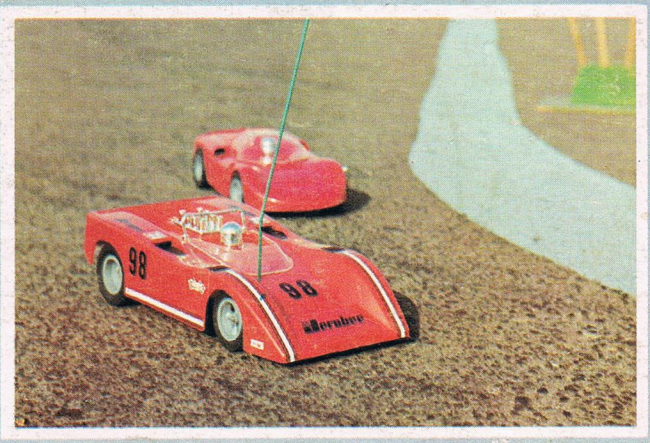
MODEL AIRPLANE NEWS



September, 1972 • 75 cents

m.a.n. at work

In our July 1972 issue we had an article by Horace Hagen titled "Straight Up" which had many shots of the Schlueter helicopter in flight. Roy Gelber of MRC took this photo of M.A.N. at Work taking those very photographs. Flying site was adjacent to N.J. Turnpike.

● You will all have known of the following long before you read it here, but I could not let it slide by without comment. Phil Kraft has taken Kraft Systems still another step forward, one not of his seeking but of necessity and has sold his company to Carlyle and Oliver of Cincinnati, Ohio. He will remain as head of the new subsidiary and nothing will be changed either in management, product quality or innovation. It's a sad commentary that the small businessman —and Kraft could hardly be called small except that in contrast to today's conglomerates it is small—cannot develop to his maximum potential within the present tax structure. Taxes and their portent is what caused the sale as Phil felt it most important to protect the

(Continued on page 85)

ON THE COVER

Free Flight scale of truly gargantuan proportions —Chuck West of Las Vegas, Nevada and his all-sheet balsa 1910 Deperdussin which he claims to be the world's largest of this type. Photo by Bill Hannan. Inset: The little racing beauties shown here are Jerobee's fine 1/12th scale R/C racing cars.

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FOREIGN NOTES

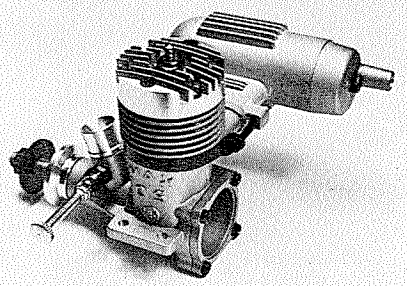
BY P. G. F. CHINN

Rossi 15 Speed — the latest

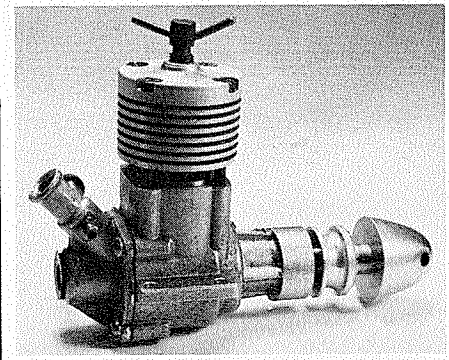
• For the third month in a row we have to report improved speeds with the Rossi 15 in Italy in the final run-up to the World C/L Championships. Fastest qualifying time reached to date is now 248 km/hr (154.1 mph). Incidentally, the Rossi brothers have been working on a rear rotary-valve version of the R.15 and they tell us that first deliveries of the production model will begin in the fall. Sometime during the winter, they also expect to start producing two new Speed engines, a .29 and a .60, both with rear exhaust and tuned pipe.

South Africa

German Webra engines and British Skyleader radio systems seem to be the most popular equipment among South African R/C Pattern flyers, at the moment. At the 1972 S.A. Nationals, winner Max de Weyer had Rossi 60 power and a Kraft radio, but more than half of the entries used Skyleader radio and



New OS-Max 25 complete with muffler for R/C C/L or F/F. Light and compact. Nicely made.



Russia's "Rhythm" .15 diesel. Has drum valve and ball-bearings but disappointing quality.

