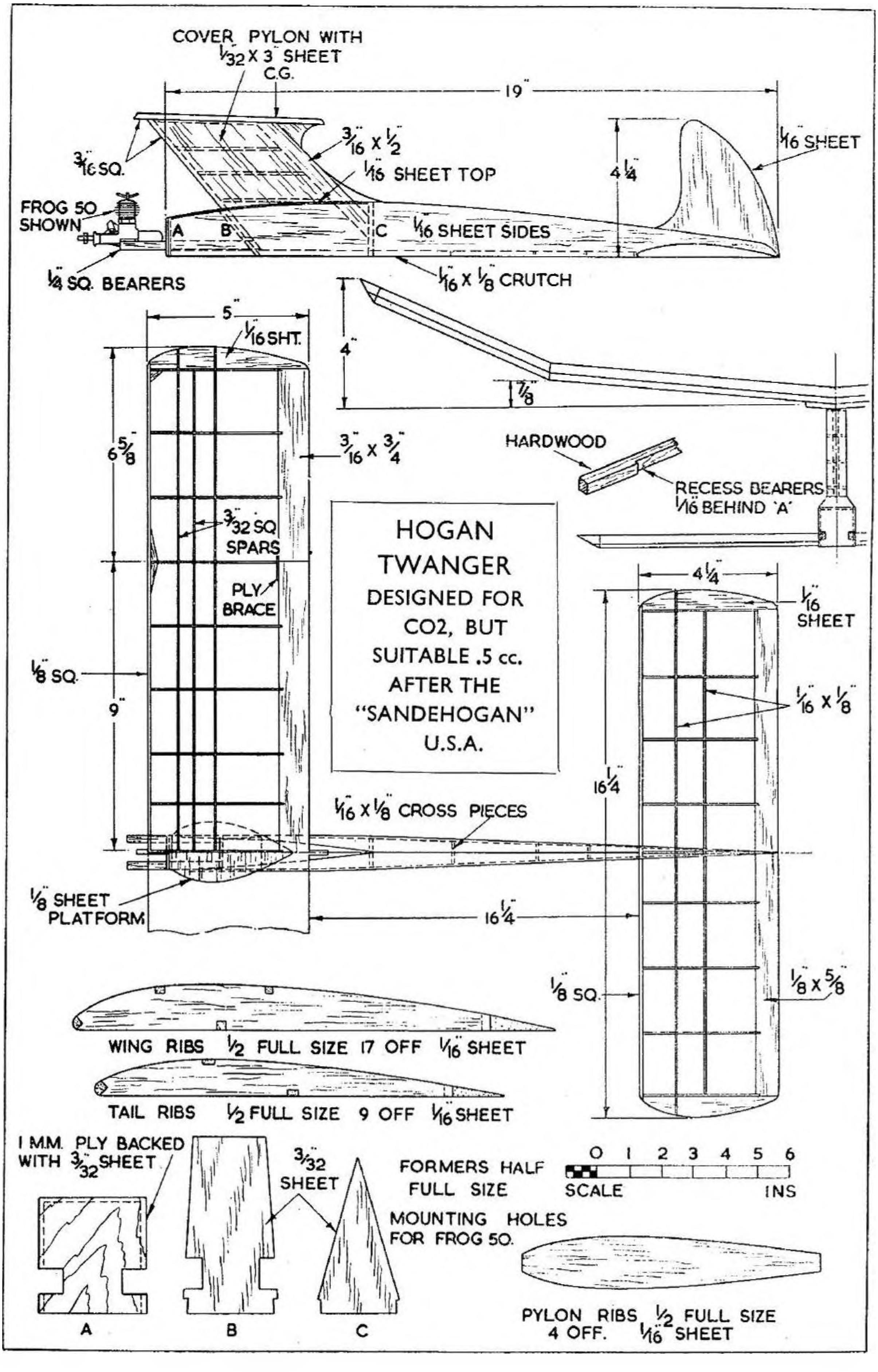
NOTE: COVER FUSELAGE FROM F1 - F5 WITH 1/32" SHEET OR SOFT 1/16" WELL SANDED.

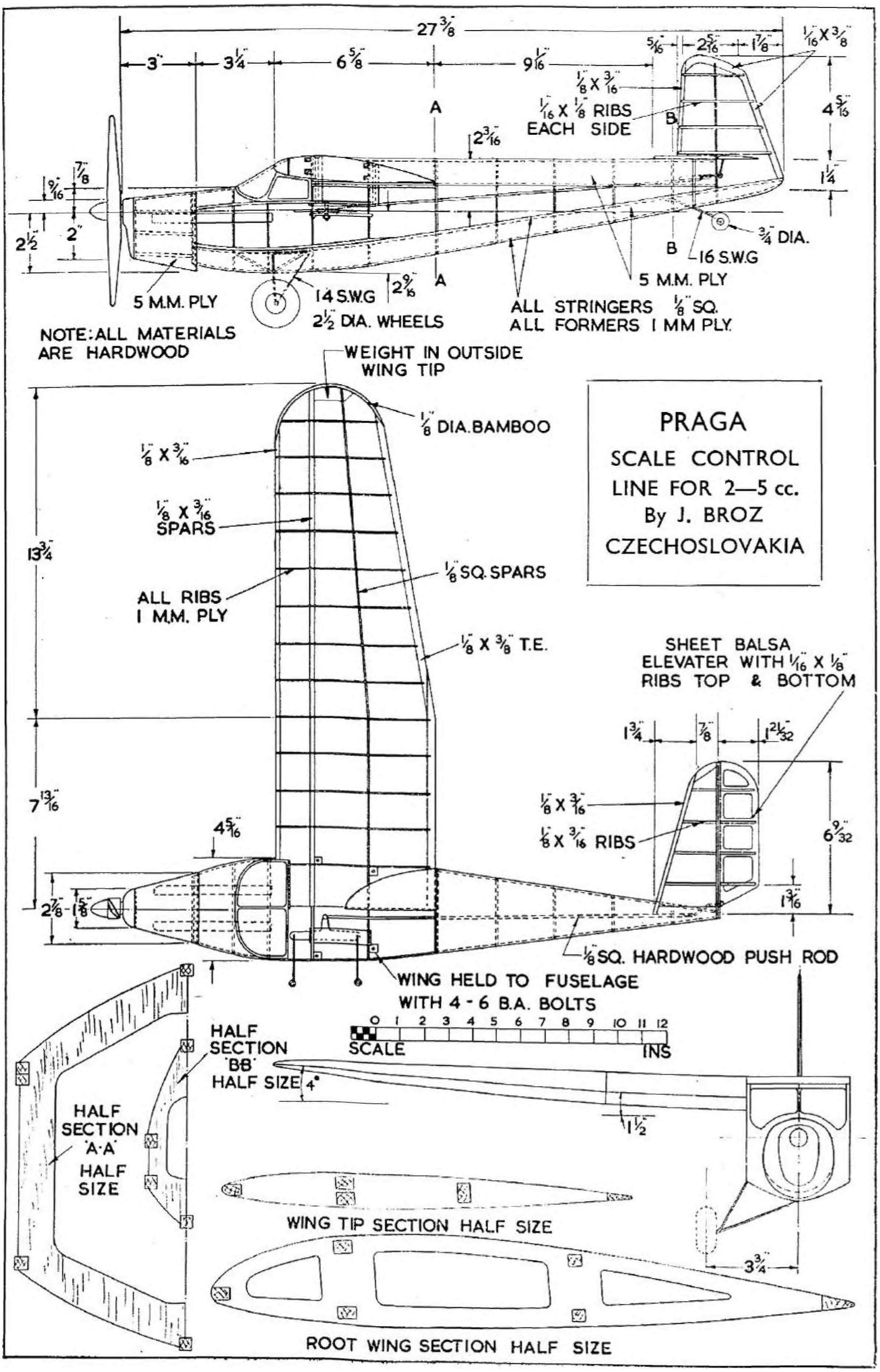
NOTE: DIHEDRAL 0°

NOTE WING, TAIL & FUSELAGE ARE HALF SIZE.

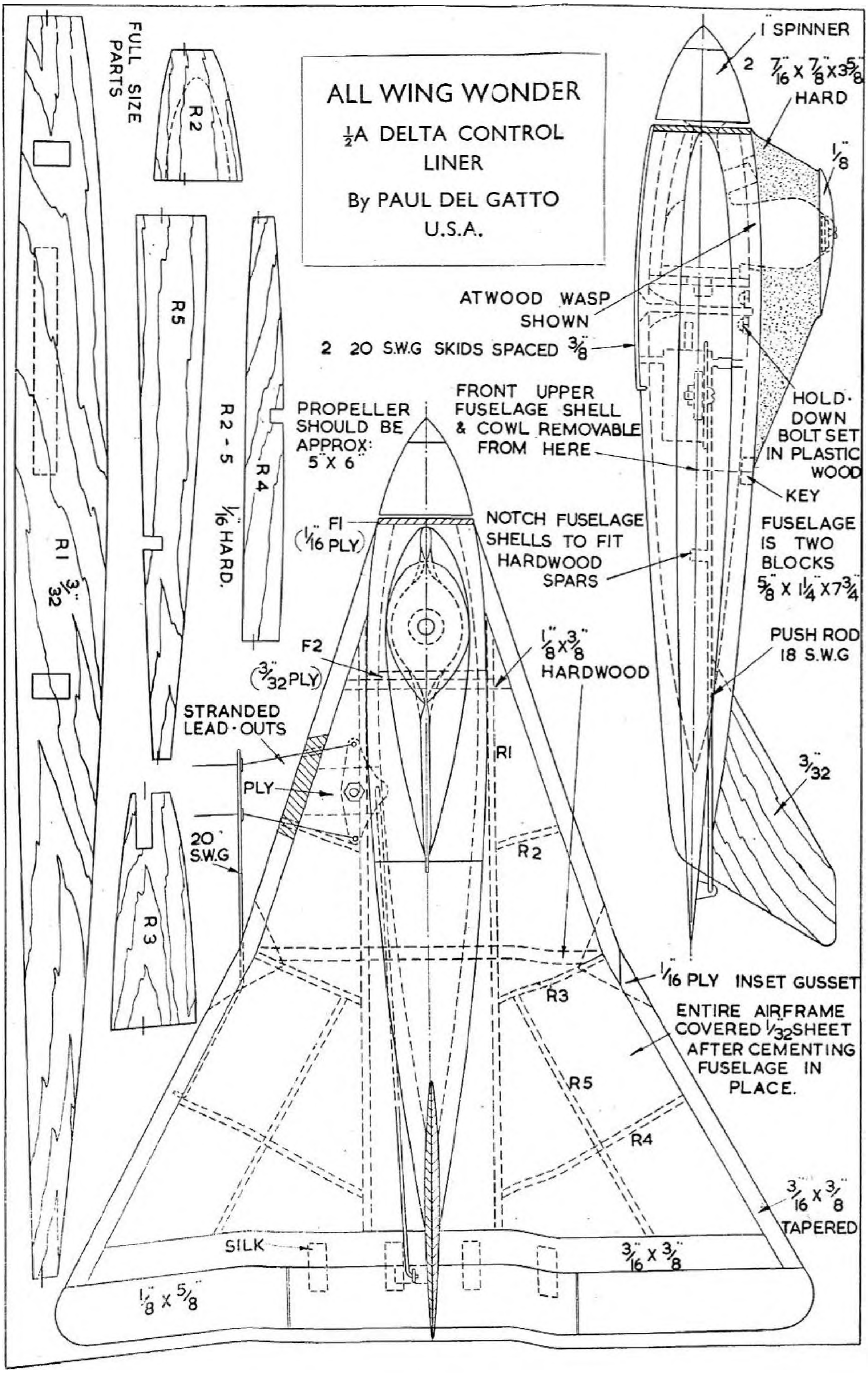
ALL FORMERS FULL SIZE.
F2, F3, & F4. 1/32" SHEET. F1, 3/16" SHEET
F5. 3/8" SHEET.

WING RIB FULL SIZE

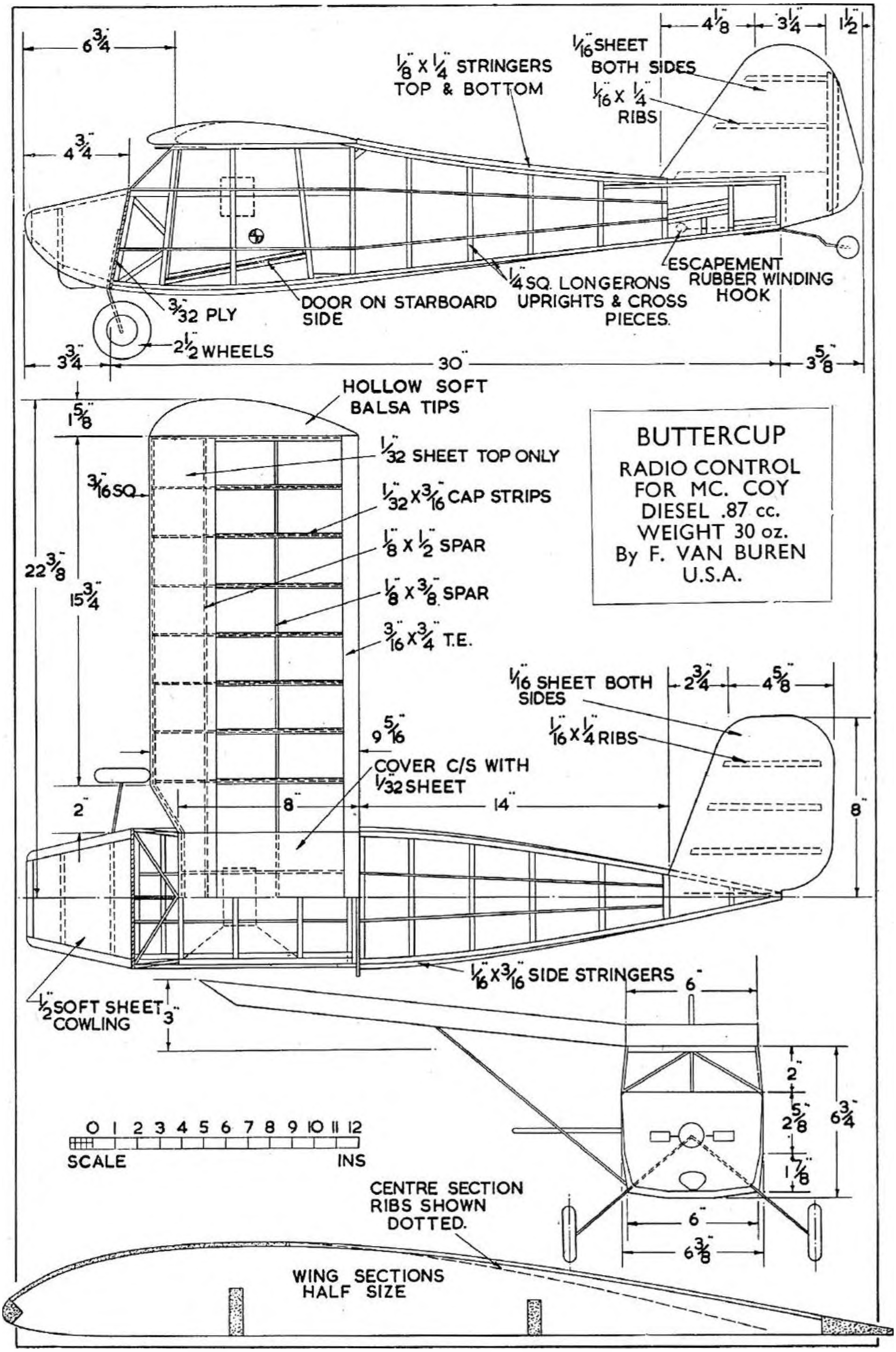

COVER PYLON WITH 1/32 X 3" SHEET
C.G.
19"
3/16 SQ.
3/16 X 1/2
1/16 SHEET TOP
1/16 SHEET
4 1/4
FROG 50 SHOWN
A
B
C
1/16 SHEET SIDES
1/4 SQ. BEARERS
1/16 X 1/8 CRUTCH
5"
1/16 SHT.
4"
7/8
6 5/8
3/16 X 3/4
HARDWOOD
RECESS BEARERS 1/16 BEHIND 'A'
3/32 SQ SPARS
PLY BRACE
HOGAN TWANGER
DESIGNED FOR CO2, BUT SUITABLE .5 cc.
AFTER THE "SANDEHOGAN" U.S.A.
4 1/4
1/16 SHEET
1/8 SQ.
9"
1/16 X 1/8
16 1/4
1/16 X 1/8 CROSS PIECES
1/8 SHEET PLATFORM
16 1/4
1/8 SQ.
1/8 X 5/8
WING RIBS 1/2 FULL SIZE 17 OFF 1/16 SHEET
TAIL RIBS 1/2 FULL SIZE 9 OFF 1/16 SHEET
1 MM. PLY BACKED WITH 3/32 SHEET
3/32 SHEET
FORMERS HALF FULL SIZE
0 1 2 3 4 5 6
SCALE
INS
MOUNTING HOLES FOR FROG 50.
A
B
C
PYLON RIBS 1/2 FULL SIZE 4 OFF. 1/16 SHEET

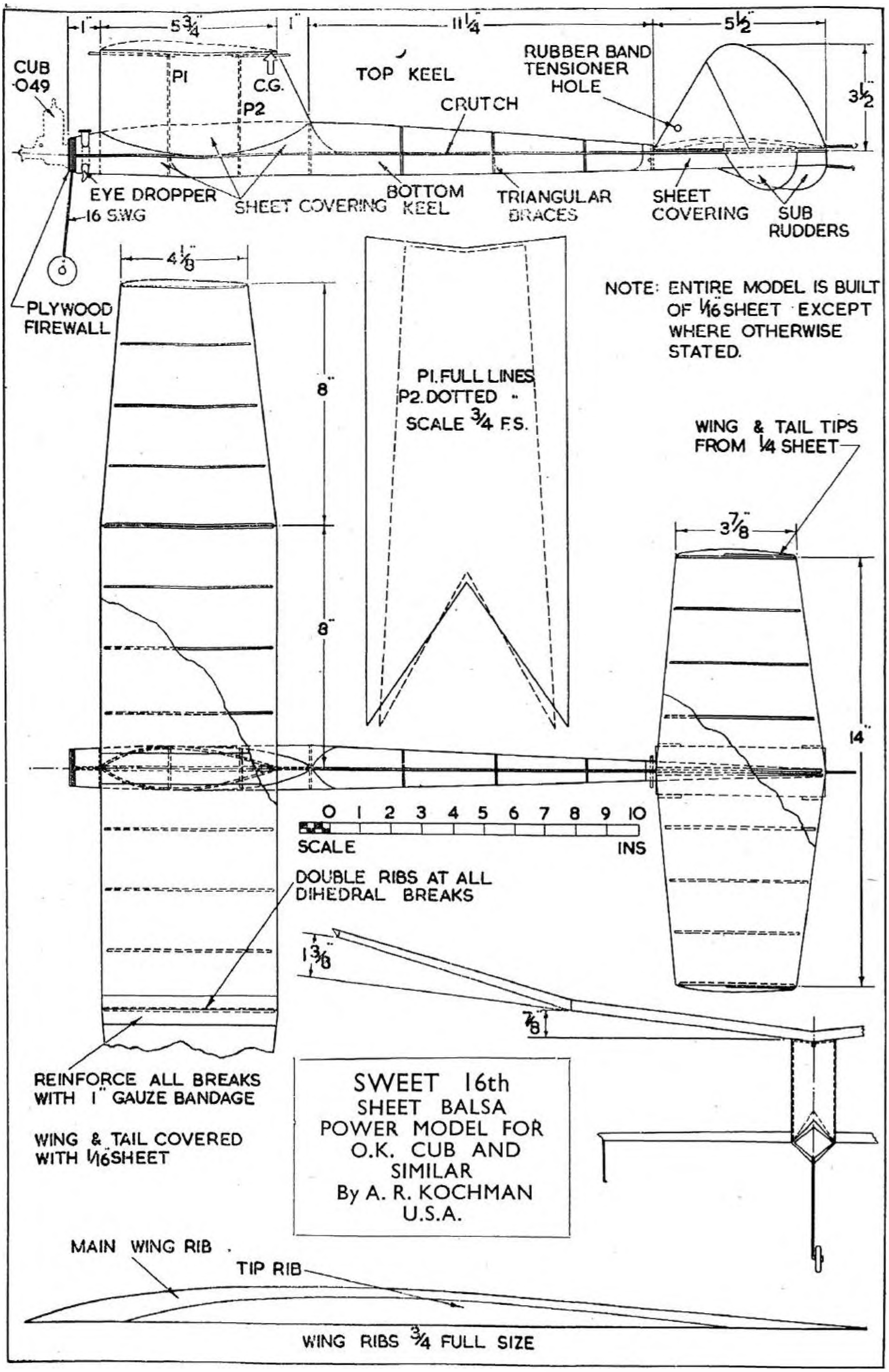


PRAGA
SCALE CONTROL
LINE FOR 2—5 cc.
By J. BROZ
CZECHOSLOVAKIA

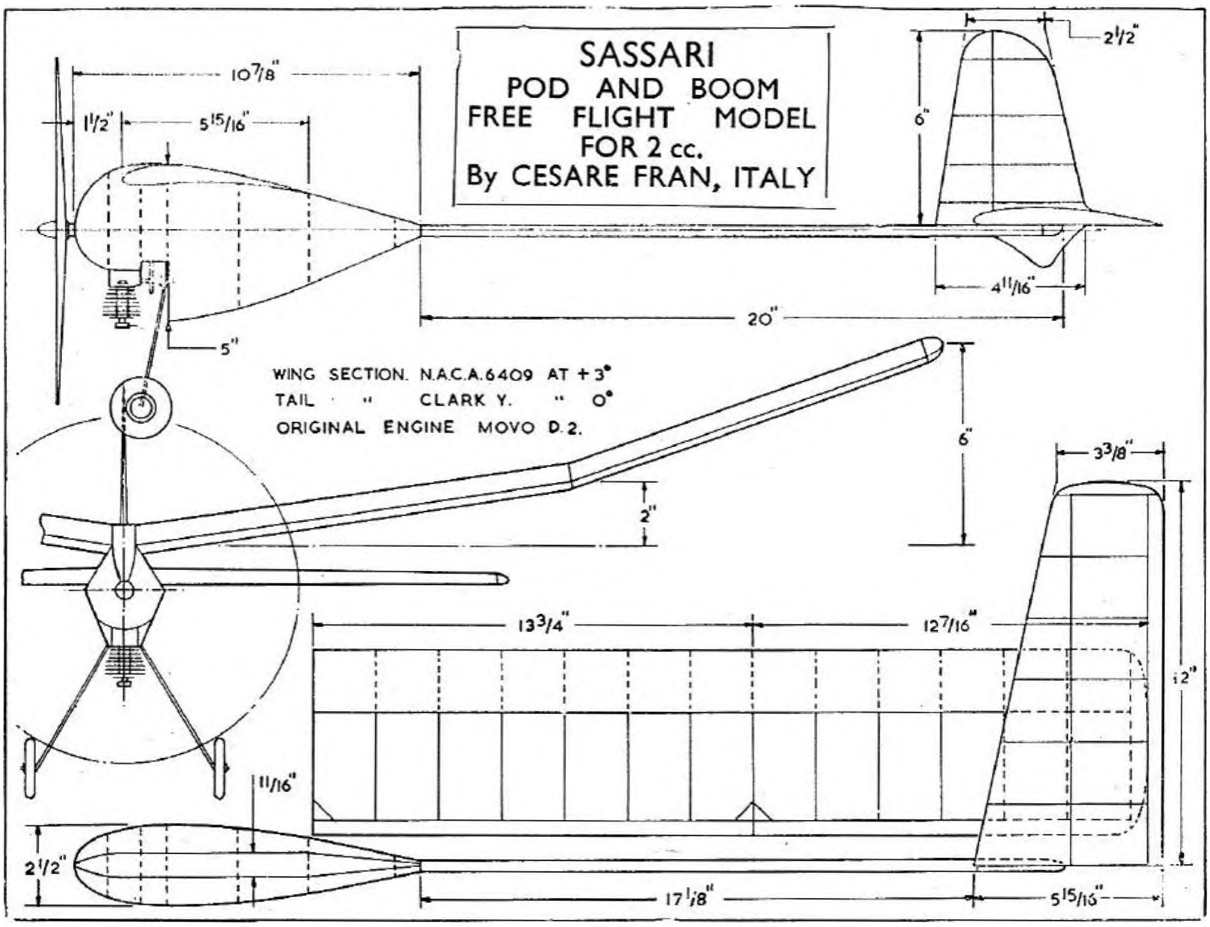


ALL WING WONDER
½A DELTA CONTROL LINER
By PAUL DEL GATTO
U.S.A.


BUTTERCUP
RADIO CONTROL
FOR MC. COY
DIESEL .87 cc.
WEIGHT 30 oz.
By F. VAN BUREN
U.S.A.
6 3/4"
4 3/4"
1/8" x 1/4" STRINGERS TOP & BOTTOM
1/16" SHEET BOTH SIDES
1/16" x 1/4" RIBS
4 1/8"
3 1/4"
1 1/2"
ESCAPEMENT
RUBBER WINDING HOOK
1/4 SQ. LONGERONS UPRIGHTS & CROSS PIECES.
DOOR ON STARBOARD SIDE
3/32" PLY
2 1/2" WHEELS
3 3/4"
30"
3 5/8"
HOLLOW SOFT BALSA TIPS
1 5/8"
1/32" SHEET TOP ONLY
3/16 SQ.
1/32" x 3/16" CAP STRIPS
1/8" x 1/2" SPAR
1/8" x 3/8" SPAR
3/16" x 3/4" T.E.
22 3/8"
15 3/4"
9 5/16"
COVER C/S WITH 1/32" SHEET
2"
8"
14"
1/16 SHEET BOTH SIDES
1/16" x 1/4" RIBS
2 3/4"
4 5/8"
8"
1/16" x 3/16" SIDE STRINGERS
1/2" SOFT SHEET COWLING
3"
6"
2"
2 5/8"
6 3/4"
1 7/8"
6"
6 3/8"
0 1 2 3 4 5 6 7 8 9 10 11 12
SCALE
INS
CENTRE SECTION RIBS SHOWN DOTTED.
WING SECTIONS HALF SIZE



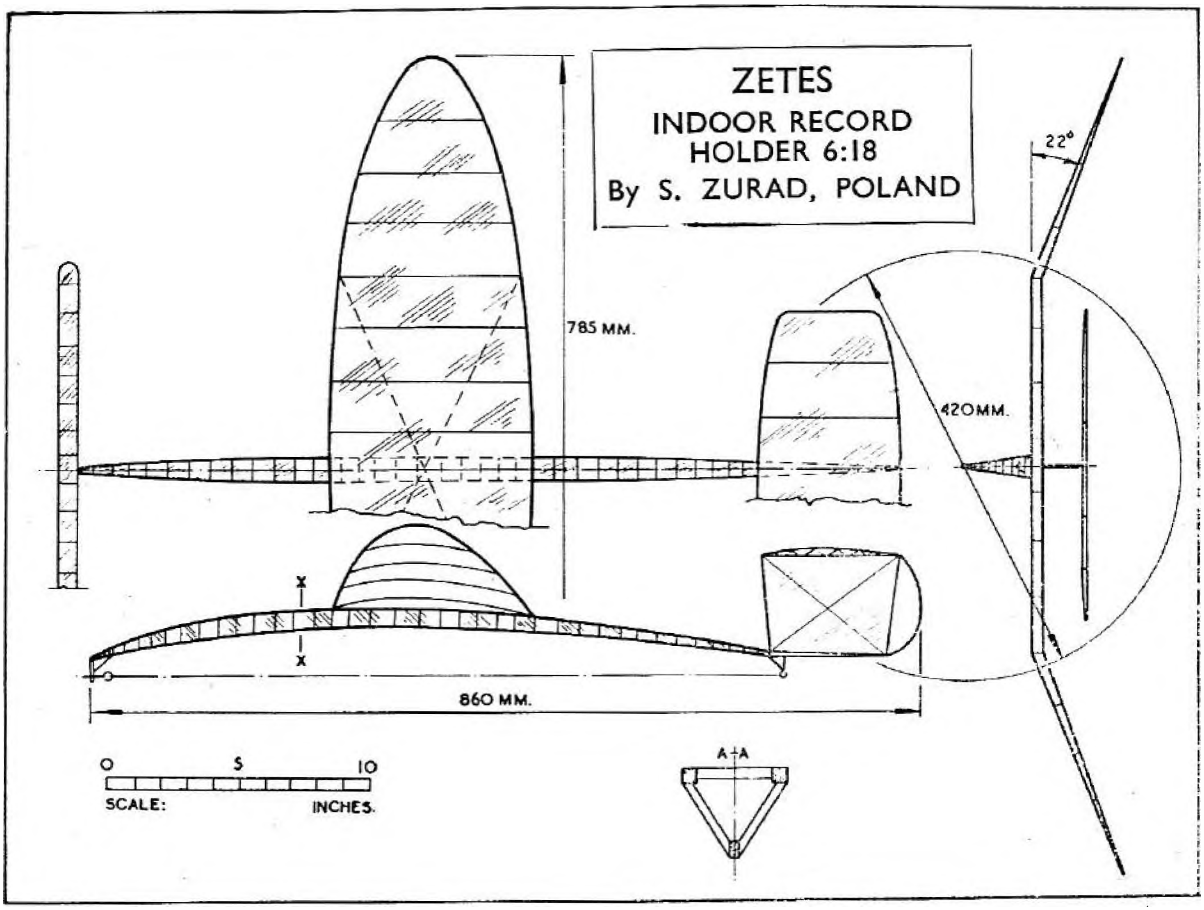
SWEET 16th
SHEET BALSA
POWER MODEL FOR
O.K. CUB AND
SIMILAR
By A. R. KOCHMAN
U.S.A.



SASSARI

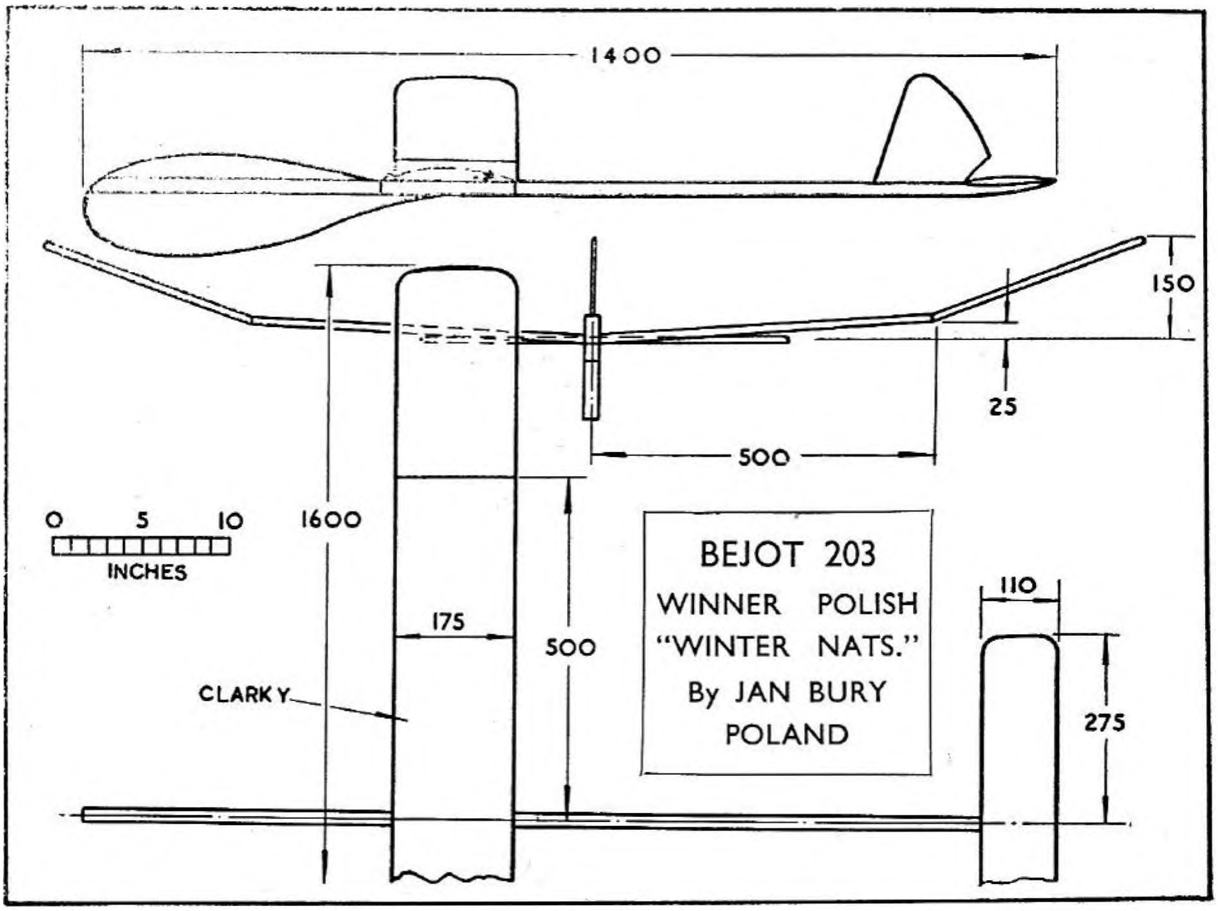
POD AND BOOM
FREE FLIGHT MODEL
FOR 2 cc.
By CESARE FRAN, ITALY

WING SECTION. N.A.C.A. 6409 AT + 3°
TAIL " CLARK Y. " 0°
ORIGINAL ENGINE MOVO D. 2.

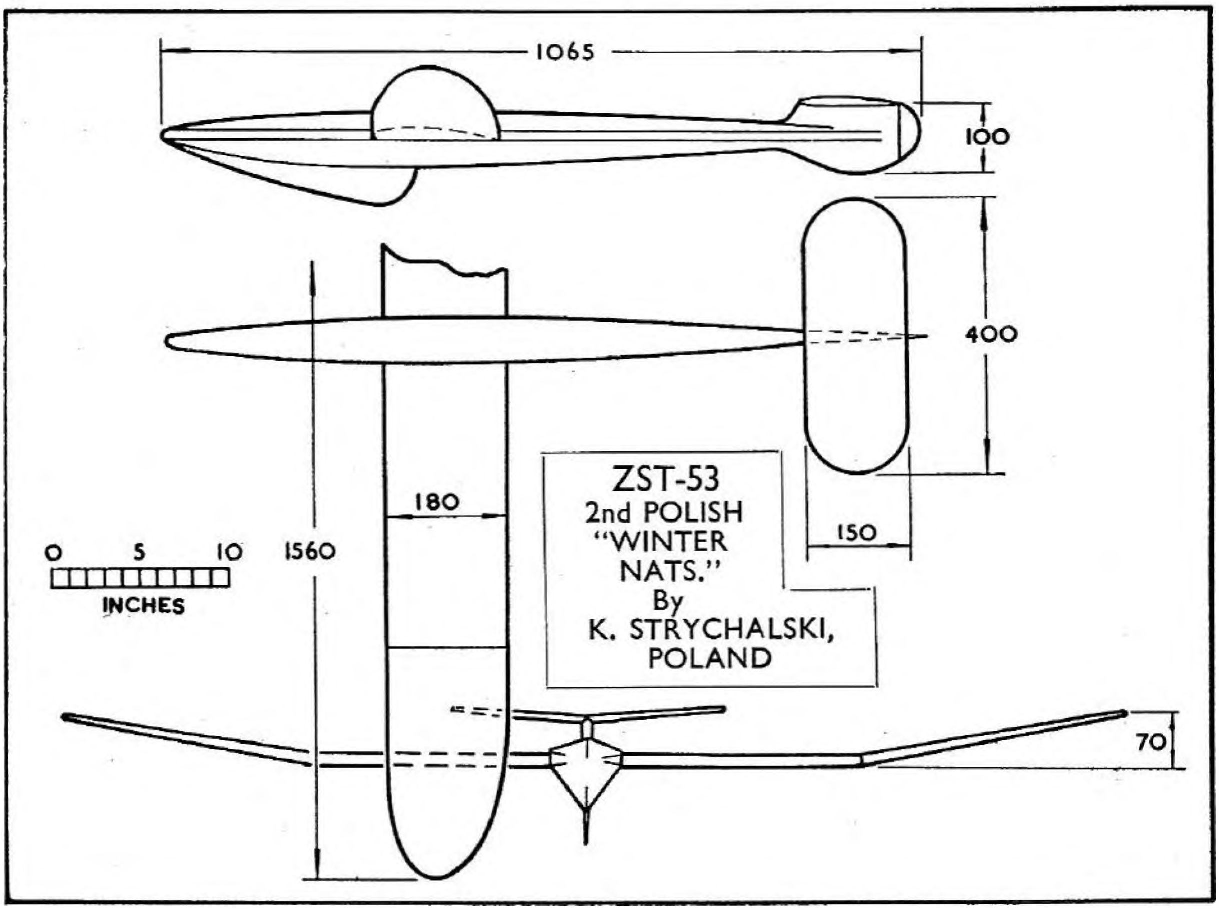


ZETES

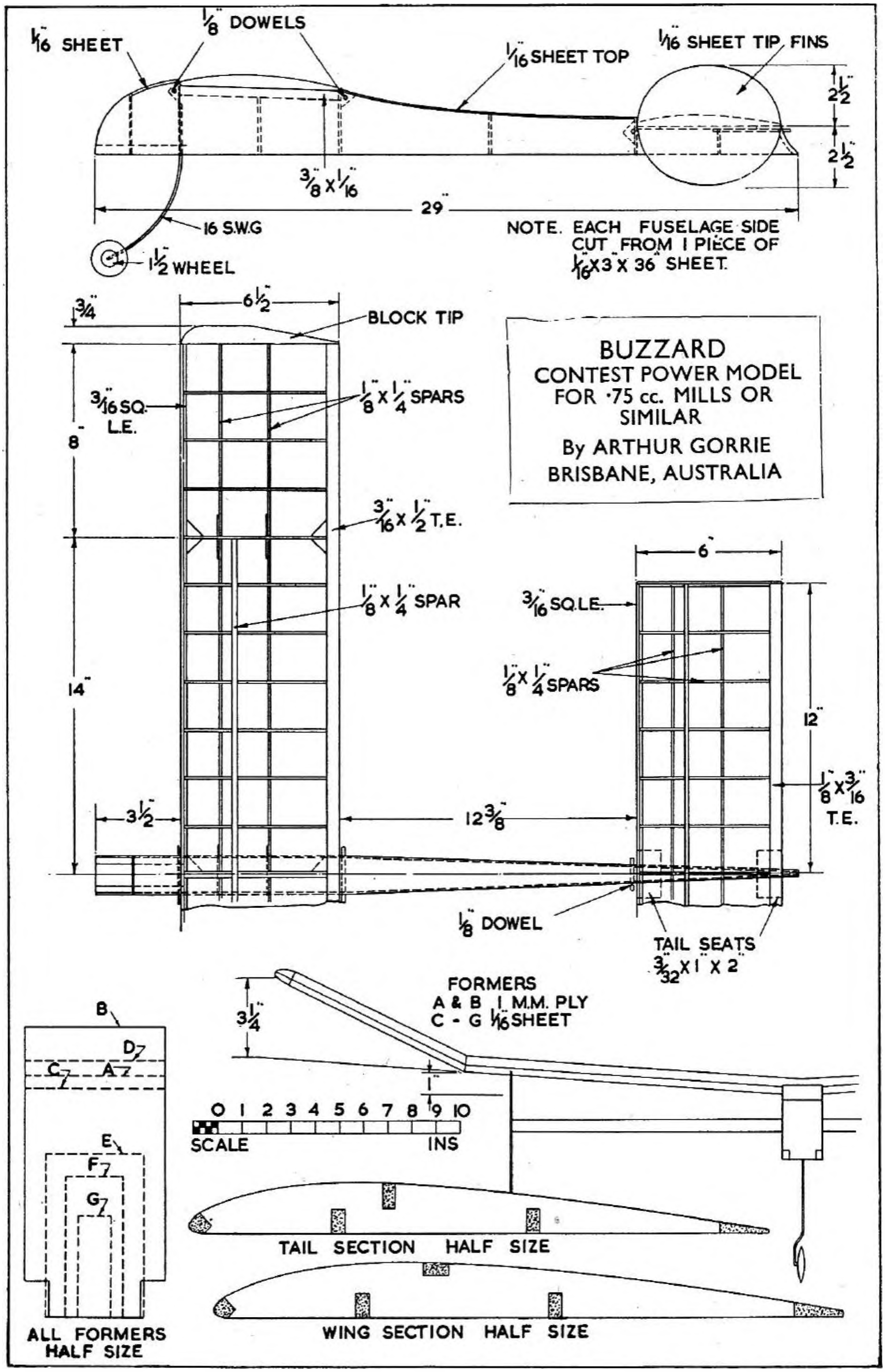
INDOOR RECORD
HOLDER 6:18
By S. ZURAD, POLAND

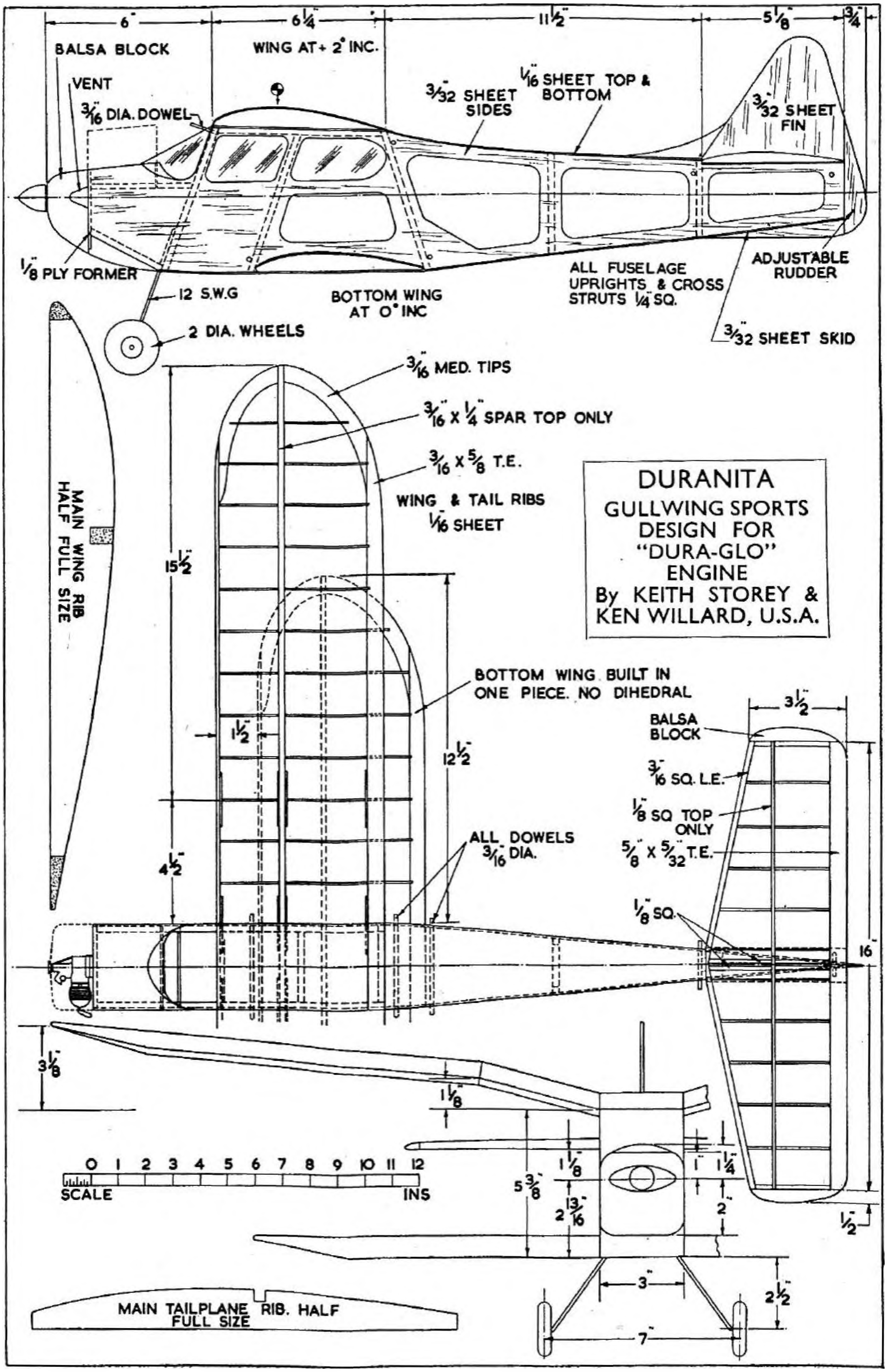


BEJOT 203
WINNER POLISH
"WINTER NATS."
By JAN BURY
POLAND



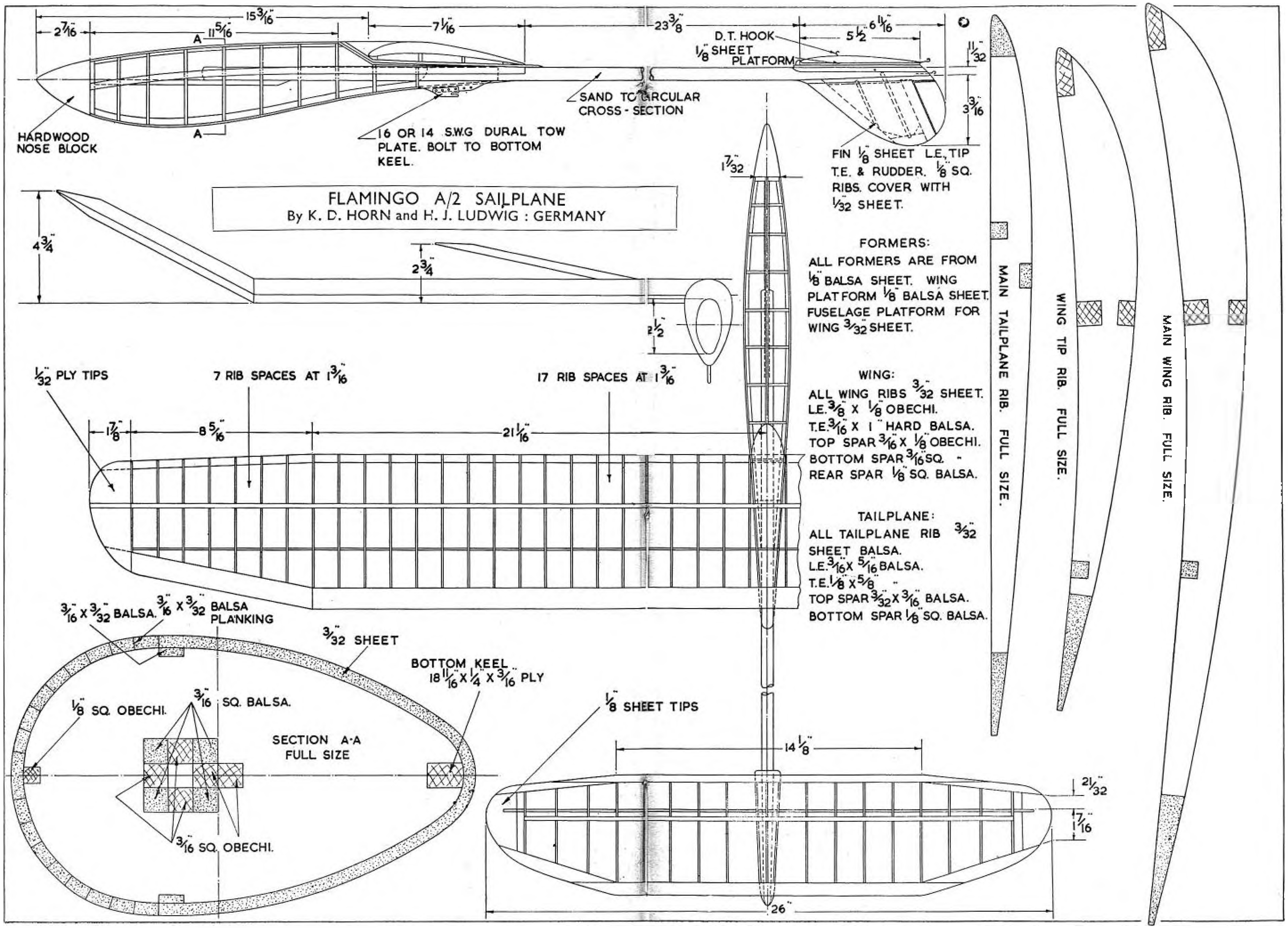
ZST-53
2nd POLISH
"WINTER
NATS."
By
K. STRYCHALSKI,
POLAND


BUZZARD
CONTEST POWER MODEL
FOR ·75 cc. MILLS OR SIMILAR
By ARTHUR GORRIE
BRISBANE, AUSTRALIA
1/16" SHEET
1/8" DOWELS
1/16 SHEET TOP
1/16 SHEET TIP FINS
2 1/2"
2 1/2"
3/8" X 1/16"
29"
16 S.W.G
1 1/2" WHEEL
NOTE. EACH FUSELAGE SIDE CUT FROM 1 PIECE OF 1/16"X3"X 36" SHEET.
3/4"
6 1/2"
BLOCK TIP
3/16 SQ. L.E.
1/8" X 1/4" SPARS
8"
3/16" X 1/2" T.E.
1/8" X 1/4" SPAR
14"
3 1/2"
12 3/8"
6"
3/16 SQ.L.E.
1/8" X 1/4" SPARS
12"
1/8" X 3/16" T.E.
1/8" DOWEL
TAIL SEATS 3/32" X 1" X 2"
FORMERS
A & B 1 M.M. PLY
C - G 1/16 SHEET
3 1/4"
1"
0 1 2 3 4 5 6 7 8 9 10
SCALE
INS
B
D
C
A
E
F
G
ALL FORMERS HALF SIZE
TAIL SECTION HALF SIZE
WING SECTION HALF SIZE



DURANITA

GULLWING SPORTS
DESIGN FOR
"DURA-GLO"
ENGINE
By KEITH STOREY &
KEN WILLARD, U.S.A.



FLAMINGO A/2 SAILPLANE

By K. D. HORN and H. J. LUDWIG : GERMANY

FORMERS:

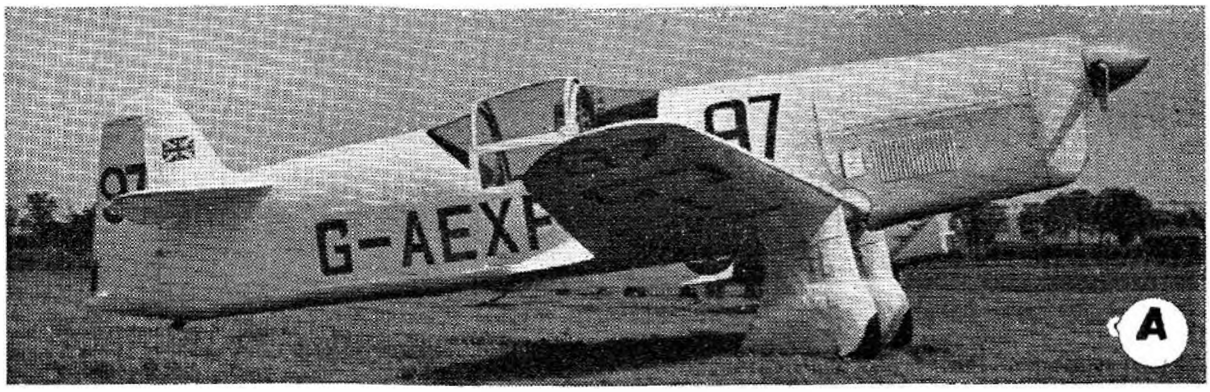
ALL FORMERS ARE FROM 1/8" BALSA SHEET. WING PLATFORM 1/8" BALSA SHEET. FUSELAGE PLATFORM FOR WING 3/32" SHEET.

WING:

ALL WING RIBS 3/32" SHEET.
L.E. 3/8" x 1/8" OBECHI.
T.E. 3/16" x 1" HARD BALSA.
TOP SPAR 3/16" x 1/8" OBECHI.
BOTTOM SPAR 3/16" SQ. "
REAR SPAR 1/8" SQ. BALSA.

TAILPLANE:

ALL TAILPLANE RIB 3/32" SHEET BALSA.
L.E. 3/16" x 5/16" BALSA.
T.E. 1/8" x 5/8" "
TOP SPAR 3/32" x 3/16" BALSA.
BOTTOM SPAR 1/8" SQ. BALSA.

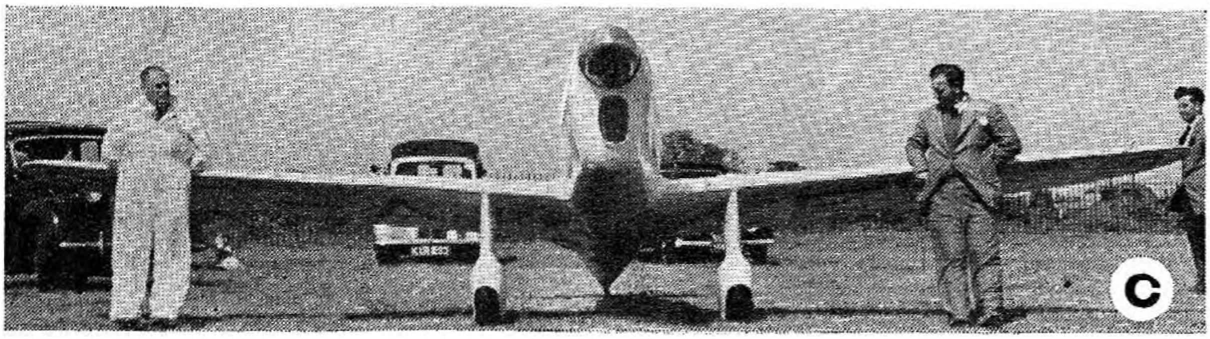


SCALE DETAILS

By G. A. CULL *Photographs by the Author*

OUR hobby gives a great deal of visual pleasure to both aeromodellers and onlookers and no model does this better than a good scale job. Non-flying scale and "solid" models are made for no other purpose, but the flying scale model has to perform as well, which seems to be often taken as a good excuse to forego a more than justifiable amount of the details which are so attractive. With more and more trying their hands at scale modelling, these pages are intended as a practical guide aimed at preserving that *realism* which makes a scale job a joy to see whether flying or on the ground.

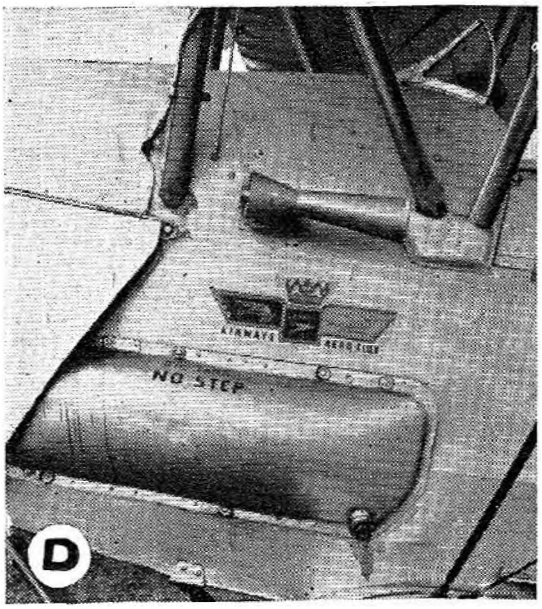
If the newcomer to scale modelling is an enthusiast for full size avaiation he will know just how his subject looks and is likely to turn out a real "eye-feast" of a model, even if it won't fly! More often the case is that of the modeller who has served his time on duration models and so knows the ins and outs of flying, but is not so familiar with the real thing. His model will more likely fly than bust, but would be all the better for more knowledge of its full size parent. So let us start with the ideal model from the "looks" angle. The actual aeroplane shrunken down to a smaller scale would be an absolute gem, but quite impractical for the rough and tumble of the flying field. So the too flimsy details are deleted, but there still remain some intriguing bits and pieces which can be made strongly but are nevertheless omitted from most models which are the worse for their absence. It is not only in lack of possible detail that the bulk of models fall short of the mark, but also in the way essential components such as cowlings and undercarriages are modelled. Whatever the scale, fine clean edges and sharp outlines enhance the whole effect to a degree seldom realised and the resultant neatness redeems many sins in other directions. All we really see of a model is the top coat of dope, but this aspect of scale modelling does not have the obstacles which beset the reproduction of detail. The colour scheme of the machine can be faithfully copied and the importance of colouring needs on



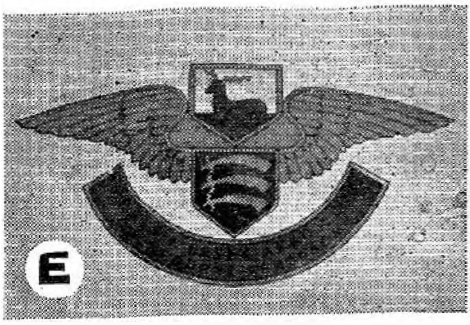
emphasis. No two aeroplanes are exactly alike in external appearance, for each has its individual identity in its colour scheme and markings and so if it is worth while making a model of a life-size aircraft, then it follows that it should be correctly dressed. The practice of working personal initials into registration letters on models is a bad one. It is technically wrong and nobody, except the builder, cares that these are, in fact, his initials. He who decks his scale model in a colour scheme of his own invention with initial-registration letters ends up with a model of an aircraft which has never existed! Instead, let us have it right. Authenticity is an indisputable virtue which will be rewarded by a knowledgable "Concour" judge, and afford the builder no small satisfaction.

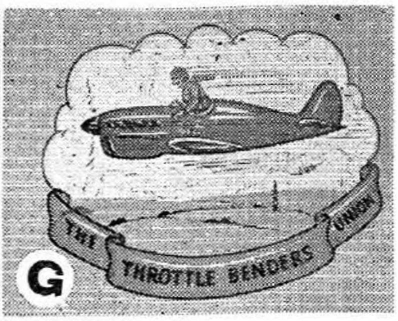
On the other hand an obsession for absolute dead accuracy is likely to be a bad thing, as available time for one thing makes this practically impossible to achieve, and striving after this end could change a pleasurable hobby into a rather slow moving duty. Instead, it will be found that a good standard can be accomplished without using too much precious time and a model so made will be beyond the criticism of all who are likely to see it. As it happens, many professionally made scale models are not perfectly accurate in detail and markings because of the time factor, but are quite satisfactory because the difference between near accuracy and dead right is so small as to be undetectable.

The well-known military aircraft markings do not provide the variety available among the civil aircraft, and this field also provides us with many suitable subjects for flying scale so we will take a closer look. Apart from the main colours and five-letter registrations, aircraft often carry small crests and markings which give personality to otherwise standard planes. Many are transfers



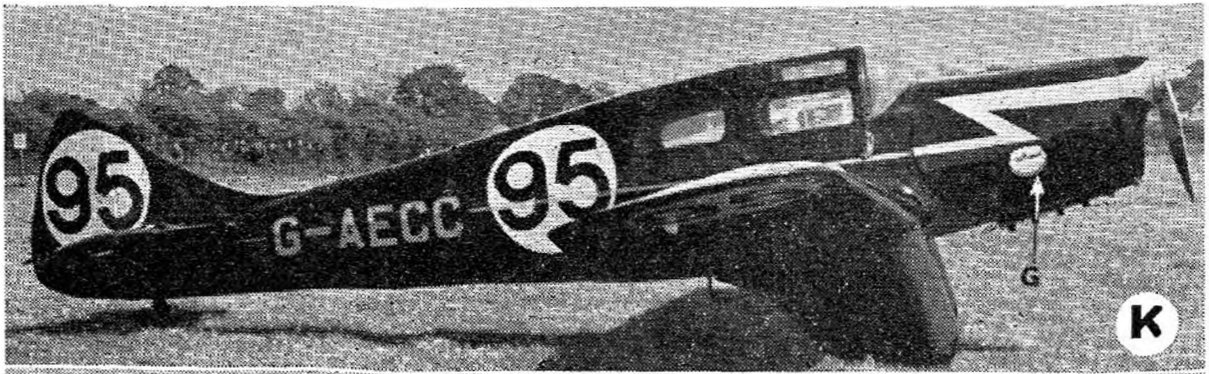
The sole surviving Mew Gull is seen in A and C and, it is hoped, will inspire many more models to better those already built. B shows an all silver doped Tiger Moth of the Herts and Essex Club with dark green struts and letters. In D is some of a Tiger's wealth of detail, and the engine cowling curving out and over the front of the oil tank to a point not to be missed

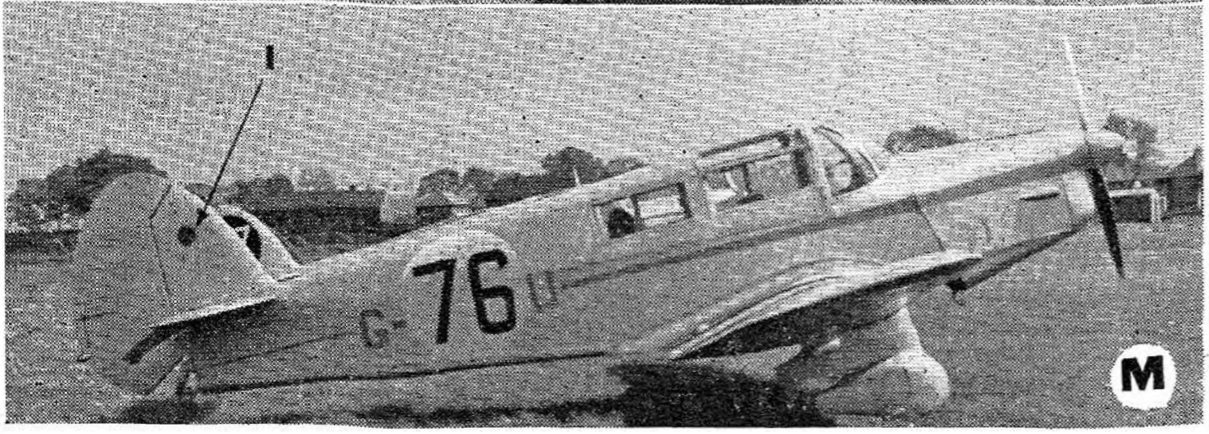


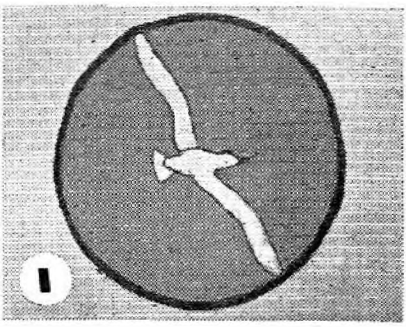


as shown in E, G, H, and J and may be seen on a variety of machines. E is a typical club badge and another may be seen in D, which is also repeated on the Aiglet Trainer in N. F is a standard style Auster Aircraft Ltd. lettering sprayed through a stencil while I shows a hand-painted Percival badge in black, yellow and white on Proctor G-AIEP. The same badge is seen in M, but as a transfer with a blue background on another Proctor which has a racing number. These considerably enliven machines used for racing and are painted in diverse ways. The Proctor V in M wears its black 76 on a white disc obliterating its registration letters G-AHWU and this number is repeated above and below each wingtip. The Miles Falcon Six in K is a habitual racer as may be gathered from the badge on the cowling shown in G. This belongs to "The Throttle Benders Union," a select band of top British racing pilots, and shows a red racer over green fields with black letters on an orange ribbon. This Falcon is a very smart sight in its glossy black dope with gold flash and letters and racing number in eight places. The Autocrat in L also has a race number, but this time in red to match its letters with no disc which illustrates the latitude taken when race numbers are applied.

The Autocrat is a most common type in this country and is turned out from the factory in two standard colour schemes. Cream is the overall colour and the letters and trim lines are either in red or dark green. Two thin parallel

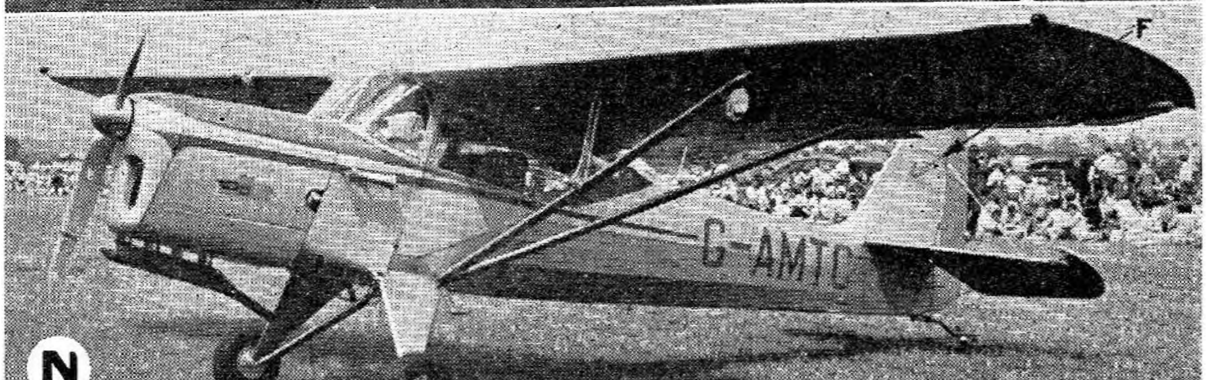


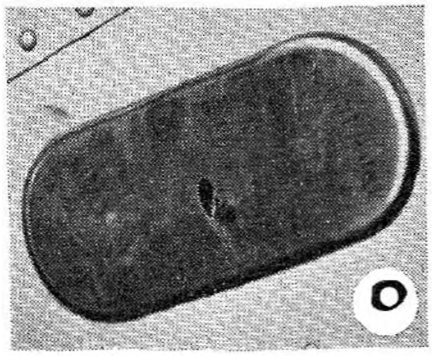




lines extend along the wing leading edge and join together short of the tip. This does not mean that a modeller with intentions on an Autocrat need be tied to cream as a finish for his model because, after a period of service, these aircraft are often redoped in new colour schemes. A notable example of this is Autocrat G-AGXT which started life in 1946 in the standard red and cream, but has since had a dark blue fuselage, fin and rudder with yellow wings and tailplane which was changed in 1950 to plain silver with black letters. 'XT is currently flying in light blue overall with dark blue letters which is the standard colouring of Wolverhampton Aviation Ltd. The Proctor on page 60 is entirely silver doped with turquoise and the Aiglet trainer on page 61 is also silver, but with mid-blue markings and wheel discs. Points of interest on this machine are the non-standard landing lamp generator in the starboard wing and lifting handles below the letter "C" on the fuselage.

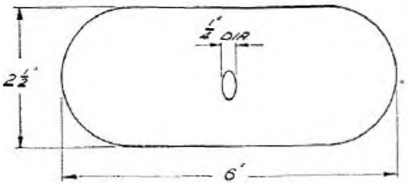
Markings are by no means the only non-standard items affecting the outer appearance of aircraft for details often vary and an example of this is seen in B and D. The close-up D of a Tiger Moth shows a larger venturi tube than that visible on the Tiger in B. The standard Autocrat venturi shown in V provides suction for the artificial horizon, but is missing from the Autocrat in L. Its position is immediately above the fuselage flash arrowhead. The airspeed indicator is a vital instrument to all aircraft and its receiving end is the pitot

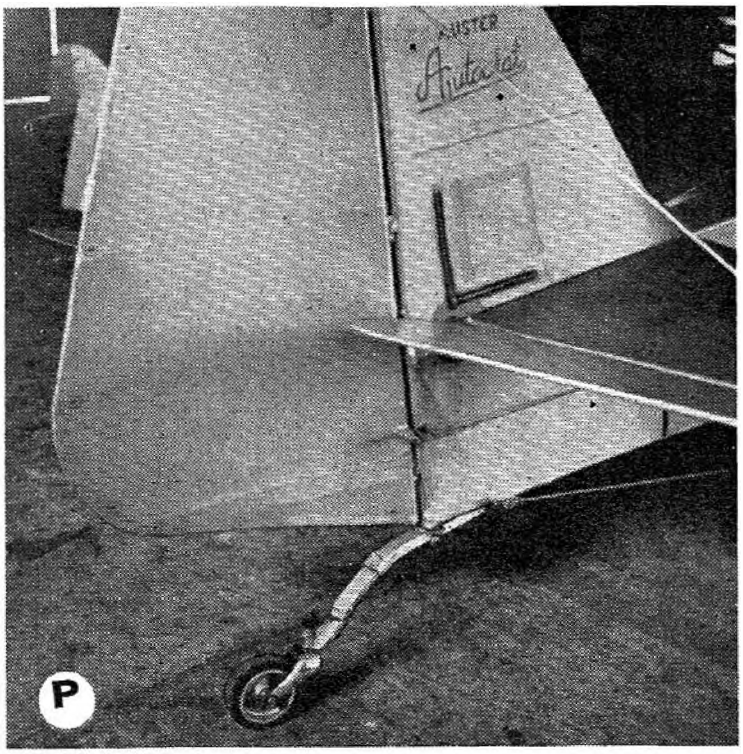




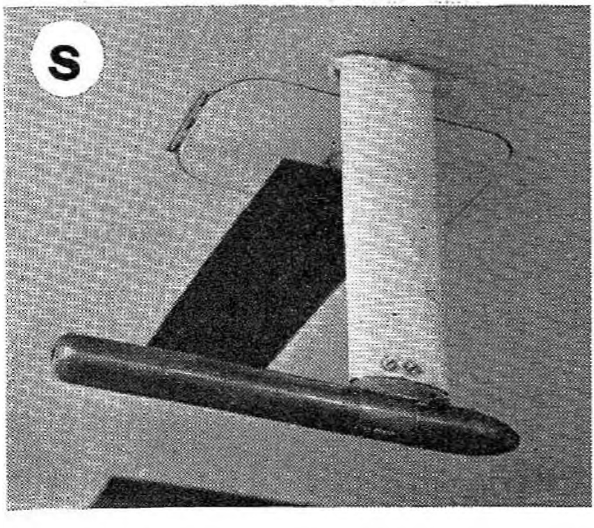
STANDARD STATIC VENT PLATE

PLATE IS BRASS AND STANDS PROUD 5/64" WITH ROUNDED EDGES. HOLE BREAKS SURFACE AT OBLIQUE ANGLE.

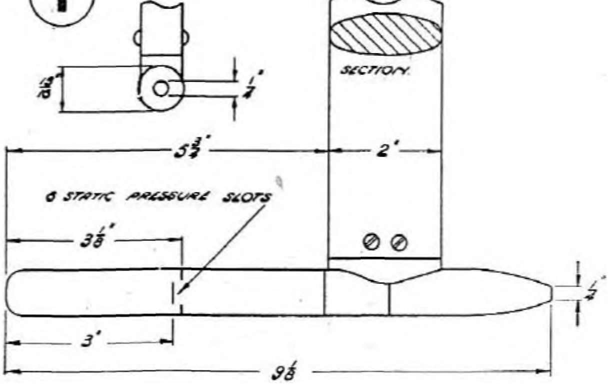


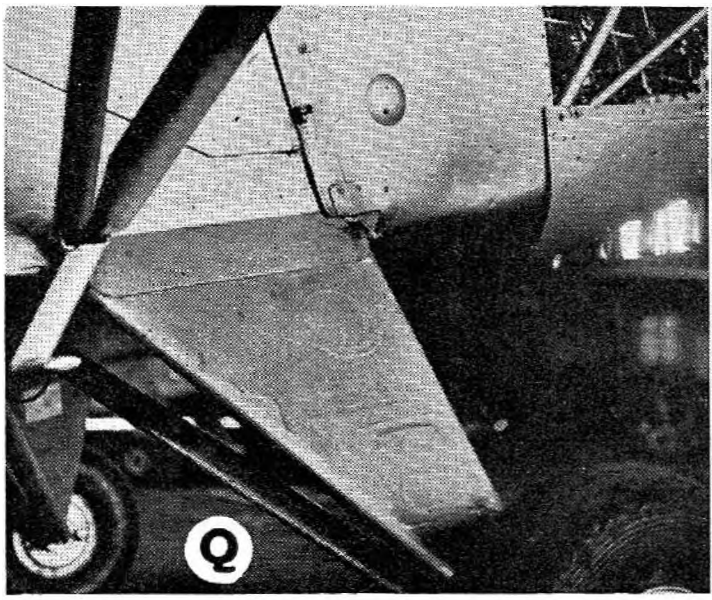


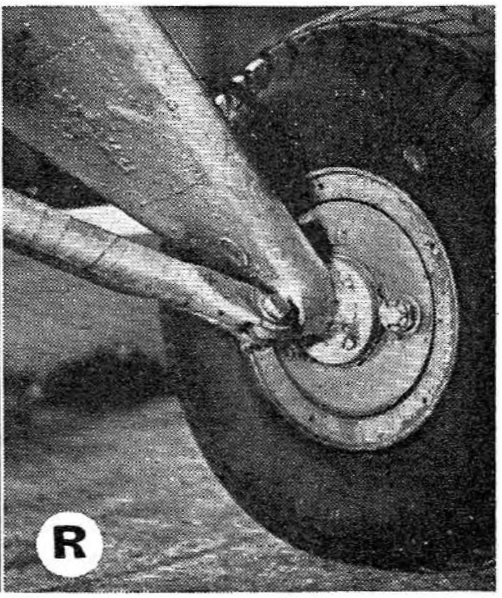
head which provides an interesting detail always to be seen mounted clear of the propeller slipstream. The design shown in U has been used since W.W.1 days and is fitted to slower aircraft and consists of separate static and pressure tubes. Faster aircraft use the neater type shown in S and T wherein the pressure tube is located inside the static tube and this type is seen on most service machines, as is the static vent in O. This is a further instrument accessory found on the fuselage of larger aircraft. The example shown is on the rear fuselage of a Provost so if you like polished brass and are building a Provost, here's your excuse as these plates are never doped, but often polished. P, Q, and R show Autocrat details: two zip fasteners are seen at right-angles on the fin, which, like the tailplane, is of flat plate section. The black dots spaced at each rib on the rudder trailing-edge are drainage eyelets. These are small oval celluloid washers with the fabric covering cut away from their centres to equalise pressure at altitude and allow moisture to drain out. These are also found under the wing trailing edge, *outboard* of each rib. In Q the bottom of the engine cowling is seen to



ELECTRICALLY HEATED PITOT HEAD FITTED TO 'GEMINI' A/C





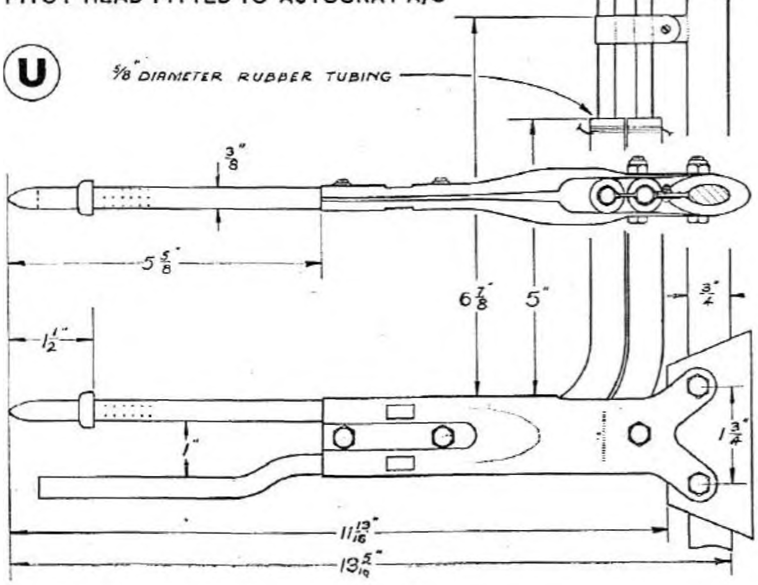


form an open chute for the exit of cooling air, a point not apparent on drawings, while R shows just how U/C struts join up. The tyre is seen to be of different pattern to that in Q. The drawings on pages 62 and 63 show details in their external entirety, but, even if we wish to reproduce detail to this degree, such drawings are a rarity and more practical means of finding what we want to know must prevail of which more will be said.

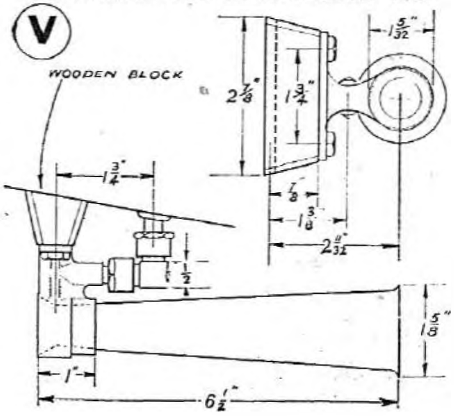
To the modeller who decides to make a good scale model, a likely snag is getting all the odd little items of information required for an authentic job. For this, nothing is better than inspecting the actual aeroplane, and most aerodromes have a number of machines that can be looked over for the asking. The course then is to take note of both sides of the machine, they are bound to be different, and faithfully to follow its details, colours, and letters, etc., on the model. This procedure is not always possible and the next best thing is to obtain six or so photos of the type, preferably all of the same machine. Such pictures may be found in aviation magazines and additional 6 in. × 4 in. photos may be had from these magazines at 2s. 6d. each. A set of pictures of the sole surviving Mew Gull appear on these pages as specimens of the type of photographs available, and the scale modeller would do well to equip himself with

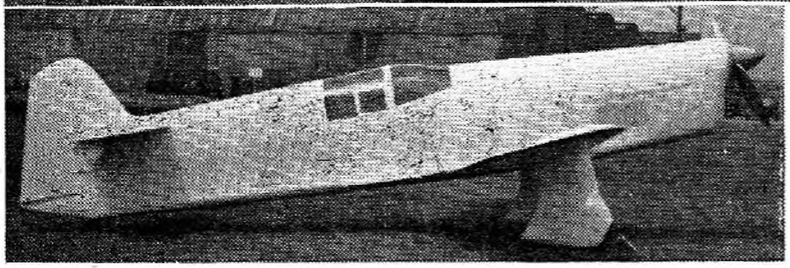
A point for the large scale 'solid' modeller in Q is the permanent inspection patches on the fabric covered U/C leg. The small blister is one side of the fuselage only and permits movement of a control system crank

PITOT HEAD FITTED TO 'AUTOCRAT' A/C



VENTURI FITTED TO 'AUTOCRAT' A/C





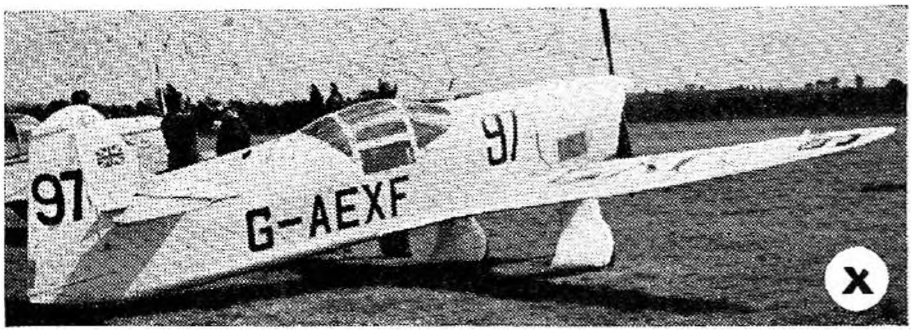
The Mew Gull is naked and without identity in the lower photo, but in W has been brought to life with registration letters and race numbers. The altered cockpit hood is noteworthy as it is unique to 'EXF. Although very few Mew Gulls were actually built, the design has always been popular among scale model builders. The machine in the photographs was discovered stored in France at the end of the war, and but for the chance that kept this one machine intact, post-war air races would have lost a doughty contender and modellers a colourful prototype

a corresponding set before embarking on a new job. The actual photographic prints, of course, will show much greater detail than can be discerned on the smaller illustrations printed here. It should be noted that these photographs indicate the sort of photos that are *available*, and are not in all cases the most ideal views. For wing lettering a dead plan view is obviously best, but this view is very seldom to be had and so we must contrive to get the best from photos which can be obtained.

Colouring information may be had from the manufacturers or the owner, and there are many enthusiasts who will help out, though it is far better to make a trip to an air display or race meeting to see for oneself and make a few notes from the real thing. The many attractive and varied colour schemes to be seen in the visiting aircraft park as well as those of the participating machines, will prove an eye-opener to the newcomer and might interest the non-scale man too.

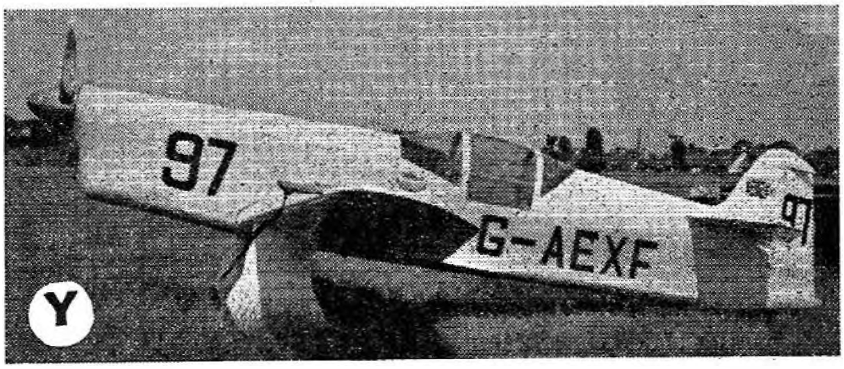
Without measurements it is difficult to place markings correctly, but armed with photographs only the simple geometry in Z is helpful and will achieve the best practical results in the absence of better information, and has a multitude of scaling uses.

Taking the location of the Mew Gull's fuselage registration letters, these can be positioned on the drawing in the correct size, using photo W. First the line YZ is drawn and a vertical line erected from it. On the photo a distance adjacent to the letters and which can be easily found on the drawing, is selected, and this could be a line parallel to the letters from the tailplane root to the windscreen frame. On this is marked the position and width of all letters and this line from the photo becomes AY in diagram Z. The corresponding distance is



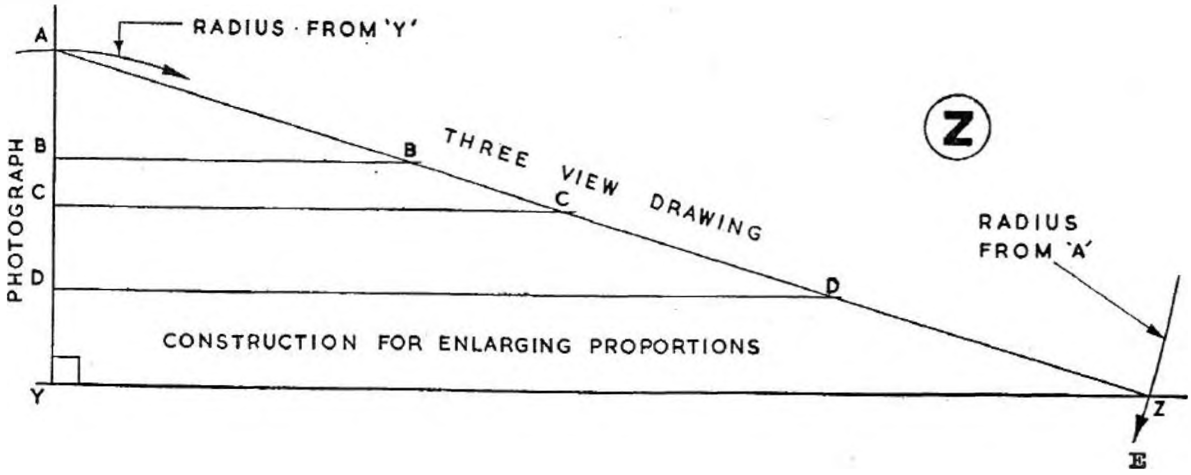
This view of 'EXF shows the position of the wing lettering relative to the aileron, which has a large mass balance. The colour scheme is matt white overall, deepest blue letters and eight sets of glossy black race numbers. Cockpit is medium grey, but matt black forward of instrument panel

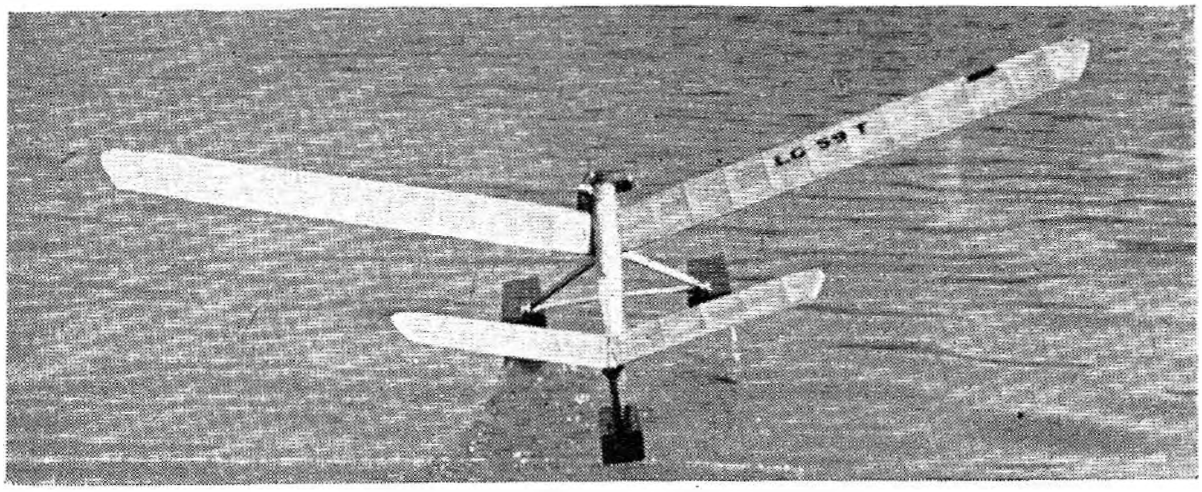
That full size aircraft seldom have identical sides is seen from a comparison of this with others on these pages. Racing number is on cowling on port side, but is larger and further aft on starboard side to avoid louvres. Note figures varying styles on nose and rudder. "Throttle Benders" badge on port side only and cockpit hinge introduces a horizontal member on starboard side.



taken from the plan and marked from A so that Z is where it meets YZ. Through the registration letter positions marked on AY, lines are drawn parallel to YZ to cut AZ. These intersections mark upon AZ the position of the letters in scale with the plan. Assuming that BC on AY is the width of one letter on the photo, then BC on AZ is the width of that letter to the same scale as the plan from which AZ came. Similarly, AB on AY becomes AB on AZ. The photograph height of letters is marked anywhere on AY and projected across to AZ, and the distance between the two intersection points on AZ is the desired letter height. This system is accurate only when the photo is a square-on view. Wing letters can be had in the same way from C, alternatively, in X the letter "F" can be extended to cut the aileron line, and so its position can be fixed. The "E" and "X" can be spaced equally between the fuselage and the "F." This view has perspective foreshortening, but with practice allowance can be made and surprisingly accurate results can be had. Where the photo is bigger than the plan the lines AZ, AY are reversed, and this system can be used for gaining the size plus location of anything.

An example is the venturi tubes, already mentioned, in B and D. Their scale lengths may be arrived at by taking the distance between the roots of the centre section struts and applying it to diagram Z where it can be matched against the equivalent measurement taken from the three-view drawing. In this way non-standard items need not cause any concern because they do not appear on the particular plan being used. On pages 60 and 61 there is no indication of the sizes of the six emblems illustrated, but these also can be established in the same way. The badge E can be matched up with the length of the Tiger Moth's cowling in B while the "Throttle Benders" badge can be compared with the cowling length on the Falcon Six in K. When this method has been employed once or twice its many applications will become apparent and the correct location and sizing of markings need no longer cause a lot of head scratching.





FLOATPLANES ARE FUN

At the beginning of 1953 a series of articles was published in the *Aeromodeller* which, for the first time, seriously attempted to collate all available information from the numerous but scattered devotees of waterplane flying. "Hydromodels," as the series was called, attracted world-wide interest and was commented upon and even reproduced in various countries. Several modellers wrote in to say that the figures and recommendations given coincided closely with their own experiences; others had suggestions and ideas for better float sizes and shapes or viewpoints which differed very slightly. The overall picture obtained was that although relatively little is seen of floatplanes and flying boats, there is tremendous interest all over the globe; this at present is concerned chiefly with sport flying, but the right lead could easily divert it into a contest direction. The Swiss and Italian hydromodel meetings, and the floatplane events at the American Nationals, are always extremely well supported, and are invariably voted amongst the most enjoyable contests of the year.

Probably most floatplane fliers gravitate to waterborne models by first converting an existing landplane. It seems that the average flier would prefer to use twin pontoons for ordinary knock-about flying, and Fig. 1 shows the simplest form of pontoon drawn so that it can be quite easily scaled up to fit any normal cabin-type model. The total length should be approximately half the model's wingspan, and as a check the following figures may be used: 6-8 ozs., ×3; 10-12 oz. ×4; 14-18 oz., ×5; 20-24 oz., ×6. The resulting pontoons will be a little larger than could be used with safety, but will not be so large as to spoil the model's flight.

Space them at 20% of the span between the inner sides, with the step

FIG. 1

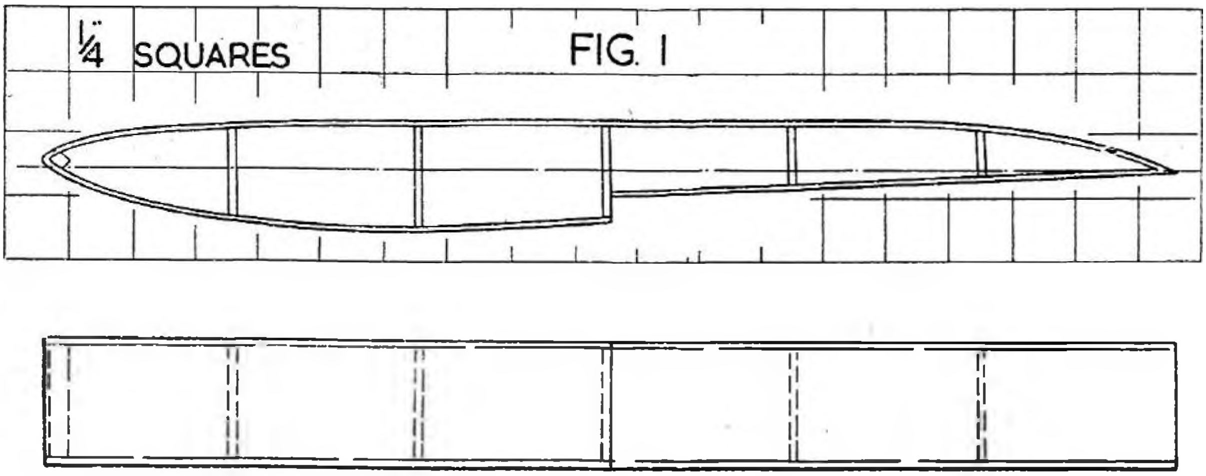
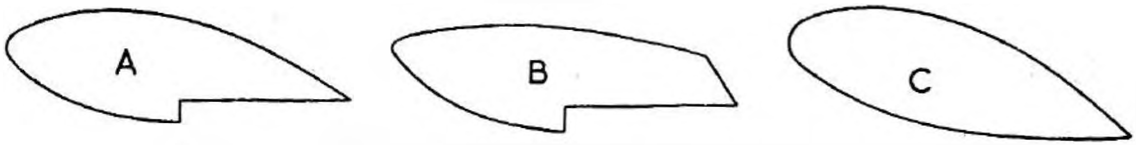


FIG. 2

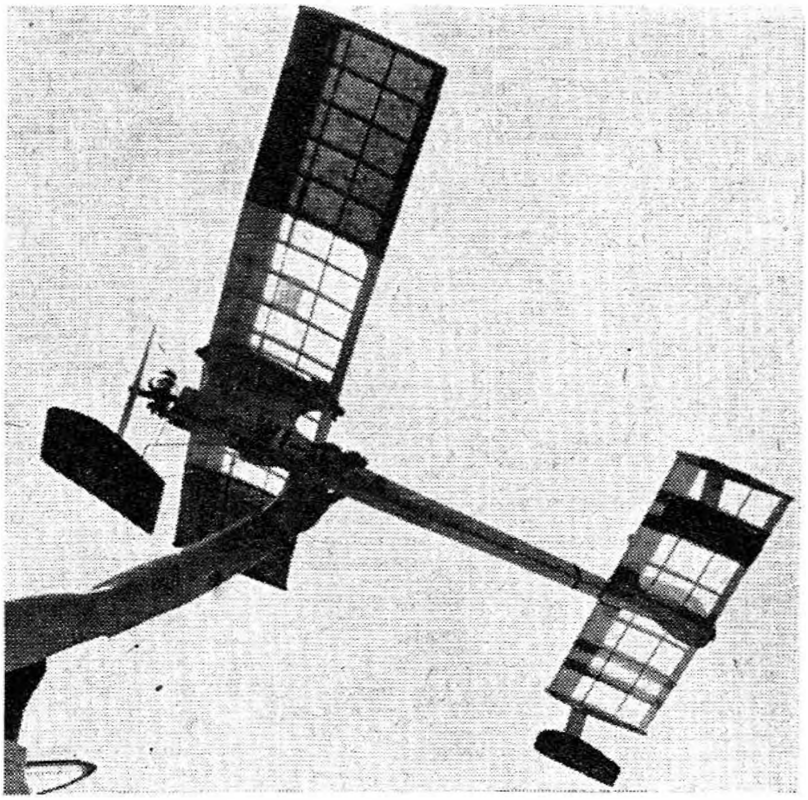


Model weight	Minimum required volume	Two front, one rear			One front, two rear					
		3 equal floats			Front			Each rear		
		L	W	D	L	W	D	L	W	D
8 oz.	28 cu. in.	5	2½	1⅛	6	3½	1¼	3	1½	1
10 oz.	35 cu. in.	5½	3	1¼	7	4	1¼	4	1½	1
12 oz.	42 cu. in.	6	3¼	1¼	7½	4	1½	4½	1⅝	1⅛
16 oz.	56 cu. in.	6½	3½	1⅜	8½	4½	1⅝	4½	2	1¼
20 oz.	70 cu. in.	7	3¾	1⅜	9	5	1⅝	5	2	1⅜
24 oz.	84 cu. in.	7	4	1½	9½	5½	1¾	5½	2	1⅜

5% of the model's length in front of the C.G.; the underside should make an angle of 5° to the rigging line, and this can easily be checked, since the outline is arranged so that when the heel and the step are both touching a level surface, and the rigging line is parallel to the surface, the float angle is correct. Formers and sides of 1/8 in. with 1/16 in. cross-grained top and bottom covering would suit any of the sizes, grading the wood from soft for the small size to very hard for the larger. Attach to the model with two wire legs each side (*see "Nirvana"*) reinforcing the attachment points liberally.

Next in order of popularity is the three-float lay-out arranged as two front, one rear, and this is probably more common than the twin pontoon gear. This apparent paradox is explained by the fact that although modellers may *prefer* pontoons, they feel safer in using three floats because more information has been published on their use. Rubber models rarely use anything except a threesome, and rubber floatplanes have been flying for much longer than similar power models, so that it is natural for information on this lay-out to be more readily available.

Although there is no real need, it is usually convenient to



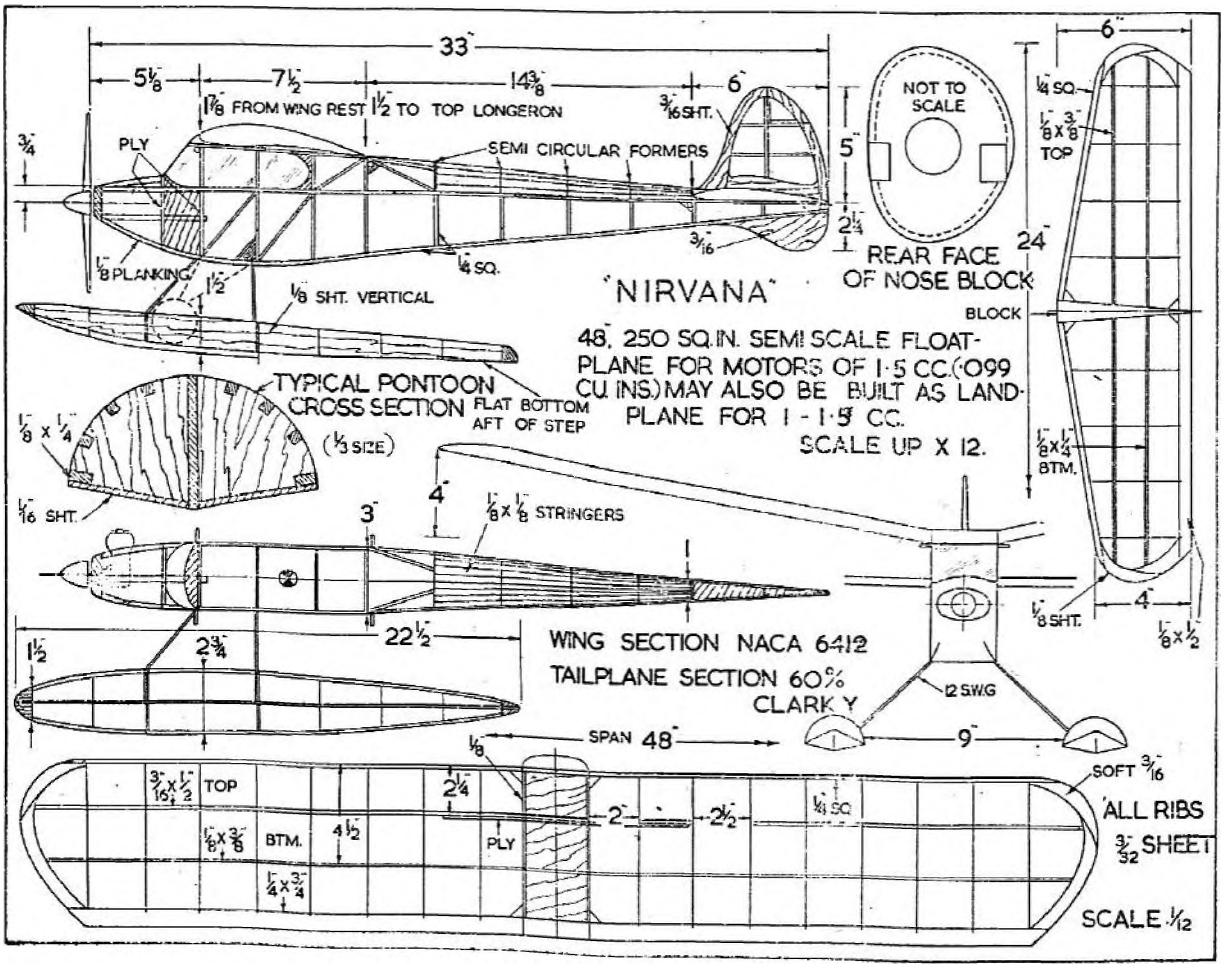
Heading picture shows a Swiss two-front/one-rear job planing and about to lift. Unsticking of starboard float before port can be dangerous; different float angles of attack can prevent this. On right is an example of the one-front/two-rear layout. Note float ahead of airscrew and stalk-mounted rear floats.

make all three floats of equal size; for maximum efficiency, however, the rear float can be two-thirds of the volume of one front float. Three proved float profiles are shown in Fig. 2, together with recommended sizes for type "A," which is the safest and most reliable of the three. The front floats must have their leading edges in line with or slightly in front of the plane of the airscrew.

Contest type floatplanes are nearly always seen with a single front float and twin flotation pods at or near the tailplane tips. Table-tennis balls are very suitable for the rear units on small models, and it is also possible to use cheap light plastic toy boats of suitable shape for this purpose. The front float normally conforms with one of the shapes shown in Fig. 2, and the table gives recommended dimensions for this type of installation.

The essential factor with every type of float is rigidity, since a very springy mounting enables the floats to change their positions and angles of attack; this can even lead to the float following the contours of the water, preventing a successful take-off. At the same time, too much rigidity may cause damage should the model alight on land, which, of course, frequently occurs. Twin pontoons are simple to mount, using plug-in struts, but the other types are best built integral with the fuselage. For portability it is desirable to make them detachable if possible, and many normal landing gear systems can be adapted should the builder prefer an easily-packed job. A neat interchangeable float/wheel gear, useful for the front float(s) of three-float lay-outs, is shown in Fig. 3.

It is customary for all floats to be of monocoque construction, using sheet sides and sheeted top and bottom with a minimum of internal structure.

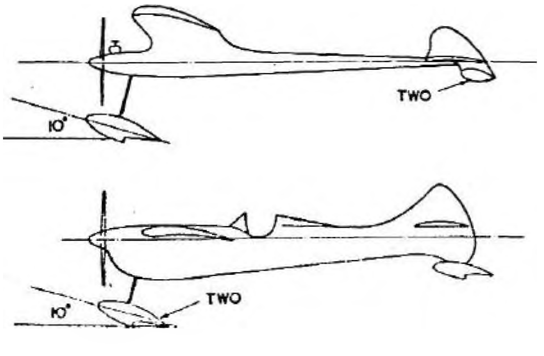


The method now in general use is shown, in Fig. 4, while scale-type pontoons are detailed in the "*Nirvana*" drawing. A ply former is advisable at the attachment points, and care should be taken to reinforce the step corner, which shows signs of wear remarkably quickly.

Flying boats are beginning to attract more attention nowadays; they offer fascinating design problems and much has yet to be learned about this branch of modelling. A recent "fashion trend" is towards the newish N.A.C.A. long-planing hull with a beam loading of 3 oz. per inch or even more (*i.e.*, a maximum beam of 4 in. or less for a 12 oz. model), but it would seem that such hulls require a longer take-off run than the "dish" type with a short planing bottom and a beam loading of around 2 oz./in. Another difference is, of course, in water stability, the long hulls being better directionally and possibly longitudinally, but the dish scores all the way in the lateral plane, which is usually the tricky one.

Salient design points which have proved satisfactory in practice are summarised in Fig. 5.

Nirvana, on opposite page, typifies the sturdy, easy-to-handle sport model which can give endless fun on river, pond, or even the open sea on a calm day, and is also useful as a reference if you feel like converting one of your existing models to a twin-pontoon float-plane. Below are shown the correct float positions and angles for reliable operation with three-float gears



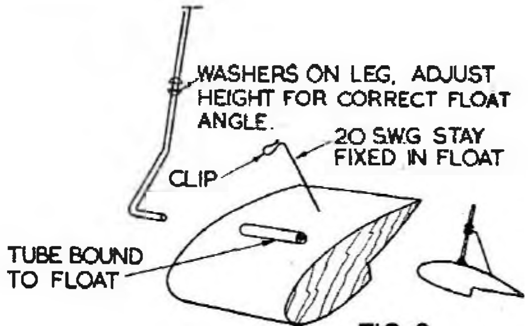


FIG. 3

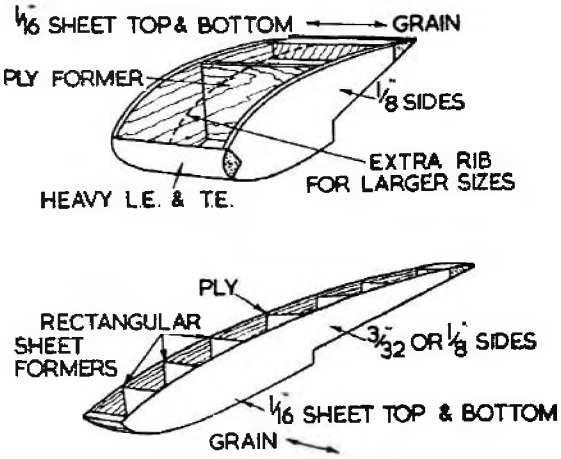


FIG. 4

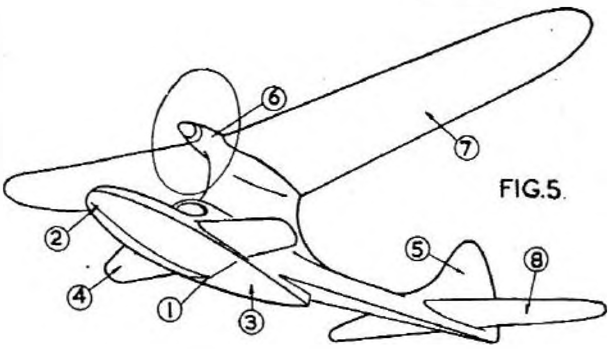


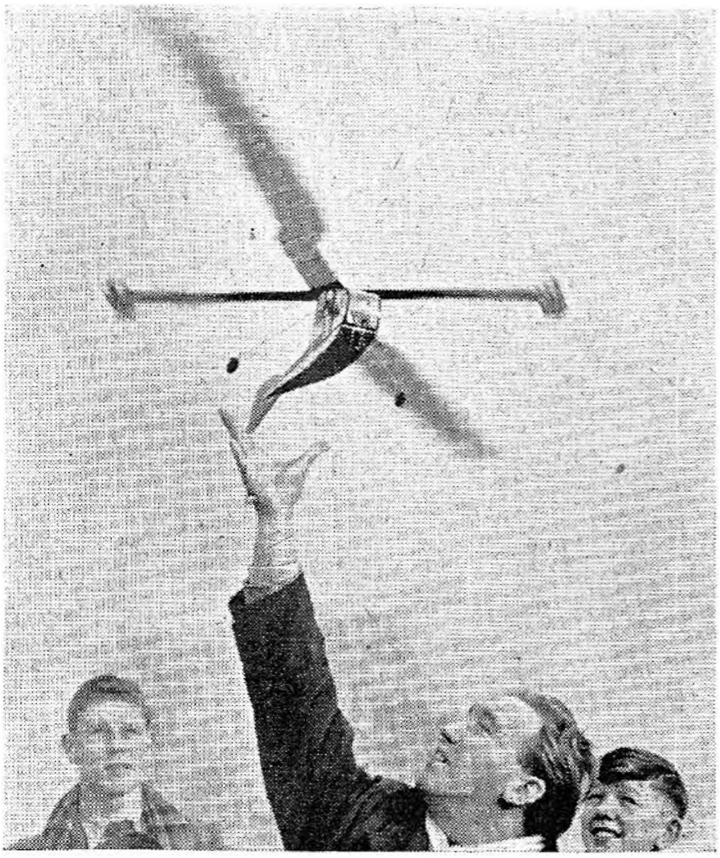
FIG.5

FLYING BOAT FEATURES

1. Maximum beam at main step, beam loading 2-3 oz./in., step depth approximately 10-15% beam, up to 15% of beam ahead of C.G.
2. Bluntish bow with V bottom from step forward, deadrise angle step to bow totalling 6-10°.
3. Flat bottom aft of step, parallel or up to 7° deadrise Area slightly greater than V portion; total bottom area in sq. in. = Wt. in oz. x 1.8 x 2 minimum.
4. Total sponson area approximately 10% of wing area, t.e. on waterline, angle of attack 3-5°. Thick Clark Y or similar section.
5. Fin area 10-15% of wing area.
6. Motor mounted on pylon which also supports wing; keep pylon low as possible. Provision allowed for thrust adjustment.
7. Moderate dihedral wing, tapered for preference. May be mounted direct on hull with increased dihedral. Wing loading low for quick take-off, angle of incidence 3-5°.
8. Tailplane mounted clear of spray, etc., preferably on thrust line (angle aft fuselage upward). 30-40% lifting tail.

THE LATEST DEVELOPMENTS IN JETEX

AN AUTHORITATIVE CONTRIBUTION ON THE FIRMLY ESTABLISHED JETEX RANGE BY A. A. (BERT) JUDGE, FORMER WAKEFIELD WINNER AND NOW ON THE RESEARCH AND DEVELOPMENT STAFF OF JETEX MANUFACTURERS,' WILMOT, MANSOUR & CO. LTD.



Jets applied to vertical lift. The Jetex "Jeticopter," which is powered with two motors, being launched on a trial flight. This is one of the applications of the units developed by the firm's own research staff

SINCE the first Jetex units were designed in 1947 continuous development has taken place in order to increase the powered and simplify the methods of sealing and loading the motors.

The first motor produced—the "100"—developed approximately 1 oz. static thrust and weighed $\frac{7}{8}$ oz. loaded. The flat end cap, with screwed-in jet, was retained by three "clip on" wires tensioned with three coil springs (see Fig. 1). Loading the motor was accomplished by compressing each spring, with the special tool supplied with each unit, which enabled the hook on the end of the wire to be lifted clear of the lip on the end cap.

The latest type motor using "100" size fuel is the Jetmaster and this develops 1$\frac{3}{4}$ oz. static thrust for an all up weight of $\frac{3}{4}$ oz. Research on jet design, fuel, etc., has, therefore, produced an increase in thrust of approximately 75%.

Loading the Jetmaster is much more simple than the early "100". Instead of three compression springs, the end cap is held in position by a wire saddle tensioned with six leaf springs. The end of the saddle is fitted with a roller which enables the complete unit to snap off sideways (see Fig. 2). No special tool is required and the motor is, therefore, a self-contained unit.

All Jetex motors use the solid fuel pellets made exclusively by Messrs. Imperial Chemical Industries, and distributed exclusively by Wilmot Mansour & Co. Ltd. These fuel charges burn at a predetermined rate which gives a controlled power output. It is impossible for the charges to explode and they are quite safe and easy to handle. Thrust is produced by the expanding gases of the burning charge being ejected at high velocity through the jet orifice. There is no torque and, provided the motor is located in the mounting clip correctly before each firing, the thrust line will be constant irrespective of the speed of the model.

The composition of the fuel is slightly different for each size of motor. The larger pellets burn at a faster rate and give a higher thrust than those produced for the smaller motors. All the latest type charges, however, give considerably more thrust than those produced earlier.

The fuel charges are ignited by a special wick which is held in position on the face of the charge with a Nimonic gauze washer. This ensures the good contact essential for foolproof ignition of the charge and also serves as a filter to prevent any solid pieces of the burnt charge from blocking or partially choking the jet orifice. The end of the wick is then passed through the jet when the end cap can be fitted in place.

The ignition wick consists of a special highly inflammable composition which is moulded on to a fine gauge copper wire. The copper centre, being a very good conductor of heat, ensures that the wick continues to burn when passing through the jet orifice, which, in some motors, is some ¼ inch long. the wick itself is ignited by a match, cigarette, or dethermaliser fuse, etc. Failure to ignite the charge is due, in nearly all cases, to bad contact between the wick and the fuel pellet. It is essential that the gauze washer presses the wick firmly against the face of the charge.