Free Flight contest scene, could be anywhere in Europe. Actually Soviet Nats. Good field!

an equal number had Webra engines. Of the 32 contestants who actually flew, 17 relied on Webras, 11 used HP 61's, two had Enya 60's and the remaining two used a Rossi 60 and a Super-Tigre G.60. The radio line-up consisted of 17 Skyleaders, six Krafts, five Futaba's, two P.C.S., one Royal Classic and one Rowan-Kraft.

Great Britain

It is to the Cape Radio Flyers' bulletin "Flysheet" that we are indebted for the information contained in the South African notes above, and it was in this same publication that the Pylon racing event at the S.A. Nationals was summed up as follows: "FAI Pylon racing was poorly supported and it is this writer's conviction that much was lost by changing from Formula I machines. They

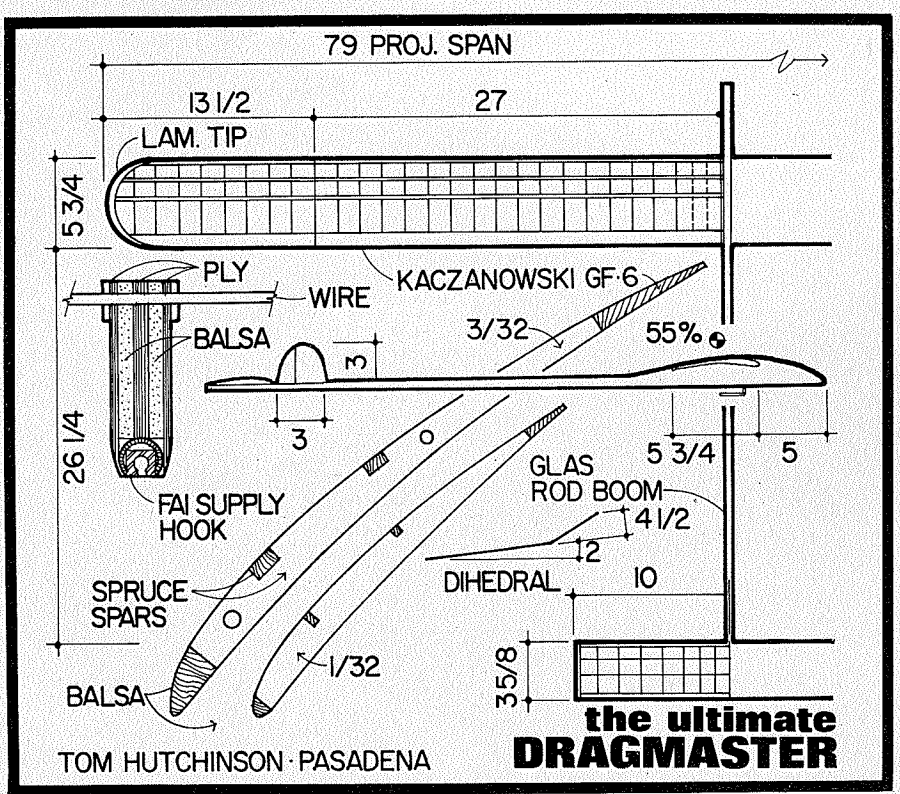
(Continued on page 69)

Free Flight Affairs

RUBBER • POWER • INDOOR GLIDER • FLYING SCALE

BY DAVE LINSTRUM

Young Ken Hannan's (Escondido, Ca.) "Double Dart," twice size D.D. by Linstrum, later lost OOS.



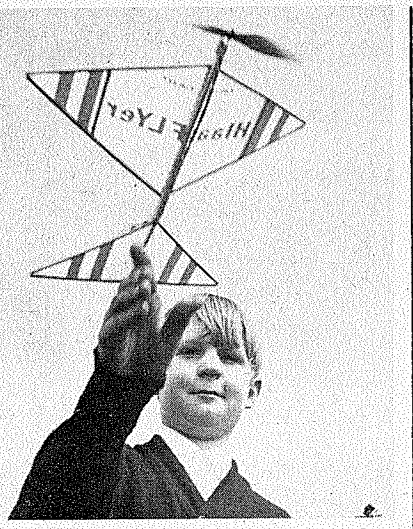
"Thermal Sniffer" man George Xenakis, NF/FS ed. & son moved to Calif. to fly F/F year round.

FREE FLIGHTERS ENDANGER OUR ENVIRONMENT?