FIG. 1

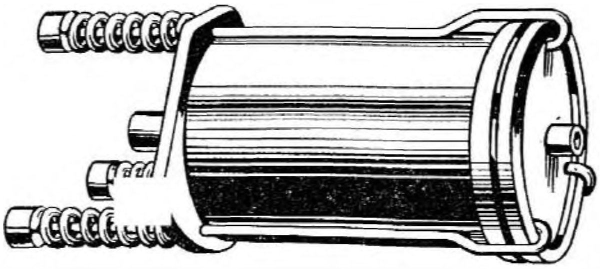


Fig. 1. The original Jetex 100, first of the long range of units. This has been refined and simplified, though the basic principle is retained

FIG. 2

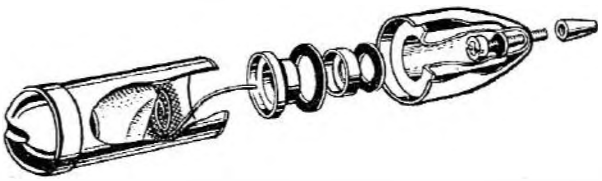


Fig. 2. The present appearance of the Jetmaster—a more streamlined and simplified version of the "100" which has 75% increase in power

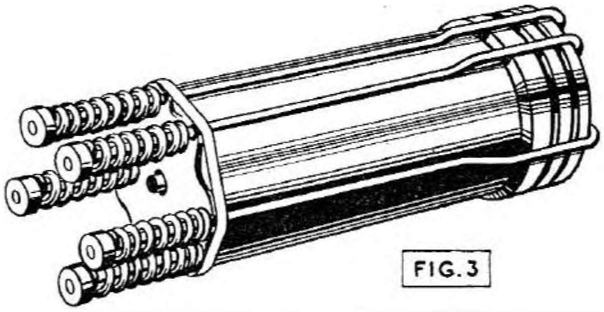
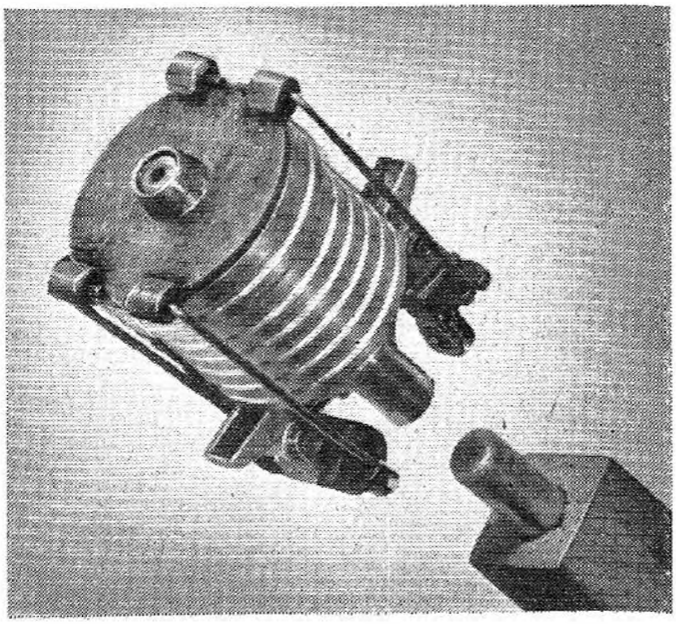
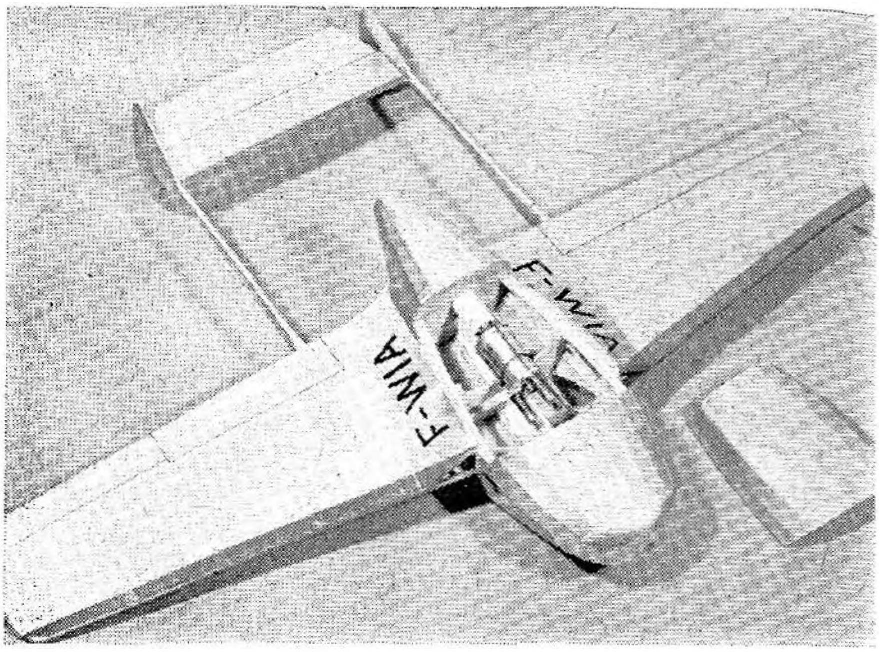


FIG. 3

Fig. 3. The basic design has been retained for Jetex 200 and 350 units. Below in Fig. 4 is the Scorpion, designed specially for the contest enthusiast, and employs a single 350 size charge





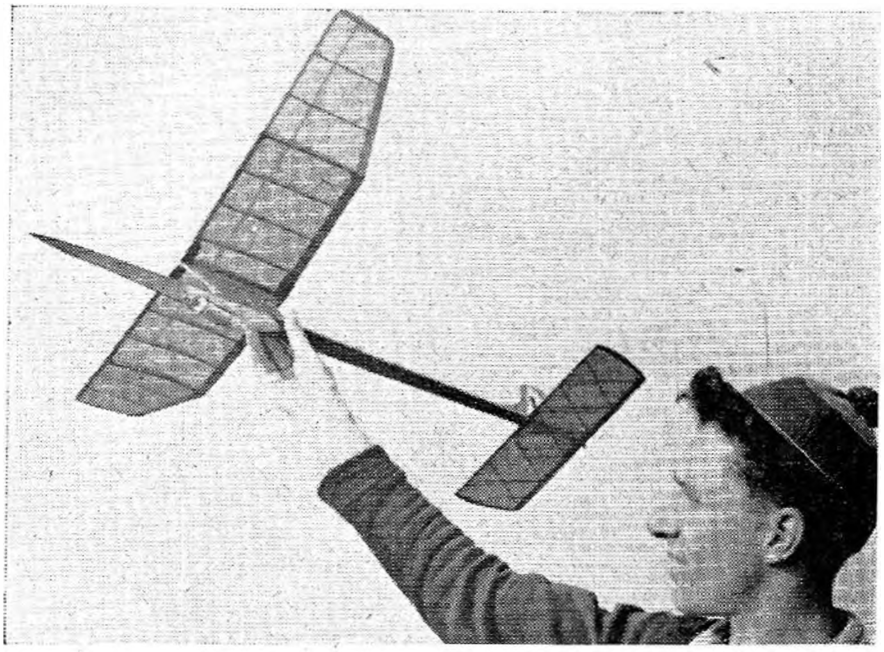
French prototype! The very pleasing model of the Sipa Minijet 200 built by Brian Lewis. The large bulk of the nacelle makes Jetex installation very simple, unlike some of the faster streamlined prototypes which require delicate tolerances

Recent experiments have shown that a more positive method of ejecting the wick, especially for the smaller motors, is obtained by adopting the following method of loading. The wick is coiled in the usual manner and the gauze pressed into position. Instead of threading the free end of the wick through the jet in the end cap, it is coiled on top of the gauze and the end cap then replaced. A short length of wick is then threaded through the jet, from the outside, so that it comes into contact with the coil on top of the gauze. Upon ignition, the short length of wick centre will be forcibly ejected due to the rapid increase in pressure caused by the combustion of the coiled wick.

The end caps on all Jetex motors are held in place on to the main cases by some form of spring tension and it is impossible, therefore, for the motors to explode if, for any reason the jet orifice becomes blocked with a piece of the copper wick centre or carbon. The sprung end cap merely lifts off the end

Ian Dowsett with his Arrow 50. This little contest model has been very successful. (*Photo Bill Dean*)

F. G. Boreham of Helicopter Association of Gt. Britain and his modified version of Jetex 100 powered autogyro design developed from an American model described in *Aeromodeller*. Weight $4\frac{1}{2}$ ozs. Rotor diameter 15 in. (*Photo Bill Dean*)



The Dowsett Arrow 100, a larger edition of the Arrow 50. One of the advantages of Jetex units is that experimental models can be stepped up in size with mathematical certainty of their performance based on results with smaller versions

of the main case and allows the gases to escape. As the action of the fuel causes corrosion which makes the motors difficult to dismantle, they should be cleaned thoroughly after use. The best ways of cleaning them are by washing in hot soapy water or by immersion in a bath of paraffin.

The three larger motors in the Jetex range are the new "Scorpion" and the older "350" and "200" units (see Fig. 3).

The "200" motor can take either one or two fuel pellets. With a single charge the power duration is 15 secs. and this can be increased to 30 secs. by fitting two charges.

The largest motor, the "350", can take one, two or three charges, and the duration can be either 12 secs. or 24 secs. or 36 secs. All secondary charges are ignited by the preceding charge and the "take over" from one charge to another is entirely automatic.

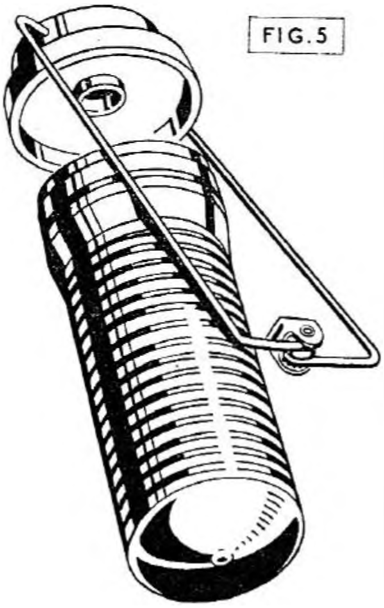


FIG. 5

Fig. 5. The most popular motor—Jetex 50. This has been the successful power unit for many of the small scale jet models on the market

The new "Scorpion" motor (*see* Fig. 4) has been designed especially for the "Power Duration" enthusiast and should prove most popular in future "Jetex Challenge Cup" Contests. It has been designed to give maximum thrust from a single "350" size charge. The charge itself has a conical depression in order to increase the burning area which in turn increases the thrust. A special coned washer ensures positive contact between the igniter wick and the pellet.

Construction of the motor is a compromise between the earlier and latest methods of manufacture. The main case is turned from a special aluminium alloy complete with rings, etc. The end cap is a stainless steel pressing and the sealing washer and flame shield are retained by the screwed jet and jet collar, which are made from mild steel.

The end cap is sealed with a duplication of the Jetmaster spring assembly. Two saddles tensioned with leaf springs are fitted and these snap on to a special yoke pressing on the mounting end of the motor. The actual motor mounting consists of a thin walled aluminium alloy tube, screwed to the end of the motor, which is a good press fit into another tube fitted into a balsa block which can be cemented in place on the model. As already stated only one charge can be fitted and this gives a thrust of 6 oz. for approximately 8-10 secs. for an all up weight of $1\frac{7}{8}$ oz. The unloaded motor weighs $1\frac{1}{2}$ oz.

Next in size come the "100" and Jetmaster motors. Only one charge can be fitted to the "100" and this gives a thrust approximately 1 oz. for 15 secs. The Jetmaster, however, can take either one or one and a half pellets so that the duration may be varied between 15 secs. and 22 secs.

To date, the most popular motor has been the "50" (see Fig. 5). The original design featured a turned main case and end cap assembly retained by a simple wire tensioning spring. This is now being replaced by the "50 B" motor (see Fig. 6) which is fitted to all Jetex made-up models and which has proved to be immensely popular in America. All components are high grade alloy pressings consisting of a main case, end cap and ring complete with wire tensioning spring and a flame shield. The flame shield is retained by the special asbestos compound sealing washer which is a good press fit in the end cap.

The thrust of both types of "50" motors was $\frac{1}{2}$ oz. using the original fuel specification, but this has now been increased to $\frac{5}{8}$ oz. for between 10 and 12 secs.

The latest and smallest Jetex motor to go into production is the Atom "35" (see Fig. 7). This motor is only $1\frac{5}{8}$ in. long and $\frac{1}{2}$ in. diameter and weighs less than $\frac{1}{4}$ oz. when loaded ready for firing. A single charge only can be fitted and this gives a thrust of

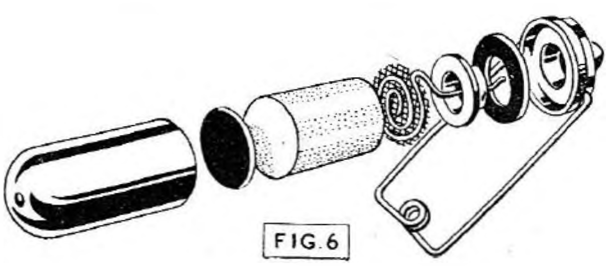
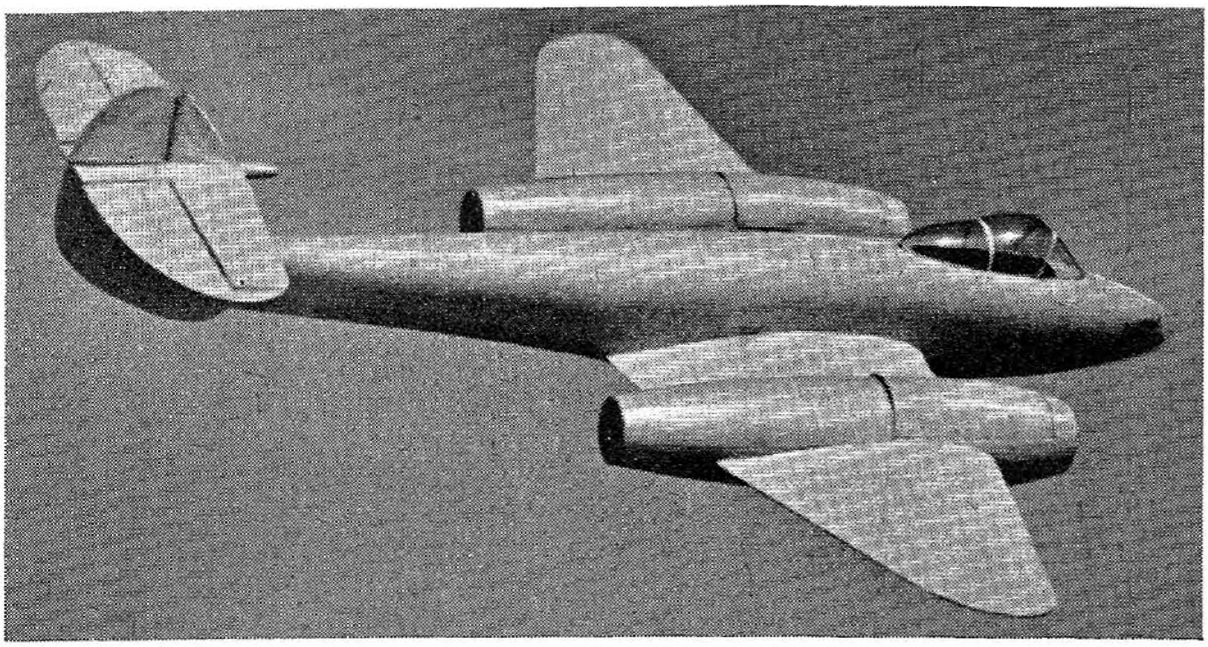


FIG. 6

Fig. 6. Even the 50 has been refined to produce the 50B, shown opened up. Thrust has been improved as well as design—improvement being 25%



Probably the first twin-engined scale model—a Meteor IV—developed for Jetex power by the *Aeromodeller* in 1948, almost before the units were generally on sale. The model is tricky to trim but most delightful in performance once it has been mastered

⅜ oz. for between 8-10 secs. The base of the pellet is coned and a shaped base washer exactly fits the recess so that the burning area of the pellet is considerably reduced for the last 2-3 secs. This reduces the thrust towards the end of the power run and should assist the model in changing its flight attitude between power and glide. The general design of the motor is similar to the "50 B", all components being high grade pressings. With this motor really small "power" models can be built. For general purposes or duration type of model a wing span of between 10 in. and 12 in. and approximately 25 sq. in. wing area should be about the ideal size. The total weight of the model and motor should not exceed 1 oz.

Mention must now be made of the Thrust Augmenter Tube. To date, these are produced in two basic sizes; a large one for the "Scorpion" and Jetmaster motors and a small one for the "35" and 50" motors. These Augmenter Tubes, as their name implies, actually increase the thrust of the motor. The percentage of thrust increase varies in proportion to the length of the augmenter tube and, generally speaking, maximum thrust is obtained with a short length tube of approximately 5 diameters in overall length. To illustrate the foregoing the Jetmaster motor alone gives 1¾ oz. thrust and this can be increased to 2¼ oz. with the full length tube, 13 inches overall, and further increased to 2¾ oz. with a tube of 5 in. overall length.

The design of the Augmenter Tubes was worked out by the Experimental Dept. of Wilmot Mansour & Co. Ltd., in conjunction with and from data supplied by the

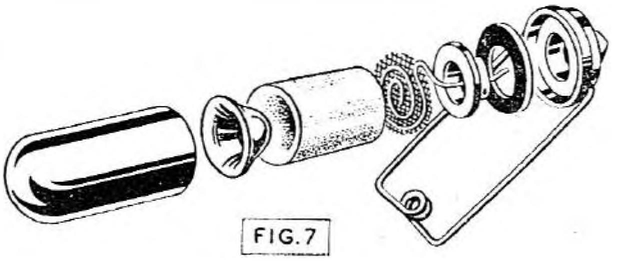
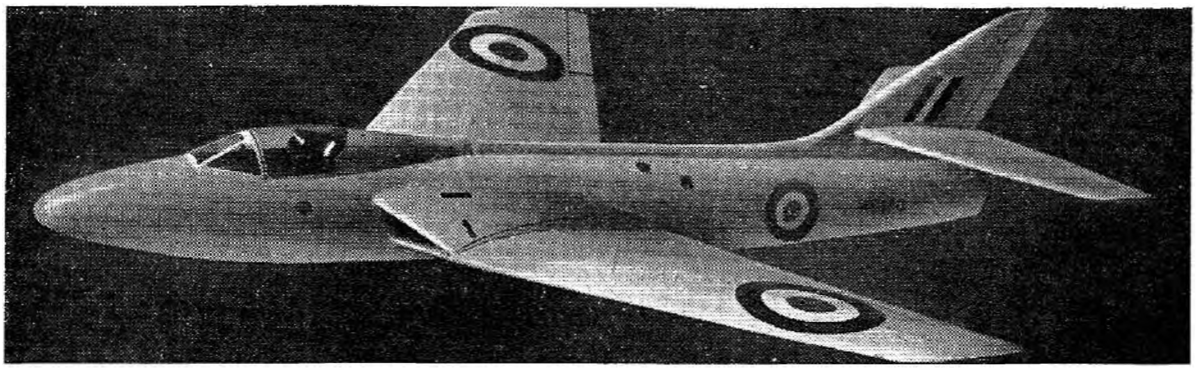


FIG. 7

Fig. 7. The "baby" of the range, the new Atom 35, which weighs only ¼ oz. loaded for firing



The new "tailored" system enables such as this Hawker Hunter—photo *is* of the *model*—to be flown successfully

L.S.A.R.A. under their Director of Research, N. K. Walker.

The thrust augmenters for the Jetmaster and Scorpion motors consist of a tube made from two flanged half pressings which are seamed along both flanges. The bell mouth is made in a similar manner and is a push fit in the end of the tube. Two standard length tubes are available, the Jetmaster being 13 in. overall and the "Scorpion" 6 in. overall.

The newer "35" and "50" Augmenter tubes are drawn and are, therefore, seamless. The tubes are 2¼ in. long and are made with a ¼ in. long socket to enable a number to be fitted together.

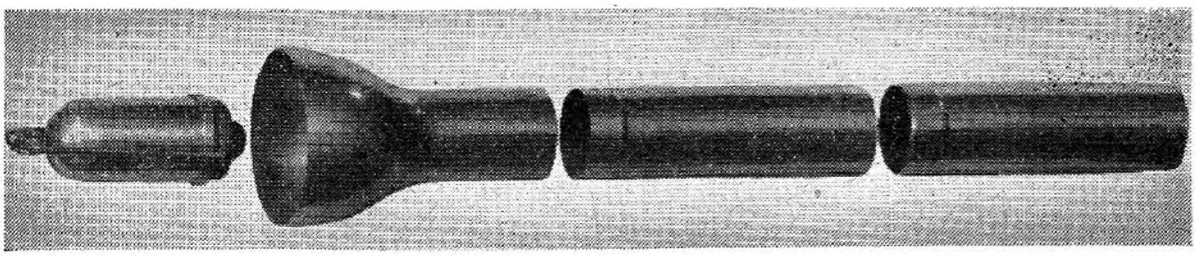
The bell mouth is a one piece spinning and fits inside the socket in the tube.

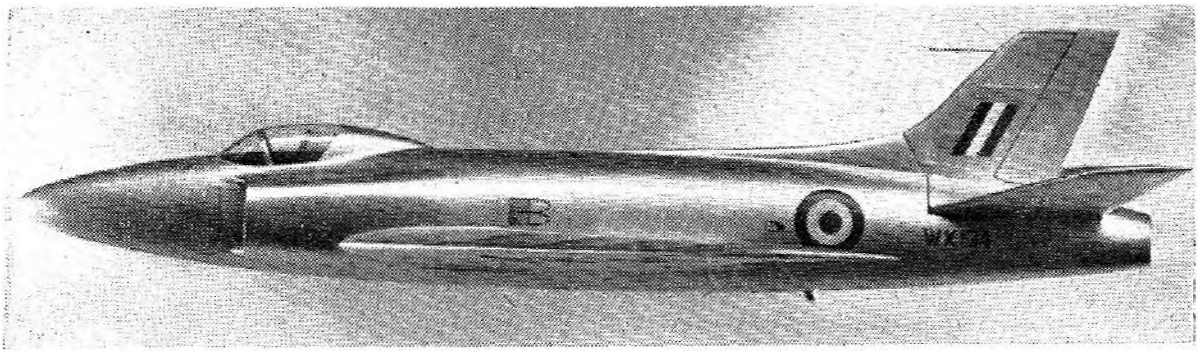
Before the Thrust Augmenter Tubes were produced it was impractical to mount the motors inside a fuselage or wing as the method of mounting inevitably caused swirls or drag on the jet effluxes. All Jetex motors work at maximum efficiency when there is minimum turbulence around the jet stream and any mounting or restriction of air flow round the motor causes loss of thrust. The Augmenter Tubes increase the thrust by smoothing out the air flow over and around the motor and by ensuring proper "mixing" of the heated and expanding jet effluxes with the surrounding air.

The advent of Augmenter Tubes makes possible perfect flying scale models of the latest types of jet aircraft. Two such models are the Jetex Hawker Hunter and Vickers Armstrong Supermarine Swift. Both machines are fitted with Jetmaster motors and full length Augmenter Tubes.

The Hunter was one of the first Jetex "tailored" kits to be produced. All Jetex kits prior to this comprised the usual printed balsa panels, strip wood, cement, accessories etc. "Tailored" kits have set a new standard for prefabricated components. All parts which can be cut to shape are accurately die-cut and new methods of cutter manufacture ensure that all shaped parts are exactly the right shape and size. Jetex engineers, too, have perfected the art of moulding

Augmenter tube units 2¼ in. long may be fitted together to make up any length required by the user





Another "tailored" kit model, this time of the Supermarine Swift, shortly going into service in the R.A.F.

the very thin balsa shells which form the skin and outside shape of the fuselage.

Both the Hunter and Swift follow the same basic design features. The fuselages are built up on two keels slotted to take all bulkheads, side frames, nose blocks etc. Each side is built as a separate unit flat on the drawing and, as the cut parts for both sides are cut with the same cutter, the possibility for errors to creep in is reduced to the minimum. The wings and tail surfaces are also prefabricated as far as possible and the only hand work required is the final sanding to section of the leading and trailing edges and tip blocks. The building procedure is fully detailed and step-by-step sketches supplement the written instructions. Both models have the same fast smooth flights which are characteristic of the full size machines.

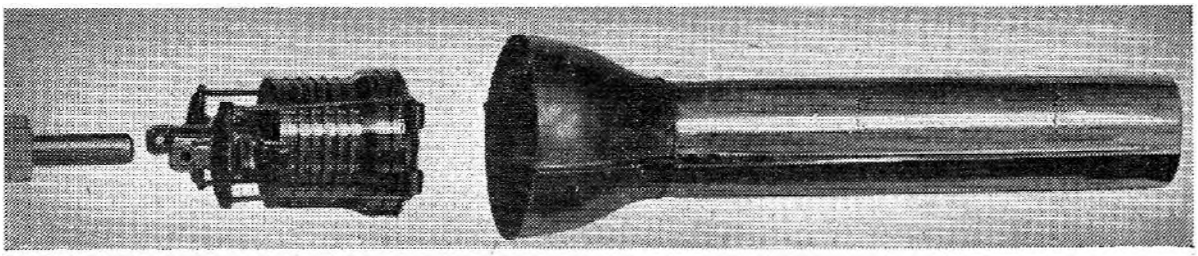
Other additions to the range of kits are the "tailored" silhouette models. These are produced primarily for the beginner or young enthusiast. The construction is kept as simple as possible but, again, all parts are cut to shape and they can, therefore, be built very quickly. These kits use either the "50" or "35" motors and the range includes the M.7 Javelin, Swift, Sparrow, etc.

Latest additions to the ready-to-fly models are the "Wren," a silhouette mid wing model for the "35" motor and the new "Interceptor." This latter machine is a Delta Wing model based on the latest types of fighter aircraft. The complete machine is made from moulded balsa shelfs covered with thin paper for decoration and to ensure adequate strength.

An Augmenter Tube is housed inside the fuselage and an unusual feature is the detachable nose complete with motor mounting. To reload the motor the nose slides forward and out of its runners when the motor can be removed. A standard "50 B" motor is fitted and the model may be flown either with or without the undercarriage.

In conclusion it may be stated that new developments are in hand further to improve the existing range of motors and kits and that no effort will be spared in order to maintain the high standard and quality of Jetex products.

The Scorpion with its special augmenter tube, 6 in. long. Next season should find this motor well at the top



AEROFOIL SECTIONS

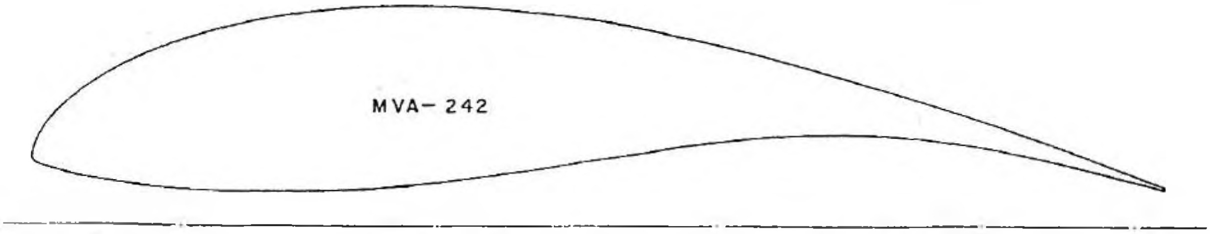
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.00	–	4.87	6.61	–	8.74	10.00	10.95	–	11.60	11.38	10.39	8.94	7.15	5.05	2.66	–	0.18
Lower	1.00	–	0.00	0.15	–	1.20	2.10	2.66	–	3.17	3.05	2.65	2.13	1.60	1.06	0.50	–	0.00

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.40	2.50	3.25	4.65	5.75	6.70	8.25	9.40	–	10.45	10.50	9.30	8.60	6.95	5.00	2.85	1.55	0.00
Lower	1.40	0.85	0.70	0.45	0.25	0.15	0.00	0.00	–	0.30	0.95	1.00	1.15	1.20	1.00	0.65	0.30	0.00

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.50	4.45	5.35	6.65	7.65	8.45	9.60	10.25	–	11.00	10.95	10.20	8.95	7.25	5.20	2.85	1.50	0.00
Lower	2.50	1.10	0.65	0.25	0.00	0.00	0.10	0.35	–	1.05	1.75	2.30	2.50	2.50	2.00	1.25	0.65	0.00

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.90	4.95	5.65	6.75	7.55	8.20	9.20	9.80	–	10.40	10.25	9.55	8.33	6.80	4.80	2.55	1.40	0.00
Lower	2.90	1.70	1.30	0.90	0.65	0.45	0.20	0.00	–	0.00	0.20	0.50	0.70	0.75	0.65	0.45	0.25	0.00

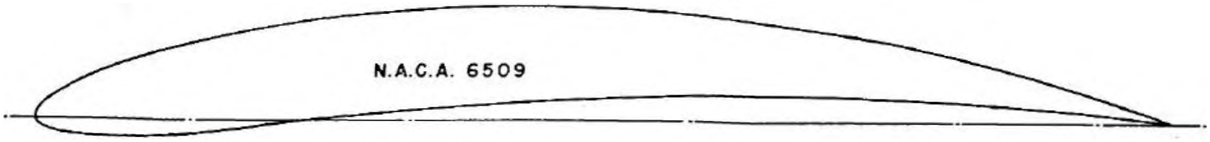
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.60	4.54	5.50	6.49	7.28	7.70	8.30	8.66	–	9.00	8.90	8.40	7.50	6.30	4.70	3.20	2.40	1.30
Lower	2.60	0.56	0.25	0.14	0	0	0	0	–	0	0	0	0	0	0	0.20	0.49	1.30



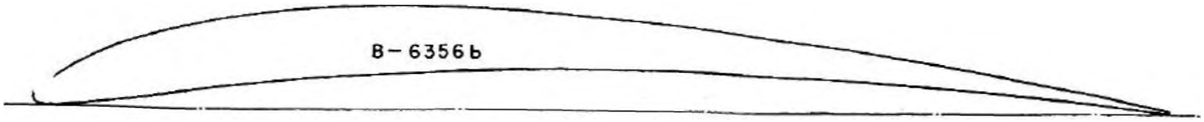
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	5.70	–	10.40	12.40	–	15.20	17.20	18.40	19.20	19.50	19.40	18.20	16.20	13.50	10.40	7.10	–	3.50
Lower	5.70	–	4.70	4.10	–	3.60	3.30	3.20	3.20	3.40	4.50	5.90	7.40	8.10	7.50	5.80	–	3.20

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.20	–	6.78	7.99	–	10.47	11.48	12.12	–	12.42	12.26	11.33	9.82	8.09	6.23	4.45	3.66	2.95
Lower	2.20	–	0.03	0.00	0.03	0.17	0.31	0.41	–	0.46	0.41	0.19	0.03	0.05	–	1.17	1.75	2.51

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	2.24	3.11	4.31	5.18	5.86	6.89	7.54	8.78	8.00	7.77	7.14	6.21	5.02	3.62	2.00	1.09	0
Lower	0	–1.54	–2.16	–2.85	–3.26	–3.52	–3.82	–3.94	–3.99	–4.00	–3.84	–3.45	–2.92	–2.31	–1.65	–0.91	–0.52	0



Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	1.93	2.75	3.99	4.97	5.82	7.18	8.22	8.97	9.58	11.10	9.97	9.20	7.81	5.85	3.29	1.78	0.90
Lower	0	–0.99	–1.27	–1.45	–1.34	–0.96	–0.49	–0.02	–0.15	1.39	2.03	2.34	2.30	1.87	1.07	0.53	0.90	0.90



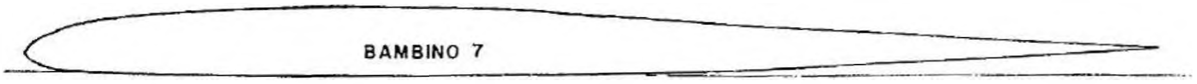
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0.70	2.18	3.14	4.55	5.65	6.53	7.78	8.55	9.00	9.15	8.96	8.23	7.10	5.75	4.08	2.23	–	0.22
Lower	0.70	0.03	0.15	0.42	0.78	1.12	1.85	2.45	2.92	3.25	3.57	3.65	3.50	3.0	2.22	1.19	–	0

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.53	3.53	4.63	6.32	7.56	8.42	9.75	10.43	10.70	10.70	10.18	9.28	7.96	6.40	4.55	2.50	–	0.25
Lower	1.53	0.40	0.17	0	0.06	0.12	0.39	0.65	0.82	0.90	0.93	0.90	0.75	0.55	0.38	0.20	–	0

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.15	3.48	4.85	6.80	8.33	9.45	11.0	11.92	12.35	12.40	11.90	10.78	9.22	7.33	5.12	2.78	–	0.27
Lower	1.15	0.10	0	0.12	0.40	0.75	1.43	2.00	2.40	2.57	2.67	2.42	2.00	1.55	1.00	0.53	–	0

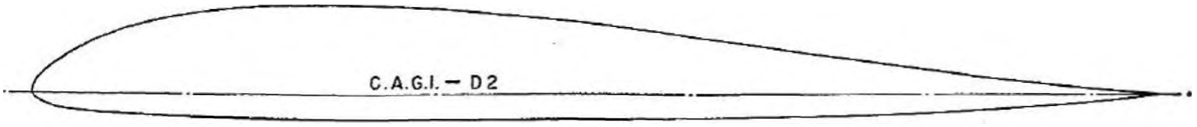
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.68	4.67	5.80	7.46	8.70	9.73	11.25	12.09	12.50	12.55	12.07	11.10	9.65	7.82	5.55	3.00	–	0.25
Lower	2.68	1.20	0.77	0.33	0.10	0	0.13	0.37	0.55	0.67	0.77	0.82	0.80	0.67	0.43	0.20	–	0

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	–	3.68	5.57	–	7.77	–	9.87	–	9.98	9.77	8.93	7.77	6.20	4.52	2.52	–	0.21
Lower	0	–	−0.53	−0.42	–	0.32	–	1.68	–	2.52	2.73	2.52	2.31	2.00	1.37	0.63	–	0

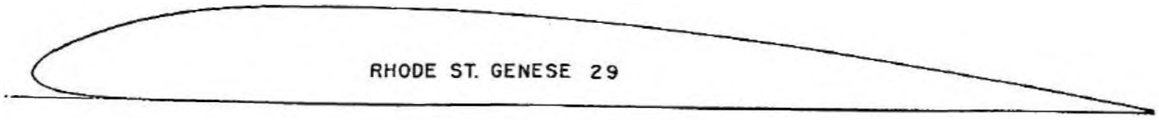


Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.60	–	3.60	4.30	–	5.10	5.55	5.80	–	6.00	5.90	5.20	4.80	4.00	3.25	2.90	–	2.40
Lower	1.60	–	0.20	0	0	0	0	0	0	0	0	0	0.10	0.75	1.40	1.80	–	2.40

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	1.62	2.13	3.15	–	4.60	5.54	6.16	–	6.71	6.56	5.91	4.94	3.75	2.48	1.25	–	0
Lower	0	–1.25	–1.55	–2.05	–	–2.60	–2.92	–3.13	–	–3.35	–3.44	–3.41	–3.25	–2.90	–2.32	–1.43	–	0

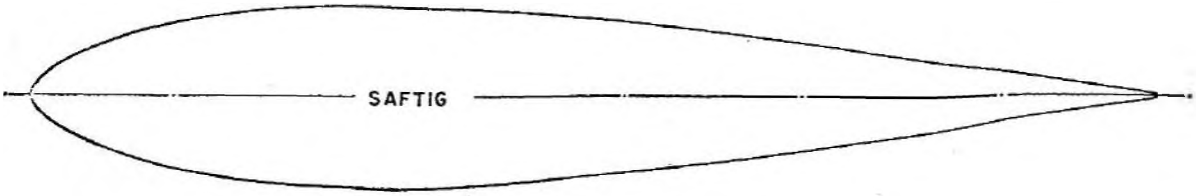


Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	2.10	3.10	4.53	5.54	6.27	7.27	7.76	–	7.83	7.21	6.16	4.90	3.49	2.17	0.86	0.36	0
Lower	0	–0.98	–1.28	–1.59	–1.72	–1.81	–1.91	–2.00	–	–2.14	–2.19	–2.15	–2.05	–1.89	–1.58	–1.06	–0.57	0



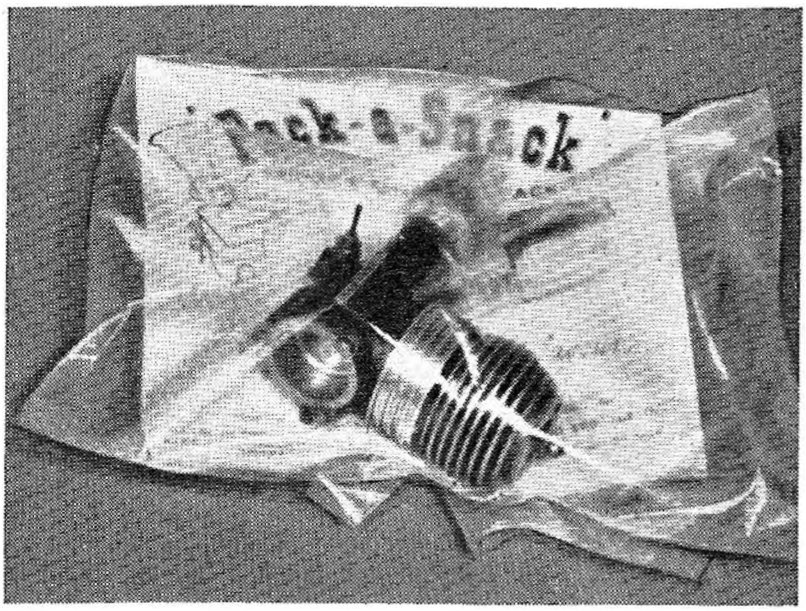
Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	2.13	3.8	4.53	5.53	6.40	7.15	8.10	8.53	–	8.66	8.27	7.60	6.53	5.20	3.60	1.80	0.95	0
Lower	2.13	0.98	0.53	0.27	0.14	0	0	0	0	0	0	0	0	0	0	0	0	0

Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	1.30	3.20	4.25	5.97	7.27	8.17	9.35	9.98	–	10.05	9.23	8.10	6.75	5.23	3.58	1.83	0.92	0
Lower	1.30	–0.18	–0.20	–0.58	–0.85	–1.03	–1.30	–1.43	–	–1.58	–1.60	–1.58	–1.43	–1.20	–0.87	–0.48	–0.23	0



Station	0	1.25	2.5	5	7.5	10	15	20	25	30	40	50	60	70	80	90	95	100
Upper	0	1.9	2.8	4.1	5.0	5.7	6.7	7.4	7.7	8.0	7.7	7.0	6.0	4.6	3.3	1.7	0.8	0.1
Lower	0	–1.9	–2.8	–4.1	–5.0	–5.7	–6.7	–7.4	–7.7	–8.0	–7.7	–7.0	–6.0	–4.6	–3.3	–1.7	–0.8	–0.1

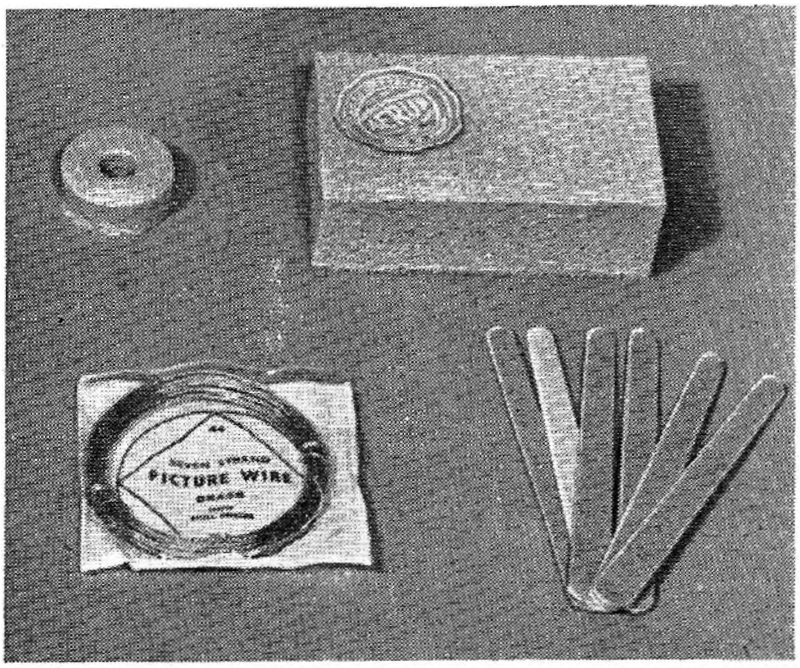
WOOLWORTH TOOL CHEST



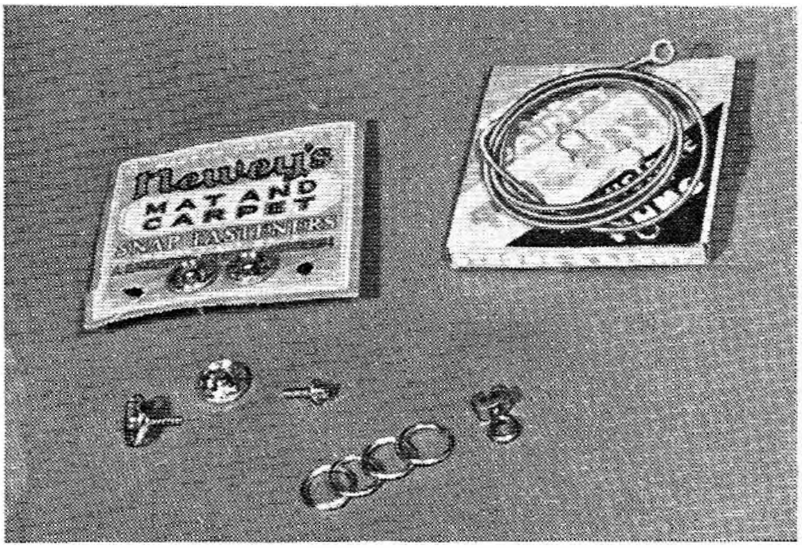
Let's keep 'em clean! Only 4d., yet quite capable of saving you pounds, is the transparent plastic bag sold for keeping picnic sandwiches fresh and free from dust. This is not limited to engines only, larger and smaller sizes can be obtained at equivalent prices, some even large enough to enclose a complete team racer. They are tough, hard to tear and a worthwhile investment for all power modellers.

AMONG the thousands of items to be found stocked in the familiar Woolworths Stores there are many, perhaps unnoticed and little appreciated, goods that have an excellent purpose in aeromodelling. All you see illustrated in these two pages were bought for a nominal 10s. note. They are but a scant example of what can be found on the multiple store counter, and we hope that these few suggestions will assist you in your aeromodelling.

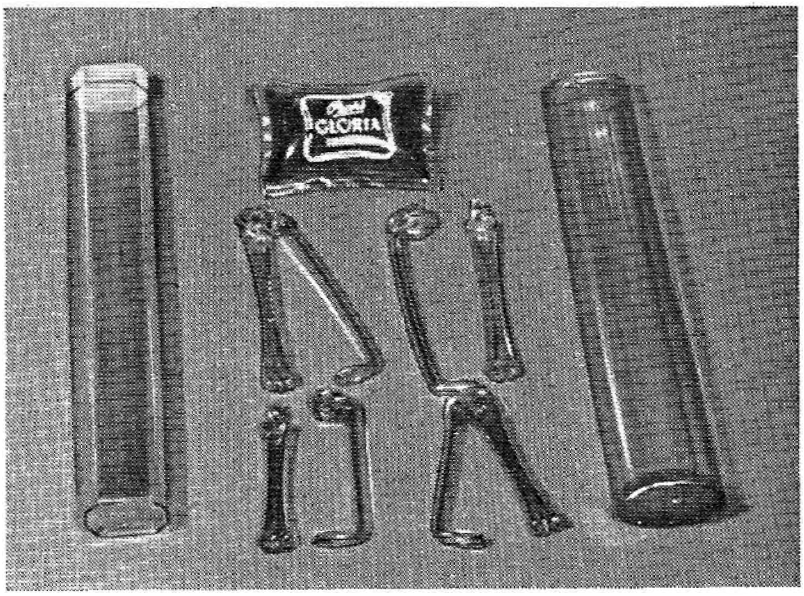
We have taken examples from the toilet counter, hardware, and foodstuff departments. Doubtless, if we had tried harder and made a thorough search of toys, haberdashery and stationery counters we would have found many more useful bits and pieces for our gadgetry. Who would have thought, for example, that the hairgrips used for home permanent waves would provide one of the neatest, lightest and most effective ball and socket snap fittings it is possible to obtain? That the container for a well-known hair shampoo makes a perfect freeflight fuel tank? Or that an anti-drip teapot ring would make a perfect radio valve protector?



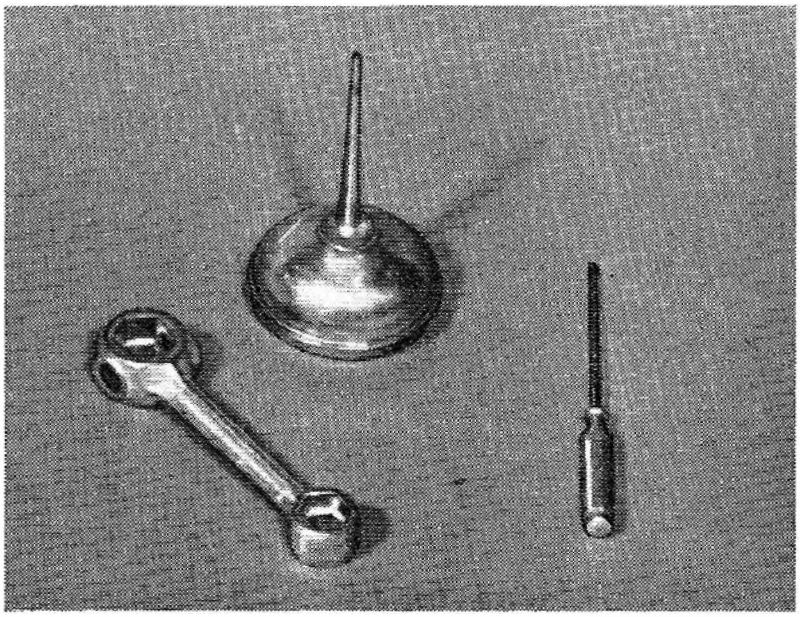
Sponge rubber is invaluable to the Radio Control enthusiast. The 2½d. anti-drip ring at left is intended for teapots; but makes a perfect protector for hard valves. Block of sponge at right is sold for toilet purposes at 1s. 2d., can be cut to shape to take a Receiver or cut in strips to line the fuselage. For only 9d. countless feet of perfect binding wire for soldered joints comes in the form of Picture Wire on the hardware counter, just unwind the strands and you have fine gauge wire. Bottom right is a 9d. selection of nail file cards for toilet, ideal for getting into difficult places, graduated with varying sandpapers, and double-backed.



Carpet snaps make perfect wing fittings for models of even as much as 8 ft. wingspan, using struts for additional support. Large diameter and fitted with a screw on the male side, they cost only four for 11d. and are a simple solution to the wing attachment problem. Four towing rings cost only 1d. and a 2½d. end stop for curtain rail will make a sliding towhook. Also from the curtain fitting department comes the expanding rod (6d.) at top right, ideal for making flexible needle valve extensions.



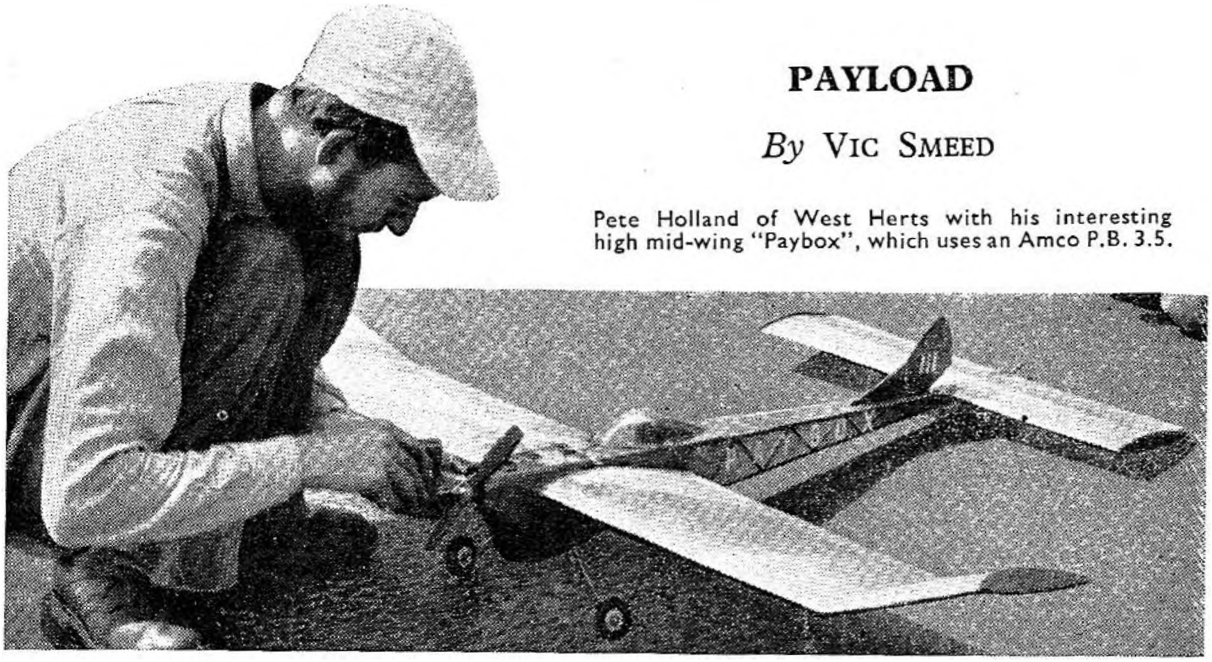
Sandwiched between two examples of the type of plastic toothbrush case, already so popular for freeflight fuel tanks, are two items likely to be passed over. At top is a Pears' "Gloria" 7½d. shampoo pack. Give the contents to your sister and keep the outside transparent plastic bag, which makes an ideal freeflight tank. Below are the two sizes of "Pinup" spinnit curlers used for home permanent waves. One end has a perfect ball and socket, and the other an ideal cowling clip, only 4d. or 5½d. a pair.



More commonplace, but nevertheless apt to be overlooked when passing by the hardware department, is the 9d. double ended cycle box spanner which fits most engine nuts including continental engines—the amazingly cheap 6d. fuel can which is handy for carrying empty and then filling up for priming on the flying field, and lastly, the little electrician's screw driver with brass handle, for engine mounting nuts, sold for a very modest 4d.

PAYLOAD

By VIC SMEED



Pete Holland of West Herts with his interesting high mid-wing "Paybox", which uses an Amco P.B. 3.5.

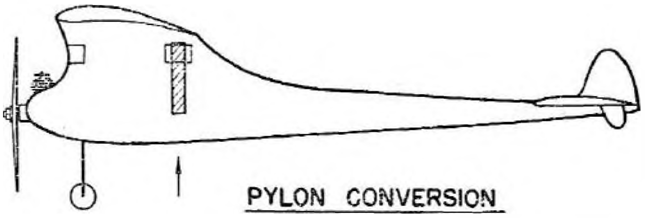
The outstanding feature of the 1953 contest season was the emphatic arrival—at long last—of the payload event. Somehow or other the contests held for this class of model in 1951 and 52 just didn't "catch", but better publicity, better timing, and the awakening interest in other than pure duration competitions, more than remedied this in 1953. In fact, there is every indication that British acceptance of this type of contest flying will be quite as widespread as in the U.S.A., where payload jobs have been flown for the last six years, and where more than 50% of recent Nationals entries have been for these events.

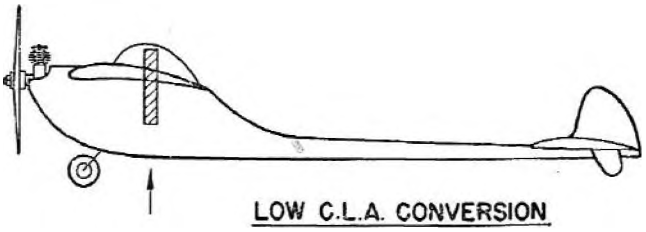
As most readers will know, the basic conception for a competition in which models must carry dummies of certain minimum sizes and weights originated from Pan American World Airways, who by now must have presented hundreds of pounds' worth of Bulova watches as prizes. This wholehearted sponsorship deserves the appreciation of modellers the world over, and it has done an immense amount of good, both by encouraging model builders in a practical direction and by showing to the world generally that here is one "full-size" firm which realises the value of model aviation and the part it can play in future development in the air. Another beneficial effect is that the general public—upon whose goodwill we rely and from whose ranks come new recruits—is more intrigued and interested in such a contest, because it is more readily understandable. The specifications, too, emphasise the kinship of a model aeroplane to its full-size counterpart, and thus prove more attractive to the many "semi-scale" enthusiasts, who, statistics have shown, are approximately eight times more numerous than the out-and-out pure contest fan.

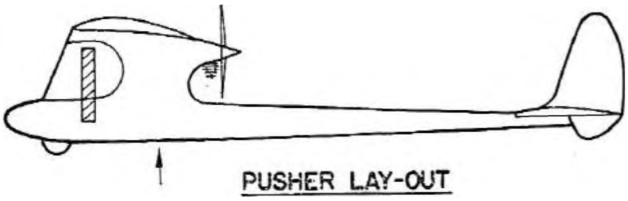
1953 has seen the arrival of no fewer than four separate pay-load classes in this country, as compared with the single class existing in 1951 and 2. This older class, for 3.5 cc. motors and 8 oz. dummy, has been retained by the S.M.A.E., but to it have been added two smaller classes—2.5 cc. motors, 8 oz. dummy, and 1.5 cc. motors, 4 oz. dummy. Besides these, the "AEROMODELLER", working in close co-operation with P.A.A., has introduced a 1 cc. class calling for a 4 oz. dummy.

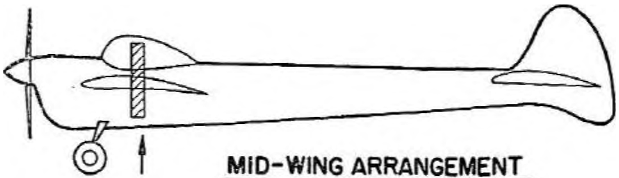
Initial experience indicates that these four classes could comfortably be reduced to two. It is the aim of Pan American to bring the payload type of contest to an international level, which means, in actual fact, that a mean must be found between American and European motor classifications. There is no point at which regular motor sizes correspond, except at the 5 cc. (.29 cu. in.) level, which has proved to be too large for international work; however, interest is rapidly growing in the U.S.A. and Canada in the World Championship Class of F.A.I. free-flight power model, which fixes maximum motor size at 2.5 cc. (.149 cu. in.), and one or two excellent .14 engines are being produced in answer to the growing demand. The American power team over here for the August Bank Holiday International meeting were emphatic in their approval of this size motor for contest work. This, then, is a size worthy of consideration. Under U.S. rules, classes A (.19) and B (.29) are flown as one contest, the larger model being required to carry two 8 oz. dummies to even things out. The step down to .15 from .19 is not a great one for the A flier, particularly when one considers the power now being obtained from .15 motors, which is probably considerably more than was produced by contemporary .19s when the payload contest was first introduced. In this country more than half the entries in the payload event at the 1953 Nationals used 2.5 motors when 3.5 was permitted, so it would seem that we could do away with the 3.5 class without any hardship whatsoever.

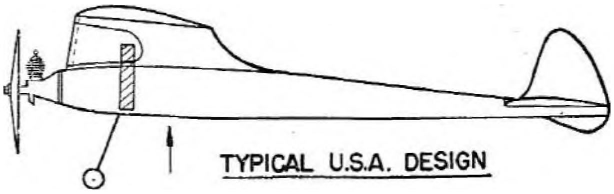
However, it is an incontrovertible fact that nowadays the smaller model receives a good deal more support—it would probably be safe to say that for

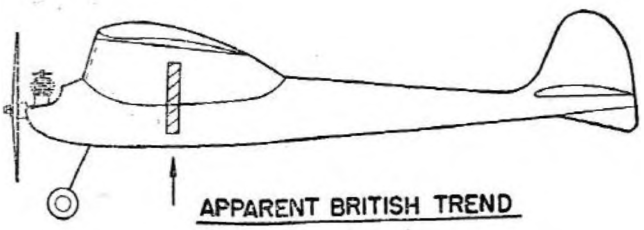

PYLON CONVERSION

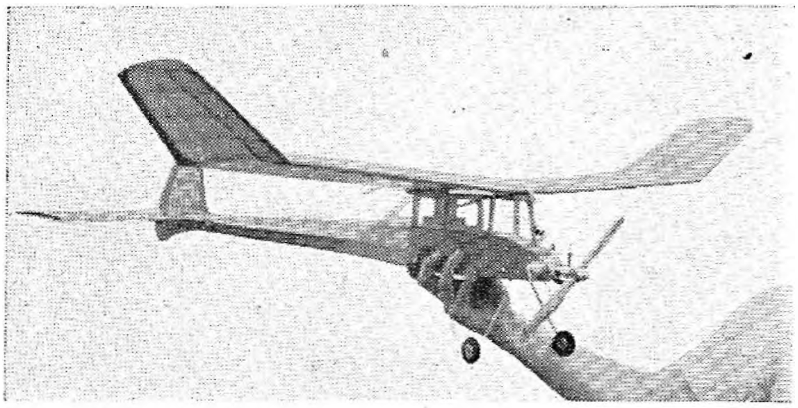

LOW C.L.A. CONVERSION


PUSHER LAY-OUT


MID-WING ARRANGEMENT


TYPICAL U.S.A. DESIGN


APPARENT BRITISH TREND



Typical of many current British models is this full-visibility design by R. Gould of Southend. With an Elfin 2.49 and 23½ oz. all-up weight, the 400 sq. in. wing was generally considered to be too small by those who saw it fly at the Nats.