• Those of you who know me well are aware that I am professionally and personally (as a citizen) concerned about degradation of our living environment. While I am quite serious about this, and happy to see the restrictions put on mini-bikes, snowmobiles, etc. at Bong (which is also a wildlife preserve as well as Chicago's F/F center), it has also occurred to me that the newest trends in F/F may cause some hapless modelers to become unwitting polluters of the environment! Everyone is trying out new methods of construction involving foams, mylar polyester film covering, aluminum motor tubes and engine mounts, etc. Some guys have even gone to Free Flights made *entirely* from foam—witness the wild Class A job by Dr. Dan Gabriel of Dallas, recently three-viewed in VTO. Another foam F/F'er is Mike Atwood, also of Texas, who whacks out polystyrene foam Nordics. Both these guys must be drinking too much Coors or Pearl, or whatever—they don't know what a threat to the environment they are creating! Every time they fling their foam Free Flight into the air, they are risking losing it (DT fuse and timers are not infallible) and if they lose it O.O.S., where does it go? And what happens to it if it's never found?

Let me warn you plastic polluters—*don't lose your models!* If ever they are found by a wandering Sierra Club backpacker out in the wilderness, he will blame all Free Flighters for your littering. If you want to insure yourself against causing such a problem, use the traditional modeling materials. We all know what a faded-Jap-tissue, pretzel-warped, grasshopper-devoured hulk a normal model becomes in only one season of weathering after loss. So remember the kit manufacturers' slogan of the '70's: *"Balsa is biodegradable!"*

Onoufrienko (with model) & Verbitsky of USSR clown for photog Linstrum at '71 World Champs.



Kenyon Pope, Oregon, launches Delta Dart at elementary school Delta Dart contest.

Actually the above tongue-in-cheek fable does have a moral for modelers —Free Flighters as well as R/C and U/C. That should be self-evident: respect your flying site, don't litter (even by losing a foam F/F) and leave the scene as natural as it was before you came to chase a few thermals.

CRIPPLED COUPES

When Tennessee Ernie Ford recorded "Sixteen Tons" a long while back, he must have had a premonition about the new Coupe d'Hiver weight rules as passed last December by the FAI. Most USA flyers agree that such a rules change was absolutely unnecessary, and far from improving Cd'H flying, only served to ruin what was a fine, simple event ideally suited to beginners. Roger Schroeder of Kansas City, whose "Coupe de Grace" has been proxy-flown on the USA Coupe Team before, has this to say about that:

"Last year the all-up weight of a Cd'H was 80 grams and this year it is 100 grams, an increase of 25%. To analyze the effect of this weight increase I made some 'best guess' assumptions about trim of my old model: wing coefficient of lift is 0.80, glide ratio is 9 to 1, motor run is 30 seconds, dead air time about 100 seconds. Glide ratio should remain at 9 to 1 with 100 grams, and no changes would be made except to add ballast.

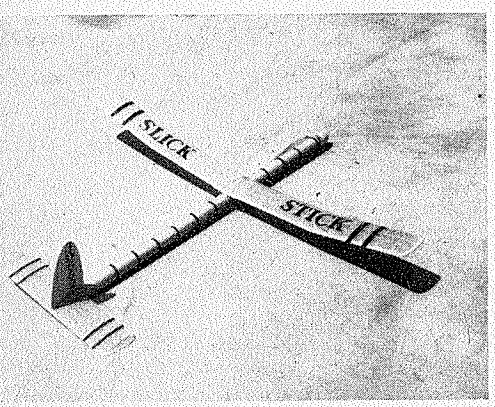
"Now the first thing the increase in weight will do is increase the flying speed (if no changes are made to model) and this can be calculated as $V^2 = \frac{2L}{SC_LA}$ where V = glide speed, L = lift = model weight, S = air density, C_L = coeff. of lift, and A = lifting area. Solving this for the weights 80 and 100 grams gives:

$V_{80} = 13.12$ feet/second

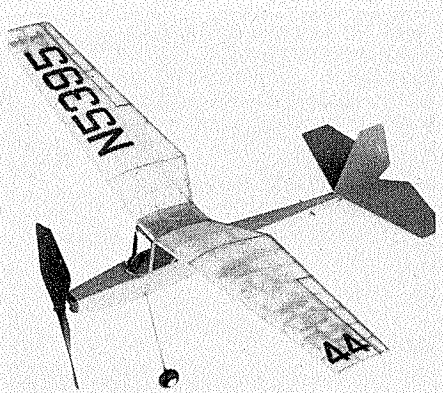
$V_{100} = 15.20$ feet/second

Using the assumed glide ratio of 9 to 1 and a glide time of 70 seconds (100-30), the height reached at the end of the motor run of an 80 gram model was 102 feet. However, with the weight increase, more of the total energy available in the 10 gram rubber motor will be used in lifting excess weight and the total height reached will be less! The new altitude will be reduced in proportion (approximately) to the weight increase or $\frac{80}{100}$ (102) = 81.6 feet. In addition, the motor run will be shorter because the model is flying faster (if prop pitch is not changed) and the 100