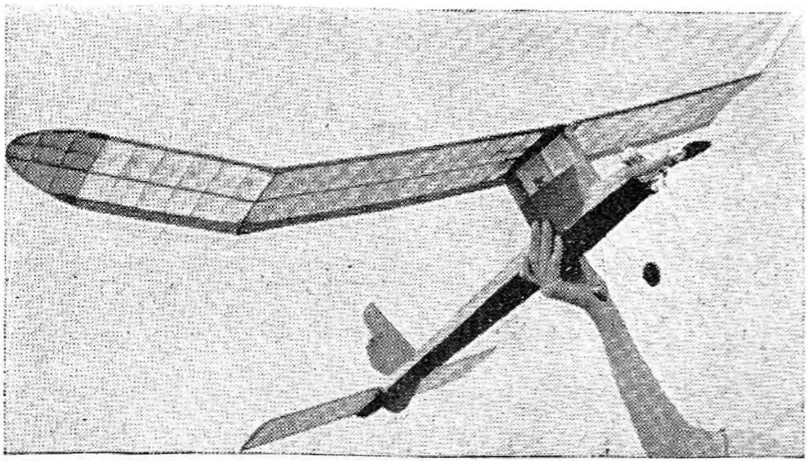
every 2.5 cc. job flying, there are a dozen powered by motors of up to 1.5 cc. Unfortunately, there is no equivalent American size, the nearest being .099 (1.66 cc.), but, in any event, there is very little point in a modern 1.5 diesel flying a 4 oz. dummy around, since it is not uncommon to use this much ballast to attain F.A.I. loadings. The nearest coincident motor size occurs below this figure, at 1 cc. (.061 cu. in.) which is reasonably close to the popular .065 American class; the quarter-pound dummy is a reasonable load for this size.

It would seem, therefore, that in this country the 1.5 and 3.5 classes could comfortably be dropped, leaving the 2.5 (8 oz. dummy) and 1 cc. (4oz. dummy) for development and elevation to international status. The door would then be wide open to all-comers, and suitable motors already exist on both sides of the Atlantic. When the efficiency of the diesel is realised for this type of contest, the logical step will be to double up the specified weights, which could quite easily be done now, with a little loss of performance but with a further reduction of the luck element and the accentuation of design and trimming technique.

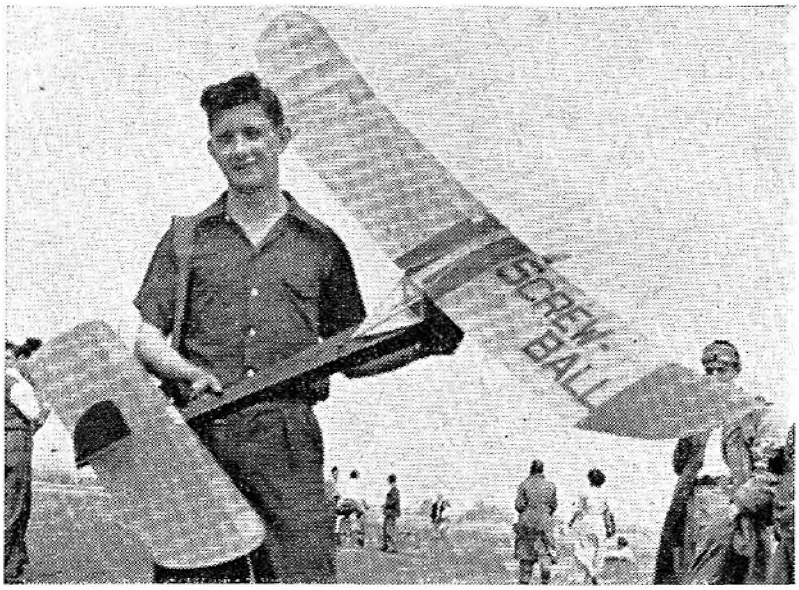
DESIGN.

At present, the specifications for payload are fairly wide open, although P.A.A. do state that part of their aim is "to encourage the construction of models which in many ways resemble full-size airplanes," They also say that "a successful payload model should. . . . be capable of being scaled up to full-size." No doubt many existing models would prove suitable for such treatment, but some of the designs seen would find difficulty in inducing a pilot to take them up!

Most models, nevertheless, do tend to stick to the normal high-wing cabin lay-out, and seem to be able to hold their own with the adapted-pylon



Converted pylon models such as "Dredger" by A Wrigley of Whitefield, who also employs the Elfin 2.49, have yet to prove that their performance is in any way superior to the more general cabin-style machines

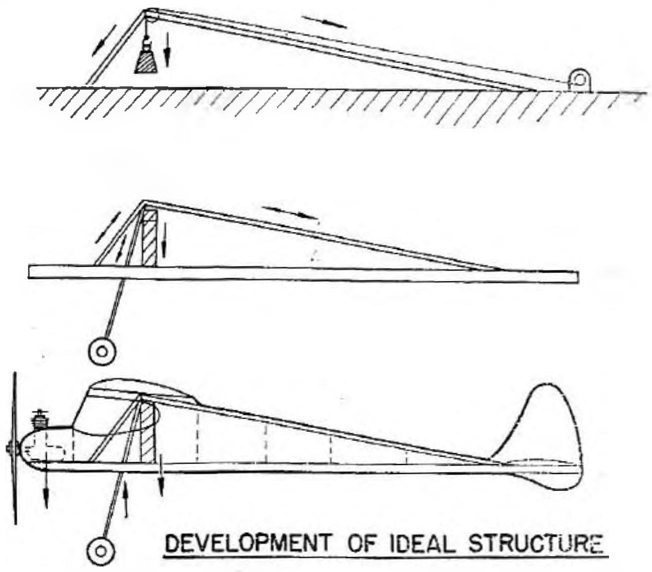


Norman Marcus has been flying his huge "Screw-ball" this season. Despite the over 1,000 sq. in. of area and all-up weight of around 30 ozs., the E.D. 2.46 took the model up as fast as any other present—good enough to win a gold watch on August 30th!

style of job. Very few really unorthodox designs have been seen, which is rather surprising when the carrying of a lump of ballast is compulsory; the rules state that the occupant may not influence the flight in any way, except for the purposes of balance. In all probability further development will bring forward experimental machines of canard and tandem wing configuration, and the pusher lay-out is an obvious and practical field for research. That the specifications stimulate refreshing ideas has already become evident in the "AEROMODELLER" 1 cc. Payload Design Contest.

For a conventional approach, the chief design factor is the increase in minimum weight brought about by the inclusion of a non-contributory load. A 2.5 cc. F.A.I. model must weigh a minimum of 17.65 oz., for which the maximum total area allowed is roughly 640 sq. ins., or a model of 60 ins. span and 8 ins. chord with a 33% tailplane. A 2.5 cc. payload model must have an empty weight of 15 ozs., or loaded, 23 ozs. There is, however, no area restriction. Most successful designs have, up to now, used areas equivalent to normal F.A.I. practice for the motors employed, accepting the slightly greater wing loading, but this may be due to a desire to duplicate the functions of part, or all, of the model, flying in two or three different events. While this approach produces economic and versatile models, it may retard the development of the ideal payload machine. A pointer is that many well-known model designers who have produced pure payloaders have almost all built in considerably more wing area than is permitted under F.A.I. rules. The accompanying chart attempts to illustrate the *wing* area range in a simple manner, and reflects the views of several experts consulted.

Having accepted the weight increase and decided the areas, a practically virgin field lies before the designer. American models have been channelled into the near-pylon set-up with thin flat-bottomed aerofoils, but it has yet to be proved that such an arrangement is any more or less efficient than the undercambered wing on a cabin-style fuselage which seems to find greater favour over here. It is again the old question of the thin flat airfoil giving a slightly faster climb, or the turbulent flow section giving a superior glide. As with other formula events, time will no doubt bring a fairly standardised approach.

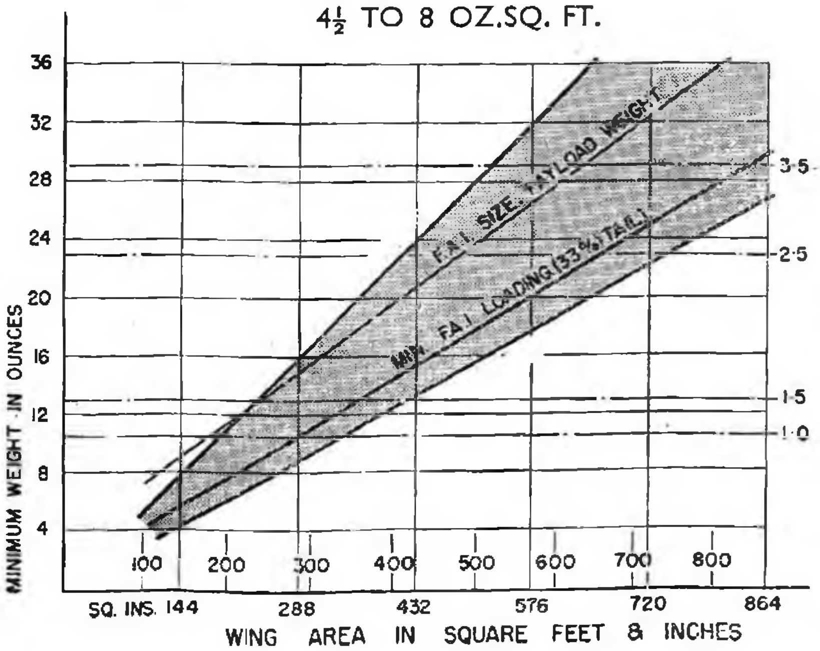


DEVELOPMENT OF IDEAL STRUCTURE

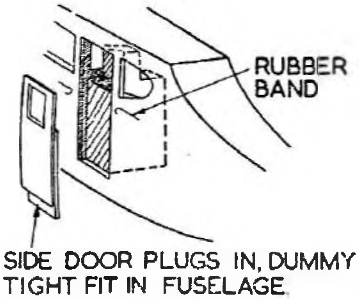
Structurally, consideration must be given to the positioning of the occupant, which is normally placed on the expected C.G. of the model; this allows flight testing or use of the aircraft unloaded. The development of the optimum structure is shown (*at left*), although the minimum weight requirement is such that adequately strong airframes can be built without a crutch and to almost any profile. In practice, too, sheet areas would normally replace the stress struts shown in the sketch.

Only vertical flying and landing loads are indicated in the illustration, but, of course, the biggest force created by the dummy's inertia is likely to be along the fore and aft axis during deceleration, especially if the model stops dead on landing or strikes an obstacle. It is not a difficult matter to provide adequate bracing for this eventuality, however. Trickier is the problem of providing a means of loading and unloading the dummy without weakening the construction; the original rules specified that this must be done with the model fully assembled, and, although this requirement appears to have been dropped in the U.S.A., general British feeling is that it should be retained. The dummy must therefore be inserted either through the side or bottom of the fuselage, the latter being probably slightly the better way structurally, particularly when one considers that cabin windows of some sort are mandatory. A side door would thus need to be a composite of solid and celluloid, making for a potential source of failure. Some methods of placing the occupant firmly in position are given opposite. The weighting of the dummy needs thought, since it can materially affect the position of the C.G., and it seems best to concentrate the ballast in the head, as far as possible, in order to keep the C.G. high. One of the most novel ideas seen so far is a dummy cut from thick sheet rubber, weighted with lead rods.

PRACTICAL SIZE RANGE FOR PAYLOAD MODELS

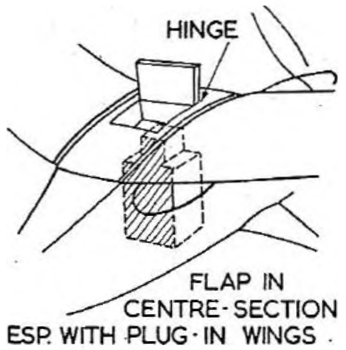


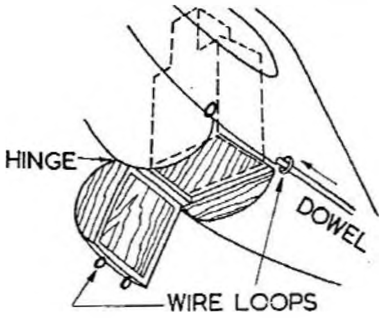
Construction otherwise can follow conventional lines, with a little strengthening of critical points such as the wing spars, wing fixing, undercarriage, etc. Since take-off is one of the basic ideas of the event, the undercarriage has to be fool-proof—rigid (but capable of absorbing landing shocks) and with tough, true-running wheels firmly fitted.

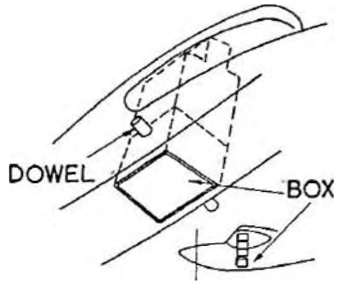


Flying

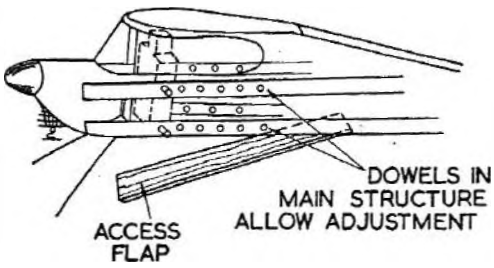
There is room for considerable experimentation into airscrew diameters and pitches for payload work, to an even greater extent than in normal free flight. In general, a fine pitch gives greater acceleration and a coarse prop. a higher eventual rate of climb, subject to the power being available. On the restricted motor run (usually 15 secs.) and with the slightly larger model which at present seems preferable for payload work, getting off the ground quickly is important, and with the power loading imposed by the rules a really fast vertical climb does not appear possible. Thus, fine pitch propellers are indicated, the diameter and area being adjusted to allow the motor to reach its peak b.h.p. The larger the model, in relation to its engine, the finer should the pitch be, due to the greater drag and lower flying speed produced by the lower wing loading. Needless to say, every ounce of thrust produced by the motor should be utilised.

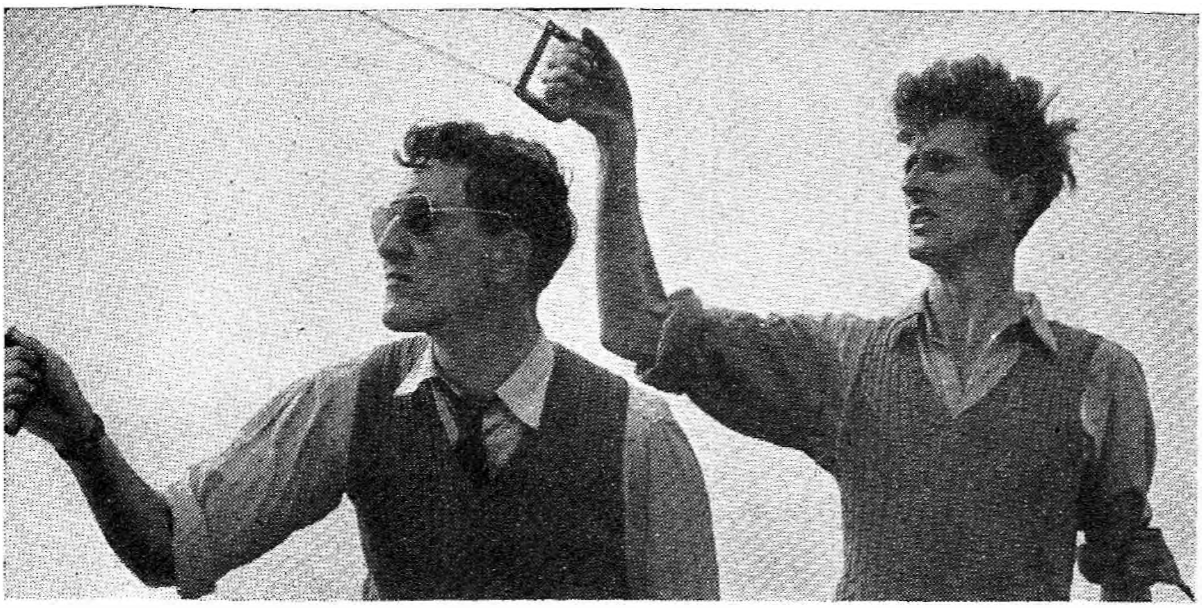






Little difference is evident when flying a payload model, except that a tendency to drop out of a stall appears. Thus, when the motor cuts with the model in a nose-up position, considerable height is usually lost before recovery. Best trim seems to be a wide spiral with a left-left or right-right pattern flight; transition is then smooth and easy with little chance of a severe stall. The extra weight makes no difference to the angle of glide, of course, but increases the sinking speed by quite a measurable extent. Even so, thermal flights are still more than possible, as has been shown in the contest results this season. Increasing the present payload would go a long way towards reducing the number of such flights . . . hmmmmm . . . now what's the F.A.I. maximum loading limitation . . . ?





Heading shows the author (dark glasses) competing against a Wycombe clubman at this year's Nationals at Waterbeach R.A.F., Near Cambridge

CLASS B TEAM-RACING

By CHAS. TAYLOR

WHY is it that the same names invariably seem to appear in the majority of team-race finals? There must surely be a reason. Pure luck may win a race once in a blue moon, but such consistent wins by the top men must be attributed to more than just that, don't you think?

In this article, I will attempt to provide some small amount of guidance to those modellers who would like to know just how a successful team manages consistently to win and place in important races. That I personally should be asked to do so is to me insignificant. Rather let it be understood that I consider it an honour to be just one member of a team of three, and a medium through which some of the knowledge accumulated by the West Essex "stable" may be passed on to "AEROMODELLER ANNUAL" readers.

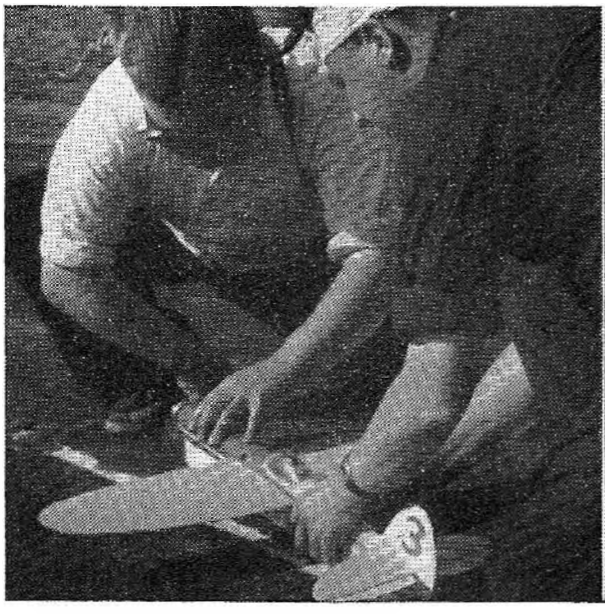
The basis of a winning team, of course, is the model. No matter how expert and experienced the team-members may be, nothing can be won without a first-class, well-planned and well-tried model. In this direction, I feel that it is a very good start if all three members of the team get together and pool ideas on the best possible method of construction. This gives the great advantage of each knowing the model personally, so to speak; of understanding its peculiarities, little likes and dislikes, and how to operate them at their utmost efficiency. Although in the past year the West Essex Team Racing has been done mainly by Len Steward, Ken Muscutt and myself, it has been a great asset to have been able to call upon as many as six different other chaps, confident in the knowledge that they are capable of getting as much out of the model as the actual bod that built it, merely because they have made a practice of finding out the things that matter about a particular model in case of an emergency.

The first thing, obviously, when designing a model is to decide on the motor. Different people may vary in their opinion on this matter, and it is worthwhile giving it considerable thought. In 1950, and for some time during '51, it was quite sufficient to utilize a 3.5 c.c. diesel with every chance of success, whilst a 5 c.c. motor of *any* manufacture was considered in the "hot" class.

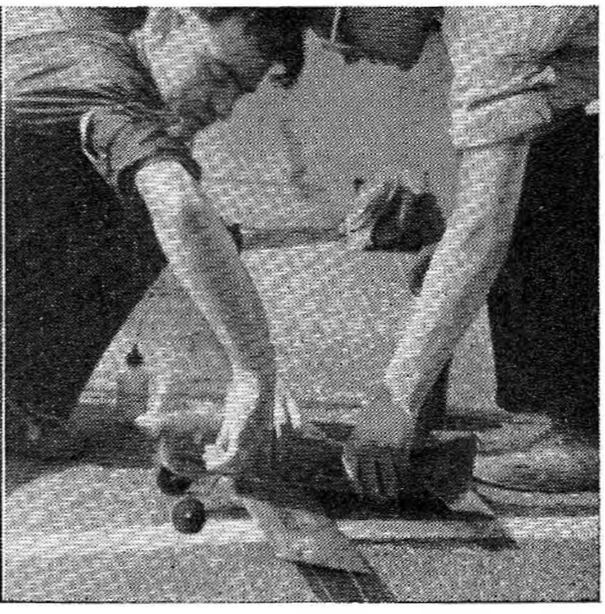
Things have changed slightly since then, however, and "just anything" will not do—at least, it will not win races consistently, which should be the object of any team race enthusiast. I did, for a giggle, rake out from the cupboard my old, 3.5 cc diesel-powered model, which, in its day, won 4 races in a row. We were not drawn against particularly fantastic opposition, (apologies to my fellow club-member!), and did the 5 mile heat without stopping, but we were still beaten. To me that was conclusive proof. The high-speed, medium range model will, barring misfortune, be the winner every time. In the choice of motor then this narrows down the field quite considerably. It is rather unfortunate, but as far as British engines are concerned, only two can provide serious opposition all the time to imported species, namely the Eta 29 and the Frog 500. If, of course, you are fortunate enough to be able to muster an American motor, then there are the McCoy, Dooling, Fox and K. & B. to name but a few. It must be remembered, however, that the toll of team-racing *can* be heavy. The fate of your motor can depend not only on yourself, but on as many as eleven others as well. If you have no easily accessible repair service to call on, it's a point worth remembering when considering an American motor. Of the two British motors mentioned, the best bet, in our opinion, is the Eta. For team-racing, here is a motor quite capable of beating the rest. Pete Wright and Ron Checksfield can exceed 100 m.p.h. with Eta powered models, and others that I have seen have been going only slightly under that speed. Coupled with this, the Eta will do over 40 laps every time, and start exceedingly well—in an organised model.

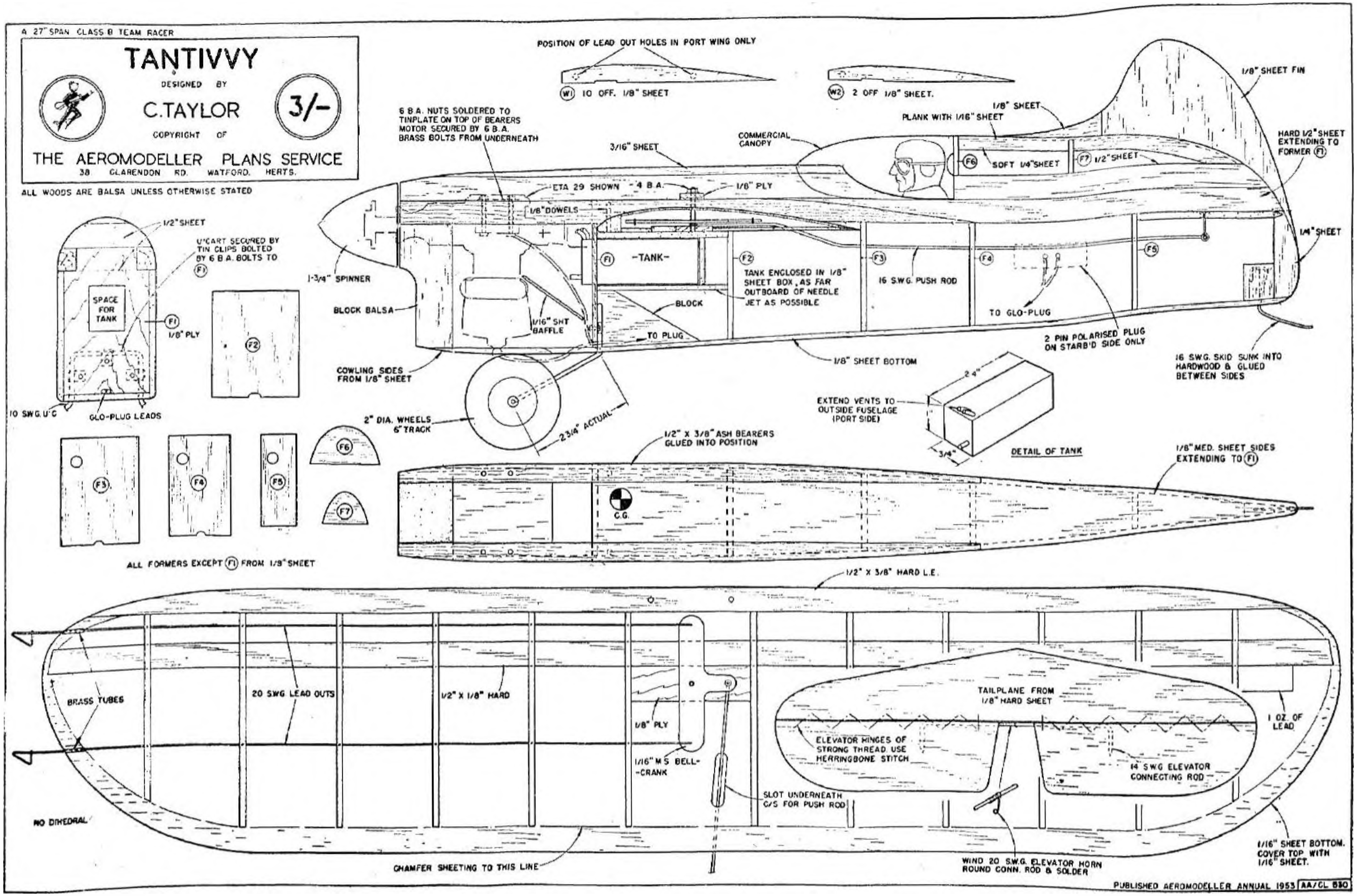
In a season's flying, a team-racer takes a terrific beating. Indeed, one should feel quite pleased these days to keep a model in one piece that long! This being the case, the model must, of necessity, be extremely robust in construction. Extremely light weight is O.K. if you feel disposed to build about a dozen models a year, but it does not really pay. The only advantage that has become apparent is a gain in initial acceleration—a good thing, perhaps, if the American type rules, involving ½ mile sprints etc., were introduced, but

"Stoo" Steward and A. McNess with their Eta 29 model, weighing 25 ozs., which has been timed at 103.4 m.p.h. Fastest pit-stop to date by "Stoo" with this job is 2.7 secs. (Timed Bob Copland)



Pete Cameron and Ron Martin with Eta 29 powered *Sorcerer* warming up their motor at 1953 Nationals. Note "squeeze bottle" filler, and light slippers worn by both pitmen for faster circulation on pit-stops!




A 27" SPAN CLASS B TEAM RACER
TANTIVVY
DESIGNED BY
C.TAYLOR
3/-
COPYRIGHT OF
THE AEROMODELLER PLANS SERVICE
38 CLARENDON RD. WATFORD. HERTS.
ALL WOODS ARE BALSA UNLESS OTHERWISE STATED
POSITION OF LEAD OUT HOLES IN PORT WING ONLY
W1 10 OFF. 1/8" SHEET
W2 2 OFF 1/8" SHEET.
6 B.A. NUTS SOLDERED TO TINPLATE ON TOP OF BEARERS MOTOR SECURED BY 6 B.A. BRASS BOLTS FROM UNDERNEATH
3/16" SHEET
COMMERCIAL CANOPY
PLANK WITH 1/16" SHEET
1/8" SHEET
1/8" SHEET FIN
HARD 1/2" SHEET EXTENDING TO FORMER F1
F6
SOFT 1/4" SHEET
F7 1/2" SHEET
ETA 29 SHOWN
4 B.A.
1/8" PLY
1/8" DOWELS
1/4" SHEET
1/2" SHEET
U'CART SECURED BY TIN CLIPS BOLTED BY 6 B.A. BOLTS TO F1
SPACE FOR TANK
F1
1/8" PLY
F2
10 SWG U'C
GLO-PLUG LEADS
1-3/4" SPINNER
BLOCK BALSA
1/16" SHT BAFFLE
F1
-TANK-
F2
TANK ENCLOSED IN 1/8" SHEET BOX, AS FAR OUTBOARD OF NEEDLE JET AS POSSIBLE
F3
16 S.W.G. PUSH ROD
F4
F5
BLOCK
TO PLUG
TO GLO-PLUG
2 PIN POLARISED PLUG ON STARB'D SIDE ONLY
16 S.W.G. SKID SUNK INTO HARDWOOD & GLUED BETWEEN SIDES
COWLING SIDES FROM 1/8" SHEET
1/8" SHEET BOTTOM
2" DIA. WHEELS 6" TRACK
2 3/4" ACTUAL
EXTEND VENTS TO OUTSIDE FUSELAGE (PORT SIDE)
2 4"
3/4"
DETAIL OF TANK
1/2" X 3/8" ASH BEARERS GLUED INTO POSITION
1/8" MED. SHEET SIDES EXTENDING TO F1
F3
F4
F5
F6
F7
C.G.
ALL FORMERS EXCEPT F1 FROM 1/8" SHEET
1/2" X 3/8" HARD L.E.
BRASS TUBES
20 SWG LEAD OUTS
1/2" X 1/8" HARD
1/8" PLY
1/16" M S BELL-CRANK
SLOT UNDERNEATH C/S FOR PUSH ROD
TAILPLANE FROM 1/8" HARD SHEET
ELEVATOR HINGES OF STRONG THREAD. USE HERRINGBONE STITCH
14 SWG ELEVATOR CONNECTING ROD
1 OZ. OF LEAD
NO DIHEDRAL
CHAMFER SHEETING TO THIS LINE
WIND 20 S.W.G. ELEVATOR HORN ROUND CONN. ROD & SOLDER
1/16" SHEET BOTTOM. COVER TOP WITH 1/16" SHEET.
PUBLISHED AEROMODELLER ANNUAL 1953
AA/CL 830

C. Taylor with his latest B Class Team Racer *Tantivvy*, reduced size plans of which appear opposite, and are available through Aeromodeller Plans Service as fullsize working drawings. Though designed late in 1953 season this model has already been flown in several meetings, and gives every promise of being a regular winner in the right hands.

under our own present rules, outweighed by the greater reliability of a model of more sturdy build. Construct your model then, of good quality, carefully chosen materials, especially the fuselage. Be most meticulous with the workmanship and allow nothing the least bit shoddy to pass. In the fuselage, particularly, pre-cement all joints. After the motor, the next most important point to be considered is the tank. Most team race fans must, at some time or another, have spent quite an appreciable amount of time experimenting in tank design, and no doubt there are a great variety operating entirely successfully and efficiently in scores of models. It is no great problem to design a good tank, and the particular one illustrated on the accompanying plan is by no means claimed to be the ultimate. It is, however, a tank which has seen service in 4 different models, all with different motors—(ED. IV, Frog 500, Eta 29 and McCoy 29), and in each case has fed smoothly and consistently throughout without leaving a trace of fuel behind on landing. It may or may not suit you or your motor, but I can recommend it as a sound foundation on which to base your own particular fancy. It has been my good fortune to have piloted 3 out of the 4 Davies Trophy winners up to the time of writing, and each model (two Class B and one Class A), has incorporated a tank of this basic design. A most important point is that both filler and overflow pipes should be facing forward, a very old idea this, but it is surprising the number of models that can be seen even today with fuel siphoning out as soon as the motor is started. And make sure that the filler pipe is of a bore sufficiently large to permit entry of fuel just as fast as your filling container can supply it.

A whole article could, and indeed has, been written on fuels. Each modeller has his own ideas on this subject, but from discussion with quite a few of the consistent winners, there seems to be only a little variation in the mixtures used. A most satisfactory brew, used by my club over the past two or more years, has been; 4 parts methanol, 1 part Castrol R, and 10 per cent. Nitro-Methane. We have found it necessary to increase slightly the amount of methanol on a really cold day, and for this purpose now take to contests enough of each ingredient to allow any necessary adjustments to be made on the field, according to the weather conditions. This is very rare, however, and is only called for by extremes of temperature.

The particular items on a Team-Racer that come in for more than the usual share of hard work are the undercarriage and the control system. With the U/C, it is advisable to make this of at least 10 SWG piano-wire, which in turn should, if possible, be bolted or otherwise most securely fixed to some robust portion of the construction, such as a ply bulkhead or the bearers. If the landing gear is kept as short as possible within the limits of safe prop. clearance, this does afford a greater degree of rigidity, as well as creating less drag. Fairings for the U/C legs do also help streamlining, but it is significant to note that next to none of the "top men" favour such luxuries, presumably because of their usual impracticability. Here again we have a case of appearance and theoretical efficiency being discarded in favour of down-to-earth, reliable and functional operation.

Controls must be constructed with no possible chance of their failing—they will only do so once! I have found myself, in the past year or so, of really fast models, copying a clubmate's habit of employing a $\frac{1}{16}$ in. mild steel bell-crank, and found more peace of mind since. Lead-out wires should not need to be larger than 20 SWG but if the flexible variety are preferred, I would certainly recommend the use of cable employed on cycle three-speeds. For the push-rod, we have found 16 SWG piano-wire quite satisfactory, but this should be supported by formers, fuselage sides, etc., to obviate the possibility of elevator flap, a thing which I have only once experienced but found most disconcerting at 90 m.p.h.

Some small mention should be made, I suppose, of the fact that Team Racers are intended by the rules to look semi-scale, although a great deal of discussion has already taken place on this subject in the model mags. Around all the practicability and efficiency of your model, it is a most satisfying feeling to know that you have tried to combine with these essential qualities as much in semi-scale appearance as is within the scope of your own particular artistic capability. If people choose to think of my models as gruesome-looking monsters, then they are perfectly entitled to do so, but at least one has the satisfying knowledge that the effort has at least been made to stick as near as one can to the rules.

From the construction of the model, let us pass on now to the actual business of performing in a team-race. This is the time when all the hours of designing, building and test-flying are put up to public scrutiny. Nobody cares how fast you have been going during a test flight or how many thousand laps you claim to do to the tankful—they want to see you do it now. Each individual member of the team has his own particular duties to perform, and he must carry them out as quickly and as efficiently as is humanly possible. In the West Essex Teams on Class B models, the chap who does the actual flicking refuels the model. We have tried various methods of refuelling, and by far the fastest has proved to be by means of a "squeeze-bottle." These are plastic bottles which may be obtained, albeit full of disinfectant, at the majority of ironmongers, chemists or grocers. Into the cap should be fitted a short piece of brass or copper tubing. By plunging this into the filler pipe and simultaneously squeezing the bottle, a 30 cc tank can be filled in under one second. Whilst this is taking place, the 2nd mechanic should have connected the glow-plug leads in readiness for the 1st man to flick. Without exception, all models from the West Essex Club are fitted with a 2-pin polarised plug situated somewhere at the rear of the fuselage, with one lead connected to the plug and the other to the crankcase, usually a mounting lug. This is particularly necessary with an inverted model, but even with an upright engine installation, it avoids a confusion of hands around the motor, as occurs with the 'Kwickglo' or other type of connector.

During the past year, it has become the practice for a 'Le Mans' type of start to be used. Before the start, therefore, it is advisable to spend just a short period warming up the motor until such times the official starter calls upon all contestants to stand back prior to commencement of the race. It is worth half-a-second or so to leave the filling container already inserted into the filler pipe in readiness for one squeeze and a flick.

At this point in the proceedings the pilot starts his own part and the safety of the model depends on him. Provided everything possible has been prepared and practised beforehand, his job should be relatively simple, but it is surprising the number of silly things some pilots still do. He should not only be watching his own model, but any others in the proximity of about $\frac{1}{8}$ of a lap of his model. Ears as well as eyes should be on the alert, listening to his motor, judging approximately when he thinks it is liable to cut, and even for anything amiss happening to others in the centre of the circle or their models. If he considers that another contestant's flying is particularly dangerous or possibly too high, then let him say so. Very often I myself have come across a pilot who takes his handle over someones' head and lines yards before his model has overtaken his rival. This is a stupid practice, and could bring about ruination of 4 good models if, say, the motor cut suddenly. When a motor cuts, a quick look round for anyone else on the ground is most advisable, giving time to glide the model in well clear of that team. Seconds can also be saved if a pilot makes note of where his pit-men are stationed, and brings the model in as near as possible to them, and thus involve the minimum amount of running round the circle.

It is all these small points that go to make up a successful team. There is absolutely no difference between the ordinary everyday aeromodeller who enters a Team Race just to 'make up the number' and those who are continually dominating the major events. It is just that extra little bit of effort, organisation and practice that brings the winners to the fore, and I hope that these few words will prove of some little assistance and encouragement to some disheartened competitor. Perhaps if I read it myself I might even learn a little bit about Team Racing! Happy circulating.

World and International Records

ABSOLUTE WORLD RECORDS

Duration	Koulakovsky, Igor	U.S.S.R.	6/ 8/1952	6 hr. 1 min.
Distance	Boricevitch, E.	U.S.S.R.	14/ 8/1952	378.756 km.
Altitude	Lioubouchkine, G.	U.S.S.R.	13/ 8/1947	4,152 m.
Speed (Straight) ...	Stiles, E.	U.S.A.	20/ 7/1949	129,768 km.
Speed (Circular) ...	Vassiltchenko, M.	U.S.S.R.	9/ 1/1953	264.7 km.

RUBBER DRIVEN

Duration				hr.	min.	sec.
Orthodox	Kiraly, M.	Hungary	20/ 8/1951	1	27	17
Seaplane	Egorovskaya, Mlle. I.	U.S.S.R.	21/ 7/1951	1	13	26
Special	Evergary, G.	Hungary	13/ 6/1950		7	43
Tailless...	Kiraly, M.	Hungary	23/ 8/1950		35	42
Tailless Seaplane ...	Kiraly, M.	Hungary	9/ 8/1952		3	42
Distance				km.		metre
Orthodox	Benedek, G.	Hungary	20/ 8/1947	50.26		
Seaplane	Horvath, E.	Hungary	10/ 9/49	45.15		
Special	Roser, N.	Hungary	9/ 4/1950			238
Tailless...	Halla, J.	Hungary	2/ 9/1951	5.25		
Tailless Seaplane ...	Abaffy, E.	Hungary	10/ 7/1949			435
Altitude						
Orthodox	Poich, R.	Hungary	31/ 8/1948			1,442
Seaplane	Gasko, M.	Hungary	18/ 8/1949			939
Speed						km/h.
Orthodox	Davidov, V.	U.S.S.R.	11/ 7/1940			107.08
Seaplane	Abramov, B.	U.S.S.R.	6/ 8/1940			76.896
Tailless...	Koumanine, V.	U.S.S.R.	9/ 8/1952			56.25
Tailless Seaplane ...	Koumanine, V.	U.S.S.R.	8/ 8/1952			69.23

POWER DRIVEN

Duration				hr.	min.	sec.
Orthodox	Koulakovsky, I.	U.S.S.R.	6/ 8/1952	6	1	0
Seaplane	Batourlov, N.	U.S.S.R.	8/ 8/1952	4	18	20
Special	Khoukra, Y.	U.S.S.R.	18/ 8/1950		27	35
Tailless...	Lipinsky, L.	U.S.S.R.	14/ 8/1951	3	31	0
Tailless Seaplane ...	Ivanov, Y.	U.S.S.R.	9/ 8/1951		33	5
Distance						km.
Orthodox	Horvath, E.	Hungary	10/ 9/1949			45.15
Seaplane	Koutcherov, E.	U.S.S.R.	14/ 8/1951			130.597
Special	Morozov, V.	U.S.S.R.	26/ 7/1952			22.2
Tailless...	Lipinsky, L.	U.S.S.R.	14/ 8/1951			109.284
Tailless Seaplane ...	Rakov, E.	U.S.S.R.	28/ 7/1950			1,550 m.
Altitude						metres
Orthodox	Lioubouchkine, G.	U.S.S.R.	13/ 8/1947			4,152
Seaplane	Kavsadze, I.	U.S.S.R.	8/ 8/1940			4,110
Tailless...	Lipinsky, L.	U.S.S.R.	14/ 8/1951			2,813
Tailless Seaplane ...	Rakov, E.	U.S.S.R.	28/ 7/1950			1,550
Speed (Straight)						km/h.
Orthodox	Stiles, E.	U.S.A.	20/ 7/1949			129.768
Seaplane	Khabarov, R.	U.S.S.R.	18/ 8/1948			50.05
Tailless...	Marinov and Rakov	U.S.S.R.	12/ 8/1950			49.68
Speed (Circular) Class I						
Orthodox	Mueller, G. & Brown, M.	U.S.A.	24/ 8/1952			180
Seaplane	Vassilchenko, V.	U.S.S.R.	16/ 8/1950			70.056
Special	Franko, J.	Hungary	2/11/1952			105.9
Tailless...	DeBolt, H. & Wilson, R.	U.S.A.	22/ 8/1952			116.7
Speed (Circular) Class II						
Orthodox	Mueller, G. & Brown, M.	U.S.A.	23/ 8/1952			180
Seaplane	Vassilchenko, V.	U.S.S.R.	28/10/1951			98.362
Special	Jancso, B.	U.S.S.R.	14/10/1951			111.801
Tailless...	Horvath, E.	Hungary	29/11/1952			162.2
Tailless Seaplane ...	DeBolt, H. & Wilson, R.	U.S.A.	23/ 8/1952			101.4
Speed (Circular) Class III						
Orthodox	Sugden, R. & Brown, M.	U.S.A.	24/ 8/1952			248.8
Special	Vassilchenko, M.	U.S.S.R.	4/ 1/1953			138
Tailless...	Gaevsky, O.	U.S.S.R.	23/ 5/1950			163.447
Tailless Seaplane ...	Wilson, R.	U.S.A.	23/ 8/1952			135.8
Speed (Circular) Class IV (Jet)						
Orthodox	Husicka, Z.	Czechoslovakia	13/ 7/1952			245.052
Tailless...	Vassilchenko, M.	U.S.S.R.	9/ 1/1953			264.7

SAILPLANES

Duration				hr.	min.	sec.
Orthodox	Aidaninov, S.	U.S.S.R.	6/ 7/1950	3	18	0
Tailless...	Mouraschenko, B.	U.S.S.R.	6/ 6/1951	1	16	32
Distance						km.
Orthodox	Szomolanyi, F.	Hungary	23/ 7/1951			139.8
Tailless...	Mouraschenko, B.	U.S.S.R.	6/ 6/1951			33.36
Altitude						metres
Orthodox	Benedek, G.	Hungary	23/ 5/1948			2,364
Tailless...	Koutcer, M.	U.S.S.R.	17/ 8/1950			547

UNORTHODOX "SPECIALS" (Motorless)

Duration and Height ...	O'Donnell, J.	Great Britain	22/ 4/1951	4 : 20 & 1,720 m.

RADIO CONTROL

Power (*Duration, Height and Speed*)	Velitchkovsky, P.	U.S.S.R.	2-3/8/1952	1 : 2 : 30, 845 m. and 39.229 km/h.
Sailplane	Bethwaite, F. D.	New Zealand	5/ 1/1953	1 : 0 :7

List of British National Model Aircraft Records

31st August, 1953

OUTDOOR (Minimum F.A.I. Loading)

Rubber Driven				
Monoplane	Boxall, F. H.	(Brighton)	15/5/1949	35 : 00
Biplane	Young, J. O.	(Harrow)	9/6/1940	31 : 05
Wakefield	Boxall, F. H.	(Brighton)	15/5/1949	35 : 00
Canard	Harrison, G. H.	(Hull Pegasus)	23/3/1952	6 : 12
Scale	Marcus, N. G.	(Croydon)	18/8/1946	5 : 21.75
Tailless	Woolls, G. A. T.	(Bristol)	10/5/1953	3 : 03
Helicopter	Tangney, J. F.	(U.S.A. & Croydon)	2/7/1950	2 : 43.75
Rotorplane	Crow, S. R.	(Blackheath)	23/3/1936	: 39.5
Floatplane	Parham, R. T.	(Worcester)	27/7/1947	8 : 55.4
Flying Boat	Parker, R. A.	(North Kent)	24/8/1952	1 : 05
Sailplane				
Tow Launch	Best, F.	(Leeds)	20/6/1948	63 : 46
Hand Launch	Campbell-Kelly, G.	(Sutton Coldfield)	29/7/1951	24 : 30
Tailless (T.L.)	Lucas, A. R.	(Port Talbot)	21/8/1950	22 : 33.5
Tailless (H.L.)	Wilde, H. F.	(Chester)	4/9/1949	3 : 17
Nordic (T.L.)	Whittall, L.	(Birmingham)	2/7/1950	29 : 51.7
Nordic (H.L.)	Campbell-Kelly, G.	(Sutton Coldfield)	29/7/1951	24 : 30
Power Driven				
A (0-2.5 cc.)	Springham, H. E.	(Saffron Walden)	12/6/1949	25 : 01
B (over 2.5-5 cc.)	Dallaway, W. E.	(Birmingham)	17/4/1949	20 : 28
C (over 5 to 15 cc.)	Caster, M.	(C/Member)	15/7/1951	10 : 44
Tailless	Poile, W.	(C/Member)	23/8/1950	2 : 09.6
Scale	Tinker, W. T.	(Ewell)	1/1/1950	1 : 36.5
Floatplane	Stainer, J. R.	(Canterbury)	14/8/1949	2 : 59.4
Flying Boat	Gregory, N.	(Harrow)	18/10/1947	2 : 08.5
Control Line Speed				
Class I	Scott, R.	(St. Helens)	9/ 7/1950	80 m.p.h.
Class II	Wright, P.	(St. Albans)	23/ 5/1953	106.5
Class III	Hall, J.	(Enfield)	24/ 8/1952	107
Class IV	Wright, P.	(St. Albans)	14/ 7/1951	124.54
Class V	Wright, P.	(St. Albans)	24/ 5/1953	124.3
Class VI	Guest, F.	(C/Member)	14/ 7/1951	133.10
Class VII (Jet)	Stovold, R. V.	(Guildford)	25/ 9/1949	133.33

INDOOR

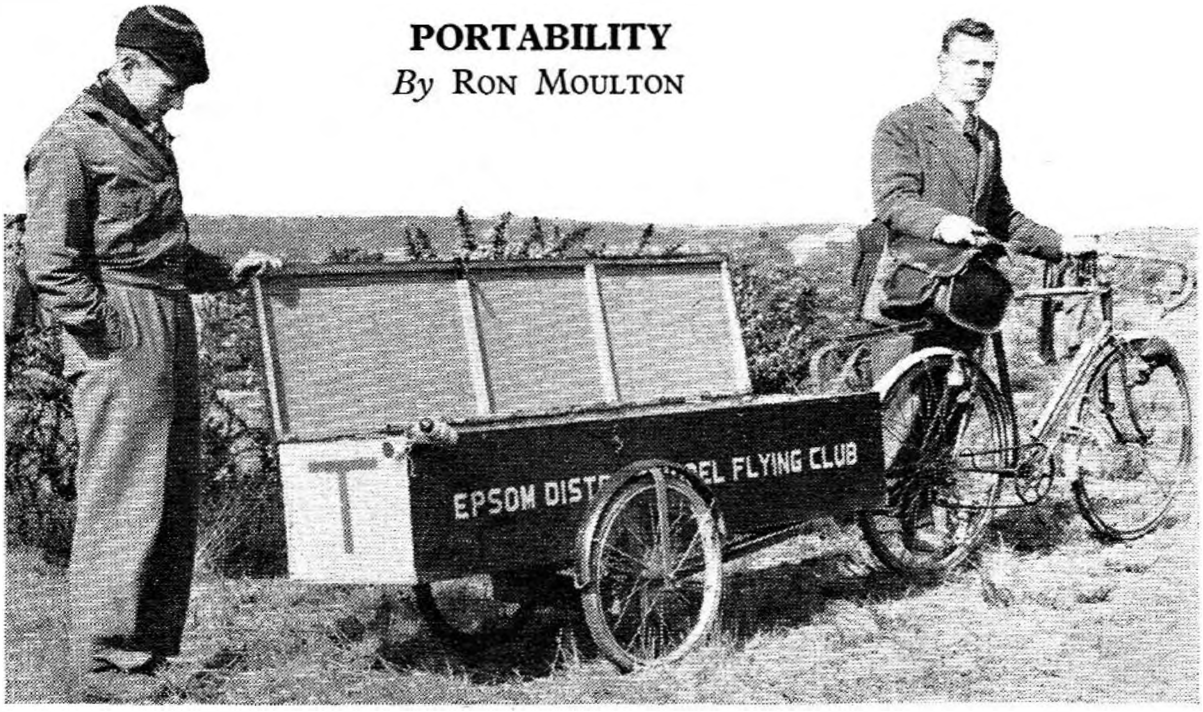
Free Flight				
Stick (H.L.)	Copland, R.	(Northern Heights)	22/ 1/1937	18 : 52
Stick (R.O.G.)	Mackenzie, R.	(Blackheath)		8 : 42
Fuselage (H.L.)	Parham, R.T.	(Worcester)	19/ 8/1951	7 : 15
Fuselage (R.O.G.)	Parham, R. T.	(Worcester)	18/ 8/1951	7 : 30
Tailless (H.L.)	Parham, R. T.	(Worcester)	18/ 8/1951	2 : 59
Tailless (R.O.G.)	Parham, R. T.	(Worcester)	18/ 8/1951	2 : 28
Helicopter	Read, P. W.	(South Birmingham)	19/12/1952	4 : 04
Rotorplane	Mawby, L.	(Ealing)		: 32.2
Round the pole				
Class A	Muxlow, E. C.	(Sheffield)	10/12/1948	6 : 05
Class B	Parham, R. T.	(Worcester)	20/ 3/1948	4 : 26
Speed	Jolley, T. A.	(Warrington)	19/ 2/1950	42 : 83 m.p.h.

OUTDOOR (Lightweight)

Rubber Driven				
Monoplane	Barnacle, N. A.	(Leamington)	/ 8/1952	17 : 55
Biplane	O'Donnell, J.	(Whitefield)	18/ 5/1952	6 : 46
Canard	Harrison, G. H.	(Hull Pegasus)	28/ 9/1952	1 : 47
Scale	Dubery, V. R.	(Leeds)	14/ 7/1951	1 : 11
Floatplane	Taylor, P. T.	(Kingston)	24/ 8/1952	5 : 15
Flying Boat	Rainer, M.	(North Kent)	28/ 6/1947	1 : 09
Sailplane				
Tow launch	Hunt, P.	(Bury St. Edmunds)	25/ 5/1952	32 : 10
Hand launch	Gates, G. K.	(Southern Cross)	16/ 2/1952	8 : 45
Tailless (T.L.)	Couling, N. F.	(Seven Oaks)	3/ 6/1951	22 : 22
Tailless (H.L.)	Donald, K.	(Southern Cross)	23/ 5/1952	3 : 29
Canard (T.L.)	Caple, G.	(R.A.F.)	7/ 9/1952	22 : 11
Power Driven				
Class A	Archer, W.	(Cheadle)	2/ 7/1950	31 : 05
Class C	Ward, R. A.	(Croydon)	25/ 6/1950	5 : 33
Tailless	Gates, M. M.	(Non Member)	28/ 1/1951	2 : 47
R/C	O'Heffernan, H.	(Salcombe)	24/ 6/1953	60 : 35

PORTABILITY

By RON MOULTON



In war-time years and beyond there used to be a perfect *ab initio* kit for a low wing rubber model with a very novel sales feature. When finished and ready for flying tests the job could be packed away into its original kit box of modest dimensions, and carried with ease to the local field. Few, if any, of the modern kit designs can boast this feature; but fortunately most of them can be packed away in home-made carrying boxes without difficulty, and certainly all of those designs accepted and published in the *Aeromodeller* Plans Service comply with the general requirements of portability. But what of your next model? Have you considered how to transport the next creation to the flying field?

Study of arrivals at any major model aircraft rally will reveal the diversity of arrangements made by modellers to carry their comparatively fragile charges. Few model boxes are seen exceeding 6 feet in length and these are of smaller cross-section to provide less wind resistance . . . at 30 m.p.h. a model box could quite easily render cycle control with or without motor quite difficult. These long boxes are the ready-made variety obtainable through most electrical installation contractors, and providing you are prepared to become a travelling advertisement for a fluorescent tube manufacturer, a shilling or two will save much inconvenience for a couple of seasons' flying.

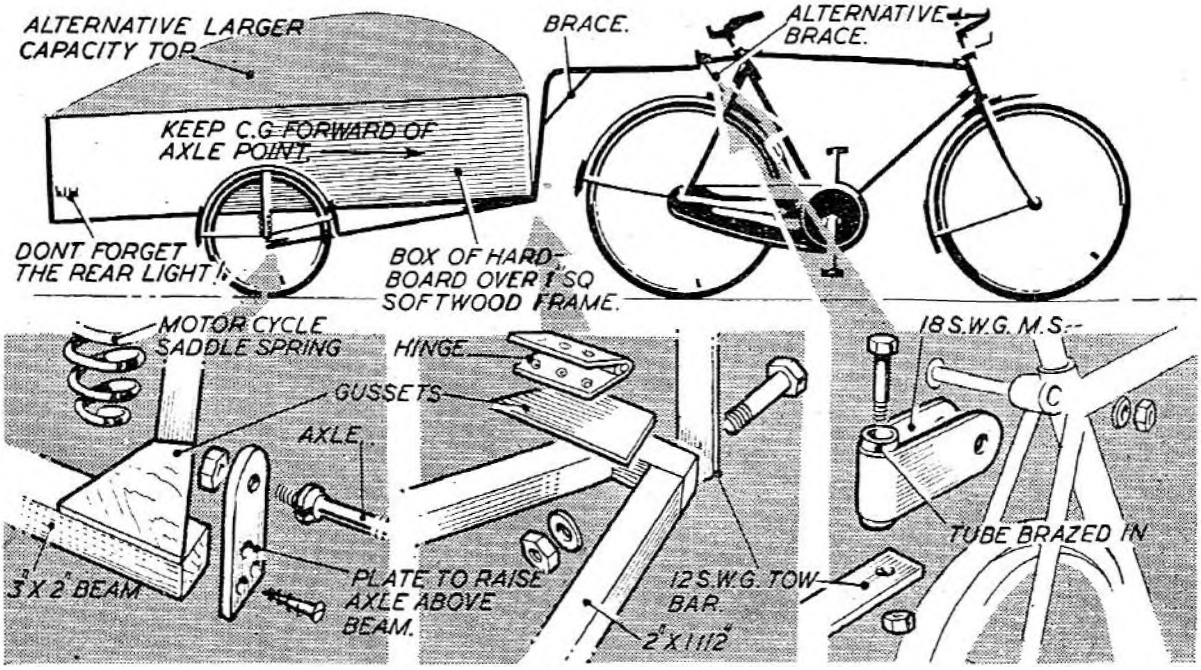
The normal cross-section for a built-up hardboard or ply carrying box depends rather upon the particular type of model you prefer. In general, 10 × 12 × 40 inches will provide ample capacity for three or four rubber/glider jobs or perhaps a couple of power models. Forty inches is not over long to be carried across the rear of a motor cycle, giving only an inch or two overhang in excess of handle bar width and allowing no possibility of inadvertent collision with other traffic. The same size is equally good for the man dependent upon public transport and it will be found to have convenient enough proportions to tuck away either on railway luggage rack or omnibus under-stair compartment. For the man who has to carry his load, lightness will be the keynote of his model box and the thinnest plywood with sufficient rigidity will be best and well worth the extra expense over the more economic but much heavier commercial hardboard. For the framework 5/8ths square softwood has ample strength and provides sufficient thickness for the use of good length hinge and handle screws. Where the box is to become a trailer unit, however, it is advisable to step up this frame dimension to 1 inch square, particularly in view of the larger proportions of the trailer box.

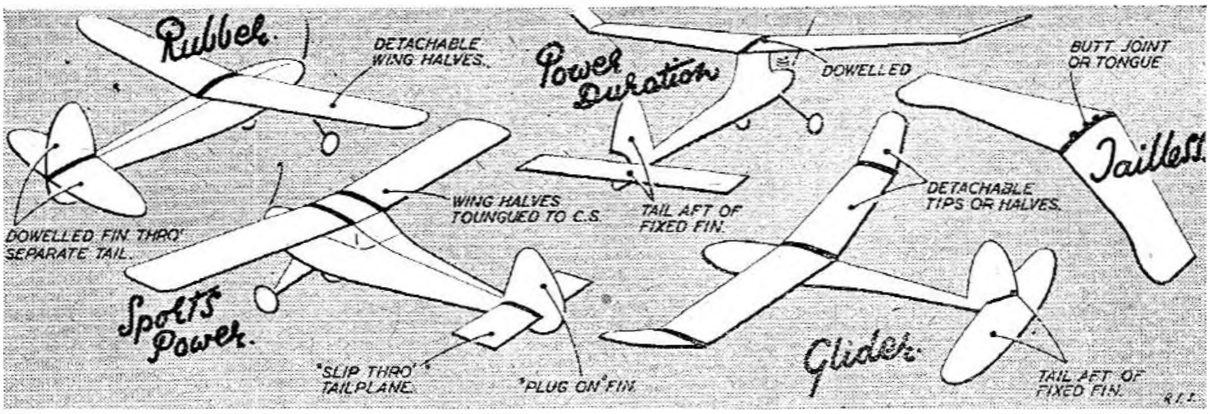
For the cyclist with but a few miles to travel to his local field, the trailer box is the most adequate answer to the portability problem. Suspension is the added requirement, and a pair of motor cycle saddle springs will be found to have just the right shock absorption for a box of 6 or 7 feet long and 15 × 18 inch cross-section. Simple butt hinges provide the "swinging arm" hinge point at the front end of the box, whilst a low slung axle will keep the box near to the ground for better road control and also improve loading and unloading. Care should be taken to see that most of the heavy material (bottles of fuel, booster batteries, etc.) are kept packed in the front end to keep the main mass of weight between the trailer wheels and the bicycle.

Unfortunately, cycle accessory manufacturers do not appear to cater for the trailer man, so the actual pivoting attachment to the rear of the frame is a matter for the local engineer or blacksmith. Simplest attachment of all is an 18 gauge, 2 inch wide mild steel strap bent around a 2 inch length of tubing (with sufficient bore to accommodate a pivot bolt) and fixed via the saddle stem clamp bolt to the bicycle frame. The accompanying sketch gives detail of this; but doubtless many of our more ingenious modelling brethren will have other and perhaps more improved ideas on this and the trailer box frame. One item most essential, especially in winter months is the provision of adequate rear lighting for road safety's sake.

Leaving the design and construction of the carrying box to suit your individual taste, the next and most important consideration is that all future models should be capable of fitting entirely within the bounds of the box.

The lightweight rubber model, with detachable wings and tail, presents no problem, but the larger Wakefield of 40 inches or more span usually demands a wing-break. Tongue and box shoulder wing fitting or vertical ply false spars are already accepted practice for this class of model where two part wings are commonplace. The same wing fittings can be used in fact for almost every type





ABOVE: "BREAK POINTS" FOR

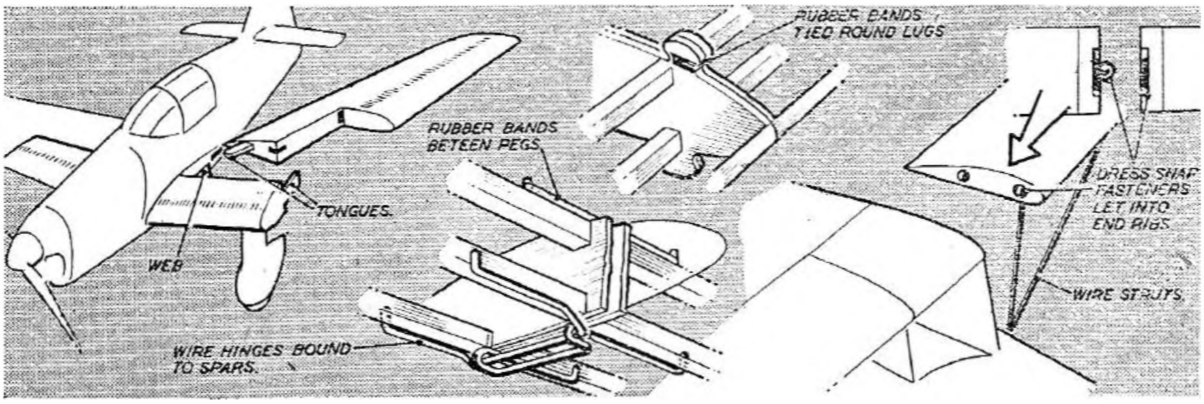
of free flight model and the sketches shown here will display the many variations that are possible.

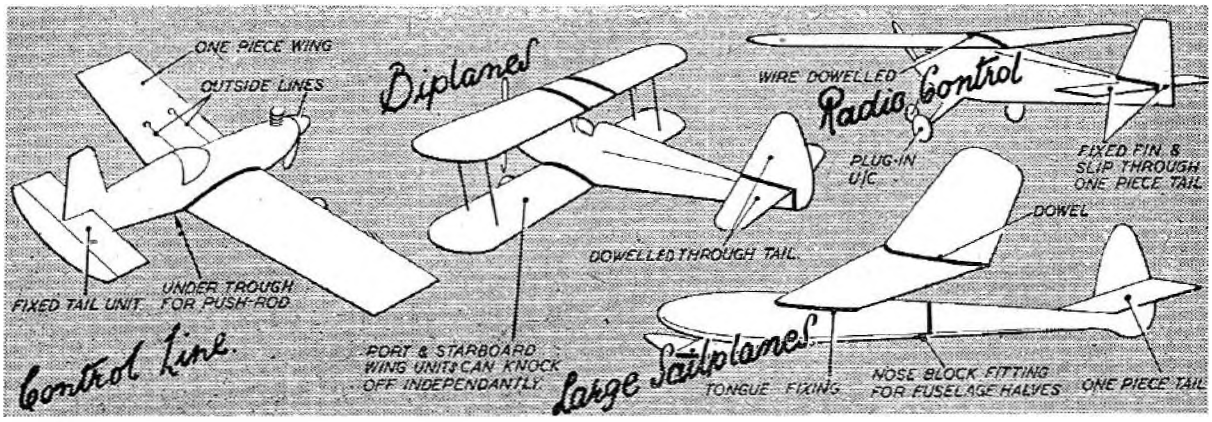
Perhaps the most frequent error in design for portability is the use of polyhedralled wings, which even though broken up into halves at the centre section, still take up more than enough space in the box. Detachable parts at each dihedral break would render structure weight too high for practical purposes in a competition model, though there is no objection to use of, say, a 4-panel wing with polyhedral on a 72 inch sport power design.

Remember always that if the wing is dissembled into two or more panels then the fuselage length will be the governing factor for accommodation of the model in your box, whilst the wing chord and height of the fin, if attached permanently to the tail, will decide the cross sectional dimensions. There are cases, particularly among a number of the extra large A.P.S. glider designs, where it is essential to transport the fuselage outside the box, or alternatively to provide a fuselage break so that the fore and aft sections can be carried more easily.

Control line models, tailless and biplane types have difficulties peculiar unto themselves. For structural reasons it is generally desirable to have a fixed wing on control line stunt design. However, if one is considering a 50 inch span 500 sq. inch stunter for 5 c.c. or more, it is hardly likely that you will want to carry this size of model around in one piece. Here we give thanks to Henry J. Nicholls and his Monitor design with under trough for a detachable push rod from wing mounted bell crank to the elevator horn. This simple system allows the benefit of internal lead-out wires in the wing and also enables the flaps to be connected permanently, if fitted, to the same push-rod. Otherwise a detachable

BELOW: A FEW METHODS





TYPICAL MODEL TYPES

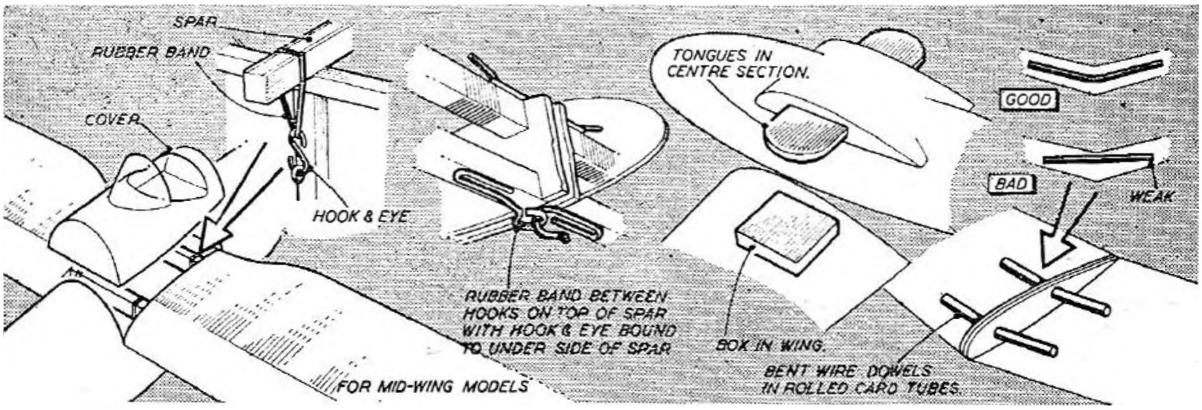
wing on a control line stunter demands external lead-out wires and a plug-in flap attachment incorporated into the wing fitting.

Large spans, which are characteristic of the tailless model, mean that wing halves must be arranged to be taken apart, and by far the most popular scheme for this is the plain flat wing tongue which "floats" between the boxes in each wing panel. There are some who feel this system still prone to damage and from Germany we have a novel scheme which in effect provides a butt joint of the two root ribs with only elastic bands at four different points to locate both dihedral and incidence. That this is successful is proven beyond doubt, but it has yet to come into favour with British modellers.

Knowing one's own limitations as to the size of box that can be made and carried, it is then entirely up to the commonsense of the builder to arrange for component parts to be sufficiently small to fit into the box with the greatest economy of space.

One thing more remains, and that the actual packing of models on their way to the field. *Never* pack tightly so that the components are allowed to rub against one another. Where wing panels have to be stacked closely together, wrap each with a single sheet of newspaper for insulation. Fuselage dowels, glider towhooks, dethermaliser hooks, diesel engine compression screws and needle valves can be protected with a wad of newspaper. Otherwise in even the shortest of journeys these normally inoffensive items can wreak havoc upon tissue covered wings and tails. Finally, once you think you have packed everything neatly, get a few more sheets of newspaper and pack wads between each part and down every open gap, so that there can be no opportunity for the cargo to shift in transit.

OF WING ROOT ATTACHMENT



KNOW YOUR ENGINE

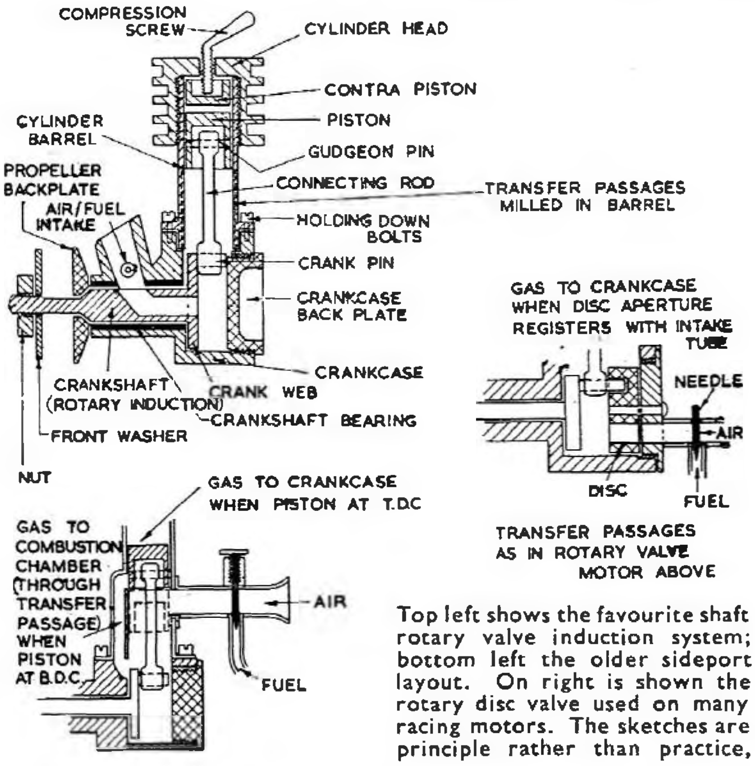
By VIC SMEED

The modern miniature diesel engine is an extremely efficient piece of machinery, the culmination of years of research, experiment, and development. Its mechanical efficiency, in terms of usable energy, is, in fact, greater than any other form of power unit except the rubber motor. For a minimum of sixteen or seventeen parts, each of which may require two or three machining operations, and each of which must fit within some of the finest limits worked to in production engineering, the price of today's average motor is ridiculously low. Even so, a new motor represents a fair cash outlay, particularly to a young modeller, and it is therefore interesting to consider the practical applications of the various sizes of motor available, in order to see which is the best all-rounder for the purchaser with a restricted income.

For sport flying, the small motors have it all the way—the .5s, the 1s, and the 1.5s. The same applies to scale; of course, we see larger sport and scale jobs, but 90% of the models in these categories use the smaller sizes for economy in model cost and fuel consumption, as well as portability. Contest fliers are now concentrating on 1.5 and 2.5 engines; below 1.5 the model's efficiency drops off noticeably, and 2.5 is the upper limit for F.A.I. International models. Again, larger models are built, but their uses are restricted, and portability, in these days of travelling to find a flying field, is again a snag. In radio control, too, the trend is towards smaller models, 3½ cc. being a normal top limit, while the 2.5 is used if possible. The lower limit is 1.5 for, although smaller models are built, flying becomes a little touch-and-go on less than 1.5 power. Control line stunts are easier with higher power, up to 5 cc. being usual; 1.5 is again a practical lower limit, as it is in speed flying, where the largest motor allowed in the particular class (1.5, 2.5, 3.5, 5, 8.5, and 15) is advisable. Finally, team racing calls for 2.5 or 5, and it is usual to stick to maximum permitted sizes.

From this it is obvious that for a general modeller concerned chiefly with free-flight the 1.5 is the motor, while a similar builder with leanings towards control-line types would do better with a 2.5 Sport or scale fans, or young modellers, would do best with something around the 1 cc. mark or slightly less; this size motor can, after all, be used in small control-liners and can give a lot of fun in that category.

Incidentally, these capacities also apply to glow-plug motors, although it should be remembered that in the smaller sizes glow-motors have nothing like the *usable* power of diesels. As an example of this, a fine little .8 cc. American



Top left shows the favourite shaft rotary valve induction system; bottom left the older sideport layout. On right is shown the rotary disc valve used on many racing motors. The sketches are diagrammatic only, illustrating principle rather than practice, since timing is all-important.

glow-motor with a phenomenal b.h.p. figure would only fly level (despite all the props and fuels tried) a 36 in. model which a standard British .5 cc. diesel (with less than two thirds the theoretical power) took up in a fast vertical climb.

Having, then decided the capacity required, a motor should then be chosen on the advice of genuinely experienced friends (or, if you prefer, on the recommendation of the "AEROMODELLER" Staff—providing you enclose a stamped addressed envelope). Once purchased—and before you twiddle the controls on the engine—READ THE MAKERS' INSTRUCTION LEAFLET. More grief and pain arise from the omission of this simple, common-sense step than from any other cause! The engine should then be mounted on a test rig, either made up from bearers screwed to a solid base or even just a square notch sawn in a piece of $\frac{3}{4}$ in. timber; screws are often used to hold the motor but bolts are far better. Use the recommended fuel for initial running, and use a *heavy* propeller, which will give far easier starting and smoother running in.

Starting is a knack, and little else can be said. Tighten the prop on so that the piston is coming up to compression when the far prop blade is at 45° above the vertical, and flick with the fingers as near the hub as possible. "Flick" is hardly the word—you must use the same amount of "punch" as you would put into cracking a whip. It's easy after a little practice. There are two basic methods of getting the fuel through the engine—by choking, which means blocking the air intake with your finger and turning the prop to suck in neat fuel, and by priming, which has come to mean squirting a little fuel through the exhaust ports directly on to the top of the piston. The latter gets quicker results as a rule, but is also more dangerous. When the piston is at the top of its stroke and the contra-piston in in the usual running position, the distance between the two faces is roughly .015 in. as a rule. An ordinary postcard is .011 in. so the space is very small, and the first law of hydraulics states that liquids are incompressible. It pays therefore, after priming, to turn the engine over slowly once, to ensure that the fuel injected will not hydraulically "lock" the piston. If the motor turns over satisfactorily flicking will usually produce a short burst, and on re-priming once or perhaps twice, the burst will normally cause sufficient fuel to be drawn into the engine for it to commence running.

If priming fails to produce a burst after a dozen flicks, increase the compression about $\frac{1}{8}$ turn at a time, checking on each ocacsion for hydraulicing before flicking. The fastest start is usually obtained by a couple of choked flicks and a small prime. Most motors incidentally, will run on equal parts of ether, castor oil (or Castrol R) and paraffin, (see fuel list).

Once the starting technique is mastered, the engine should be run for periods of about a minute at medium revs., gradually increasing the length of run after a time and, if you are a perfectionist, dropping a spot of castor oil in the air intake now and then. Don't be afraid that your engine will wear out (only misuse is likely to cause that)—on the contrary, it will wear *in*, a process which results in more power from smoother, faster running, and considerably easier starting. Some motors which may prove quite difficult to start when new can be guaranteed to roar off in a couple of flicks after an hour or so of running in. The particular use of bench running in this respect is that a considerably heftier flick can be given to a rigidly mounted motor; when it is eventually transferred to a model, far less powerful flicks will start it easily. A good many contest fliers who have hurriedly installed a new motor in a model, the day before a competition, have known the humiliation of being unable to start the motor when their turn to fly came round!

The care of the motor once it is in daily use is largely a matter of commonsense. It is generally known that a good piston/cylinder fit is a carefully lapped job with a final tolerance of about .0001—that is, one fifteenth of the thickness of an average human hair. Now the air is usually full of dust particles, many of which are of almost diamond hardness, and a few of these tiny bits of grit introduced into the engine can quite easily ruin its compression by scoring the internal mating surfaces. Some fuels, too, tend to be a little corrosive after a time. It is therefore a good idea to seal off the ports (exhaust and intake) with either soft wooden or cloth plugs or strips of cellophane tape, or, if the motor is going into temporary store, it can be put in a cellophane or plastic bag such as are used for sandwiches.

Fuel-tanks should always be emptied and the engine "run-dry"; fuel left inside will evaporate and leave a gummy deposit which can render starting very difficult when next the engine is used. For storage it pays to wash the motor out with lighter fuel or ether and introduce a little light machine oil, before sealing the ports or wrapping the whole unit up. Never yield to curiosity and take the motor apart unless you have definite grounds to suspect internal damage. Avoid turning the motor over if, after a crash or a nose-over in loose soil, it is smothered with dirt or dust; the dirt can be washed off quite simply with a little fuel. And on no account attempt to modify a stock motor unless you know exactly what you are doing or have expert assistance. No one can stop you trying to improve the performance (though it's doubtful if you will) but it can save you money if you resist the temptation to file "that bit there" away!

When flying a new model for the first time, it is often desirable to reduce the motor's power output to a certain extent. This can usually be done by slackening off compression slightly, and by adjusting the needle-valve. Most modern diesels can be dropped down to about half their maximum power output in this way without serious rough-running. An alternative means is to carve a balsa plug to fit the air intake, and to either drill or notch this plug so that air can pass, though not in the same quantity as through the normally unrestricted intake. A little trial and error will soon indicate how much restriction can be used. The result is a motor which runs smoothly but at much-reduced revs. Either method should be practised on the bench until the desired effect is attained.

DO . . .

Follow the maker's instructions—he *knows* his product.

Keep the motor covered when not in use—dust and grit are the cylinder's greatest enemies. Either seal off the ports or put the whole motor in a plastic bag.

Run the motor in carefully when new—a well-run in engine will last several times as long as a roughly-handled one.

Use a standard fuel mix—you get nowhere by continually chopping and changing the fuel.

Evolve a standard starting technique—once you know what actions produce results, always use them in the same order.

Learn to hear and feel the condition of the motor—too wet, too dry, etc. Corrections then become automatic.

Mount the tank as close to the engine as possible, and on a level with the needle-valve assembly.

See that the motor is always mounted firmly before running.

DON'T . . .

Dismantle your engine unless you know that something is definitely damaged.

Twiddle with the settings when you first buy it, until you have run it.

Turn the motor over when it is smothered with dirt and dust after landing, without first swilling it through.

Use pliers on the plug and/or prop-nut—Spanners are meant for this and cost very little.

Turn the motor over when it offers solid resistance—you will only bend the con-rod or break the crank-web.

Try to modify the engine without expert advice.

Use an unbalanced airscrew (unless you *want* an ova crankshaft bearing).

Run the engine in the dining room—the exhaust is so messy, let alone the smell.

Overtighten the prop-nut, and never, never put a strip of metal through the ports to help loosen a tight nut.

Grip the engine in a vice.

Run the motor over-compressed—it imposes undue strain on the reciprocating parts.

DIESEL FUELS

Ether	Castor	Paraffin	Petrol	Castrol R	Castrol XXL or SAE 40	Redex	Amyl Nitrate	DERV	Remarks
32.5	25	40					2.5		Equals Mercury 8
35	20	45				Up to 5	2–4		Recommended for Oliver racing engines
40	22	30				8			Especially good in tropics
33.⅓	33.⅓	33.⅓							Dirty but will run most engines. Excellent for running-in
60						40			Good for fixed-head or very small motors
37½		37½		25					Good contest fuel
40					20			40	Good contest fuel
45			45		10				Useful for cold weather operations

GLOWPLUG FUELS

Methanol	Castor Oil	Nitromethane	Castrol R	Remarks
72½		10	17½	Excellent team race fuel
55	25	20		Equals Mercury 7
70	30			Inexpensive though slightly less efficient

For diesel fuels, up to 2% (more brings no improvement) of "dope" may be added to reduce ignition lag. Use amyl nitr*i*te with paraffin fuels and amyl nitr*a*te with others. Do not use castor-based diesel fuels when ether is not ready-mixed in.

For methanol use "dry" methyl alcohol, at least 74° over proof, and keep bottle tightly corked.

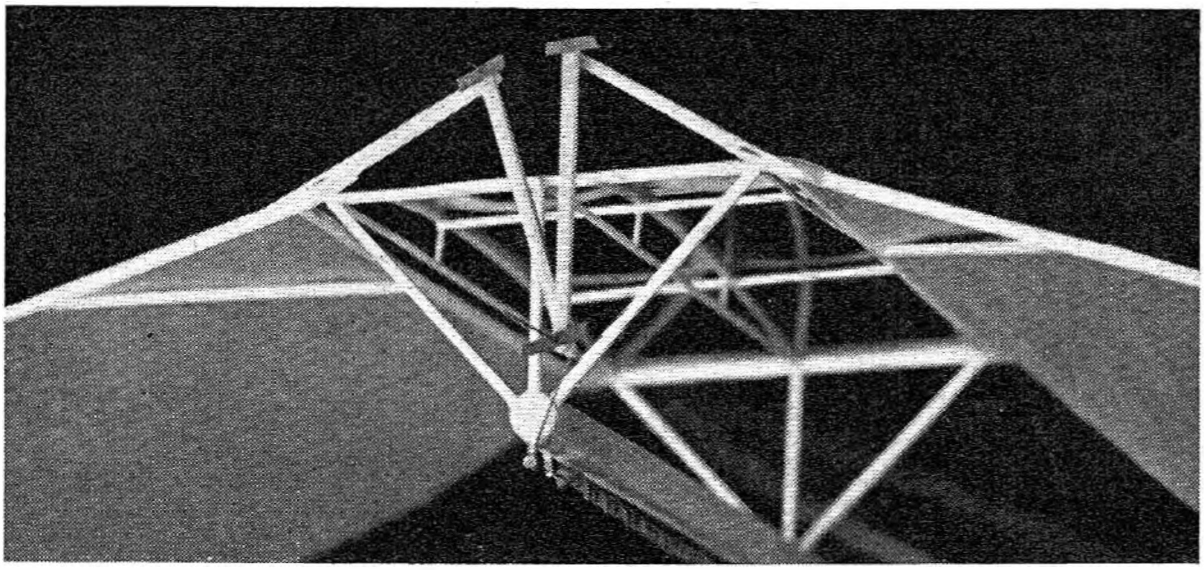
For ether use anaesthetic, technical, sulphuric or commercial, S.G. approx. .720.

For paraffin use kerosene, as used in blue-flame domestic oil heaters.

For DERV use light gas oil (diesel-engined road vehicles).

For oils other than castor, use S.A.E. 40 when in doubt.

Nitropropane or nitroethane can be used in place of nitromethane.



MODEL ORNITHOPTERS

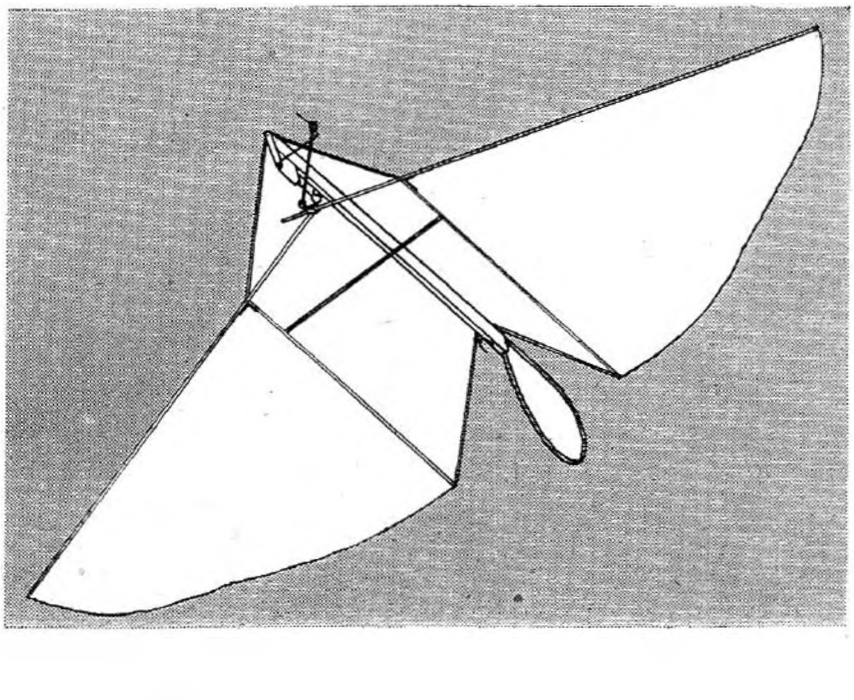
By R. H. PARHAM

MANY of the early experimenters in the field of Aeronautics endeavoured to produce flying machines which could achieve flight by flapping wings. These aircraft, whether in the full size or model form, were unsuccessful for the following reasons:

(*a*) The lack of suitable lightweight power plants.
(*b*) The extremely inefficient and complex mechanisms used to simulate the action of birds wings.
(*c*) Lack of knowledge of stability.

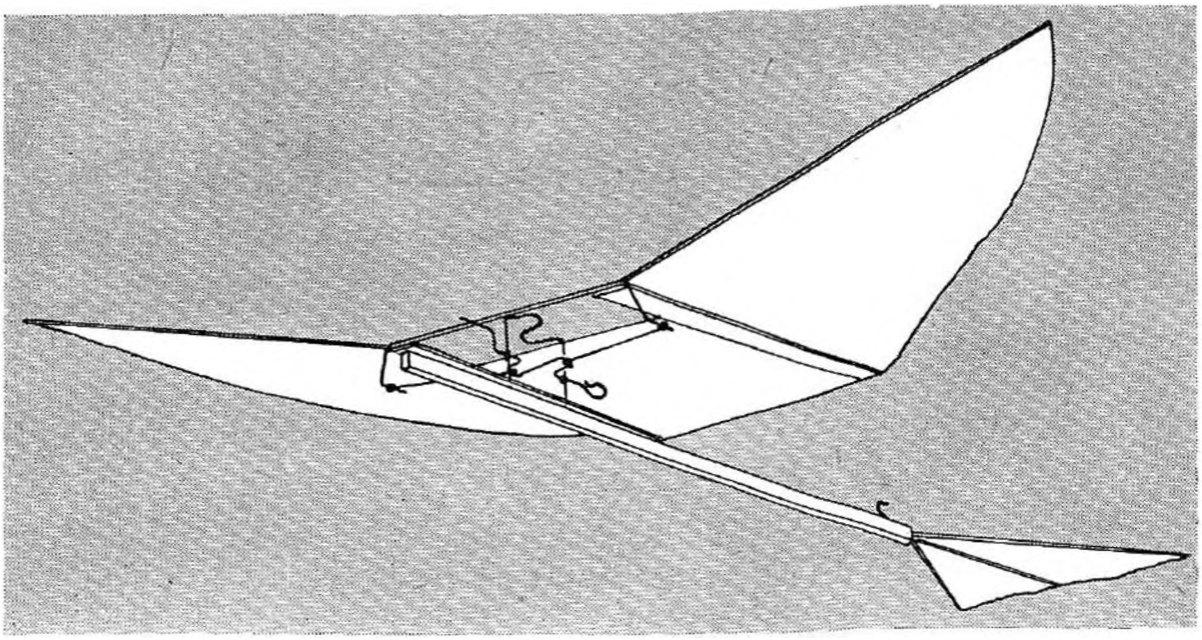
The modern model ornithopter has a light efficient power unit in the form of a rubber motor. Its wing structure and operating mechanism are the simplest possible, while both lateral and longitudinal stability are obtained by standard methods.

An early "flapper" was constructed in 1937 to plans published in an American model journal by Salem Barrack. The design was the result of three years' experimental work and soaring flight of over sixty seconds duration were claimed. Fig. 1 illustrates the layout, which is considered by the writer to have



Left: Fig. 2. The tailless ornithopter design by Orthop and Ledman, developed by Parham in this country to equal the then British record of 20 seconds.

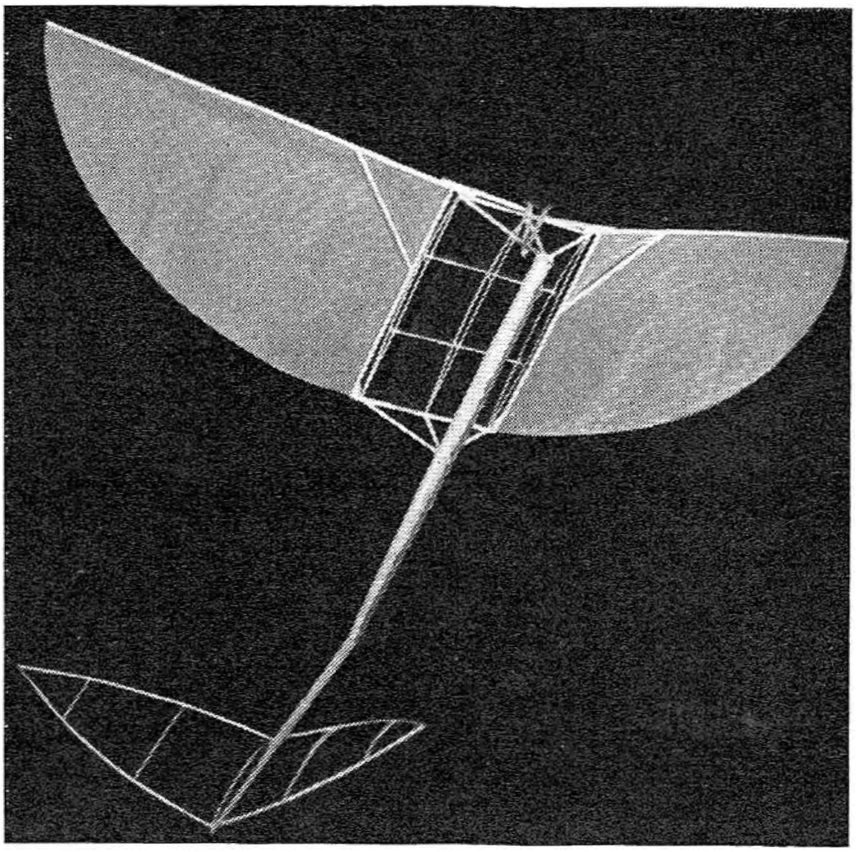
Heading: Details of the flapping mechanism on R. H. Parham's latest ornithopter design, "Flippin' Kid," a drawing of which appears on page 109.



set the modern trend in ornithopter design.

During 1939 another type of ornithopter was produced from plans published by the American modellers Alan Orthop and Joseph Ledman. This remarkable tailless design, shown in Fig. 2, had an overall length of 9 inches and a wingspan of 12 inches. It consisted of a balsa motor stick, a vee type centre section, tissue covered, with flapping wing assemblies similar to those on the previous model. The flapping mechanism comprised a rubber driven crank operating the wing spar extensions via a connecting rod. All structural parts, including the fin outline, were of bamboo and the motor was hand wound by the crankshaft extension.

This model had an excellent performance and equalled the existing British record of 20 seconds whilst being flown around a lamp post on a dark



Above: Fig. 1. Salem Barrack's 1937 design. In spite of claims for flights of 60 seconds, Parham was unable to achieve more than 6 secs. with his version. It set the modern design trend in design however. Size was: span 15 in., motor stock 12 in.

Right: A view of Parham's 44-second model "Flippin' Kid."

winter's evening. Its flight pattern was erratic, principally due to the lack of a stabiliser, but it could climb rapidly to about twelve to fifteen feet before descending slowly to earth. The small fin proved relatively ineffective and the machine flew as well without it.

Recently interest in ornithopters was revived and it was decided to concentrate upon an indoor design on the basis that it would be simple to develop, easy to construct and possibly give satisfying durations. This decision was fully justified, the model presented here being the fourth of a series and is remarkably successful. It has flown in a normal size lounge for over 30 seconds, has a best duration to date of 44 seconds, and its flight pattern can be changed readily from a straight course to a tight tailchasing spiral of less than four feet in diameter.

Design

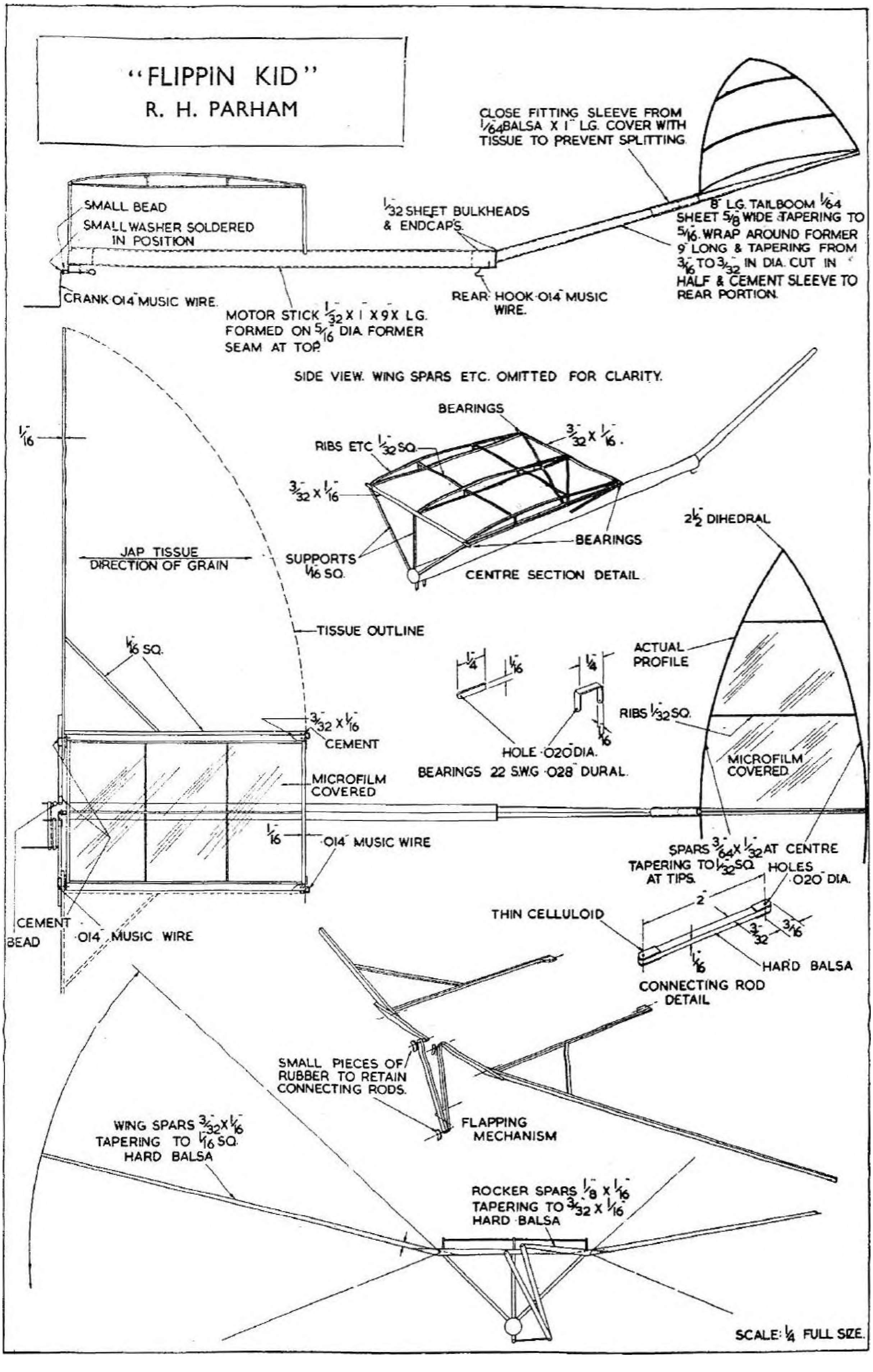
Simplicity is the keynote, and the basic layout follows the successful American school of thought headed by Parnell Schoenky. The wingflapping mechanism consists of a simple crankshaft operating wing spar extensions through connecting rods. As the wings flap, the covering assumes its own natural section and propels the machine forward in a similar manner to a boat when sculled from the stern with a single oar. Lift and climbing flight is attributed to the use of the stabiliser set at a negative incidence of between 15 and 20 degrees. This gives the model the necessary "nose up" attitude to present a positive angle of attack to the mainplanes at all positions of flap. A unique feature of the design is the use of the dihedralled tailplane. This is mounted on its own sleeve and can be rotated axially about the tailboom. When tilted a few degrees anticlockwise looking towards the nose, the model will circle to the right, and vice versa. This appears to resemble the form of control used by birds when turning in flight.

Construction

This follows normal indoor practice and little comment is necessary. Use firm straight grained wood for all spars and quarter-grained stock for the motor stick and wing ribs. Microfilm covering is added to the centre section after it is mounted on the motor stick and to the tailplane before cracking the spars and cementing to the correct dihedral. The wing panels are easily cut from jap tissue using a sharp razor blade and a card template. Holes in bearings, and connecting rods, are best made by using a .020-in. dia. twist drill held in a pin chuck which is rotated between the fingers. In the final assembly, check for free operation of all moving parts and only lightly cement the tailboom in position.

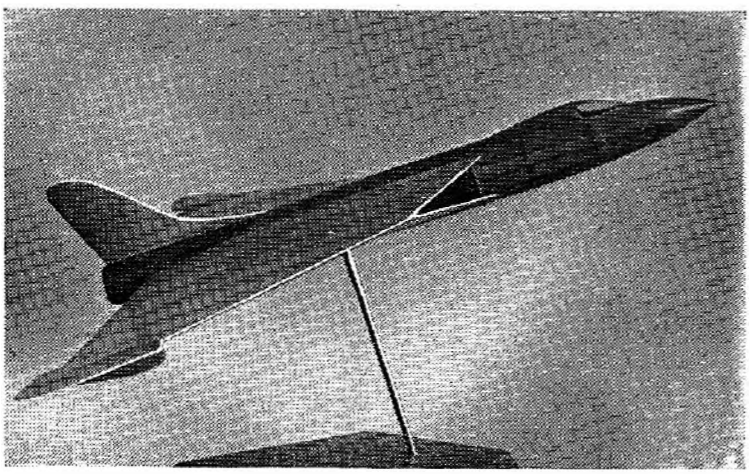
Trimming

As no torque problems are involved, this is very easy. With the tailplane in the neutral position, string a loop of lubricated rubber between the hooks, apply about fifty turns via the crank and carefully launch in a slight "nose up" attitude allowing the model to fly from the hands. A slow undulating powered glide should result, but if this is not so, *e.g.*, the glide is steep, increase the negative incidence of the tailplane by recementing the boom. Having settled the glide add more turns and the machine should begin to climb. When this condition is obtained, firmly cement the tailboom in position. The time has now arrived to experiment with tilting the tailplane, to produce circling flights. For duration attempts, the motor can be stretch-wound from the rear in the usual indoor manner. Performance will tend to fall off after a large number of flights due to excessive stretch of the tissue wing panels. They should therefore be replaced when necessary.


"FLIPPIN KID"
R. H. PARHAM
CLOSE FITTING SLEEVE FROM 1/64 BALSA X 1" LG. COVER WITH TISSUE TO PREVENT SPLITTING.
SMALL BEAD
SMALL WASHER SOLDERED IN POSITION
1/32 SHEET BULKHEADS & ENDCAPS.
8" LG. TAILBOOM 1/64 SHEET 5/8 WIDE TAPERING TO 5/16. WRAP AROUND FORMER 9" LONG & TAPERING FROM 3/16 TO 3/32 IN DIA. CUT IN HALF & CEMENT SLEEVE TO REAR PORTION.
CRANK ·014" MUSIC WIRE.
REAR HOOK ·014" MUSIC WIRE.
MOTOR STICK 1/32" X 1" X 9" X LG. FORMED ON 5/16 DIA FORMER SEAM AT TOP.
SIDE VIEW. WING SPARS ETC. OMITTED FOR CLARITY.
BEARINGS
RIBS ETC 1/32 SQ.
3/32" x 1/16".
3/32" x 1/16"
SUPPORTS 1/16 SQ.
BEARINGS
CENTRE SECTION DETAIL
2½" DIHEDRAL
1/16"
JAP TISSUE DIRECTION OF GRAIN
TISSUE OUTLINE
1/16 SQ.
ACTUAL PROFILE
1/4"
1/16"
1/4"
1/16"
RIBS 1/32 SQ.
3/32" x 1/16
CEMENT
HOLE ·020" DIA.
BEARINGS 22 S.W.G. ·028" DURAL.
MICROFILM COVERED
MICROFILM COVERED
1/16"
·014" MUSIC WIRE
SPARS 3/64" X 1/32" AT CENTRE TAPERING TO 1/32 SQ. AT TIPS.
HOLES ·020" DIA.
2"
THIN CELLULOID
3/32"
3/16"
1/16"
HARD BALSA
CONNECTING ROD DETAIL
CEMENT
BEAD
·014" MUSIC WIRE
SMALL PIECES OF RUBBER TO RETAIN CONNECTING RODS.
FLAPPING MECHANISM
WING SPARS 3/32" x 1/16" TAPERING TO 1/16 SQ. HARD BALSA
ROCKER SPARS 1/8" x 1/16" TAPERING TO 3/32" x 1/16" HARD BALSA
SCALE: 1/4 FULL SIZE.

THE DESIGN AND DEVELOPMENT OF DELTA MODELS

By J. W. FOZARD



Free flight delta by R. J. Balmer. Developed from the delta shown on page 157 of the March, 1953 "Aeromodeller." Jetmaster motor. Wing area 100 sq. in. L.E. sweep 55. Weight 3 oz. Note the all-moving wingtip trimming controls; with "hot" fuel, this model will fly at speeds above 40 m.p.h.

SINCE the publication, in the February and March, 1953, issues of the *Aeromodeller*, of the first-ever articles on the application of the delta planform to model aircraft, many examples of the type have been built and flown, both in this country and abroad. Note the use of the word "flown"; because, in spite of ill-considered criticism and hasty opinion from certain quarters, there can be no doubt that delta-winged models *do* fly. Whilst they are not to be recommended to the novice as his Very First Model, the fact that so many delta models have lately appeared in popular low-price kit form is surely enough to convince even the most sceptical aeromodeller of their genuineness as flying machines—assuming, of course, that he wishes to be convinced.

In the course of the previous articles mentioned above, the general considerations leading to the adoption of the delta planform in full-scale aeronautics were dealt with, and a broad survey made of the possibilities of applying the delta wing to model aircraft. It is the purpose of this article to enlarge on some of the ideas presented in the previous series; to clarify and to modify some of the data therein given as now seems necessary in the light of more recent information, and to present certain new ideas that have occurred during the intervening period.

One of the most difficult problems to be solved by the model designer is that of finding the correct centre of gravity position of his project. With conventional models of normal aspect ratio, it is hardly possible to go far wrong with the c.g. position. The wing chord is usually no more than about 10 inches (often much less) and if the wing is unswept, we know by previous experience that the c.g. should lie between about 25% and 50% of the root chord. In other words, we know to within half an inch where the c.g. *ought* to be. However, when we turn to the delta wing the large root chord and the high taper both combine to frighten and confuse any would-be c.g. position-er who has no previous experience of delta planforms.

In an attempt to solve this problem, Fig. 1 presents a series of design charts for tailless deltas. By the use of these charts it is possible to arrive at an "ideal" c.g. position for almost any delta planform, provided that the leading and trailing edges are composed of straight lines. Unfortunately it is not possible to give design charts for a completely generalised planform including curved leading and trailing

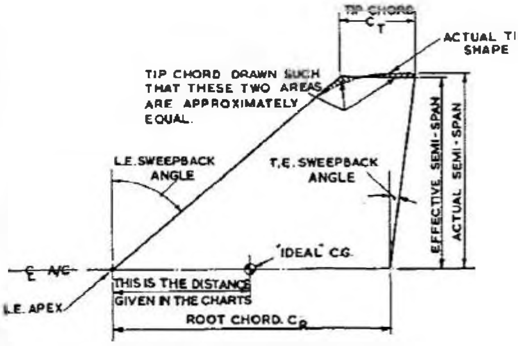


FIG. 1.(E) GEOMETRY OF WING.

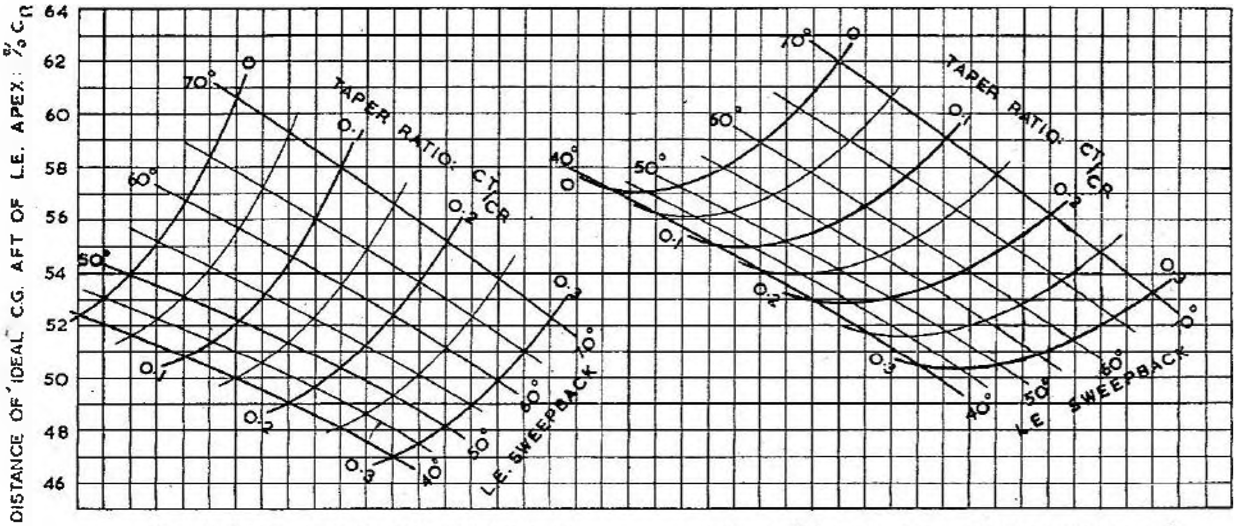


FIG. 1.(A) FOR T.E. SWEEPBACK = 0

FIG. 1.(B) FOR T.E. SWEEPBACK = 5°

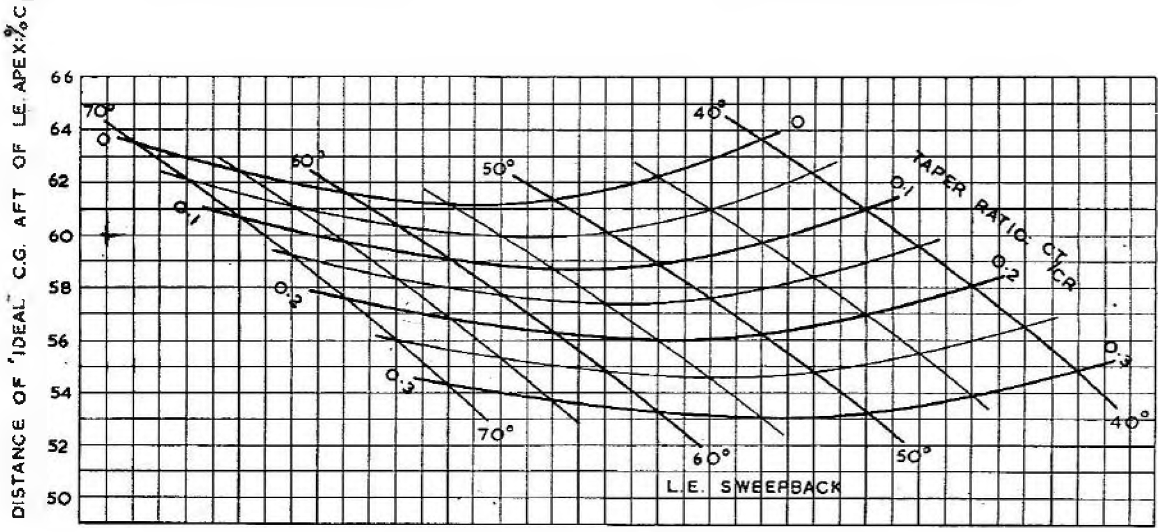


FIG. 1.(C) FOR T.E. SWEEPBACK – 10°

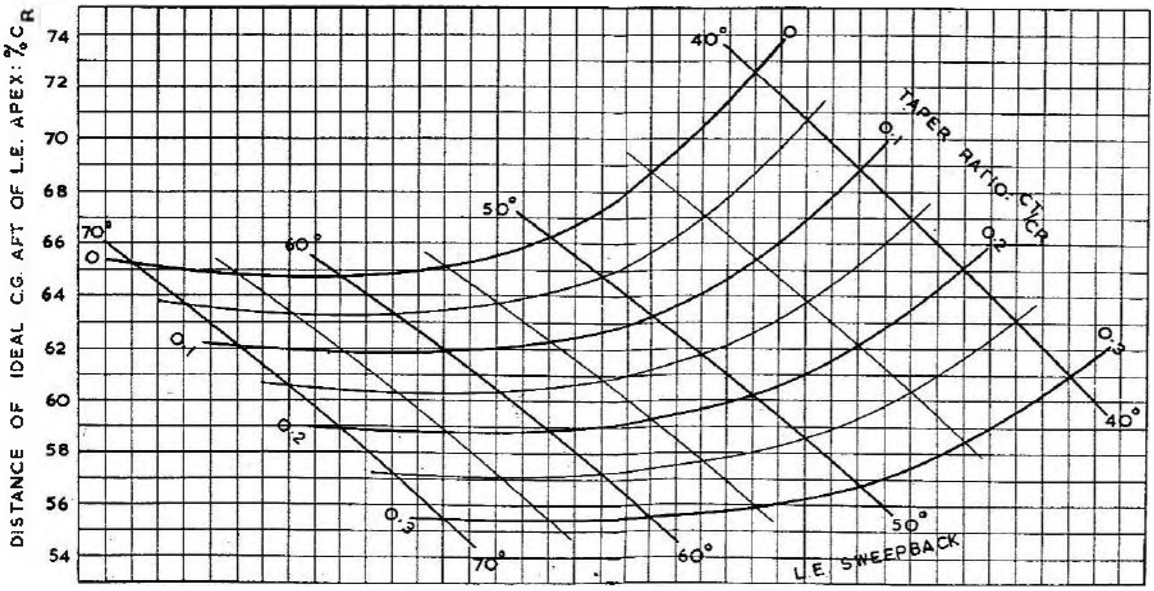
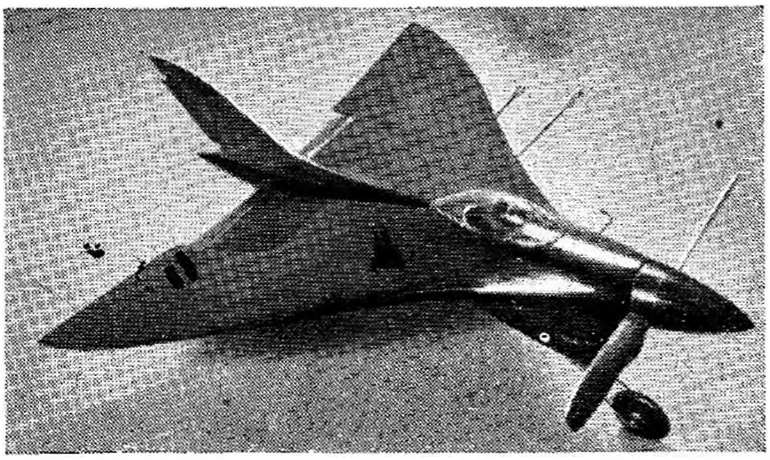


FIG. 1.(D) FOR T.E. SWEEPBACK = 15°

FIG. 1. DESIGN CHARTS FOR TAILLESS DELTAS



Class A team racer with E.D. 2.46 c.c. motor. This model is based on a design given in the second part of the author's article on deltas published in the March, 1953, "Aeromodeller." Built by Sgt. Rose of the R.A.F. Stradishall M.A.C., its speed is over 70 m.p.h. The bicycle undercarriage has not been found satisfactory.

edges; but "double deltas" (like the planform of the full-scale Swedish S.A.A.B. 210 *Draken*) and even crescent wing planforms can be handled by these design charts using the principle of superposition—*i.e.*, by adding and subtracting items of the planform as in Example 2 on page 113.

The effect of the actual tip shape on the position of the ideal c.g. can usually be neglected provided that the area lost by the curved tip shape is small compared with the total wing area. The tip chord used for the purpose of calculating the ideal c.g. is a straight chord chosen such that the tip areas "balance" about the tip chord, as shown in Fig. 1(*e*). The effect of the fuselage is to move the actual c.g. forward from the ideal c.g. position.

It is emphasised that the ideal c.g. position as given by the design charts of Fig. 1 is to be regarded as the maximum allowable rearward position. In general, to be absolutely safe against longitudinal instability (especially when dealing with C/L models where a large static margin is essential so as to avoid "overcontrolling") it is desirable to place the actual c.g. somewhat ahead of the ideal c.g. position as found by the charts. It is impossible to quote a universally applicable value for this practical c.g. shift from the ideal to the actual c.g., but the following figures will serve as a general guide:

TAILLESS DELTAS—PRACTICAL C.G. SHIFT
Distance of Actual C.G. Forward of Ideal C.G.

Free Flight Models	
	2% C_R for short deep narrow nose fuselage.
	3% C_R for short wide shallow nose fuselage.
	4% C_R for long deep narrow nose fuselage.
	5% C_R for long shallow wide nose fuselage.
Control Line Models	
Stunt and Team Racers	6% C_R for short nose fuselage. 8% C_R for long nose fuselage.
Speed	10% C_R suggested as an absolute minimum.

EXAMPLES OF THE USE OF THE TAILLESS DELTA DESIGN CHARTS

EXAMPLE 1. *It is required to find the actual c.g. position of the free flight model having the delta planform shown in Fig.* 2(*a*).

From the dimensions given in Fig. 2(*a*) we can write down the following necessary geometric particulars:

$$\text{Leading Edge Sweepback} = 56^\circ$$
$$\text{Trailing Edge Sweepback} = 4^\circ$$
$$\text{Taper Ratio} = \frac{C_T}{C_R} = \frac{5.10}{22.0} = 0.232$$

Since the design charts do not give a specific graph for deltas with 4° T.E. Sweepback, it is necessary to find the ideal c.g. position for the wing with L.E. Sweep=56°, Taper Ratio=0.232, but with T.E. Sweep =0, 5° and 10°.

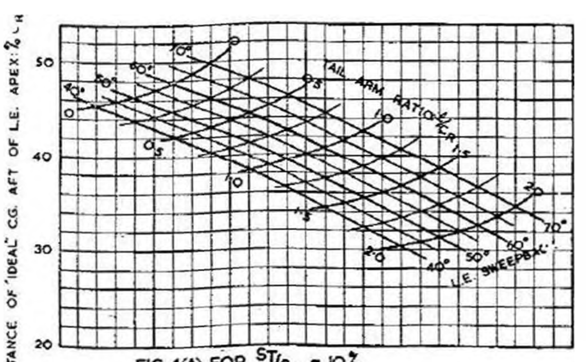


FIG. 4(A) FOR S_T/S_W - 10%

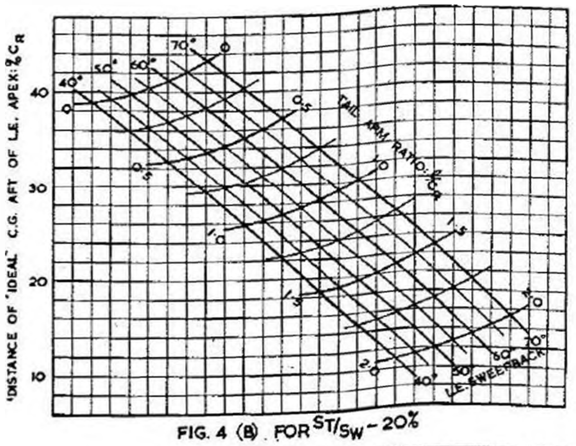


FIG. 4 (B) FOR S_T/S_W - 20%

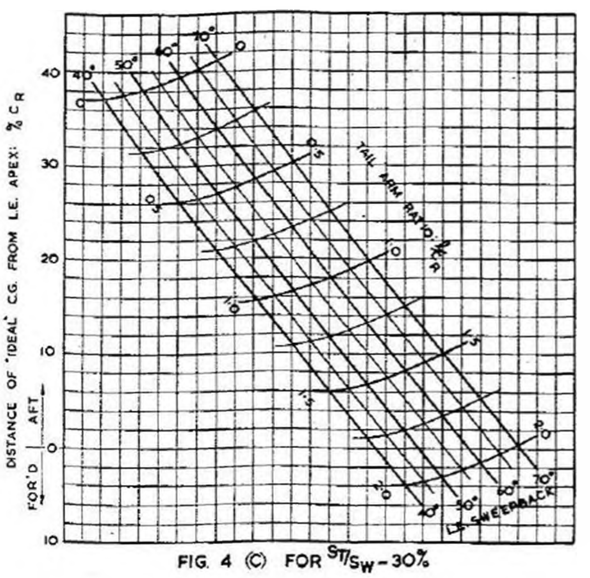


FIG. 4 (C) FOR S_T/S_W - 30%

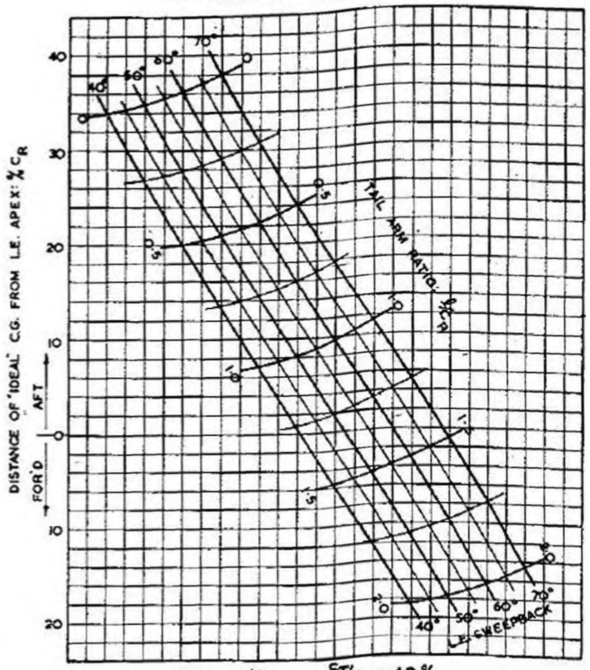


FIG. 4 (D) FOR S_T/S_W = 40%

FIG. 4. DESIGN CHARTS FOR CANARD DELTAS

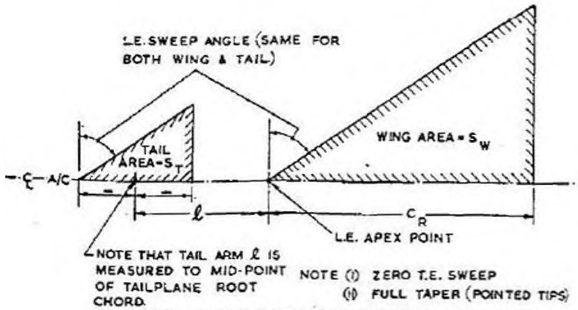


FIG. 4 (E) GEOMETRY OF CANARD LAY-OUT

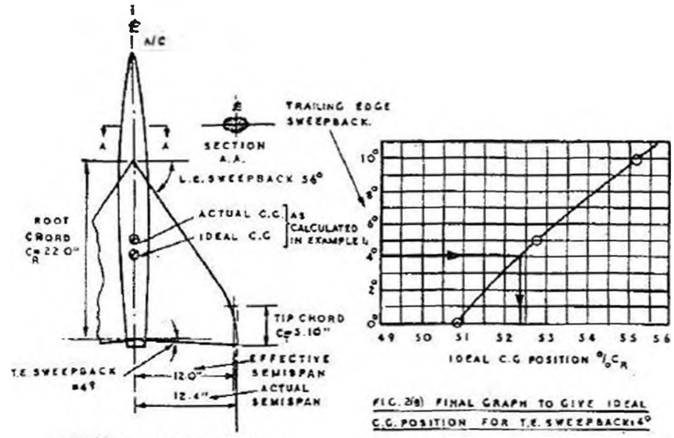


FIG. 2(A) GEOMETRIC DETAILS

FIG. 2(B) FINAL GRAPH TO GIVE IDEAL C.G. POSITION FOR T.E. SWEEPBACK = 4°

FIG. 2 USE OF TAILLESS DELTA DESIGN CHARTS. EXAMPLE 1. (SEE TEXT)

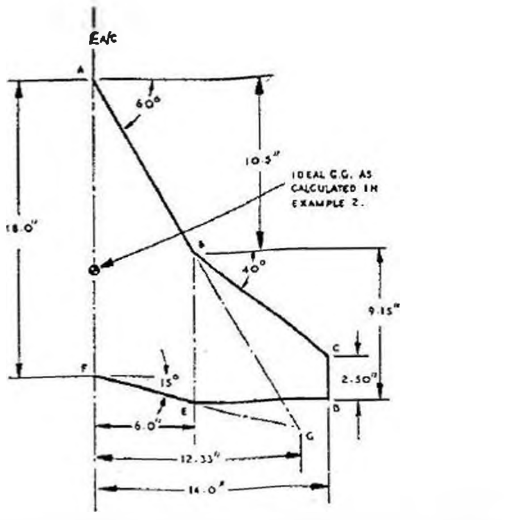
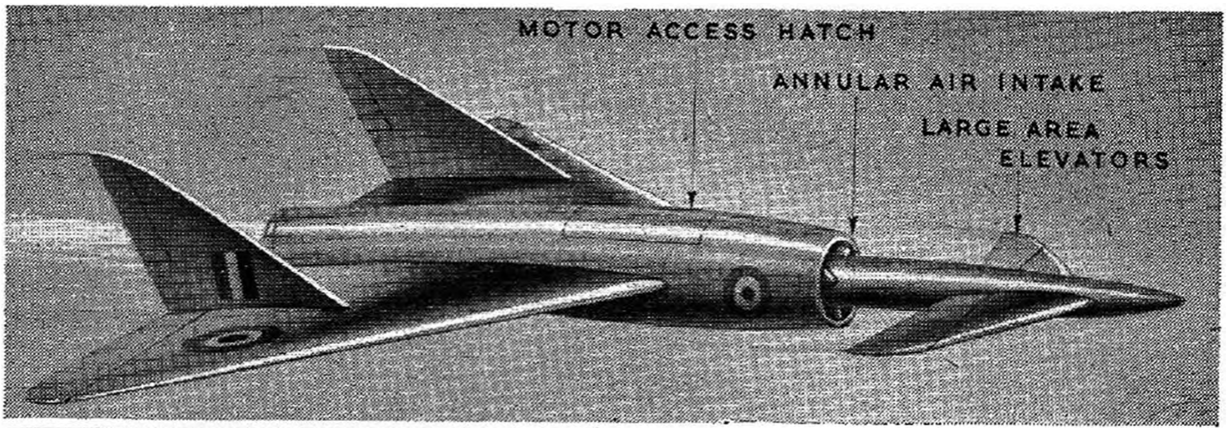


FIG. 3 USE OF TAILLESS DELTA DESIGN CHARTS. EXAMPLE 2 (SEE TEXT)



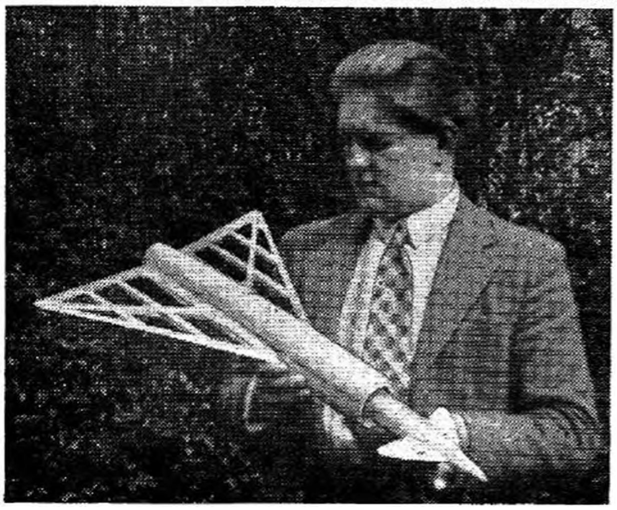


Fig. 6 Free Flight Canard Delta by the Author. Photo shows author with model at a late stage in the construction. Sketch gives some indication of the appearance of completed aircraft.

Span: 19 in. Overall length: 26 in. Wing area: 125 sq. in. "Jetmaster" motor. 8% tail area. Weight: over 7 oz.

We then plot on a separate graph the values thus obtained, and from this graph we can read off the ideal c.g. position corresponding to a T.E. Sweep=4°.

Now from Fig. 1(*a*) (T.E. Sweep=0) for the above values of L.E. Sweep and Taper Ratio, by interpolating between the marked lines the ideal c.g. is found to be at 50.8% C_R. Similarly from Fig. 1(*b*) (T.E. Sweep=5°) ideal c.g. is at 52.8% C_R: and from Fig. 1(*c*) (T.E.Sweep=10°) ideal c.g. is at 55.2% C_R.

These values are plotted on a separate graph which is shown in Fig. 2(*b*), and a smooth curve drawn through the three plotted points. From this graph we can read off the ideal c.g. position for a T.E. Sweepback of 4°, and this is found to be at 52.4% C_R.

It is now necessary to apply a correction to this position to allow for the effect of the fuselage. Fig. 2(*a*) shows the fuselage to be fairly long with a wide shallow cross-section; we shall therefore make a practical c.g. shift of 4.5% C_R

$$\textit{i.e.}\ \text{Actual c.g. position} = 52.4 - 4.5 = 47.9\%\ C_R$$

$$\therefore\ \textit{The actual c.g. is}\ \frac{47.9 \times 22}{100} = 10.5\ \textit{inches aft of the L.E. Apex}$$

EXAMPLE 2. *It is required to find the ideal c.g. position and the area of the wing shown in Fig.* 3.

Although more complicated, the method used in calculating the ideal c.g position of this wing is fundamentally the same as the method used in Example 1. The design charts of Fig. 1 can be used provided the wing is reduced to its basic components. The fundamental rule to observe when breaking any planform down into its basic components is that each component must be a wing in its own right, with its root and tip chords parallel to the aircraft centre-line. Thus the wing shown in Fig. 3 can be broken down into three basic components which combine to give the complete wing as follows:

(Wing ABCDEF) = (Triangle AGF) — (Triangle BGE) + (Trapezium BCDE).

We proceed first of all to find the area and the ideal c.g. position of each of these three components.

Triangle AGF

Leading Edge Sweepback = 60°
Trailing Edge Sweepback = 15°

$$\text{Taper Ratio} = \frac{C_T}{C_R} = \frac{0}{18} = 0 \text{ (Fully pointed tip)}$$

With this data, using Fig. 1(*d*) we find that the ideal c.g. of this component is at 64.7% of its root chord, which is the chord AF.

$$\therefore \text{ Ideal c.g. of AGF is } 64.7 \times \frac{18}{100} = 11.55 \text{ in. aft of Point A}$$

$$\text{and area of AGF} = 12.33 \times \frac{18}{2} = 111 \text{ sq. in.}$$

Triangle BGE

L.E. Sweepback = 60°
T.E. Sweepback = 15°
Taper Ratio = 0 (Fully pointed tip)

From Fig. 1(*d*) we find the ideal c.g. of this component is at 64.7% of its root chord, which is the chord BE.

$$\therefore \text{ Ideal c.g. of BGE is } 64.7 \times \frac{9.15}{2} + 10.5 = 5.92 + 10.5 = 16.42 \text{ inches}$$

aft of point A. Area of BGE $= 6.33 \times \frac{9.15}{2} = 29$ sq. in.

Trapezium BCDE

L.E. Sweepback = 40°
T.E. Sweepback = 0

$$\text{Taper Ratio} = \frac{C_T}{C_R} = \frac{2.50}{9.15} = 0.274$$

From Fig. 1(*a*) we find the ideal c.g. of this component is at 47.6% of its root chord, which is the chord BE

$$\therefore \text{ Ideal c.g. of BCDE is } \frac{47.6 \times 9.15}{100} + 10.5 = 14.85 \text{ in. aft of the point A}$$

$$\text{and the area of BCDE} = \frac{(9.15 + 2.50)}{2} — 8 = 46.5 \text{ sq. in.}$$

We now know the area of each component and the distance of its ideal c.g. aft of the datum point A. The overall ideal c.g. of the complete wing ABCDEF is given by the expression:

Distance of overall ideal c.g. aft of datum =
[*Algebraic sum of* (*area of each component multiplied by the distance of ideal c.g. of component aft of datum*)] ÷ [*Algebraic sum of all the component areas*].

$$\therefore \quad \text{Ideal c.g. of ABCDEF} = \frac{(111 \times 11.55) - (29 \times 16.42) + (46.5 \times 14.85)}{(111 - 29 + 46.5)}$$

$$= \frac{1271 - 475 + 690}{128.5} = \frac{1486}{128.5}$$

$$= 11.56 \text{ inches aft of datum point A}$$

The wing shown in Fig. 3 has, therefore, a total area of 257 sq. in. and its ideal c.g. is located on the aircraft centre-line at a distance of 11.6 *inches aft of the leading edge apex.*

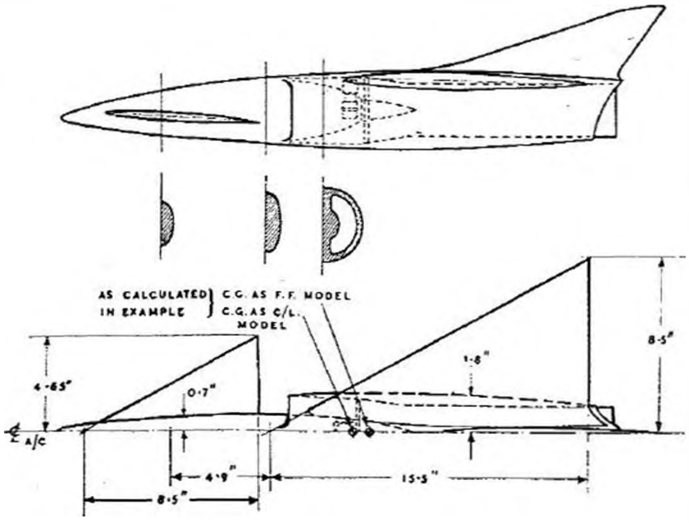


FIG. 5. EXAMPLE OF USE OF CANARD DELTA DESIGN CHARTS

From the above examples, particularly Example 2, it is obvious that the design charts of Fig. 1 are by no means restricted to deltas, but cover a wide range of planforms including crescent wings and swept wings. The only proviso that is made is that the geometry of each component of the wing under consideration (be it swept, delta, or crescent) must necessarily lie within the range covered by the charts. This range is, broadly:

Leading Edge Sweepback:	35° to 75°
Trailing Edge Sweep:	5° Sweepforward to 20° Sweepback
Taper Ratio:	0 to 0.35

The Canard Delta

Amongst the widespread members of the aeromodelling community there are always to be found those few individuals who deride any new shape of model that comes out, regardless of the special attributes it may possess. The same type of individual, it may be added, is also to be found in the sphere of full-scale aircraft design. The sceptical aeromodeller and his full-scale counter-part are easily picked out from the group which inevitably congregates round the "new shape" when it makes its first public appearance. They can be identified by an agonised expression, which combines incredulity and superior scorn to a remarkable degree, and by their universal *cri de coeur*—"It'll NEVER fly . . . !"

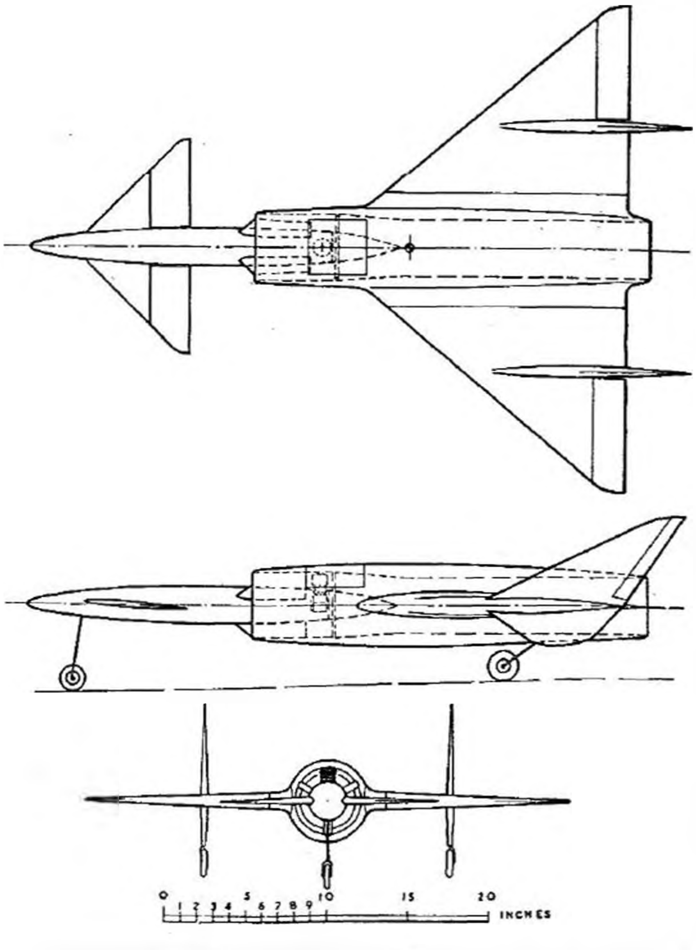
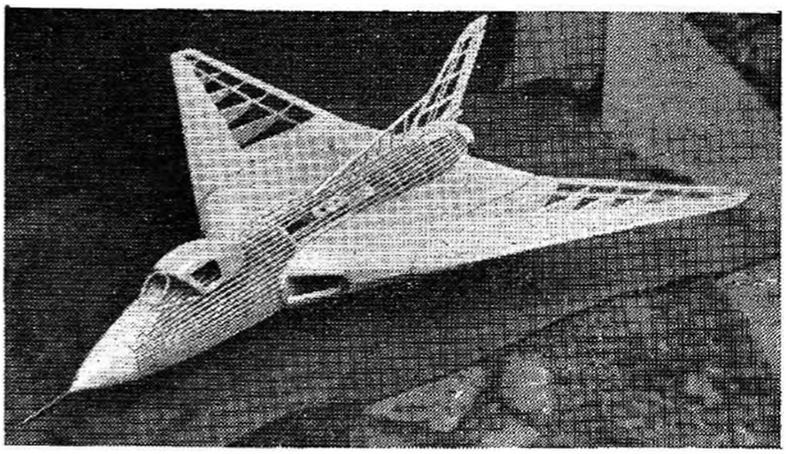


FIG. 7. FREE FLIGHT CANARD DELTA. E.D. 1·5 C.C. MOTOR DRIVING DUCTED FAN

SPAN	30 INS	TAILPLANE AREA	14 % S/W
LENGTH O/A	40·5 INS	TAILPLANE ARM	0·6 C/R
WING AREA	305 SQ. INS	WEIGHT	12–15 OZS.
L.E. SWEEP	50°		

It is to this hard core of Philistines that the canard delta is dedicated.

It may legitimately be asked at this juncture, "What is the point of the canard delta?" If a technical answer is required it may be stated that the addition of a leading tailplane gives considerably greater damping in pitch compared with a similar tailless delta. The leading tail also is a much more powerful



Radio controlled scale Avro 707 B delta by G. Elliott of Bristol. Equipment is E.C.C. 951 and the flying weight is 3¼ lb. The model is propelled by a pusher airscrew at the rear, driven by an E.D. 2.46 c.c. diesel. Note the reflexed wing section, which is a departure from scale. Dihedral should be used very warily on delta models as it can lead to very bad spiral instability. From Mr. Elliott's report on the initial flight trials, it would appear that this model suffers from spiral instability to a mild degree.

trimming device than the normal T.E. flaps of a plain delta wing. ·On the other hand, it might be stated, with equal accuracy, that the sheer novelty of the canard delta as a new type of model combined with its very "modern" look is a sufficient *raison d'etre.*

Before going on to discuss this *rara avis* in detail it will be perhaps advisable to obtain a clear conception of the fundamental factors which govern the longitudinal stability of an aircraft. On any aircraft (model or otherwise) there is a point within the aircraft which is termed the *neutral point.* Strictly defined it is a point such that if the aircraft is freely pivoted about a lateral axis through the neutral point the rate of change of pitching moment with respect to lift is zero. However, for our purposes we can more loosely define it as the point of action of the increment in lift which results from an increment in incidence.

The fundamental act concerning the neutral point is that if the c.g. of the aircraft is forward of the neutral point the aircraft will, in general, be longitudinally stable. Conversely, if the c.g. is aft of the neutral point the aircraft will be longitudinally unstable. This can be deduced from the above definition of the neutral point, for if we consider an aircraft to suffer a small increase of incidence (say from a gust) relative to its original steady flight incidence; then if the increment of lift resulting from this change in incidence acts *behind* the c.g. the model will tend to return to its original steady flight incidence and will thus, by definition, be stable.

For a conventional model with a straight unswept wing, the neutral point of the wing-body combination is normally at about the quarter-chord position.

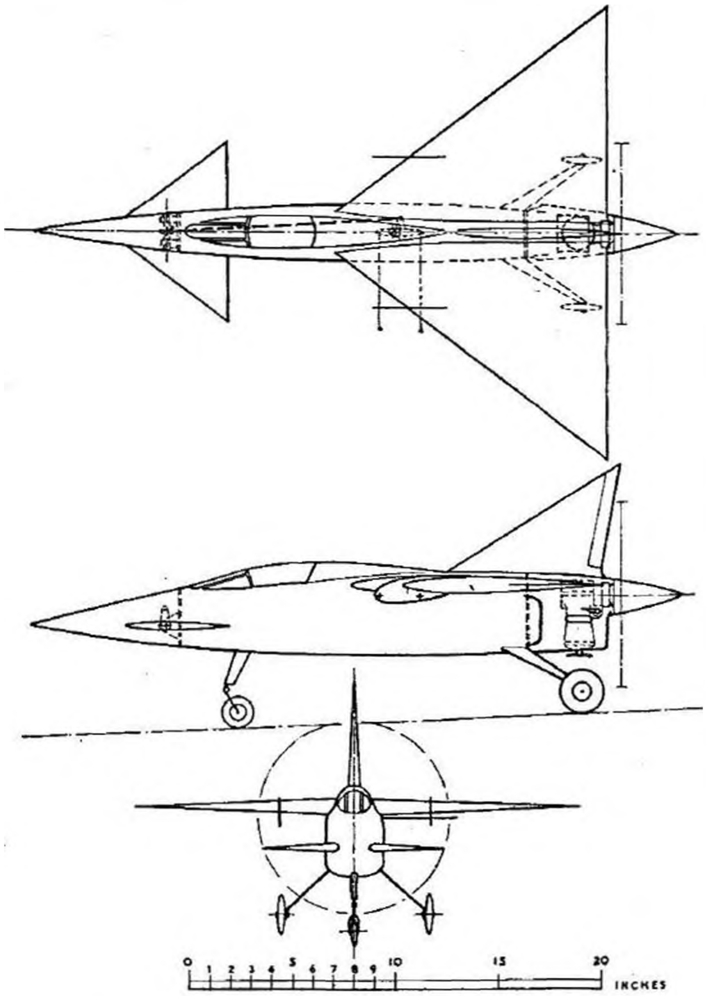


FIG. 8. CANARD DELTA TO CLASS B. T/R. SPEC. N. FROG '500' MOTOR

WING AREA : 160 SQ. INS
SPAN : 22 INS
LENGTH O/A : 31·8 INS
L.E. SWEEP : 53°
TAILPLANE AREA : 16% WING AREA
TAILPLANE ARM : 0·47 C/R
TAILPLANE MOVEMENT : 12° UP, 6° DOWN.

By adding a tailplane at the rear of the fuselage the neutral point is shifted back so that for the complete model it may be anywhere between 60% and 150% (*i.e.*, behind the T.E.) of the chord, depending on the tailplane area and the arm on which it is acting. Thus on the conventional model where the c.g. is usually located between 25% and 50% of the chord, it is obviously in front of the neutral point and the aircraft will be longitudinally stable.

It is worth noting here that the degree of longitudinal stability possessed by an aircraft is directly proportional to the distance of the c.g. ahead of the neutral point. This distance is known as the *static margin*. When the static margin is zero (that is, when the c.g. and the neutral point coincide) the aircraft will have neutral longitudinal stability—hence the term neutral point. It should also be noted that one of the most important effects of high flight speeds is a forward shift in the position of the neutral point with increase of speed. This reduces the static margin and in extreme cases will shift the neutral point in front of the c.g. which renders the model longitudinally unstable. The remedy in such cases is to start off with a bigger static margin, *i.e.*, move the c.g. forward —and build a stiffer airframe on the next model of the same type. Prevention is better than a cure, and the primary cause of this high-speed forward shift of the neutral point lies in a too-flexible structure.

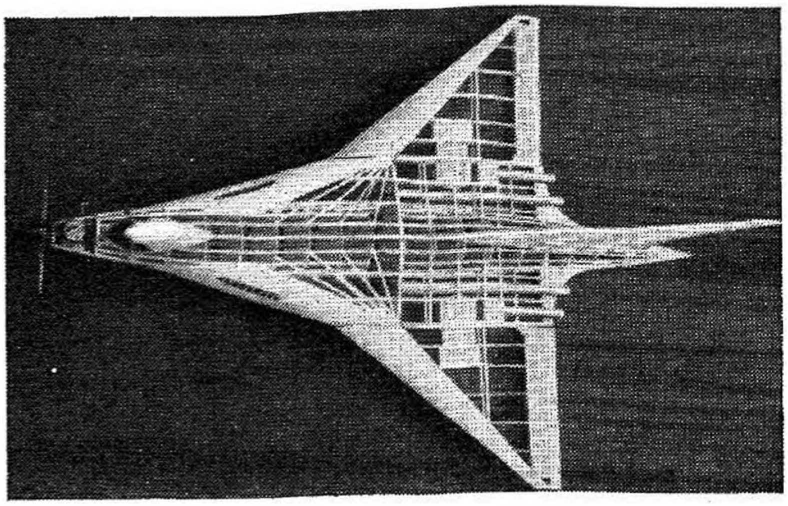
However, to return to the canard. The great difficulty with this type in the past has always been to obtain a reliable estimate of the position of the neutral point. This difficulty arises because when a tail is added forward of the wing, the neutral point of the resulting complete aircraft is forward of the neutral point of the original wing-body combination. In the past, the solution to this problem has usually been to place the c.g. by sheer guess *well* forward and subsequently to find out by flight test just how far back it can be allowed to move before loss of longitudinal stability is encountered. This process has inevitably led to much balsa being broken, and has generally caused canard models to be regarded with a somewhat jaundiced eye.

By the use of delta planforms, however, the correct positioning of the c.g. of a canard model is greatly facilitated. In order to make this possible it is specified that the wing and the leading tailplane are of the same geometric planform.

With this proviso then, Fig. 4 presents a series of design charts for canard deltas which will yield for a chosen layout an "ideal" c.g. position, in a similar manner to the tailless delta design charts of Fig. 1. The canard delta design charts of Fig. 4 are drawn for the type of delta planform shown in Fig. 4(*e*). That is, the planform must be a "pure" delta with fully pointed tips and zero trailing edge sweep.

With these restrictions the charts present, for four different values of the ratio (Tailplane Area) ÷ (Wing Area), the ideal c.g. position as a function of the L.E. sweepback angle and the tail arm. They cover the full range of these parameters likely to be met with in practice.

As for the tailless delta design charts, the ideal c.g. position for a canard delta given by the design charts of Fig. 4 is to be regarded as a maximum allowable rearward position. In practice a forward shift of the actual c.g. relative to the ideal c.g. is found necessary. This practical shift is largely determined by the fuselage size and cross-section, and by the relative proportions of wing area and tail area covered by the fuselage. Once again it must be stated that no universally applicable values can be quoted for the magnitude of this practical c.g. shift, but in the absence of any other data the following figures will serve as a guide. Should there be any doubt as to the magnitude of the practical c.g.



Double delta by M. Shepherd of Epsom. This model is 54 in. long and with a span of 33 in., has a wing area of 396 sq. in. Wing loading achieves a record at some 22 oz./sq. ft. and the power is an E.D. 2.46 c.c. diesel in the extreme nose. On taxiing trials, the model became airborne at a speed of over 60 m.p.h.

shift in a particular case, the designer would be well advised always to err on the safe side by making the shift too large rather than too small.

Firstly, we define the ratios:

$$K_W = \frac{\text{Area of wing covered by fuselage}}{\text{Total wing area}}$$

$$K_T = \frac{\text{Area of tailplane covered by fuselage}}{\text{Total tailplane area}}$$

when $K_W = K_T$ the following values apply:

CANARD DELTAS : PRACTICAL C.G. SHIFT

Actual C.G. Forward of Ideal C.G.

Free Flight Models 3% C_R for short deep narrow nose fuselage
4% C_R for short shallow wide nose fuselage
6% C_R for long deep narrow nose fuselage
7% C_R for long shallow wide nose fuselage

When K_W is greater than K_T these values should be increased by up to about $1\frac{1}{2}\%$ C_R.

When K_W is less than K_T these values should be decreased by up to about 1% C_R.

Control Line Models

An increase in forward shift of about 5% C_R should be made over and above the shift found as above by treating the model as free flight.

EXAMPLE OF THE USE OF THE CANARD DELTA DESIGN CHARTS

It is required to find the c.g. position of the canard delta shown in Fig. 5 *when the layout is used* (a) *as a free flight model, and* (b) *as a control-line model.*

First of all, it is necessary to evaluate the required geometric particulars:

$$\text{Tangent of L.E. Sweepback angle} = \frac{15.5}{8.50} = 1.825$$

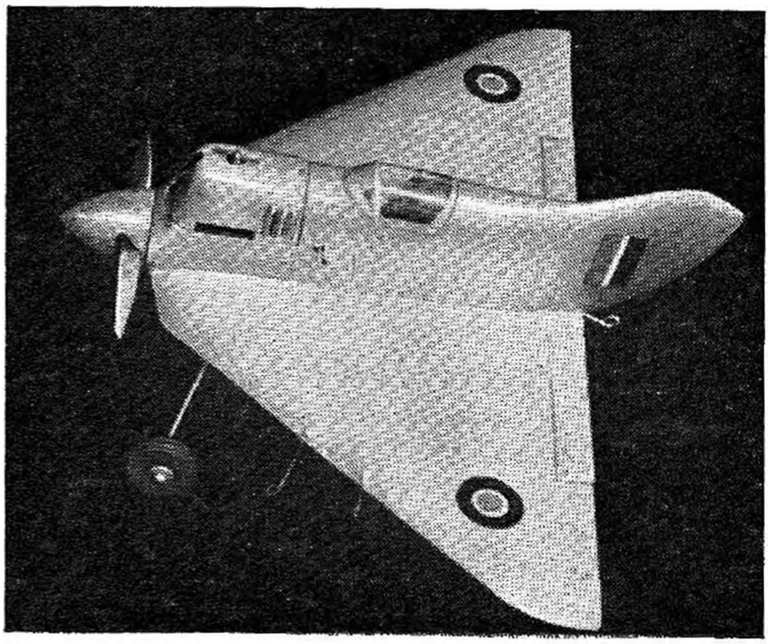
$$\therefore \quad \text{L.E. Sweepback} = 61.3^\circ$$

Wing Area S_W =

$$2 \times \frac{15.5 \times 8.5}{2} = 132 \text{ sq. ins.}$$

Tailplane Area S_T =

$$2 \times \frac{8.5 \times 4.65}{2} = 39.5 \text{ sq. ins}$$



A stubby Class A delta team racer flown at this year's South African Nationals by its designer, Jack Abbot. Power is provided by an E.D. 2.46 c.c. diesel and the speed is better than 70 m.p.h.

$$\therefore \text{ Tailplane area ratio } = \frac{S_T}{S_W} = \frac{39.5}{132} \times 100\% = 30.0\%$$

$$\text{Tail arm ratio } = \frac{l}{C_R} = \frac{4.90}{15.5} = 0.316$$

The canard delta design charts present a specific graph for 30% tailplane area ratio. Had the tailplane area been an odd percentage of the wing area, it would have been necessary to calculate the ideal c.g. position for two or three values of $\frac{S_T}{S_W}$ and to draw a separate graph in a similar manner to that shown in Example 1 on the tailless delta design charts.

Now from Fig. 4(*c*) $\left(\frac{S_T}{S_W} = 30\%\right)$ when $\frac{l}{C_R} = 0.316$ and L.E. Sweep = 61.3°, interpolating between the marked lines we find the ideal c.g. is 35.9% C_R aft of the L.E. Apex.

The fuselage sections given in Fig. 5 show the nose to be of medium length mostly of a deep narrow section.

∴ *Initial practical shift of c.g. will be taken as* 4% C_R.

$$\text{Also } K_W = \frac{1.8 \times 15.5}{132} \times 2 \qquad \text{and } K_T = \frac{0.7 \times 8.5}{39.5} \times 2$$

$$\textit{i.e. } K_W = 0.423 \qquad \textit{i.e. } K_T = 0.301$$

Since K_W is appreciably greater than K_T we shall make a further forward shift of 1% C_R on this score.

Total practical shift as free flight model = 4+1 = 5% C_R.

∴ *Actual c.g. as F.F. model* = 35.9—5 = 30.9% C_R
= 4.8 *inches aft of L.E. Apex.*

As a C/L model a further practical c.g. shift of some 5% C_R is necessary. Thus total practical c.g. shift as C/L model is 4+1+5 = 10% C_R.

∴ *Actual c.g. as C/L model* = 35.9—10 = 25.9% C_R
= 4.01 *inches aft of L.E. Apex.*

These two c.g. positions are shown on Fig. 5.

When dealing with canard models (whether of delta planform or not) it must always be remembered that in order to ensure a stable stall (*i.e.*, a stall in which the nose rises as speed is lost and then drops sharply in order to initiate the dive and subsequent recovery) the tail must lose its lift *before* the wing. This is the exact reverse of the stall sequence of a conventional model, where the tail is still lifting after the wing has stalled which ensures a nose-down pitching moment to initiate the recovery.

If, on a canard model, the tailplane does not stall before the wing, the nose of the model will continue to rise until a near-vertical attitude is achieved. Such a state of affairs is fatal as it will result in a tail-slide or a base-over-apex tumbling motion. To ensure that the tailplane does in fact stall before the wing on a canard layout, a large difference in rigging incidence between wing and tail is necessary. For a free-flight model a wing incidence of about 3° and a tailplane setting of between 7° and 9° are typical values, giving a minimum longitudinal dihedral of 4°.

It is also possible, with the same result in mind, to make use of the fact that the stalling incidence of a delta wing is much larger than that of an unswept wing. Starting from this basic fact it is possible to design a canard model in which the main wing is of delta planform and the leading tailplane is unswept with an aspect ratio of 6 or more. Such a layout will undoubtedly greatly facilitate a stable stall as the unswept tailplane will stall whilst the main delta wing is still lifting strongly. Unfortunately, by resorting to this artifice, one is deprived of the convenience offered by the design charts of Fig. 4 which (as stated above) apply only to canard models with geometrically similar delta wings and tailplanes.

Due to the fact that the c.g. must be placed well forward in order to ensure adequate longitudinal stability, there is normally a strong nose-down pitching moment on the canard model. Do not mistake this for instability, it is merely an out-of-balance effect which has to be trimmed out in order to make the model fly in a steady glide or climb. There are four available means of trimming out this nose-down pitching moment. These are: washout, reflexing the wing T.E., elevons on the main wing and elevators on the leading tail.

Washout is desirable because of its beneficial effects on lateral stability so we can expect a contribution from this source. However, the main contribution to the required nose-up pitching moment required for balance must come from elevons on the wing and elevators on the tail. Of these two devices, the author favours large-area stiff-hinged elevators for free flight models. Elevators on the leading tail are a good deal more effective, size for size, than elevons on the wing T.E. An all-moving tailplane (no elevators) is to be preferred for pitch control on canard delta control-line models.

Fig. 6 shows a free-flight canard delta which was designed, built and flown by the author during March and April, 1953. The photograph shows the model at a late stage in the construction; and as no subsequent picture is available, a sketch is given of the completed model. The aircraft was powered by a *Jetmaster* motor and the augmentor tube was built integral with the fuselage, the air intake being annular. The model made a number of flights before coming to a premature end in the jaws of an anti-aeromodelling mongrel dog. It (the model) was quite stable in flight, showing no tendency towards spiral instability (a very common failing of model deltas), but unfortunately the weight of over 7 oz. proved overmuch, even for an augmented *Jetmaster*.

After the loss of this model, preliminary drawings were made for a larger version with more power in the form of an E.D. 1.5 c.c. diesel driving a 4-in. ducted fan. Due to other commitments the model was never built, but a 3-view drawing of the project is shown in Fig. 7. This configuration is hereby made available to any enterprising aeromodeller whose spare time is less limited than that of the author. The layout is basically sound as was proved by the initial flight trials of its predecessor shown in Fig. 6. So if any reader wishes to achieve fame as the aeromodeller who built the world's first ducted-fan canard delta, this is his big chance!

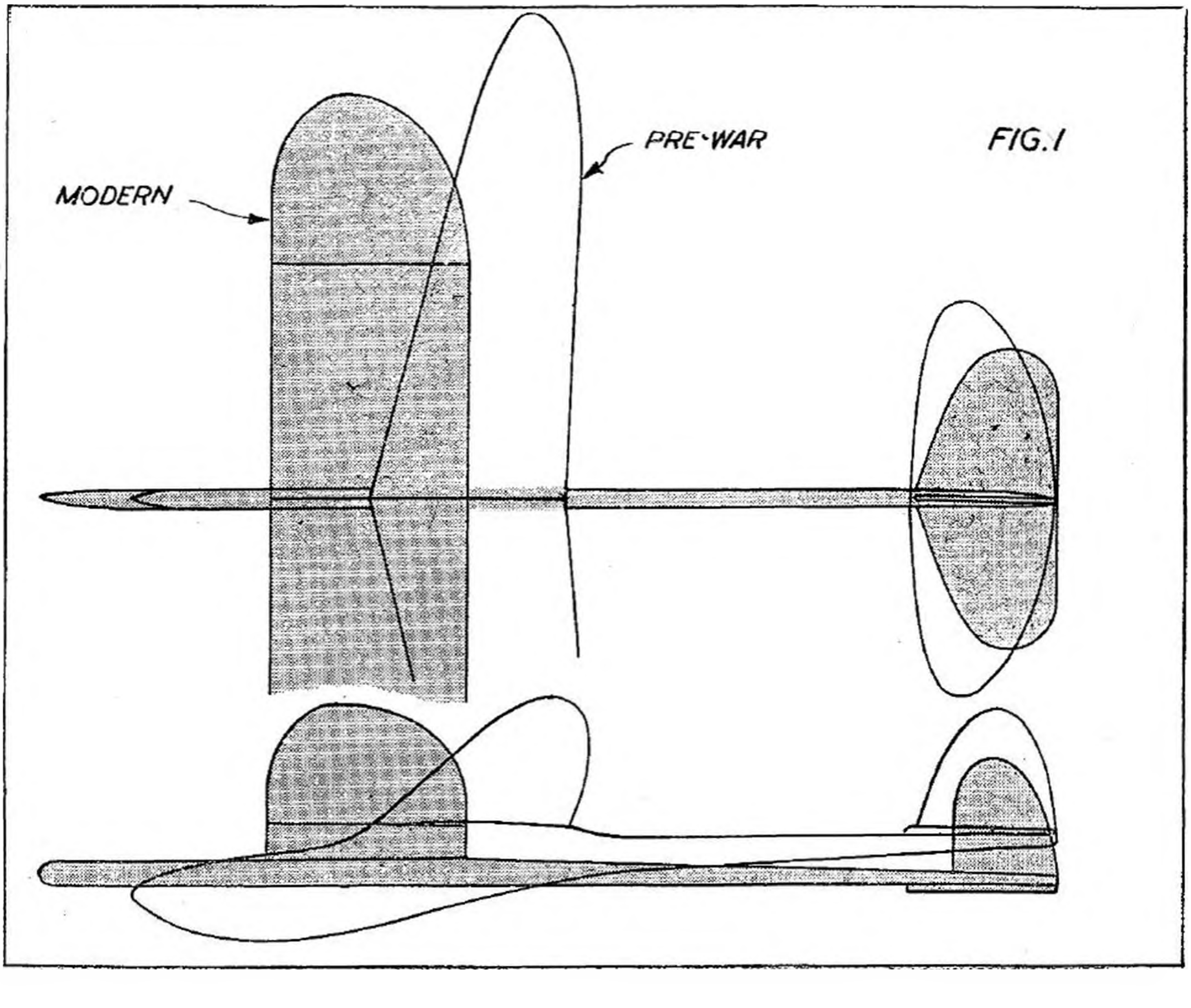
For the C/L fiend whose interest has by now (the author hopes) been aroused by the canard delta, Fig. 8 shows an example of the type to the Class B Team race rules. The pusher installation may be difficult to balance (ballast in the extreme nose will most likely be necessary with this model), but it should save a fair amount of drag. Because of the extra velocity, any object within the slipstream from a tractor airscrew will have up to 50% more drag with engine on than with engine off. Since so much of a team race model *is* within the slipstream if the airscrew is a tractor, the change to a pusher installation, which puts the whole aircraft out of the slipstream, should pay dividends in the form of extra m.p.h. Cooling air is admitted to the Frog "500" engine by twin side scoops on the rear fuselage, and this air is exhausted below the spinner.

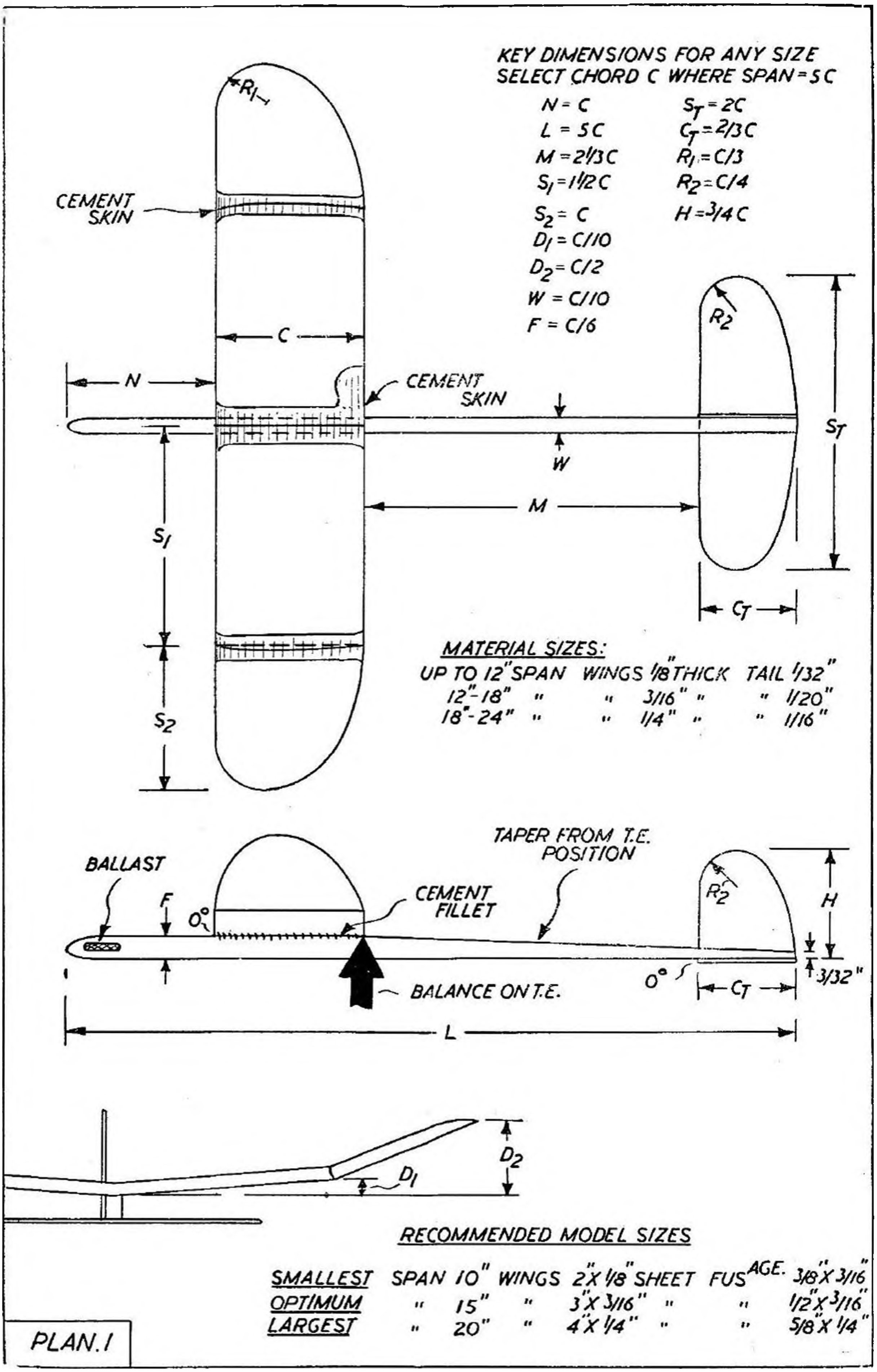
CHUCK GLIDERS

SIMPLEST, and about the most indestructible of all flying models, the chuck glider has a wide appeal to aeromodellers of all ages. It can be produced as just a toy, where merely a stable flight pattern will suffice with no regard to actual duration; or as a "contest" type capable of durations up to one minute or more in "still air" conditions, or make thermal flights just as long as those of any other type of duration model. Thermal flights with chuck gliders are not all that common, but they do quite frequently occur if the weather is favourable.

At first sight it may appear that there is very little in the design of a chuck glider. Yet one has only to compare the performance of a typical, low-priced commercial all-balsa glider with a really good "freelance" model to appreciate that there is a vast difference in the performances which can be achieved. The commercial model of this type is not necessarily a bad design. It is designed for commercial production, as a "toy," capable of a reasonable flight performance with actual duration a very minor consideration. To keep the price down handwork is eliminated as far as possible. Parts are saw cut or die cut, the wings from thin sheet, flat or slightly cambered, and, usually, designed to take apart for easy dissembly and assembly.

The freelance model, which ignores many of the eye-catching features of the commercial model, such as colour-printed wings, etc., may have accounted for many hours of painstaking work in carving and sanding the wings down to an exact aerofoil section, filling and smoothing all the other parts most carefully and polishing the completed model to a high gloss.





KEY DIMENSIONS FOR ANY SIZE
SELECT CHORD C WHERE SPAN = 5C

$N = C$
$L = 5C$
$M = 2\frac{1}{3}C$
$S_1 = 1\frac{1}{2}C$
$S_2 = C$
$D_1 = C/10$
$D_2 = C/2$
$W = C/10$
$F = C/6$
$S_T = 2C$
$C_T = 2/3C$
$R_1 = C/3$
$R_2 = C/4$
$H = 3/4C$

MATERIAL SIZES:

UP TO 12" SPAN	WINGS	1/8" THICK	TAIL 1/32"
12"-18"	"	3/16" "	" 1/20"
18"-24"	"	1/4" "	" 1/16"

RECOMMENDED MODEL SIZES

SMALLEST	SPAN 10"	WINGS 2" X 1/8" SHEET	FUSAGE.	3/8" X 3/16"
OPTIMUM	" 15"	" 3" X 3/16" "	"	1/2" X 3/16"
LARGEST	" 20"	" 4" X 1/4" "	"	5/8" X 1/4"

PLAN. I

Not every freelance chuck glider built demands this amount of time and attention. The basic model can, in fact, be built quite quickly and cheaply, which is one of its main attractions. For otherwise equivalent designs, however, as a general rule the better the finish the better the performance.

Even with such a basic model as the chuck glider there have been design developments over the years. In Fig. 1, for example, we have taken a typical leading design of the immediate pre-war period and superimposed a drawing of a modern "contest" design. The differences between the two are most marked. The modern design has straight, lower aspect ratio wings (*i.e.*, less span and greater chord for the same area), a longer tailplane moment arm, a polyhedral wing and a "stick" fuselage, as opposed to the "pod-and-boom" form of the earlier design. All these are changes which have come as the result of practical experience. The older design would still be a good model. The modern design, however, should have a higher overall *average* performance.

With a chuck glider designed for outdoor flying—and there are few halls available to modellers to permit satisfactory flying of indoor types—one of the biggest problems is getting enough height during the launch. Maximum height necessitates, for one thing, a really powerful throw. But a strong throw is no good if the model merely performs one large loop and finally pulls out just a few feet off the ground—or the wings fold up under the stress of launching.

Launching technique demands a spiral climb from the model after it has been thrown, or a substantially straight-up climb with the model rolling out at the top into its natural glide without losing any height by looping or stalling. Provided certain basic requirements are fulfilled by the model, practice and adjustment alone can produce the desired type of launch with almost any design layout, but some will be found much more controllable, and therefore more consistent, than others.

The basic requirements first. To stop the model trying to loop when launched with excess flying speed it is necessary to ensure that the wing will not generate excessive lift. This means, in effect, that during the launch the main climbing force should be the force of the launching heave, rather than wing lift. If the wing is lifting strongly it will also create drag, slow the model up rapidly and also tend to pull the model over into a loop.

Hence it is necessary to adopt a trim where the wing and tailplane are rigged at the same incidence, with the corresponding balance point somewhere back near the trailing edge—Fig. 2. It is even possible to get away with *slightly* more incidence on the tailplane (*i.e.*, slight *positive* incidence, with the wing at zero) to provide a nose-down force during launching. Then, as the model slows down and eventually resumes its normal glide attitude, downwash from the wings provides the necessary longitudinal dihedral for stability. It is very easy to overdo differential rigging of this type,however, as the further aft the balance point on any model the more critical is the trim.

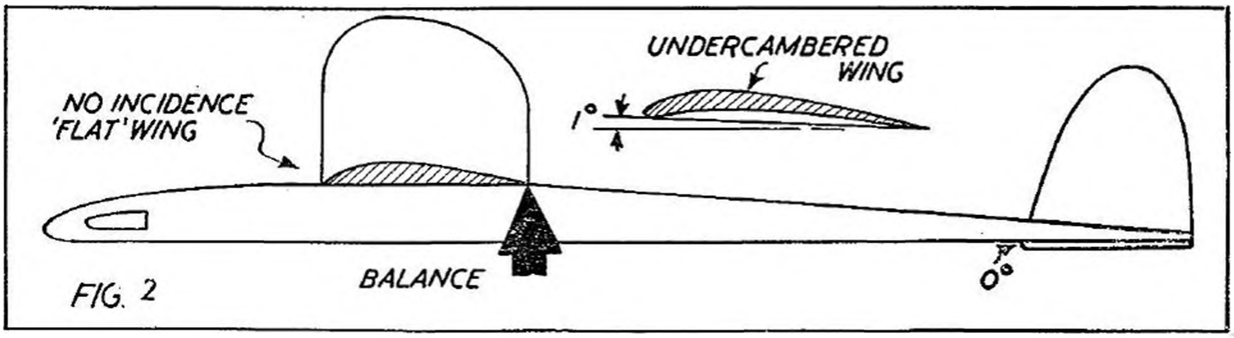


FIG. 2

Other features to avoid for a high launching height are a high-mounted wing (hence nearly all chuck gliders have wings mounted directly on top of the fuselage); a thick wing section (which creates excessive drag to slow the model down too quickly); an undercambered wing (which has a similar effect to a thick wing); a model which is too large (and thus overall drag too high); and a model which is too light in weight. Some of these factors conflict with requirements for best glide performance on the downward path.

For instance, the lighter the model the slower it should glide, and hence the slower the sinking speed, for any given model size. At one time it used to be a standard rule that indoor gliders were made as light as possible, since height available was limited in any case, whilst outdoor models needed to be relatively heavy. The extra height gained by the heavy model was useful for thermal hunting and nullified the effect of a faster sinking speed in "still" air.

Various claims have been made for the influence of the shape and disposition of the components on the model on launching stability. The pod-and-boom fuselage shape, supposedly, gave better directional control during launching, whilst sweptback wings were also widely used at one period for a similar purpose. Other designers have claimed marked improvements in launching stability from setting the fin underneath the tailplane instead of on top. With regard to the latter, spiral stability in free flight is likely to be adversely affected and the fin is certainly more vulnerable so attached.

Many of the tricky launching problems do, in fact, seem to be overcome quite effectively by the use of lower aspect ratio wings with polyhedral instead of dihedral and long tail moment arms. The pod-and-boom fuselage is now uncommon, and so also is a sweptback wing. The modern layout, as typified in Plan 1, is usually readily controllable and gives far less trouble than its earlier counterparts in trimming for the correct type of launch.

Recommendations are given for three sizes of model to the same basic layout. These sizes represent a "minimum" size for good flying performance (and hence the cheapest in material cost); an "optimum" size in which the wings are cut from standard width sheet; and a large size which is about the upper limit for comfortable launching. Performance should be progressively better with increasing size.

Part of the success of such a model depends on the design, and at least an equal part in mastering the best launching technique. The latter is difficult to lay down as hard and fast rules, since individuals tend to develop their own pet methods of getting a chuck glider "upstairs." Usually, however, the most successful flight pattern is to launch the model with a violent throw upwards at a steep climbing angle with the wings tilted at about 45 degrees to the horizontal. The model then completes what is virtually a slowly spiralling climb in this direction, gradually opening up into a tendency to turn in the opposite direction, which is the natural glide circle. As the model loses flying speed at the top of its climb it should go naturally into its glide circle or roll off the top of the climb into the glide circle without loss of height. The spiral-turn tendency during the actual launching is largely immaterial (*i.e.*, the flight path following the launch can be substantially straight at about a 60 degree angle, provided recovery at the top is immediate, or accomplished with negligible loss of height).

There are a good many ways of trimming the model for the required degree of turn on both the climb and glide—not all of which act in the manner intended. It is common practice, for example, to warp one side of the tailplane down slightly to make the model turn in the opposite direction—Fig. 3. Such a trim may be effective in this direction on the climb, and have just the opposite effect on the glide.

Differential trimming of the tailplane (*i.e.*, one side warped up and the other down) is probably the most effective method of producing a turn, but not always the safest. The fin can also be offset to produce a turn, but again its power will vary with the flying speed (effect considerable during the initial launch, but decreasing as the model slows up). The main objection to such trimming methods is that they are temporary.

Ideally we should have a model which is warp-proof—which, even with "solid" construction is most difficult to achieve. Normal sheet stock used for the fin and tailplane can warp readily, if it gets wet, for instance. These surfaces are certainly best cut from quarter-grain sheet which is extremely rigid, almost brittle, and does strongly resist warping.

We might then well adopt a lay-out as shown in Fig. 4 where quarter-grain "warp-free" sheet is used for the tail surfaces. The fin may be given a very *slight* permanent offset to the right. The model is trimmed for glide by adjusting the centre of balance until it is just on the point of stalling. The glide path will, of course, be a wide circle to the right, if fin offset is used.

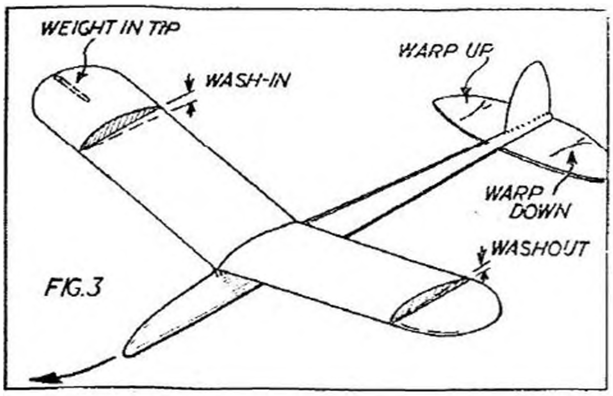


FIG.3

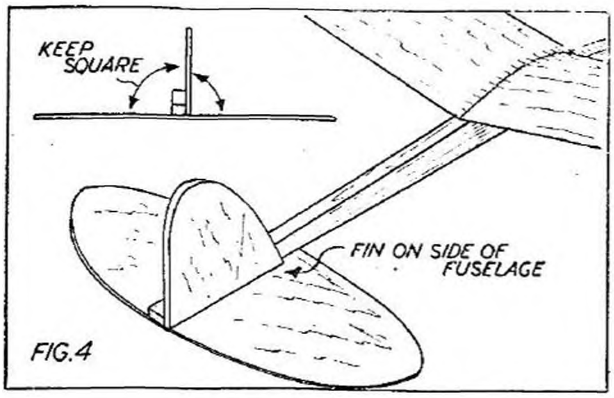


FIG.4

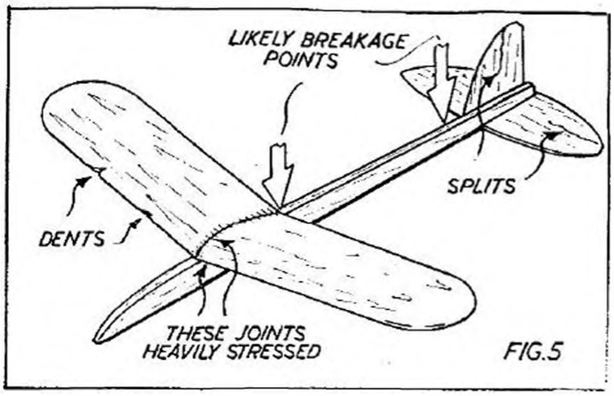
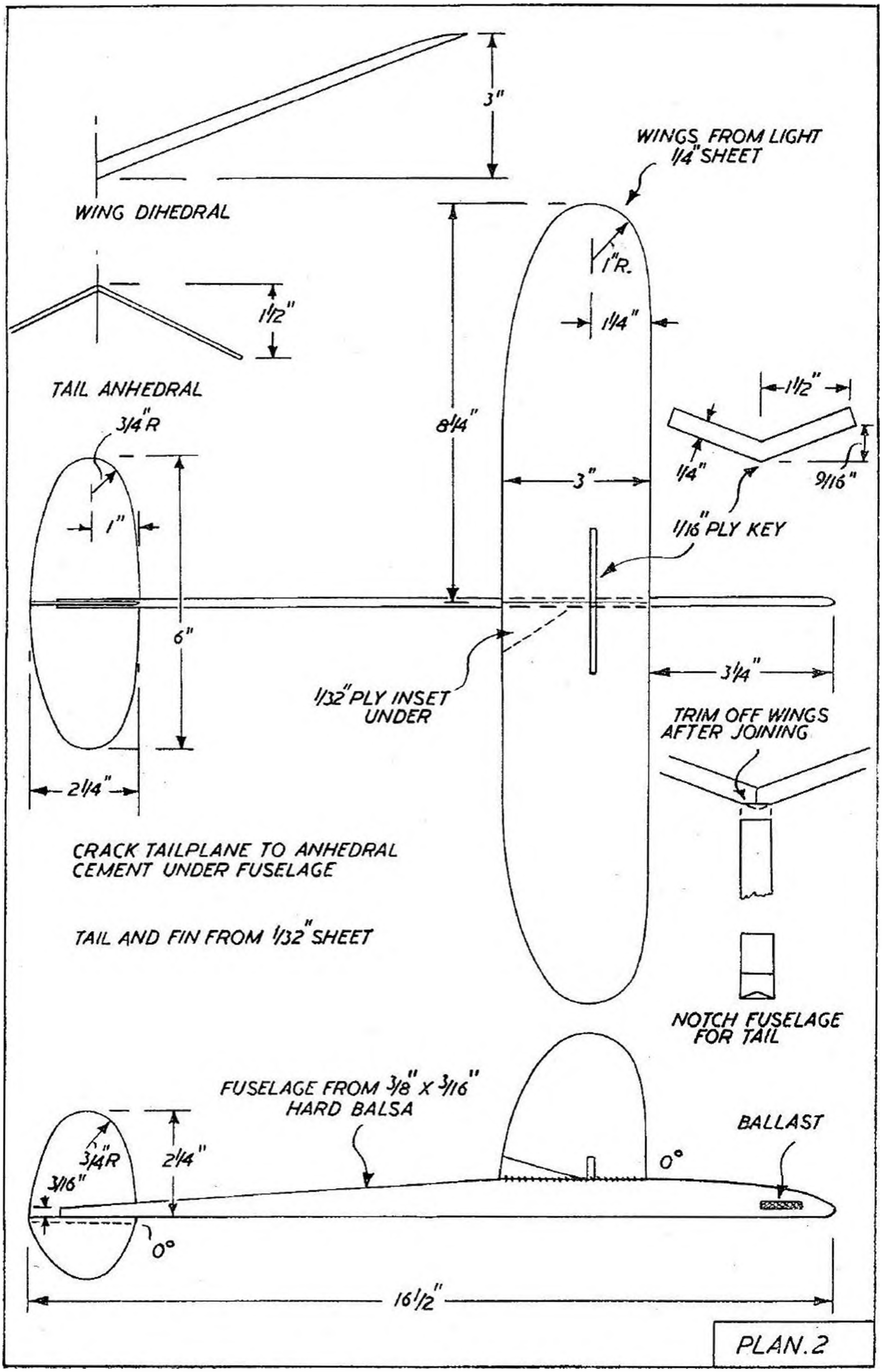


FIG.5

A natural *left* circle is produced by weighting the left hand wing tip until the model circles in that direction and any tendency to stall is ironed out. Such a trim should be well suited to a right-handed launch, as described previously. Reverse fin offset and weighted tip for a left hander. The weighted tip, incidentally, will also be helpful in making the model roll or spin out of a stall with minimum loss of height.

To get maximum effort applied to the model during the launching throw the model should be grasped by the thumb and *second* finger by the fuselage just forward of the trailing edge of the wing. The forefinger then extends upwards against the right hand side of the fuselage and bears against the trailing edge of the wing. This finger is used to apply a powerful push to the wing at the moment of release—a far more effective method of imparting the momentum of the throw to the model and controlling direction than simply grasping the fuselage between thumb and forefinger and heaving. At first some little practice will be necessary to master this technique.

To complete the picture we have now to consider one other major point as regards chuck glider design—the ability of the structure to take punishment.


3"
WING DIHEDRAL
WINGS FROM LIGHT 1/4" SHEET
1"R.
1 1/4"
1 1/2"
TAIL ANHEDRAL
3/4"R
8 1/4"
1 1/2"
3"
1/4"
9/16"
1"
1/16" PLY KEY
6"
1/32" PLY INSET UNDER
3 1/4"
TRIM OFF WINGS AFTER JOINING
2 1/4"
CRACK TAILPLANE TO ANHEDRAL
CEMENT UNDER FUSELAGE
TAIL AND FIN FROM 1/32" SHEET
NOTCH FUSELAGE FOR TAIL
FUSELAGE FROM 3/8" X 3/16" HARD BALSA
BALLAST
3/4"R
2 1/4"
3/16"
0°
0°
16 1/2"
PLAN. 2

This, in fact, can be called material selection—selecting the right type of wood stock for each particular component. This can be related to the likely damage points during normal usage, summarised in Fig. 5.

The tail surfaces are somewhat vulnerable on account of the thin sheet normally used for these components. A particularly strong and accurate method of joining the tail surfaces to the fuselage is shown in Fig. 4, where the tailplane is cemented under the fuselage and the fin to one side. This provides the greatest possible cement area. However, if this method of construction is used, take care that the two surfaces do not warp out of line as the cement dries. A slow-drying cement which does not contract appreciably on setting is preferable.

A part often strengthened by a thin ply inset is in the region of the finger grip on the wing root, to take the pressure of the finger. Sometimes a definite grip is rounded out, when the wood can be left thicker in this region as well as, or alternative to, providing a hardwood inset. Adequate strength to take care of the remainder of the likely damage points is then largely a matter of material selection and the use of good cement joints.

The quarter-grain sheet selected for the tail surfaces should be of medium or light-medium stock. Medium or medium-light stock will also be sufficient for the wings. If you want to make the leading edge stronger to resist denting the wing panels can be made from a strip of hard balsa cemented to a panel of light or light-medium stock—Fig. 6.

The fuselage is the most highly stressed member of the model and the wood stock for this should be hard, "live" and with a dead true grain.

Final finishing, we would say, is just a matter of individual preference. First gain experience with chuck gliders in general and be content with a smooth, clean model. Then, if you want something a little better in the way of performance, try applying a real high gloss finish by filling the grain of the wood properly, using high gloss dope, flatting with metal polish and finally wax polishing. It will take longer to produce such a finish than it will to construct the basic model. For sports flying such finesse will hardly be worthwhile, but if there is a contest coming along you may find it will pay dividends!

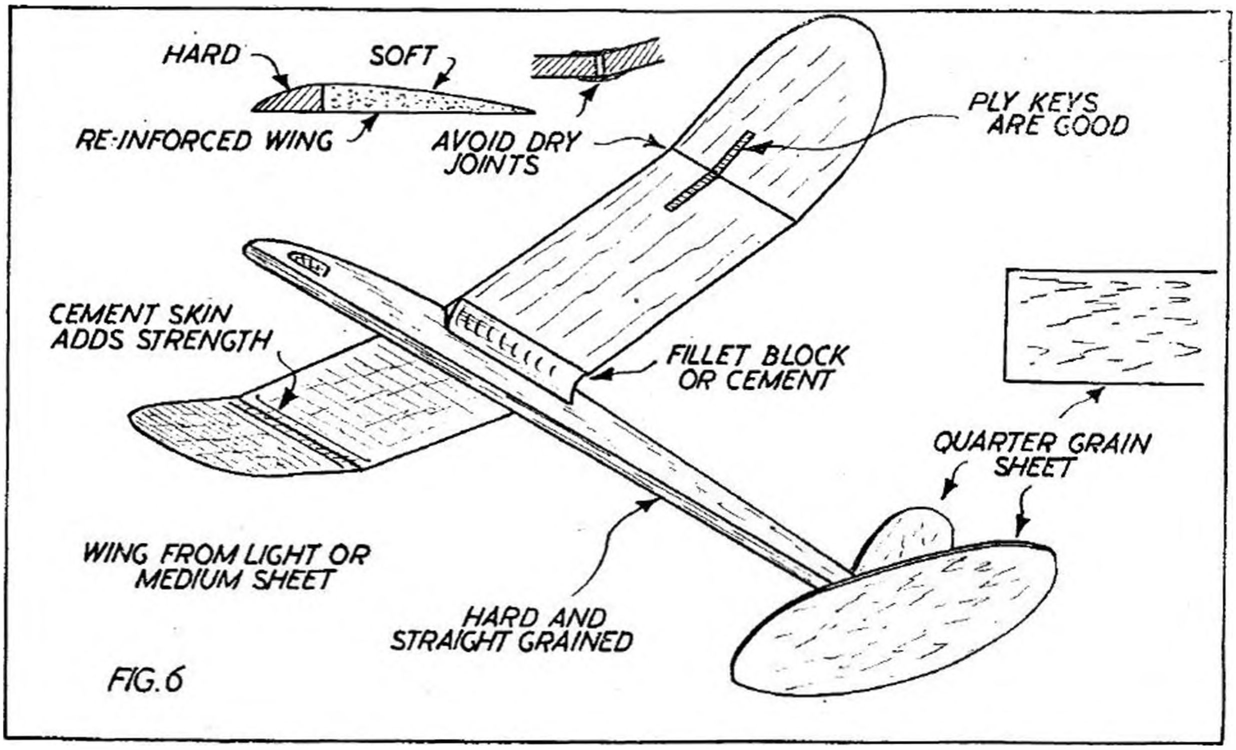
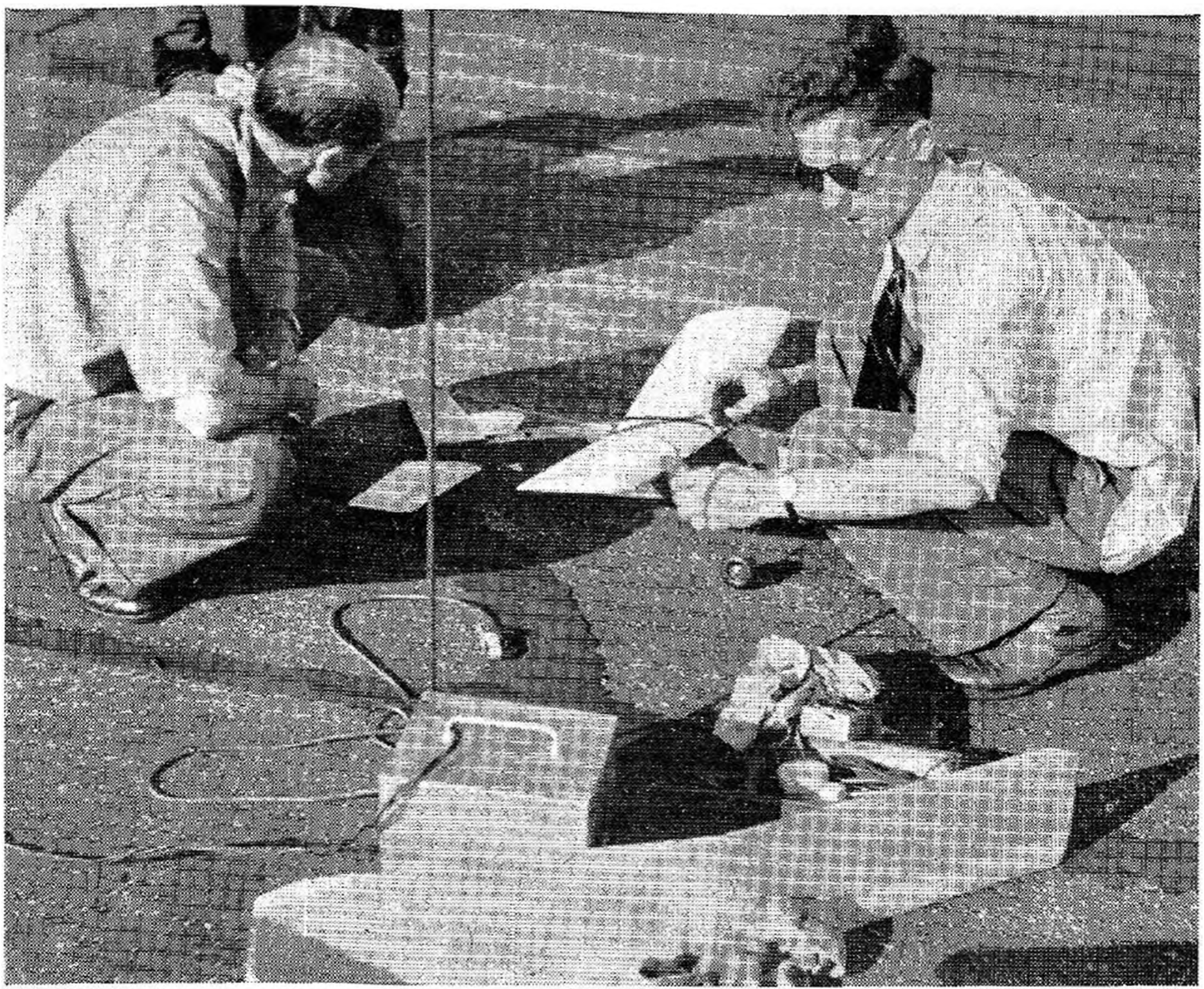


FIG. 6



Author Ted Sills seen with his collaborator R. O. Harlow, on left, at this year's British Nationals at Waterbeach. Model is his modified version of Harry Hundleby's *Sparky*. In powerful winds this model is flown with "clipped wings" enabling it to breast wind speeds of up to 40 mp.h., when most other models are grounded. Spare wings will be noted in foreground.

RELIABLE RADIO CONTROL

By E. C. SILLS

THE last few years have seen the most complicated of the aeromodelling arts taken out of the hands of a comparitively small number of experts and placed within the grasp of an ever-widening circle of modellers, whose primary interest lies in the flying of model aircraft and not in spending hours with a soldering iron. Yet the author's contention is that the ranks of successful radio fliers would be even more numerous to-day if greater accent had been placed both by manufacturers of commercial equipment and by the home builder on one very important aspect, namely, reliability. The radio control exponent who flies his model consistently and well is the best advertisement for his art. Remember too, that he can operate in a field whose area would be considered quite inadequate for the free-flight enthusiast; something to consider these days when the scarcity of good flying fields is dealing many clubs a sad blow. Apart from all this, nothing is more disheartening than to set out for a day's flying, perhaps travelling a considerable distance, and to end up with a disastrous crack-up within minutes of arrival, or repeated fly-aways due to faulty equipment. With all the care in the world accidents will still happen, but much can be done to avoid trouble, and a few worth-while hints are set out below. Since the majority of trouble occurs in the airborne equipment, it is proposed to concentrate on the receiver and its ancillaries.

1. Never fly or attempt to fly if you have even the slightest doubt as to the serviceability of the equipment. This is a well-known and time-worn adage, but one which cannot be stressed too highly. It is only too easy to succumb to the temptation of putting a model up with the hope that nothing will go wrong. If you do have reason to suspect trouble, check at long range with the engine running. Do not, unless unavoidable, run the engine with a test meter plugged in, as you will do the meter pivots more harm than good.

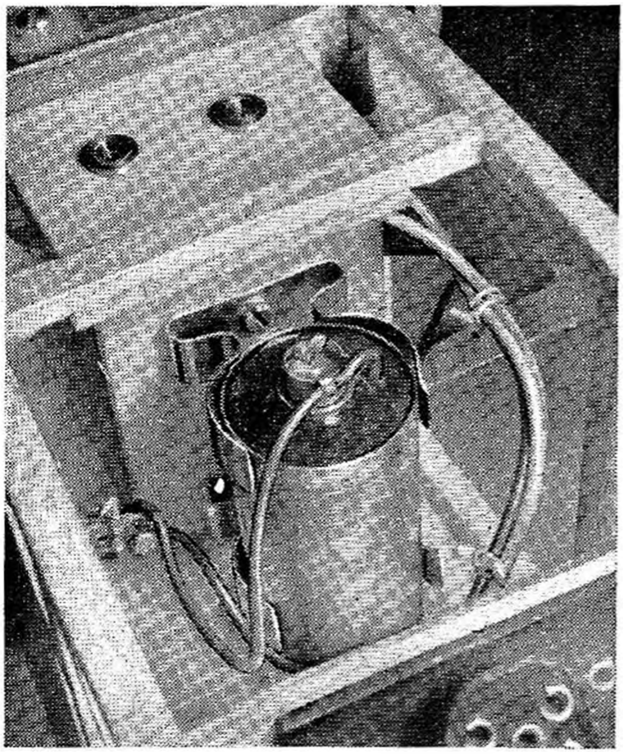


Fig. 1. Quick-change filament cell mount. For added security stretch rubber bands between "ears" of clips

2. Never try to economise by using batteries which are nearly at the end of their useful life. If you work out the economics of running a radio model you will probably find that the provision of engine fuel alone represents a large share of the cost, and it is therefore pointless to try to effect minor economics which may result in a costly crack-up. It is a good scheme to decide which battery or cells needs replacement most frequently and arrange its fixing in the fuselage so that a minimum of effort is required to replace it. In the author's case, the filament cell is replaced most frequently and the method of mounting and connection may be worth a mention. Two "Terry" tool clips which grasp the zinc can tightly are screwed to a piece of plywood mounted on sorbo-rubber against a vertical bulkhead. Connection to the brass end-cap is made by means of an International Octal Valve grid-clip, which will grasp the end-cap quite tightly. Fig. 1 shows the scheme in a typical installation.

FIG. 2

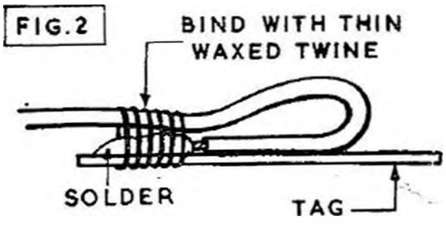


Fig. 2. Vibration-proof wiring joint. Use for all connections to batteries, switches, meter sockets, receiver power sockets etc.

3. Make all internal wiring connections proof against vibration. The reason flexible wire usually breaks at a soldered joint is that it is *not* flexible immediately adjacent to the joint. During the process of soldering, solder runs up the wire, unseen below the covering, sometimes for as much as half an inch. The use of a rubber sleeve, often recommended, is then not fully effective. The remedy here is to double the wire back on itself, and bind to the tag with waxed twine as in

Fig. 2. This takes a little longer but is well worth the extra trouble. Where possible, dispense with soldering tags on receiver panels and bring flexible wires out anchored through suitable holes.

4. If you use a rubber-driven actuator change the rubber every few months. With regard to the actuator battery, test it occasionally by putting on about 50% more turns than you normally use and check for consistent operation. When it fails to work the remedy is obvious. You will probably find that the open circuit voltage is satisfactory, but what matters is the voltage on load, not the same same thing at all. Incidentally, it is not good policy to try to overcome mechanical shortcomings by increasing the actuator battery voltage. For example, the shaft operating the rudder crank may be bowed or bent, introducing considerable friction. One may be tempted to increase the motor torque, increasing the battery voltage to suit, but this is inviting failure in other directions. The increased current drain means that battery life will be curtailed, and what is worse, arcing at the relay contacts will be intensified. In a bad case the contacts will weld together resulting in complete loss of control. Furthermore, the actuator escapement may be damaged due to the increased forces it is called upon to withstand. It has never been found necessary, even with aircraft of 6 feet wing span to use more than one strand of $\frac{3}{16}$ in. flat rubber, but care has always been taken to reduce friction to a low level. If the wire shaft operating the crank is more than, say, 9 in. long it may be advisable to fit dampers to prevent large amplitudes of vibration of the shaft from building up. A simple way is to pass the shaft through bearing plates with oversize holes, spaced every 8 in. or so.

5. See that the relay contacts are kept clean. Cleaning does not mean grinding half the silver away with a file or emery-cloth. It will normally be sufficient to soak a piece of notepaper in a cleaning agent such as Carbon Tetrachloride or Ether and slide it to and fro between the contacts, meantime applying slight pressure to the armature. Although the receiver will be on a vibration-proof mount, repeated landings which result in violent deceleration may eventually cause a relay to change its operating characteristics, so check on its setting now and again.

6. Blow all dust out of the fuselage before flying. Believe it or not, one case of radio failure was traced to an eyelash which had become jammed between the relay contacts! Repair work frequently causes small chips of balsa to fly about in the interior of the fuselage, so be extra careful afterwards to clean out all such foreign bodies.

7. If you use a shorting plug to bridge the meter sockets, check it for tightness prior to flying. Cases have been known where the plug has loosened in flight due to vibration, causing the actuator to stick in. The author's practice is to dispense with the shorting plug and bridge the meter sockets with a resistor of 270 ohms or so. This does not shunt the meter to any great extent (most 5mA meters have a resistance between 5 and 15 ohms) and 270 ohms is small in comparison with the relay resistance.

8. Watch out for dry soldered joints. A faulty soldered joint is a real menace as its resistance may well vary from a few ohms to many thousands of ohms.

The best safeguard here is careful soldering technique and close observation at the time the joint is made. Make sure that your soldering iron is hot enough as you will do far more damage with an iron which is too cool than with one which is too hot. It has been said that an electric iron assumes the correct temperature automatically, but this only applies if the correct choice of element rating is made for the prevailing mains voltage. The temperature may indeed be inadequate if, for example, a 230-250 volt iron is used on a 220-230 volt supply, since the element will be rated for 240 volts. A simple test for the bit temperature is to apply a length of 18 swg resin-cored solder (never use any other type, or flux, even for steel wire), if the bit is hot enough it will melt the solder as fast as you can apply it, and the resin will "spit." Wire to be soldered must be quite bright, clean and free from grease, and metal work such as tags or battery clips should be **scraped** until new metal is laid bare. Never use emery cloth, and do not rely on plating, even if it looks clean. Scrape it off, and make connection to the base metal. Lastly (besetting sin of us all), do not carry the solder on the bit to the work, but apply bit and solder together. Try to get a little fillet of solder between the bit and work as soon as possible in order to assist heat transference. The faster soldering is done the less likelihood there is of damage to components by heating. As soon as tinning is completed withdraw the iron and hold the work rigidly until set, often indicated by a change in appearance of the solder.

Choice of a suitable receiver

All of the previous remarks are quite general in their application, but it is proposed to conclude with something a little more specific. In the writer's opinion, a reliable receiver has long range, a very small battery drain and a large current change on receipt of a signal, apparently conflicting requirements. Furthermore, it should be as simple as possible, as expensive receivers are out of reach of most of us. It is required to be economical in operation so that there is no danger of battery characteristics changing during flight, a phenomenon which becomes more pronounced as battery drain increases. It is hardly necessary to dwell on the reason for desiring a large current change as it will be patently obvious that the more current there is to operate the relay the greater the pressure on the contacts. Given that simple non-proportional control is acceptable, a satisfactory answer to the dilemma is the S.H. type receiver developed three years ago, and since subjected to many hours of flying experience. The original receiver had two separate valves, but a twin triode is more appropriate in the interests of miniaturisation.

The S.H. Mk. II Receiver

Before considering the receiver circuit in detail it may be as well to examine Fig. 3 which will enable the principle of operation to be grasped more readily. It is to be understood that V1 is a self-quenched super-regenerative detector, although the detail is not shown. As is usual with such detectors, the grid leak

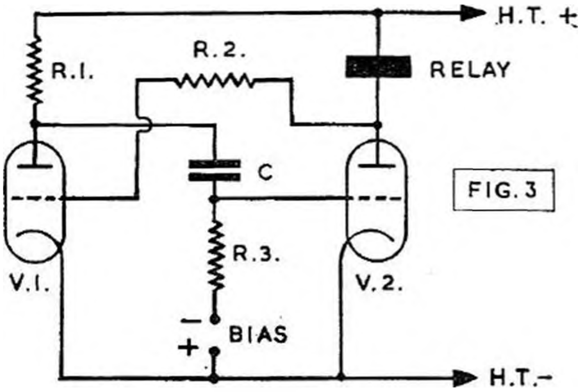


FIG. 3

Fig. 3. Functional circuit diagram of S.H. Mk. II receiver

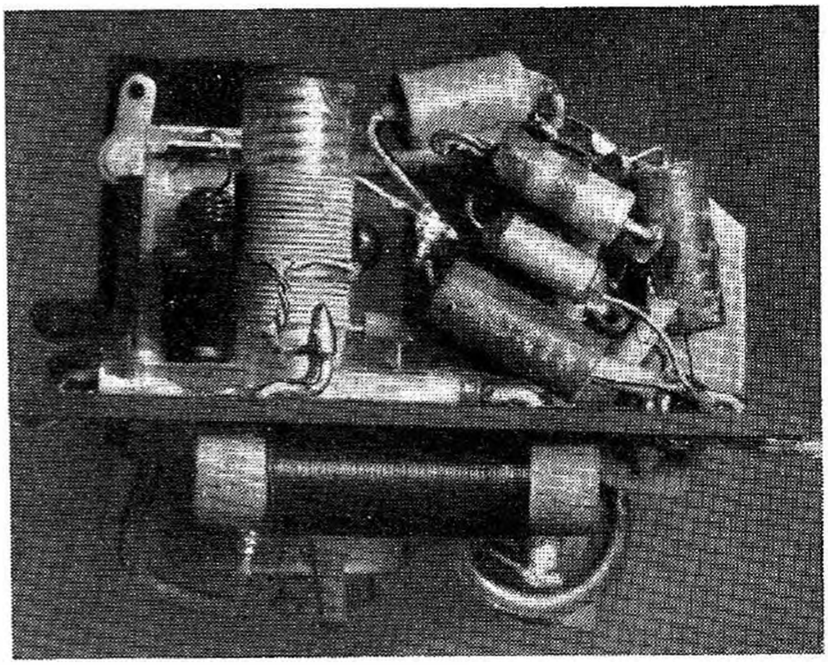
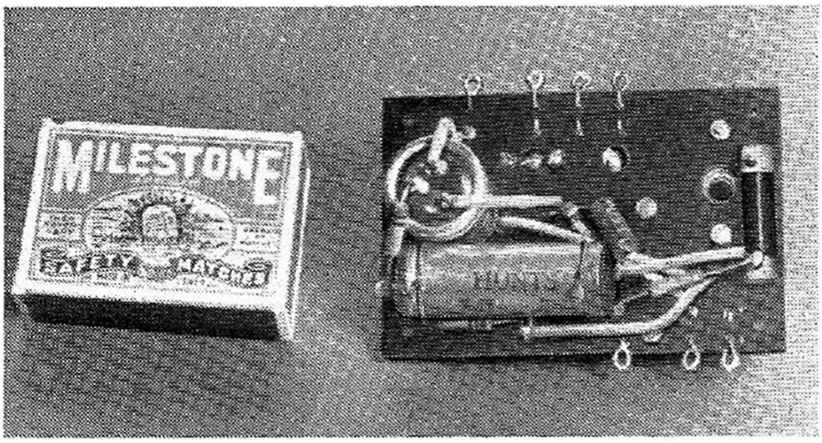
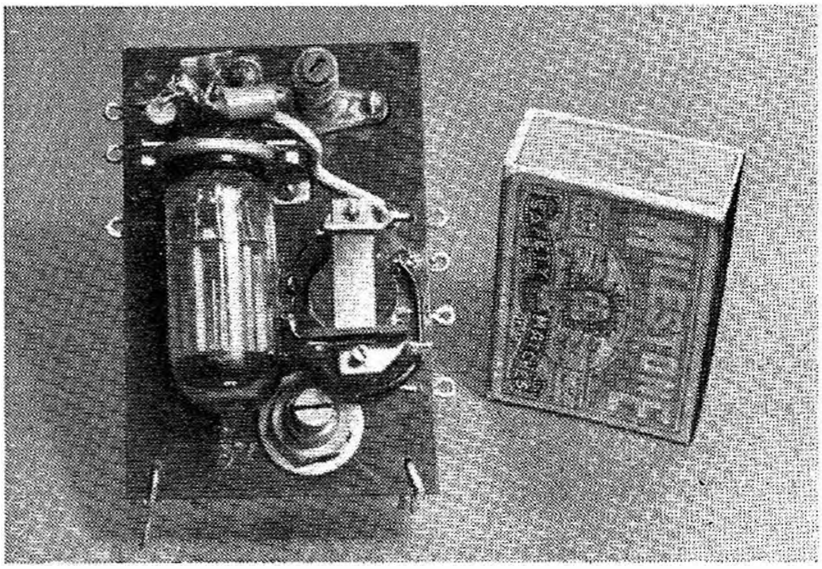


Fig. 8. Top photo. R.F. end of receiver. R_1 is mounted between pins 3 and 6 on the valve-holder. The upper end of the coil goes straight to pin 2, and the lower end to an anchor point on the R.H. side of the panel, which also serves to anchor C.2 and C.3. C.4 can be seen mounted between pins 2 and 4. C.7 is connected from pin 5 to an earth point on the panel. The method of anchoring the R.F. choke can be seen quite clearly.



Centre. The components shown in this view are: P1, C6, R2, R3, R4, C5 and the R.F. choke. C6 is held to the panel with two bindings of waxed twine.



Lower. The relay, ECC type 5A can be seen in this view. This relay, due probably to its very light armature, is largely unaffected by vibration at the frequencies commonly enencountered

R1 is returned to a point of positive potential, in this case the anode potential of V_2. Sufficient bias is applied from a battery to V_2 grid in order to reduce its anode current to a very small amount. The voltage drop across the relay is therefore very small and the potential at V_2 anode is very nearly that of the high tension battery. The anode current of V_1 flows through a resistor R_1 and any *change* of voltage at V_1 anode is passed by C to the control grid of V_2. (Steady voltages are of course blocked by C since a capacitor behaves as an open circuit to steady voltages.) On receipt of a signal the detector valve current drops by a small amount, and due to the presence of R_1 the anode potential of V_1 abruptly rises by a few volts. This rise, or "step," is passed by C to the control grid of V_2, and overcomes the inhibiting bias applied from the battery. V_2 now draws increased current, and due to the relay resistance V_2 anode potential falls. The grid leak of V_1 is hence returned to a lower potential than before, and V_1 draws even less current. This in turn gives rise to even more current in V_2, until V_2 is drawing as much current as it possibly can. This large current only persists for a short time (depending on the size of C and R_3), but is sufficient to close the relay. When the signal goes off, the reverse process occurs and the relay current is rapidly reduced to zero. The relay has in fact no alternative but to fall out. Data taken from the author's receiver may give a better overall picture of the result:

V_2 quiescent current — 0.3 mA
V_2 current rise — 2.7 mA
(*i.e.*, current kicks up to 3 mA)
Relay closes at — 1.3 mA
Relay opens at — 0.5 mA

Range, with 3 watts into transmitter, in excess of 1 mile.

From these figures it may be inferred that the relay settings are not at all critical and in fact the closing current may be doubled without reducing the range of the receiver. The extreme economy of the set is also apparent and in fact the high tension batteries may well last for two seasons. It is not possible to use a self-neutralising actuator with this type of receiver which may appear to be at variance with the reliability criteria laid down earlier in this article. This liability, however, has proved to be a blessing in disguise since a three arm actuator escapement is used which has only one neutral position. Fig. 4 shows the three arm wheel in a standard E.D. type of two-position actuator. As shown it is assumed to be in the neutral position. When the transmitter button is depressed 1 releases and 3 is caught on B: on button release, 3 is released from B and is caught on A. The shaft has now rotated through 120°, and the rudder applied. Thus, starting from neutral in each case one "pulse" from the transmitter (a "pulse" here is defined as a signal lasting for a very short time), results in, say, a right turn, and two pulses result in a left turn. Two pulses restore neutral when in a right turn, and one pulse restores neutral when in a left turn. The memory is not relied upon with this system, and due to the fact that current is drawn only for brief periods, the actuator batteries last almost indefinitely, thus doing away with the necessity for current-saving switches which are a potential source of failure.

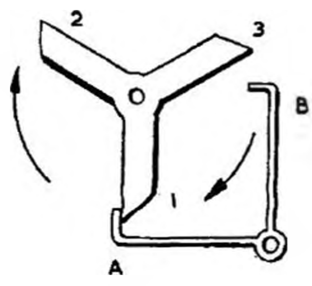


FIG. 4 ESCAPEMENT

Fig. 4. Mode of operation of 3 position escapement wheel.

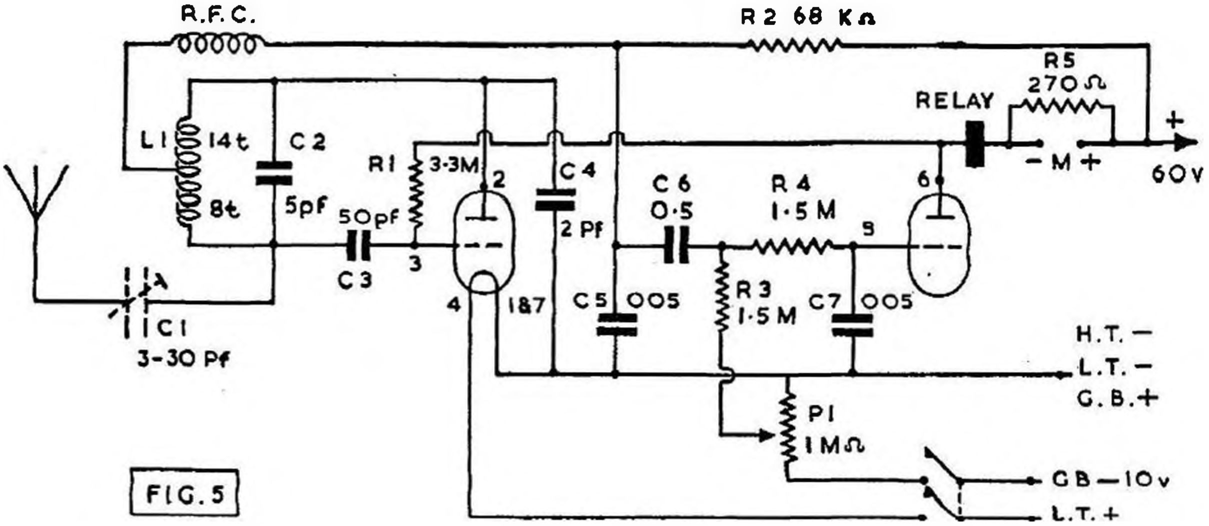


FIG.5

Fig. 5. Wiring diagram of S.H. Mk. II receiver. P_1 is a Dubilier type YN potentiometer. C6 is Hunts type W49.

Fig. 5.a Tuning coil and R.F. choke. Use a very thin smear of "Durofix" cement to keep turns tight. Diameter of coil former is $\frac{5}{32}$"

Fig. 6. Valveholder numbering. Figures correspond to those on the valve symbols in Fig. 5.

FIG. 5A

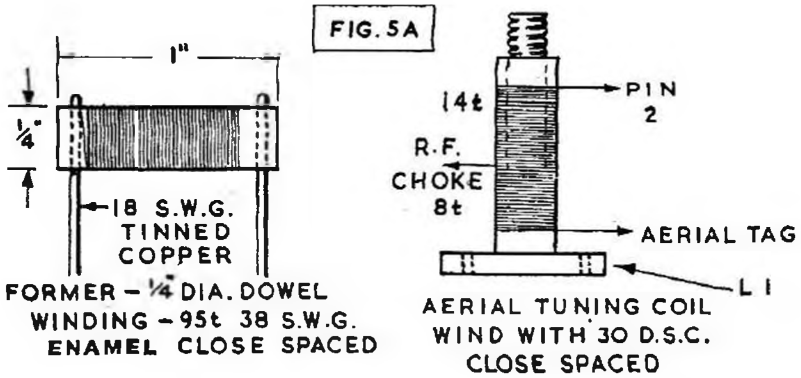
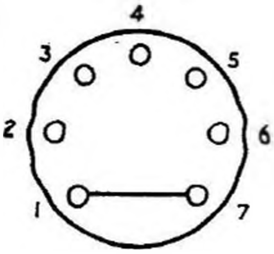


FIG.6



VIEW OF UNDERSIDE OF VALVE HOLDER.

Receiver Detail

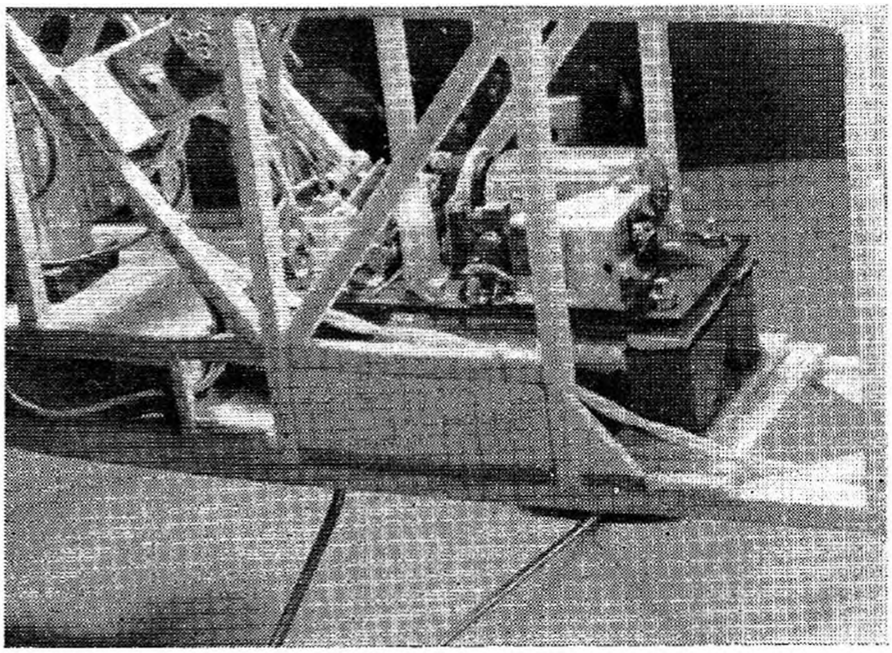
Fig. 5 is a complete circuit diagram of the receiver including the meter connections and on/off switch which are a little unorthodox. Cl, the aerial coupling capacitor may not be required, as different aerial lengths and fuselage wiring layout determine the extent of coupling required, and it is not possible to pre-fix it. R_4 and C_7 constitute a filter whose precise function need not concern us here, and Pl serves to adjust the grid bias on Vl in order to set its anode current to the desired level. The numbers on the valve symbol relate to the basing diagram in Fig. 6. Only two components in the receiver are at all critical, C_4 and C_6. It is essential that C_4 should be of the correct value, or the detector valve will not oscillate properly. The best plan is to make a capacitor *by tightly winding about 5 turns of 30 d.c.c. wire on a short piece of 20 swg enamelled wire. The number of turns and aerial coupling can be varied to find the optimum arrangement. The essential thing to watch for in* C_6 *is its insulation resistance, but provided the recommended type is used there should be no* trouble in this respect.

Careful study of Fig. 8 will assist the wiring of the valve-holder considerably. None of the leads in the tuned circuit need be more than ¾ in. long, which makes for good stability. The R.F. choke is held in position by passing the 18 swg wires through small holes in the panel, allowing $\frac{1}{8}$ in. to project, and bending the ends over. Lock the slug in the coil former with a few strands of darning wool, rubber is not satisfactory since it eventually perishes and locks the slug immovably. The slider connection to the potentiometer is marked by a spot of red lacquer, and it is immaterial which way round you connect the other two tags. You will notice from the photographs that the connections to the batteries are terminated in wire loops. This method of connection is no longer recommended and it would be preferable to bring the flexible connecting wires directly out, suitably anchored to the panel.

Testing

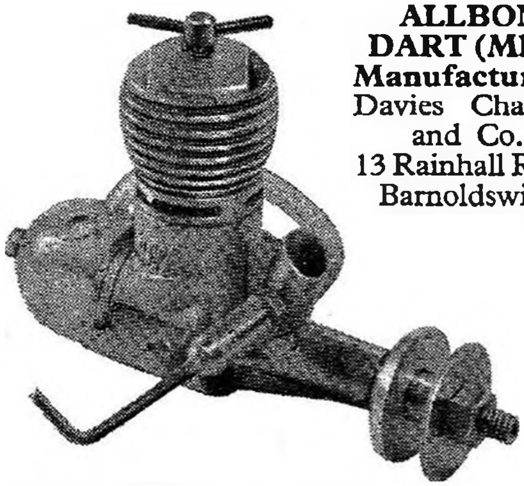
When completed, check wiring and battery connections very carefully before plugging the valve in and switching on. Regardless of the anode current of V_2 wait a few moments before adjusting P_1 *slowly* to set the current to $\frac{1}{2}$ mA or so. If the detector is operating properly the approach of your hand to within a few inches of the aerial will cause V_2 current to swing about. If nothing happens, slacken off the aerial coupling and try again. If still unsuccessful, adjust C_4, remembering, in general, that if you increase C_4 you will probably have to increase aerial coupling and *vice versa*. When working correctly the anode current of V_2 should kick-up to $2\frac{1}{2}$ or 3 mA on signal with a high resistance relay, and up to 4 mA or so with a low resistance relay. You can expect ranges of at least a mile with 2 or 3 watts input to the transmitter, in fact ranges of 3 to 4 miles have been obtained with this type of receiver. Once you have the receiver working properly, see what effect the standing current of V_2 has on range. From the point of view of economy it is obviously advantageous to keep the current as low as possible. After you have given the receiver a fair test, the writer is confident that you will not wish to use any other type of receiver, and you will enjoy many hours of happy, trouble-free flying.

The author wishes to acknowledge the help and interest of Mr. R. O. Harlow (the H of S.H.!) who has collaborated closely in the experiments which led to the development of the pulse receiver.



The author's shock-proof receiver mount can be clearly seen in this photograph. Sorbo rubber is attached by means of Bostik adhesive to two pieces of plywood, the upper of which carries two 6 B.A. screws. The receiver panel is dropped over the screws and retained by nuts

ENGINE ANALYSIS



ALLBON DART (Mk. II)

Manufacturers.
Davies Charlton and Co.,
13 Rainhall Road,
Barnoldswick.

Retail Price. £3 4s. 2d. (including Purchase Tax).
Displacement. 0.55 c.c. (.0336 cu. in.).
Bore. .350 in.
Stroke. .350 in.
Bore/Stroke Ratio. 1.0.
Bare Weight. 1 1/4 oz. (including tank).
Mounting. Beam.

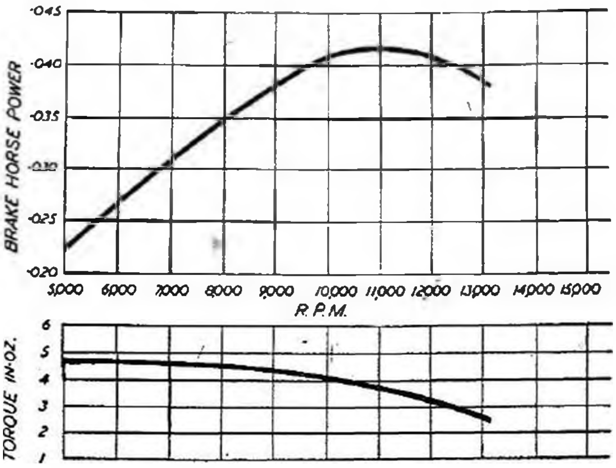
MATERIAL SPECIFICATION

Crankcase. Aluminium alloy.
Cylinder Liner. Nickel chrome steel.
Cylinder Jacket (integral head). Aluminium alloy.
Piston. Meehanite.
Contra Piston. Meehanite.

PROPELLER TEST DATA

Fuel used: Mercury No. 8.

Propeller Dia. Pitch	R.P.M.
5 × 4	12,400
5 × 5	10,600
6 × 3	11,100
6 × 4	10,350
6 × 5	8,250
7 × 5	6,350
7 × 4	7,400
7 × 3	9,300
8 × 4	6,100
8 × 3	6,750



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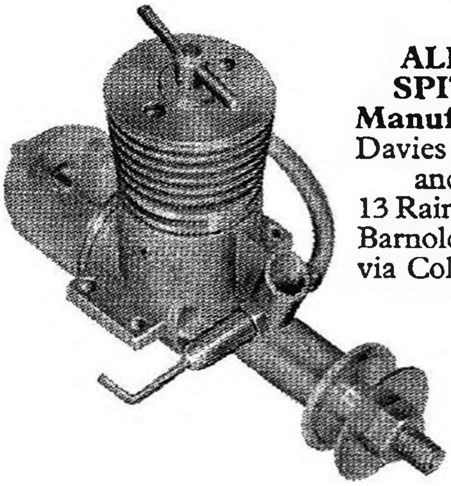


ALLBON SPITFIRE

Manufacturers.
Davies Charlton and Co.,
13 Rainhall Road,
Barnoldswick,
via Colne, Lancs.

Retail Price. £3 4s. 2d. (including Purchase Tax).
Displacement. 0.975 c.c. (.060 cu. in.).
Bore. .425 in.
Stroke. .420 in.
Bore/Stroke Ratio. 1.013.
Bare Weight. 3 oz.
Mounting. Beam (upright, inverted or sidewinder).

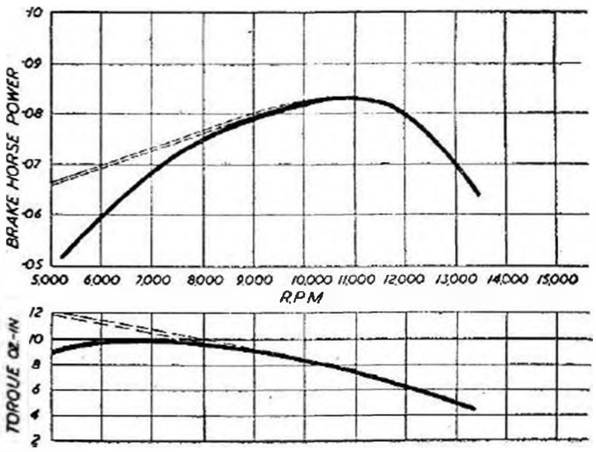
MATERIAL SPECIFICATION

Crankcase. LAC-112A silicon alloy, pressure die cast.
Cylinder. BSS-90. Hardened, ground and lapped.
Piston. Meehanite. Ground and honed.
Connecting Rod. High duty forging alloy. RR-56.
Crankshaft. BSS-90. Hardened and ground.

PROPELLER TEST DATA

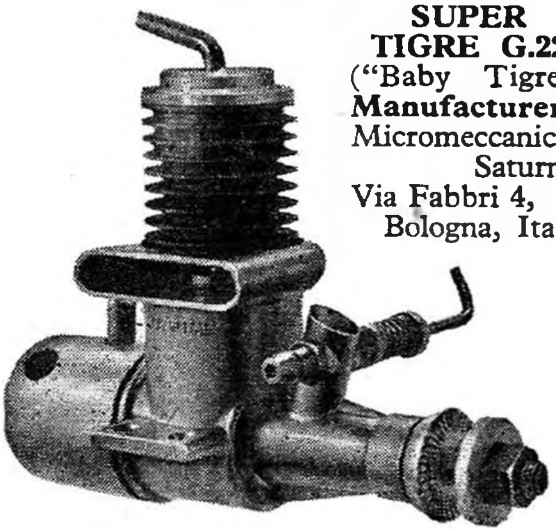
Fuel used: Mercury No. 8.

TE.—For the benefit of overseas readers,



Mercury No. 8 fuel equivalent formula is:
Paraffin, 40%; Castor Oil, 25%; Ether, 32.5%; Amyl Nitrate, 2.5%.

Propeller Dia.	Pitch	R.P.M.
9 ×	6	5,550
9 ×	4	6,750
8 ×	6	5,900
8 ×	5	7,750
8 ×	4	8,200
8 ×	3	8,500
7 ×	6	6,850
7 ×	5	8,950
7 ×	4	9,450
7 ×	3	10,800
6 ×	5	11,250
6 ×	4	12,000
6 ×	3	13,150



SUPER TIGRE G.22

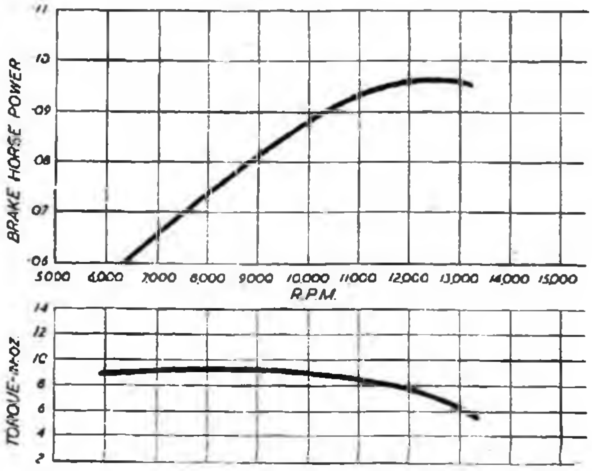
("Baby Tigre")

Manufacturers. Micromeccanica Saturno,
Via Fabbri 4,
Bologna, Italy.

Displacement. 1.23 c.c. (.072 cu. in.).
Bore. 12.5 mm. (.495 in.).
Stroke. 10 mm. (.395 in.).
Bore/Stroke Ratio. 1.25.
Bare Weight. 1 3/4 oz.
Mounting. Beam.

MATERIAL SPECIFICATION

Crankcase. Die cast light alloy.
Crankshaft Bearing. Bronze.
Piston and Cylinder. Meehanite, ground and lapped.

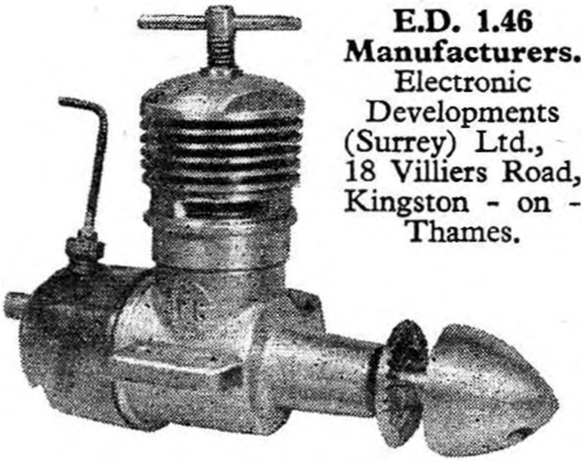


PROPELLER TEST DATA

Fuel used: Mercury No. 8; all test runs Manufacturer's Recommendation

1 part Paraffin, 1 part Castor Oil, 1 part Ether, plus 2 per cent. Amyl Nitrate.

Propeller Dia.	Pitch	R.P.M.
10 ×	4	6,000
9 ×	4	7,100
8 ×	4	8,500
7 ×	4	9,850
7 ×	5	9,000
6 ×	4	11,250



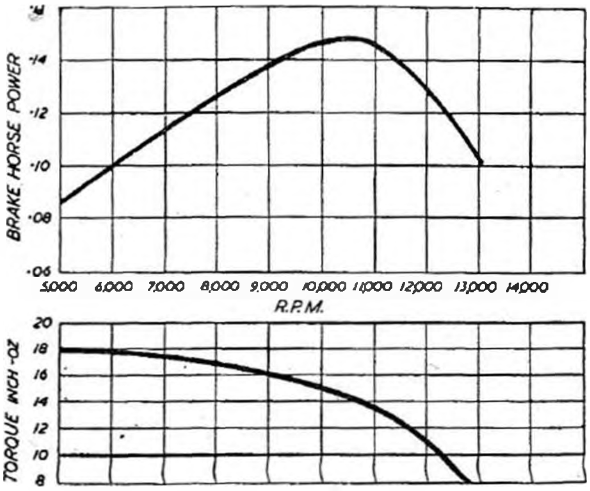
E.D. 1.46

Manufacturers. Electronic Developments (Surrey) Ltd.,
18 Villiers Road,
Kingston - on - Thames.

Retail Price. £2 17s. 0d. (including Purchase Tax).
Displacement. 1.45 c.c. (.0555 cu. in.).
Bore. .531 in. **Stroke.** .40 in.
Bore/Stroke Ratio. 1.33.
Bare Weight. 3 1/8 oz.
Mounting. Beam, 7/16 in. × 1 3/16 in.

MATERIAL SPECIFICATION

Crankcase. Aluminium alloy.
Crankcase Bearing. Plain.
Cylinder. Hardened steel.
Cylinder Casing (integral head). Dural.
Piston. Cast iron. **Contra Piston.** Steel.
Connecting Rod. Hardened steel.



PROPELLER TEST DATA

Propeller Dia. × Pitch	R.P.M.
10 × 6	5,400
10 × 4	6,600
9 × 6	6,200
9 × 5	6,450
9 × 4	6,900
9 × 3	8,200
8 × 6	6,600
8 × 5	8,100
8 × 4	9,400
8 × 3	9,700
8 × 2	10,450
7 × 7	8,000
7 × 6	8,400
7 × 5	10,350
6 × 5	11,300
6 × 3	12,900

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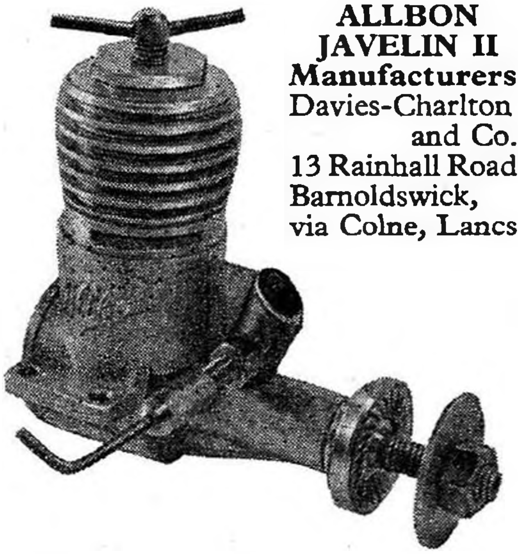
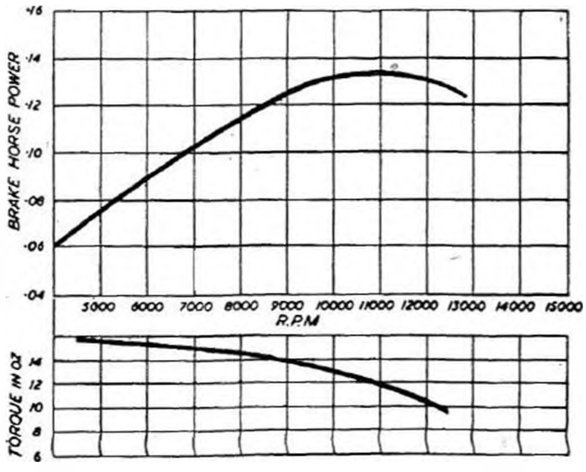


ALLBON JAVELIN II

Manufacturers.
Davies-Charlton and Co.,
13 Rainhall Road,
Barnoldswick,
via Colne, Lancs.

Retail Price. £3 5s. 4d. (including Purchase Tax).
Displacement. 1.49 c.c. (0.091 cu. in.).
Bore. 0.525 in.
Stroke. 0.420 in.
Bore/Stroke Ratio. 1.25.
Bare Weight. 2¼ oz. (less tank and propeller).
Mounting. Beam, 7/16 in. × 1 1/8 in.



MATERIAL SPECIFICATION

Crankcase. Aluminium alloy.
Crankcase Bearing. Plain.
Cylinder. Nickel chrome steel.
Cylinder Casing (integral head). Aluminium alloy.
Piston. Meehanite.
Contra Piston. Meehanite.
Connecting Rod. Duralumin.

PROPELLER TEST DATA

Fuel used: Mercury No. 8.

Propeller Dia. × Pitch	R.P.M.
10 × 6	4,550
10 × 4	6,150
9 × 6	5,200
9 × 5	6,600
9 × 4	7,250
8 × 6	6,800
8 × 5	7,800
8 × 4	9,550
7 × 7	5,900
7 × 5	10,150
7 × 4	10,550
6 × 4	11,950
6 × 3	12,450
5 × 5	11,850
*7 × 5	11,650

* Non standard propeller.

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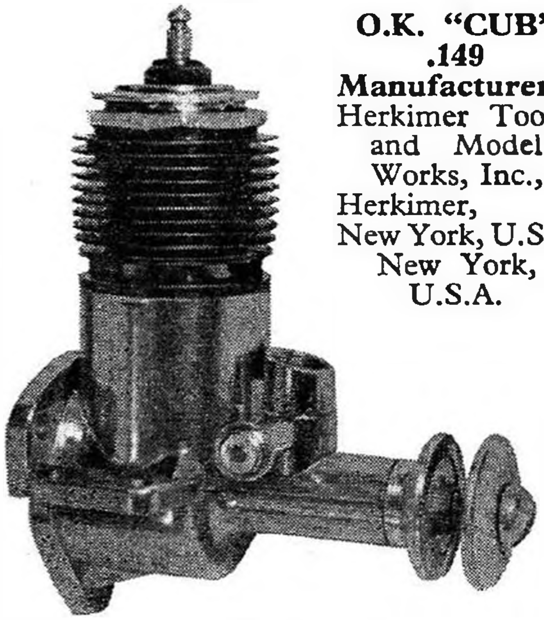


O.K. "CUB" .149

Manufacturers.
Herkimer Tool and Model Works, Inc.,
Herkimer,
New York, U.S.A
New York,
U.S.A.

Retail Price. (In U.S.A. $8.95).
Displacement. 2.456 c.c. (.149 cu. in.).
Bore. .600 in.
Stroke. .530 in.
Bore/Stroke Ratio. 1.13
Bare Weight. 2 3/4 oz.
Mountings. Beam or radial.

MATERIAL SPECIFICATION

Crankcase. Pressure die cast, light alloy.
Crankcase Bearing. Plain.
Cylinder. Steel.

Cylinder Head. Light alloy.
Piston. Plain.
Connecting Rod. Drop forged light alloy.

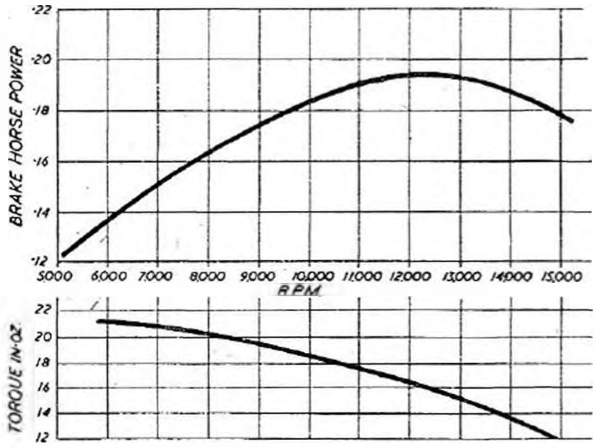
PROPELLER TEST DATA

Fuel used: Mercury No. 5 and Mercury No. 7.

NOTE.—For overseas readers the formula for Mercury No. 7 fuel is:
Methanol, 55%; Castor Oil, 25%; Nitromethane 20%.

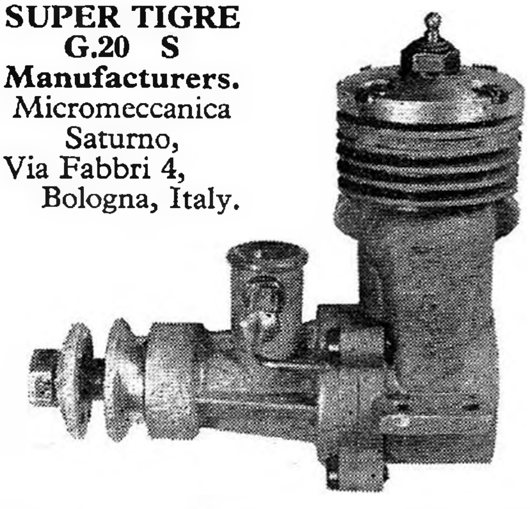
Propeller Dia. × Pitch	R.P.M.
10 × 6	
10 × 4	7,850
9 × 6	7,700
8 × 8	7,200
8 × 6	7,750
8 × 5	9,450
8 × 4	11,600
8 × 3	12,100
7 × 6	10,900
7 × 5	11,550
7 × 4	12,900
7 × 3	13,850
5 × 5	15,250

Standard, Constant Geometric Pitch, Carved Wood Propellers.



SUPER TIGRE G.20 S

Manufacturers.
Micromeccanica Saturno,
Via Fabbri 4,
Bologna, Italy.



Displacement. 2.47 c.c. (0.150 cu. in.).
Bore. 15 mm. (.59 in.).
Stroke. 14 mm. (.55 in.).
Bore/Stroke Ratio. 1.07
Compression Ratio. 8.5 : 1.
Bare Weight. 4 oz. (excluding propeller and tank).
Mounting. Beam.

MATERIAL SPECIFICATION

Crankcase. Light alloy, pressure die cast.
Cylinder. Special iron lapped sleeve.
Cylinder Jacket. Diecast light alloy.
Cylinder Head. Light alloy, screw fixing.
Piston. Light alloy, two steel rings.
Bearings. Ball races at each end of crankshaft.
Glow Plug. Super Tigre.
Recommended Fuel. Methanol 2.5, Castor Oil 1, Nitromethane 1.

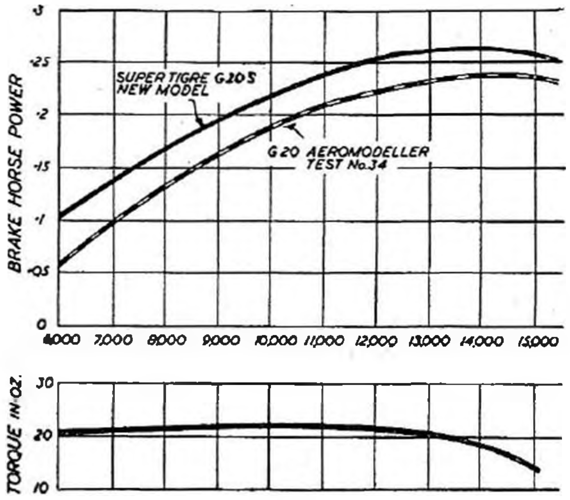
PROPELLER TEST DATA*

Fuel used: Mercury No. 7.

Propeller Dia. × Pitch	R.P.M.
6 × 5	12,700
8 × 3	12,800
8 × 4	12,200
8 × 5	10,450
8 × 6	8,500
9 × 6	6,900
10 × 4	8,100

Manufacturer's recommendations: 6 in. dia.; 9 in. pitch.

* Constant geometric pitch wooden propellers.

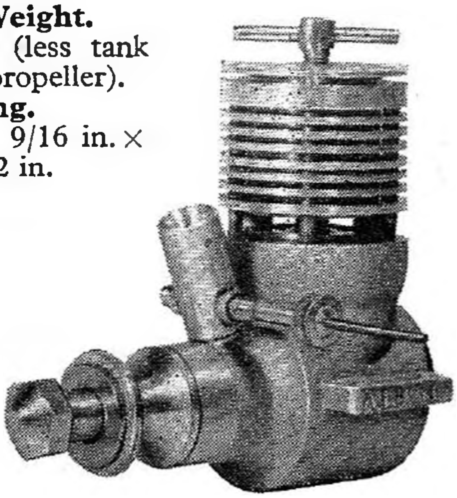


OLIVER TIGER Mk. II

Manufacturers.
J. A. Oliver (Engineering),
136 Radford Rd., Nottingham.

Retail Price. £6 10s. 0d.
Displacement. 2.5 c.c. (0.150 cu. in.).
Bore. .550 in.
Stroke. .625 in.
Bore/Stroke Ratio. 0.88.

Bare Weight.
6⅛ oz. (less tank and propeller).
Mounting.
Beam, 9/16 in. × 1 15/32 in.



MATERIAL SPECIFICATION

Crankcase. LAC.113.B.
Cylinder Liner. EN.8 steel.
Cylinder Jacket (integral Head). Aluminium alloy.
Piston. "Uniflow," cast iron.
Contra Piston. Cast iron.

PROPELLER TEST DATA

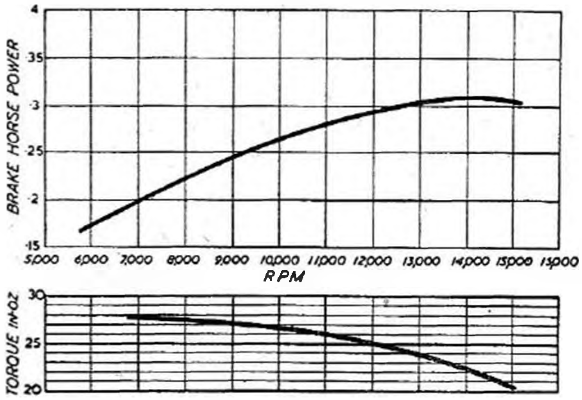
Mercury No. 8 was used for all tests.

The makers recommend a "doped" fuel for normal operation consisting of Mills diesel fuel: ether in ratio of 2 : 1 plus 3% amyl nitrate. On test we found this fuel gave more critical adjustment for smooth running, with a definite tendency to hunt at speeds below 10,000 r.p.m.

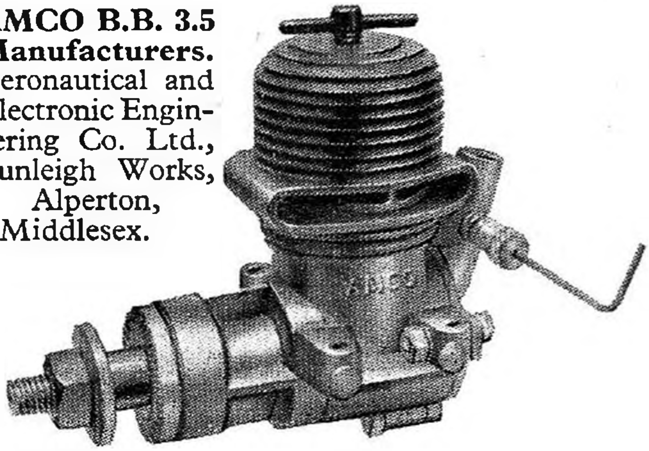
Propeller Dia.		Pitch	R.P.M.
10	×	4	8,650
10	×	3	9,800
9	×	6	8,450
9	×	5	9,400
9	×	3	11,400
8	×	6	9,950
8	×	4	12,200
7	×	6	11,800
7	×	4	13,750

Test propellers used: carved wood type, constant geometric pitch, normal outline, parallel blades with squared tips.

Recommended propellers: Free flight—9×4 or 9×3. Control line speed—6½ or 7 in. pitch (diameter trimmed for operational r.p.m. (static) of around 12,500 r.p.m.).



AMCO B.B. 3.5
Manufacturers.
Aeronautical and Electronic Engineering Co. Ltd.,
Sunleigh Works,
Alperton,
Middlesex.



PROPELLER TEST DATA

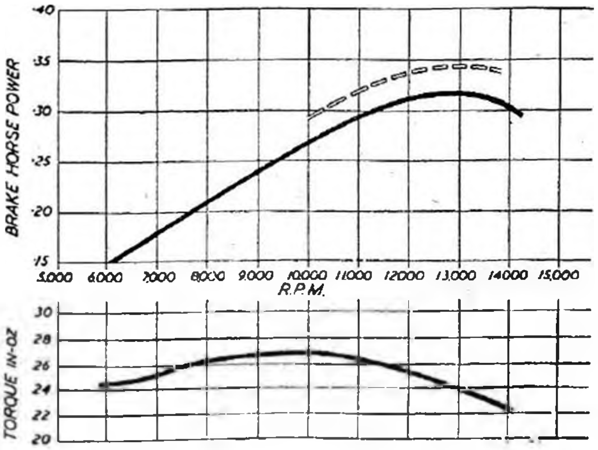
Fuel used: Mercury No. 8.

Propeller Dia.		Pitch	R.P.M.
9	×	4	11,450
9	×	5	10,650
9	×	6	10,000
10	×	4	11,100
10	×	6	9,750
11	×	6	7,950

Retail Price. £5 10s. 3d. (including Purchase Tax).
Displacement. 3.43 c.c. (2.09 cu. in.).
Bore. 11/16 in.
Stroke. 9/16 in.
Bore/Stroke Ratio. 1.23
Bare Weight. 5½ oz. (less propeller and tank).
Mounting. Beam (or radial) (upright, inverted or side-winder).

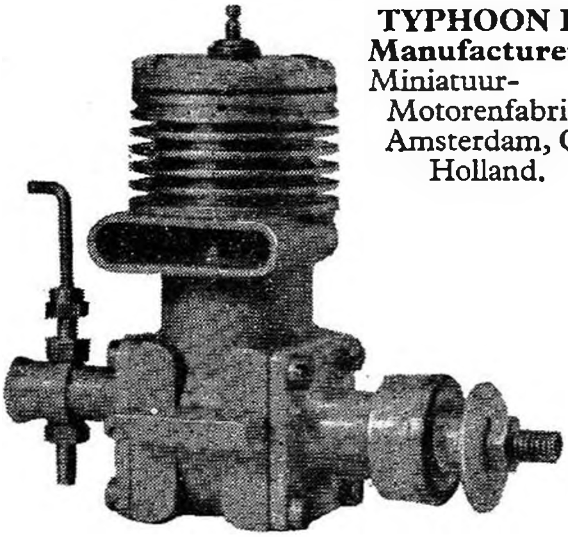
MATERIAL SPECIFICATION

Crankcase. LAC-112A silicon alloy, pressure die cast.



Cylinder. S.14 steel. Hardened, ground, honed and lapped.
Piston. Meehanite, ground and honed.
Connecting Rod. Duralumin.
Bearings. Two Hoffman high speed ball bearings.
Crankshaft. S.11 steel. Ground.
Rotary Disc Valve. Laminated plastic.

◆



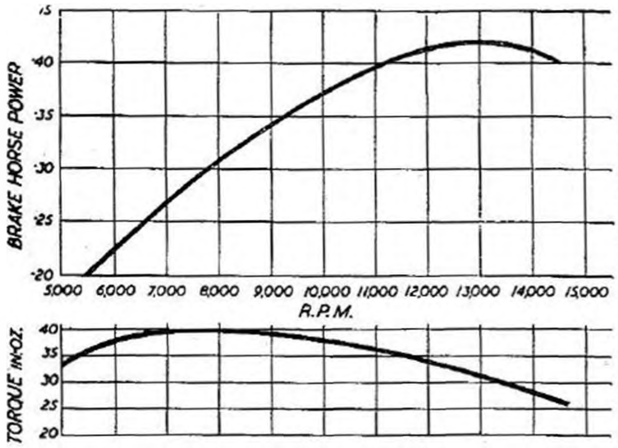
TYPHOON IV

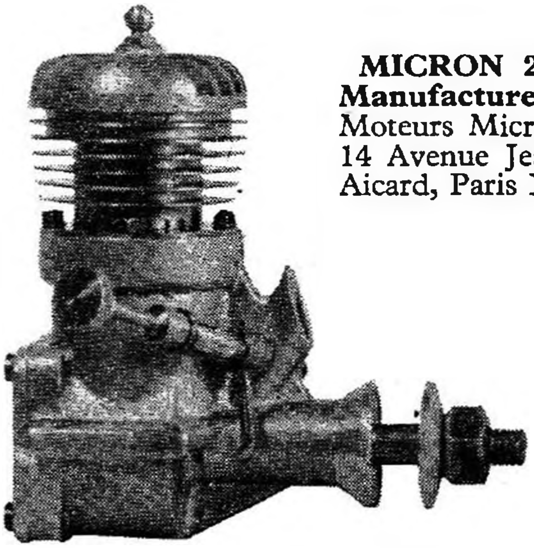
Manufacturers.
Miniatuur-Motorenfabriek,
Amsterdam, C,
Holland.

Retail Price. British equivalent £6 3s. 0d.
Displacement. 4.82 c.c. (0.29 cu. in.).
Bore. 19 mm. (.748 in.).
Stroke. 17 mm. (.669 in.).
Bore/Stroke Ratio. 1.12.
Bare Weight. 8 3/4 oz.
Mounting. Beam, 1.2 by 0.6 in.

MATERIAL SPECIFICATION

Crankcase. Aluminium alloy.
Crankcase Bearing. Two ball races.
Cylinder Liner. Steel sleeve pressed in place in diecast light alloy casing.
Cylinder Barrel. Integral casting with crankcase.
Piston. Light alloy, two rings.
Connecting Rod. Dural (machined).





MICRON 28

Manufacturers.
Moteurs Micron,
14 Avenue Jean-Aicard, Paris XI.

Displacement. 5 c.c. (0.30 cu. in.).
Bore. 19 mm. (.748 in.).
Stroke. 17 mm. (.668 in.).
Bore/Stroke Ratio. 1 : 12.
Bare Weight. 6 oz. (less tank and propeller).
Mounting. Beam. (Upright, inverted or sidewinder.)

MATERIAL SPECIFICATION

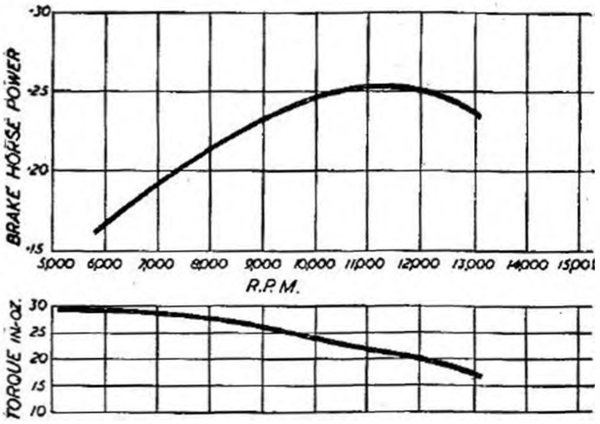
Crankcase. Sand cast light alloy.
Cylinder. Steel, turned from solid.
Piston. Light alloy, turned from bar (with steel rings).

PROPELLER TEST DATA

Fuel used: Mercury No. 7 (no additions).

Propeller Dia. Push	Type	R.P.M.
7 × 4	Wood*	12,150
7 × 6	Wood*	11,650
8 × 3	Wood*	12,200
8 × 5	Wood*	10,980
8 × 6†	Plastic	11,350
8 × 8	Wood*	8,750
9 × 3	Wood*	11,250
9 × 5	Wood*	9,980
9 × 6	Wood*	9,200
10 × 4	Wood*	10,450
10 × 7	Wood*	6,900

* Constant geometric pitch. † Nominal.



NATIONAL MODEL AIRCRAFT GOVERNING BODIES

In most instances the full-size national aero club is directly responsible for the conduct of model aeronautics, but in some cases, as for example the S.M.A.E., a specialist group has been delegated to handle affairs on behalf of the parent body. To avoid delays in correspondence any letters dealing with model aeronautics should always be very clearly marked as such.

GREAT BRITAIN	The Society of Model Aeronautical Engineers, Londonderry House, Park Lane, London, W.1.
AUSTRALIA	The Model Aeronautical Association of Australia, Sec. : M. G. McSpedden (A.C.A. Aust.), 195 Elizabeth Street, Sydney, New South Wales.
AUSTRIA	Osterreichischer Aero Club, Vienna 1, Dominikanerbastei 24.
ARGENTINE	Aero Club Argentino (Seccion Aeromodelismo), Rodriguez Piera 240, Buenos Aires.
BELGIUM	Federation de la Petite Aviation Belge, 24 Av, de Hares Ketcke Forest-Bruxelles.
BRAZIL	Aero-Clube de Brasil, 31, Rua Alvaro Alvim, Rio de Janiero.
CANADA	Model Aeronautics Association of Canada, 1555, Church Street, Windsor, Ontario.
CHILE	Club Aero de Chile, Santa Lucia 256, Santiago.
CUBA	Club de Aviacion de Cuba, Edificio Larrea, Havana.
CZECHOSLOVAKIA	Aeroklub Republiky Ceskoslovensko, Smecky 22, Prague 11.
DENMARK	Det Kongelige Aeronautiske Selskab, Norre Farrimagsgade 3 K, Copenhagen.
EGYPT	Royal Aero-Club d'Egypte, 26 Rue Sherif Pacha, Cairo.
FINLAND	Suomen Ilmailuliitto, Mannerheimintie 16, Helsinki....
FRANCE	Federation Nationale Aeronautique (Modeles Reduits), 7, Avenue Raymond Poincare, Paris XVI. Aero-Club de France (Modeles Reduits), 6, Rue Galilee, Paris. *(Communications should always be addressed in duplicate to both these bodies as they jointly share responsibility for certain aspects of aeromodelling.)*
HOLLAND	Koninklijke Nederlandsche Vereeniging voor Luchvaart, Anna Paulownaplein 3, The Hague.
HUNGARY	Magyar Repulo Szovetseg, V. Sztalin-ter 14, Budapest.
ICELAND	Flugmalafelag Islands, P.O. Box 234, Reykjavik.
INDIA	All India Aeromodellers Association, 8 Lee Road, Calcutta, 20.
IRELAND	Model Aeronautics Council of Ireland, 9, Lower Abbey Street, Dublin.
ISRAEL	Aero Club of Israel, 9 Montefiore Street, P.O.B. 1311, Tel. Aviv
ITLAY	Federazione Aeromodellistica Nationale Italiana (F.A.N.I.), Via Cesare Beccaria 35 Rome.
JUGOSLAVIA	Aero-Club Jugoslavije, Uzon, Mirkova IV/I, Belgrade.
LUXEMBOURG	Aero-Club du Grande-Duche de Luxembourg, 5 Avenue Monteray, Luxembourg
MONACO	Monaco Air-Club, 8 Rue Grimaldi, Monaco.
NEW ZEALAND	New Zealand Model Aeronautical Association, c/o Mr. L. R. Mayn, 120 Campbell Road, Onehunga, Auckland.
NORWAY	Norske Aero Club, Ovre Vollgae 7, Oslo.
PERU	Aero Club del Peru, Lima.
POLAND	Aeroklub Rzeczypospolitej Polskie, Ul. Hoza 39, Warsaw.
PORTUGAL	Aero Club de Portugal, Avenida da Liberdade 226, Lisbon.
RUMANIA	Aeroclubul Republico al Romaniei, Lascar Catargi 54, Bucharest.
SOUTH AFRICA	South African Model Aeronautic Association, 302 Grand National Buildings, Rissik Street, Johannesburg.
SPAIN	Real Aero-Club de Espana (Subeseccion de Aeromodismo), Carrera de Jan Jeronimo 19, Madrid.
SWEDEN	Kungl. Svenska Aeroklubben, Malmskillnadsgatan 27, Stockholm.
SWITZERLAND	Aero Club de Suisse (Modeles Reduits), Hirschengraben 22, Zurich.
SYRIA AND LEBANON	Aero Club de Syrie et du Libon, Beyrouth.
TURKEY	Turk Hava Kurumu (T.H.K.), Enstitu Caddesi, 1, Ankara.
UNITED STATES OF AMERICA	Academy of Model Aeronautics, 1025 Connecticut Avenue, Washington 6, D.C.
U.S.S.R.	Aero Club Central de l'U.S.S.R., V. P. Tchkalov, Moscou-Touchino.
URUGUAY	Aero-Club del Uruguay, Paysandu 896, Montevideo.

CONTEST RESULTS

Results of S.M.A.E. Contests for balance of 1952 Season, together with principal Galas, are included in this report to complete records. Those 1953 events which have been decided before press date are also included, and will be completed in the 1954 Aeromodeller Annual.

August 24th—ALL HERTS. RALLY, Radlett

Rubber		
1 Revell, H. W.	Northampton	10 : 00
2 Tubbs, H.	Leeds	10 : 00
3 Holt, J.	Upton	10 : 00
Glider		
1 Bradley, R.	Northampton	10 : 00
2 Holland, W. P.	Apsley	10 : 00
3 Longstaffe, C.	Belfairs	10 : 00
Power		ratio
1 Buskell, P.	Surbiton	45.5
2 Marcus, N. G.	Croydon	43.9
3 Gould, J.	Northern Heights	41.4
Seaplane (Power)		
1 Taylor, P. T.	Thames Valley	10 : 00
2 Bennett, E.	Croydon	8 : 15
Seaplane (Rubber)		ratio
1 Perkins, G.	Croydon	39.0
2 Brooks, A.	Grange	16.5
Radio		Points
1 Nachtman, J.	Polish A.F.A.	310
2 Allen, D.	West Essex	265
3 Honnest-Redlich, G.	Bushy Park	260
Team A		m.p.h.
1 Edmonds, R.	High Wycombe	56
2 Butcher, N.	Croydon	
3 Smith, T.	South Bristol	
Team B		m.p.h.
1 Butcher, N.	Croydon	66
2 Steward, L.	West Essex	
3 Crowe, C.	Harrow	
Tailless (Glider)		
1 Nicholls, A. H.	Southern Cross	5 : 41
Tailless (Power)		ratio
1 Marshall, J.	Hayes	4.9

August 31st—BRITISH CHAMPIONSHIPS

Area	*Power*	*Rubber*	*Glider*	*Total points*
North Western ...	20	7	20	47
South Eastern ...	14	3	14	31
Northern	5	20	2	27
London	10	10	7	
Midland	7	14	5	26
South Midland	74	4	10	18
Southern	3	5	4	12
East Anglian ...	2	1	3	6
East Midland ...	—	2	1	3

Power		
1 Buskell, P.	London	10 : 14*
2 Lanfranchi, S.	Northern	10 : 07
3 Lewis, R.	S. Eastern	9 : 43
Rubber		
1 Dunkley, T.	Midland	10 : 35*
2 Picken, B.	N. Western	8 : 51
3 Chesterton, R.	London	8 : 35
Glider		
1 Barks, E.	London	8 : 45*
2 O'Donnell, H.	N. Western	8 : 41
3 Young, F.	Midland	8 : 41

(**Individual Champions in each Class*)

August 31st—TAPLIN TROPHY

Radio-control—Centralised

1 Allen, S.	West Essex
2 Sutherland, S.	West Essex

Sept. 7th—YORKSHIRE EVENING NEWS RALLY—Sherburn-in-Elmer.

Glider		
1 Burton, G. E.	(Outlaws)	8 : 00 + 6 : 47
2 Wicks, P.	(Northampton)	8 : 00 + 5 : 57
3 Sugden, D. C.	(Loughborough Coll.)	8 : 00 + 5 : 27
4 Rodgers, J.	(Solihull)	8 : 00 + 5 : 17
5 Eckersley, S.	(Bradford)	8 : 00 + 3 : 34
6 Sprason, E.	(Solihull)	8 : 00 + 2 : 27
Power		
1 Simmonds, R.	(Grimsby)	8 : 00 + 5 : 27
2 Griffiths, H.	(Southport)	8 : 00 + 2: 36
3 Crouch, B.	(Northampton)	8 : 00 + : 40
4 Woodland, T.	(Foresters)	7 : 58
5 Preston, H.	(West Yorks)	7 : 27
6 Woodhouse, R.	(Whitefield)	6 : 24

Left: Ed Bennett and his first place Rubber Model at the 1953 British Nationals. Span is 51 in., weight 4½ ozs..and Pirelli rubber motor. *(Photo Bill Dean)*

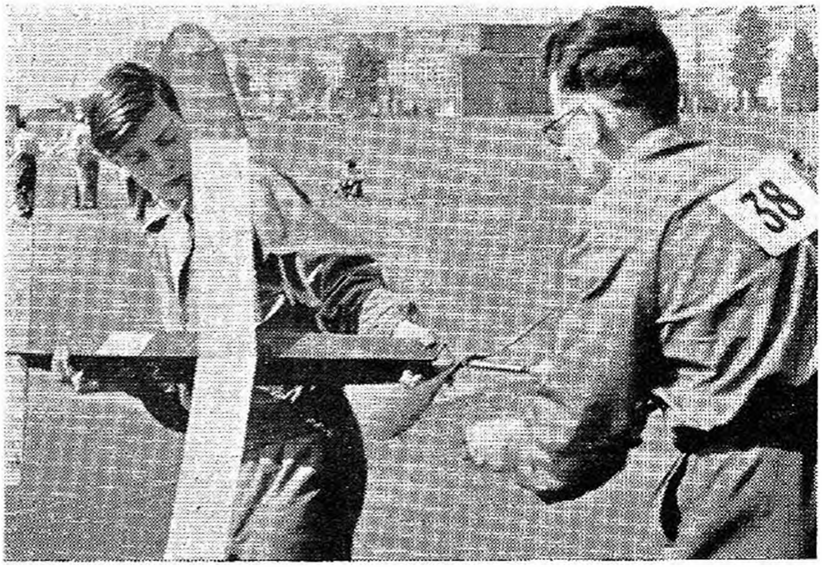
Right: Sid Sutherland of West Essex with his R/C entry at the Northern Heights Gala. This model has been adopted as a club design, and has proved s most reliable test-bed for a variety of engines and receivers. Sid's version is Elfin 2.5 powered.

Rubber			
1	Harrison I.	(Cheadle)	8 : 00 + 15 : 04
2	Cartwright, J. K.	(Bridlington)	8 : 00 + 9 : 22
3	Rockell, W.	(Lincoln)	8 : 00 + 8 : 23
4	O'Donnell, J.	(Whitefield)	8 : 00 + 6 : 02
5	Bennett, A. D.	(Whitefield)	7 : 47
Chuckglider			
1	O'Donnell, H.	(Whitefield)	3 : 53
2	Steel, M.	(York)	3 : 50
Team race A.			
1	Bolton, D.	(Foresters)	52.5 m.p.h.
2	Goddard, R.	(Grimsby)	50 ,,
Team race B.			
1	Cameron, B.	(Croydon)	66 m.p.h.
2	Russell, P. G.	(Worksop)	52 ,,
Novelty			
1	Tattersall, H.	(Halifax)	23 sec. error.
2	Collinson, R.	(Bradford)	24 ,, ,,
Concourse			
1	Lees, F.	(Ashton)	Scale.
2	Mellar, G.	(Sheffield)	Free-lance.

Sept. 14th—UNITED KINGDOM CHALLENGE MATCH

Centralised Rubber

Ireland.		
Osbourn, N.	11 : 27	
Drew, G.	8 : 30	36 : 33
Gray, L.	8 : 20	
Clelland, T.	8 : 16	
Scotland.		
Finlayson, J.	11 : 39	
Owston, R.	8 : 09	30 : 29
McConachie, W.	6 : 37	
Simpson, G.	4 : 04	
England.		
O'Donnell, J.	13 : 06	
Palmer, G.	8 : 20	
Marcus, N.	8 : 04	29 : 50
Bennett, A.	: 20	
Wales.		
Holland, F.	9 : 29	
Quick, B.	7 : 34	24 : 24
Evans, B.	6 : 07	
Crumplin, E.	1 : 14	



The most famous "Brothers" team in aeromodelling today! John and Hughie O'Donnell, pictured at Cranfield during the Wakefield contest. John is winding while younger brother Hughie holds the characteristic "family" design

Pete Buskell and his "Slick Stick" free flight winner at the 1953 Nationals. Power is Amco 3.5 diesel : span 60 in., weight 18 ozs., 40% stabiliser with integral fin. (*Bill Dean Photo*).

	Power	
England.		
Bickerstaffe, J.	11 : 25	
Brookes, A.	10 : 50	43 : 13
Dallaway, W.	10 : 47	
Perkins, G.	10 : 11	
Wales.		
Birch, A.	9 : 32	
Barker, D.	8 : 59	26 : 38
North, P.	8 : 00	
Madge, J.	: 07	
Ireland.		
Gardiner, R.	7 : 01	
McMiller, ...	5 : 10	20 : 26
Piddington, B.	4 : 30	
McDonnell, F.	3 : 45	
Scotland.		
Parsons, R.	8 : 21	
McMaster, J.	4 : 49	20 : 26
Gillroy, ...	4 : 37	
Howitt, S.	2 : 39	
	Glider	
England.		
Faulkner, B.	10 : 50	
Farrance, W.	9 : 56	39 : 05
Thomas, M.	9 : 53	
Lamble, J.	8 : 26	
Scotland.		
Robertson, J.	9 : 41	
McArthur, J.	8 : 27	33 : 11
McConachie, W.	7 : 58	
McGill, W.	7 : 09	
Wales.		
Birch, A.	11 : 15	
Maunder, R..	6 : 39	30 : 01
Persen, P.	6 : 22	
Phillips, J.	5 : 45	
Ireland.		
Bennett, D.	8 : 27	
Armstrong, R.	4 : 37	19 : 57
Ivor, R.	4 : 09	
Drew, G.	2 : 44	

	R.	*G.*	*P.*	*Total*
England	2	5	5	12
Scotland	3	3	1	7
N. Ireland	5	—	1	6
Wales	—	2	3	5

Sept. 28th—FROG SENIOR CUP

Power duration up to 1.5 c.c. *Area Centralised*

1	Wheeler, B.	Birmingham
2	Longstaffe, A.	Belfairs
3	Brown, A.	Bristol and West
Junior :	Hume, J.	Belfairs

Sept. 28th—MODEL ENGINEER CUP

Team Contest Open Gliders *Area Centralised*

1 South Bristol
2 Grange, M.A.C.
3 Bournemouth, M.A.S.

October 12th—DAVIES TROPHIES

Team Racing *Centralised*

Class A.
1 West Essex
2 High Wycombe
3 Glasgow

Class B.
1 West Essex
2 Croydon
3 Salisbury

October 12th—RIPMAX TROPHY

Radio Control *Centralised*

(17 *entries :* 11 *flew*)

1	Allen, S.	West Essex	336
2	Sallis, C.	Cambridge	284
3	Ives, T.	C.M.	276

October 12th—CONTROL LINE (SPEED)

Class			*Centralised*
1	Tuthill, R.	Enfield	76.09
2	Powell, D.	E. London	91.07
3	Watson, J.	Lewisham	82.08
4	Peek, G.	Chelmsford	115.09
5	—	—	—
6	Gibbs, R.	E. London	138.9
7	—	—	—

BRITISH INDIVIDUAL CHAMPIONS 1952

Senior :	O'Donnell, J.
Junior :	O'Donnell, H.
Control Line :	Wright, P.

CATON TROPHY : 1952 (National Rubber Model Champion)

Bennett, A.

PLUGGE CUP : 1952 (Club Championship)

Croydon

1953 Contest Results

March 8th—GAMAGE CUP

(92 Clubs 121 entries,, 16 triple wax.)

Open Rubber *Decentralised*

1	Sugden, D.	Loughborough College	19 : 39
2	Williams, E.	Outlaws	18 : 15
3	Taylor, E.	Cheadle	16 : 33
4	Dowsett, I.	W.Middlesex	14 : 15
5	Rockell, W.	Lincoln	14 : 02
6	John, E.	Grange	13 : 53
Top Junior	Johnson, C.	Wigan	8 : 50

March 8th—PILCHER CUP

(92 Clubs 309 entries,, 11 triple wax).

Open Glider *Decentralised*

1	Gooding, G.	Hull Pegasus	18 : 24
2	Yeabsley, R.	Croydon	16 : 35
3	Stott, G.	Loughborough College	13 : 53
4	Burton, G.	Outlaws	12 : 27
5	Hindle, K.	Accrington	11 : 28
6	Farrance, E.	West Yorks.	11 : 23
Top Junior	P. Jackson	Littleover	8 : 46

March 22nd—FARROW SHIELD

Team Rubber *Area Centralised*

1	Croydon D.M.A.C.	35 : 10
2	Whitefield M.A.C.	34 : 18
3	Cheadle and D.M.A.S.	30 : 58
4	Surbiton M.A.C.	29 : 56
5	Birmingham M.A.C.	28 : 46
6	Belfairs M.A.C.	28 : 15

March 22nd—WOMEN'S CHALLENGE CUP

Open Rubber (Glider 19 entries) Area Centralised

1	Simmons, B.	Bushy Park	8 : 22
2	Healey, P.	Belfairs	7 : 55
3	Lloyd, C.	Basildon	7 : 41
4	Clayton, M.	West Yorks	7 : 13
5	Bennett, E. M.	Whitefield	7 : 02
6	Edwards, —.	C/Member	6 : 45

March 22nd—S.M.A.E. CUP

A/2 Eliminator *Area Centralised*

April 5th—FLIGHT CUP

Open Rubber *Decentralised*

(32 *entries*)

1	Bagnall, A.	Whitefield	9 : 00+4 : 00
2	Jackson, E.	Littleover	9 : 00+2 : 40
3	O'Donnell, H.	Whitefield	8 : 58
4	Biss, L.	Littleover	8 : 57
5	Dubery, V.	Leeds	8 : 47
6	Tubbs, H.	Leeds	8 : 47

April 5th—HAMLEY TROPHY

Open Power *Decentralised*

(25 *entries*)

1	Smith, T.	Blackpool	9 : 00+5 : 28
2	Willis, N.	Central Essex	8 : 45
3	Lanfranchi, S.	Bradford	7 : 56
4	Horwich, E.	Whitefield	7 : 33
5	Firman, P.	Cambridge	7 : 24
6	Monks, R.	Birmingham	6 : 49

April 19th—WESTON CUP

Wakefield Eliminator *Area Centralised*

(169 *entries*)

1	Muxlow, E.	Sheffield	15 : 00
2	Sugden, D.	Loughboro' College	13 : 42
3	Jackson, G.	Littleover	12 : 15
4	Rockell, W.	Lincoln	11 : 55
5	O'Donnell, J.	Whitefield	11 : 50
6	Percival, D.	Swallownest	11 : 47

April 19th—ASTRAL TROPHY

F.A.I. Eliminator *Area Centralised*

(163 entries)

			ratio
1	Spurr, A. W.	Stockton	13.05
2	Hickmott, C.	Bridlington	11.08
3	Harrison, I.	Cheadle	10.51
4	Westerby, C.	West Yorks	10.20
5	Collinson, A.	Bradford	10.05
6	Lanfranchi, S.	Bradford	10.03

May 3rd—AEROMODELLER A/2 GLIDER

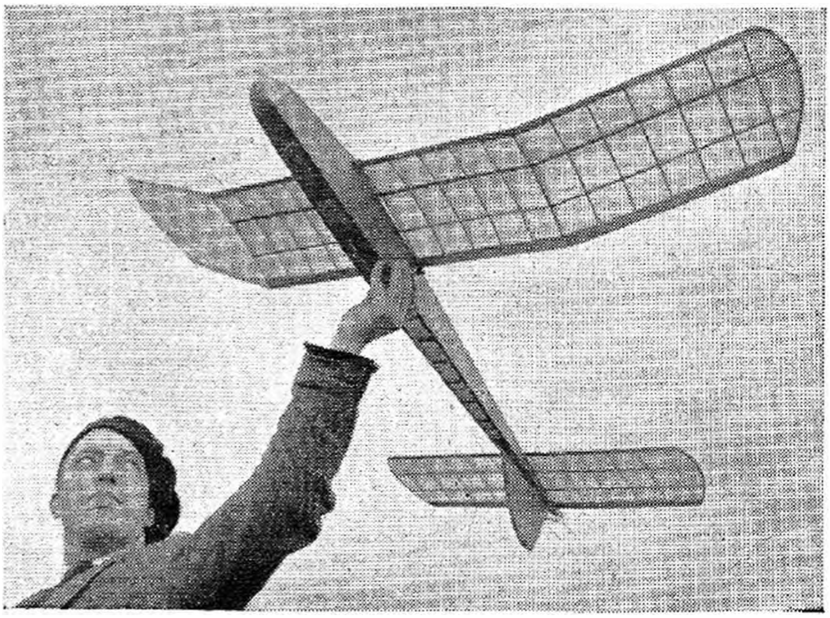
A/2 Trials *Centralised*

1	Byrd, G. C. M.	Loughboro' Col.	15 : 00
2	Linford, G. W.	Loughboro' Col.	14 : 16
3	Hanson, M. L.	Solihull	13 : 25
4	Brooks, A. J.	Grange	13 : 01
5	O'Donnell, J.	Whitefield	12 : 54
6	Power, M.	Belfairs	12 : 48
	Bootland, T.	Scunthorpe	

May 3rd—AEROMODELLER R/C TROPHY

Centralised

1	Sills, E.	Bedford	441
2	Sallis, C.	Cambridge	283
3	Cowell, E.	Knowle	243



J. R. Holt of Barking M.F.C. with his A.P.S. "Corsair," winner of the Thurston Cup at 1953 Nationals, with a terrific third flight of 8:45

May 10th—LADY SHELLEY CUP

Tailless *Decentralised*
(13 entries)

1	Smith, F.	Southern Cross	6 : 27
2	Woolls, G. A. T.	Bristol and West	6 : 15
3	Waters, D.	Grange	5 : 52
4	Harris, R.	Victoria	5 : 34
5	Roe, P.	Littleover	4 : 37
6	Webb, E.	Timperley	3 : 40

May 10th—JETEX CUP

(17 entries)
Jetex *Decentralised*

			ratio
1	Watson, C.	Brixton	32.5
2	Ranson, L.	Hornchurch	31.9
3	Allaker, P.	Surbiton	28.0
4	Reynolds, M.	Cambridge	26.9
5	Lipscombe, D.	Cambridge	24.0
6	O'Donnell, J.	Whitefield	21.1

May 24th—BRITISH NATIONALS

Held at R.A.F. Waterbeach, Near Cambridge

THURSTON CUP

Open Glider

1	Holt, J.	Barking	6 : 00+8 : 45
2	Ridley, D.	W. Middx.	6 : 00+7 : 37
3	King, M.	Belfairs	6 : 00+2 : 16
	Haisman, B.	Belfairs	
4	Giggle, P.	Brighton	6 : 00+2 : 01
5	Rawlings, H.	Belfairs	6 : 00+1 : 44
6	Soame, E.	C/Member	6 : 00+1 : 10
7	Longstaffe, A.	Beavers	6 : 00+0 : 54
8	Lamble, J.	West Herts	6 : 00+0 : 43

"M.A." TROPHY

Open Rubber

1	Bennett, E.	Croydon	6 : 00+4 : 04
2	Gorham, J. A.	Ipswich	6 : 00+3 : 56
3	Dallaway, W.	Birmingham	6 : 00+3 : 10
4	O'Donnell, H.	Whitefield	6 : 00+3 : 01
5	Taylor, P. T.	Kingston	6 : 00+2 : 47
6	Faulkner, B.	Cheadle	6 : 00+1 : 43
7	Wingate, J.	Streatham	6 : 00+1 : 32
8	Snewin, J.	Blackheath	6 : 00+1 : 30

GOLD TROPHY

C/L Stunt

			points
1	Piacentini, A.	Salisbury	282
2	Smith, P.	Chingford	235
3	Wheeler, B.	Birmingham	218
4	Jarvis, M.	Outlaws	213
5	Harper, B.	Outlaws	195
6	Hopkins, B.	South Bristol	183

CONTROL LINE SPEED

Class			*m.p.h.*
I	Dille, M.	Croydon	68.7
II	Wright, P.	St. Alnans	106.5
III	Hall, J.	Chingford	119.7
IV	Powell, D.	East London	124.3
V	Wright, P.	St. Albans	124.3
VI	Davenport, R.	East London	158.7

TEAM RACE "A"

1 Edmonds, R. ... ... High Wycombe

TEAM RACE "B"

1 West, C. ... ... Goldaming

S.M.A.E. RADIO CONTROL TROPHY

			points
1	Suthelrand, S.	West Essex	490
2	Askew, R.	Cheadle	416
3	Fox, J.	Hatfield	402
4	Allen, S.	West Essex	397
5	Rhodes, M.	Harrow	380
6	Sills, R.	Bedford	355

SIR JOHN SHELLEY

Open Power

1	Buskell, P.	Surbiton	6 : 00+1 : 37
2	Horwich, E.	Whitefield	6 : 00+0 : 48
3	Lamble, J.	West Herts	5 : 32
4	Marcus, N. G.	Croydon	4 : 54
5	Smith, J.	Blackpool	4 : 43
6	Godden, R.	Cambridge	4 : 41

SHORT CUP (P.A.A. LOAD)

1	Glynn, K.	Brixton	9 : 00
2	Monks, R. C.	Birmingham	8 : 33
3	Fuller, G.	St. Albans	7 : 47
4	Lucas, R.	Brighton	6 : 22
5	Marcus, N. G.	Croydon	6 : 05
6	Holway, R.	Brighton	4 : 56

June 7th —WAKEFIELD TRIALS

Centralised

1	Evans, E. W.	Northampton	15 : 00
2	O'Donnell, J.	Whitefield	14 : 30
3	Copland, R.	Northern Heights	14 : 18
4	O'Donnell, H.	Whitefield	13 : 59
5	Muxlow, E.	Sheffield	13 : 18
6	Baldwin, R.	Wigan	13 : 14

POWER TRIALS

Centralised

1	Buskell, P.	Surbiton	13 : 36
2	Fuller, G.	St. Albans	13 : 14
3	Upson, G.	Northwick Park	12 : 59
4	Cameron, P.	Croydon	12 : 57
5	Kearns, T.	Leeds	12 : 53
6	Miller, R.	Ilford	12 : 44

First four in each to fly for Gt. Britain at Cranfield

June 21st—KEIL TROPHY

(31 entries)
Open Power *Decentralised*

1	Mitton, D. H.	By-Pass	8 : 59
2	Buskell, P.	Surbiton	8 : 55
3	Gorham, J. A.	Ipswich	8 : 48
4	Bennett, A. D.	Whitefield	7 : 41
5	Butcher, N.	Croydon	7 : 34
6	Harrison, I.	Cheadle	7 : 31

June 21st—FROG JUNIOR

(15 entries)
Open Rubber/Glider *Decentralised*

1	O'Donnell, H.	Whitefield	8 : 56
2	Sleight, R.	Prestwick	7 : 56
3	Francis, A.	Hayes	5 : 48
4	Banfield, A.	Croydon	4 : 14
5	Williams, —.	Croydon	3 : 59
6	McNulty, F.	Leeds	3 : 54

July 5th—SUPERSCALE TROPHY

Power Scale *Centralised*

1	Nachtman, T.	Polish AFA
2	Smith, F.	Northampton
3	King, V.	West Middlesex

July 5th—BOWDEN TROPHY

Precision Power *Centralised*

1	Smeed, V.	Pilgrims
2	Mann, E.	Brentwood
3	Holland, P.	West Herts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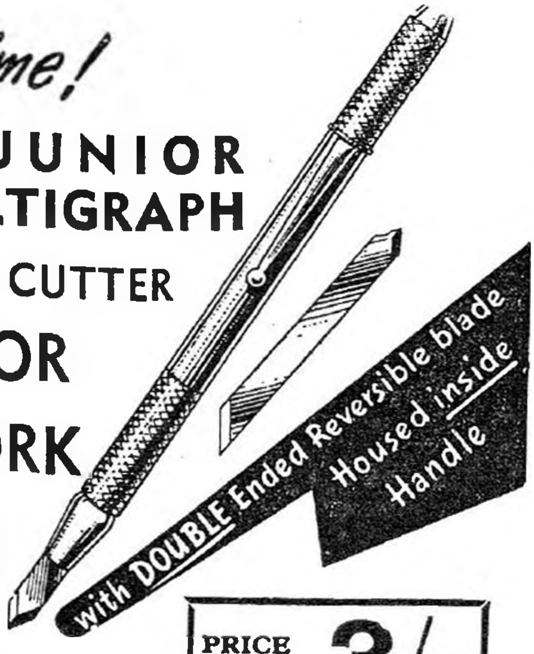
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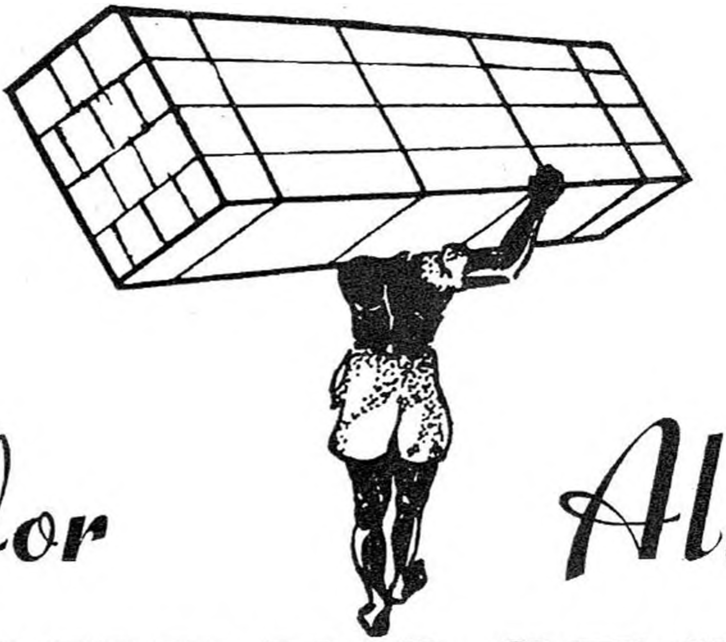

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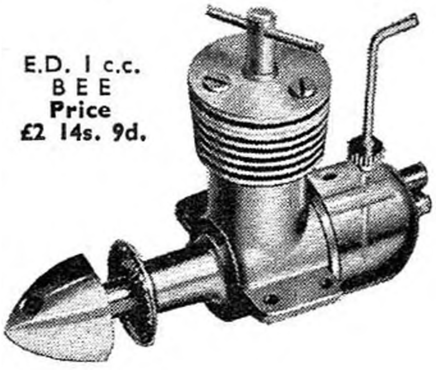

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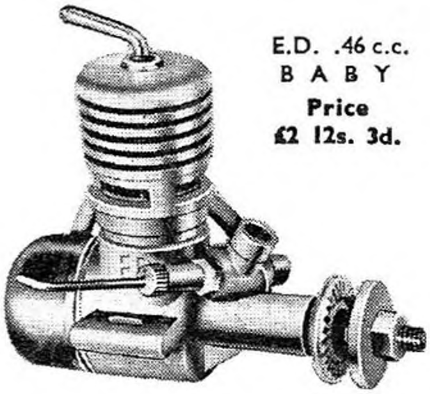

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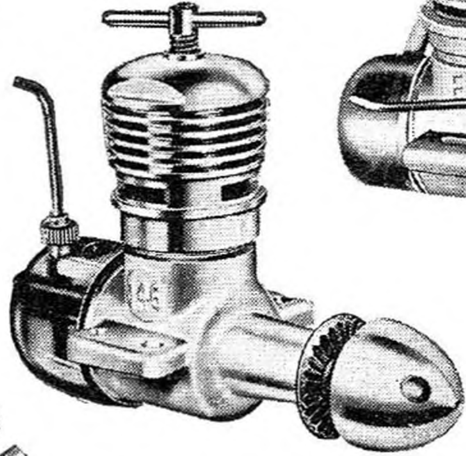

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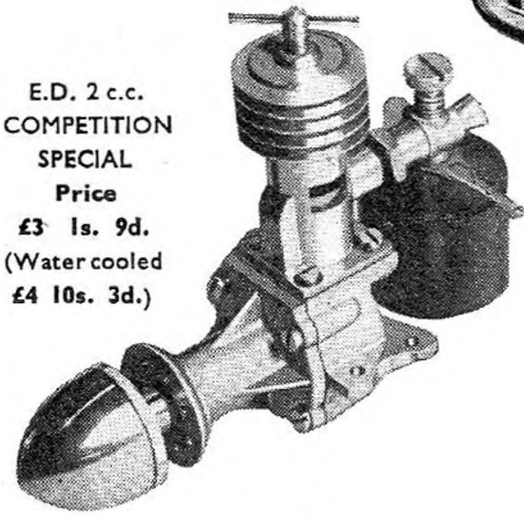

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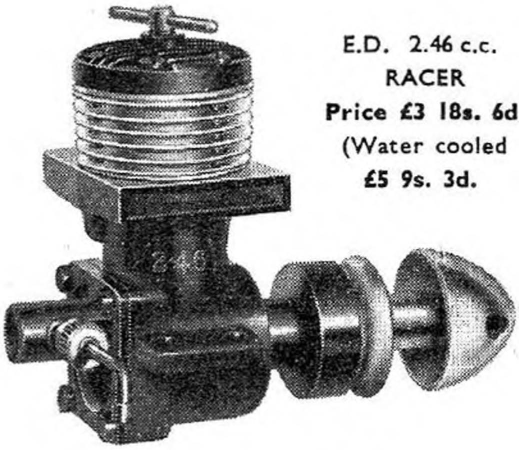

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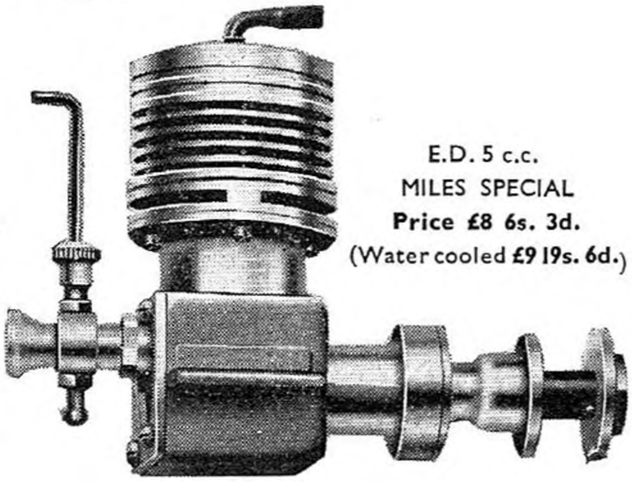

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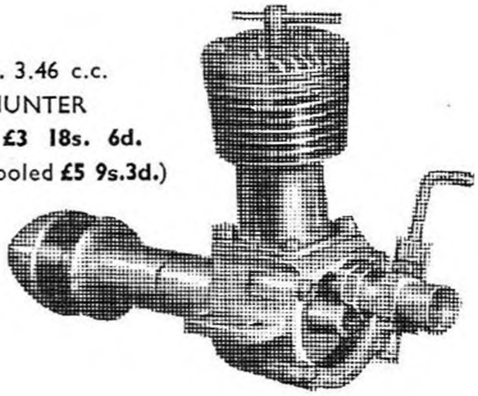

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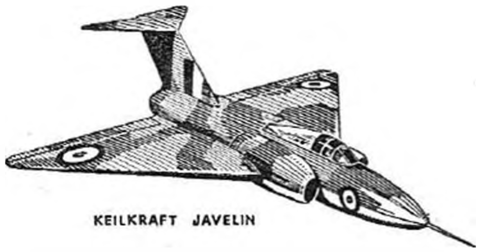

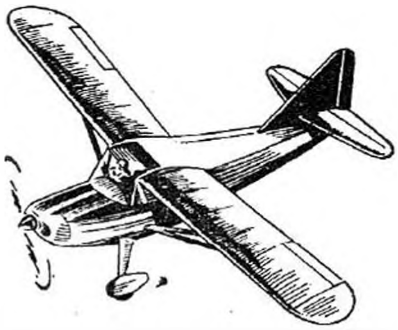

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