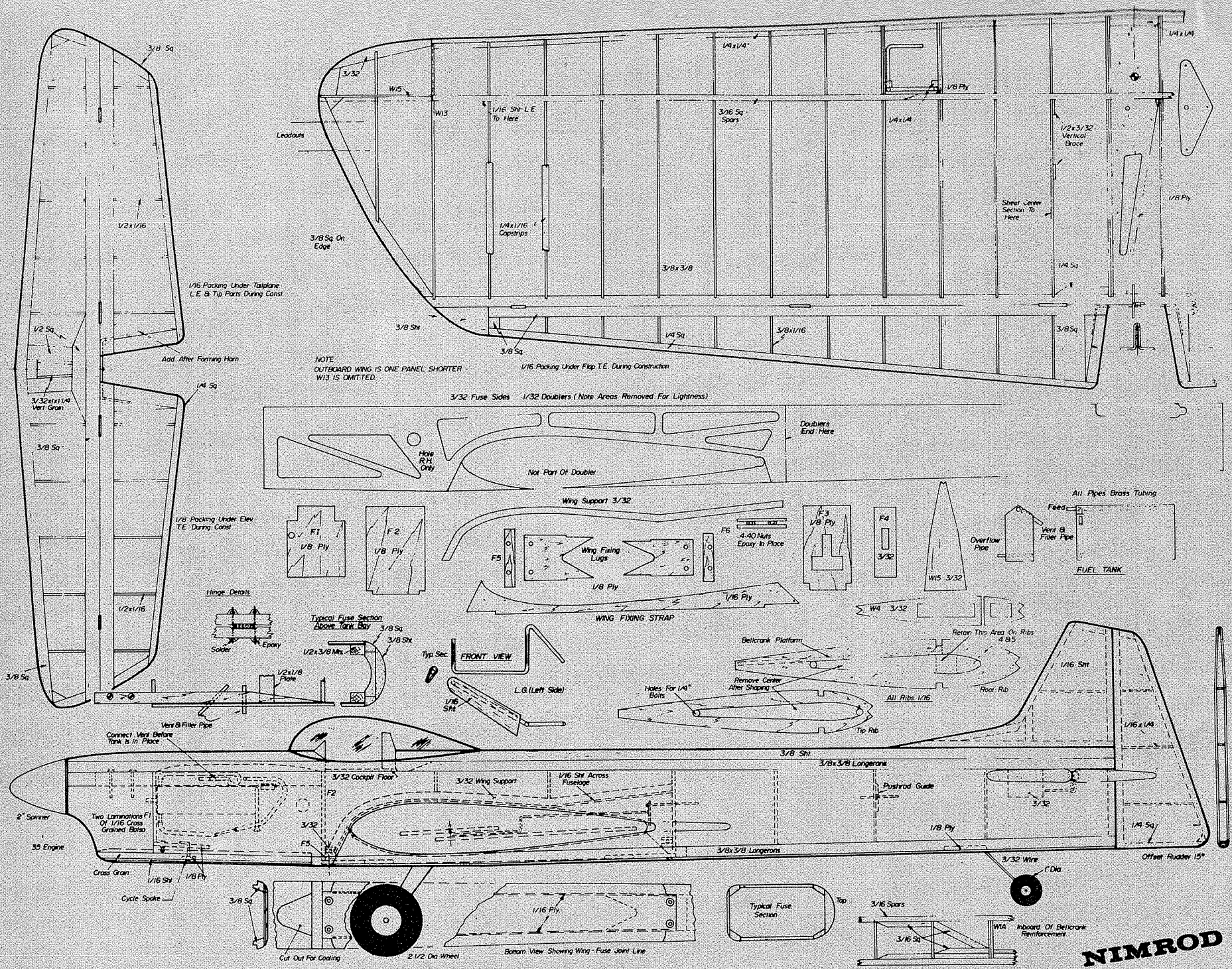
(Continued on page 78)



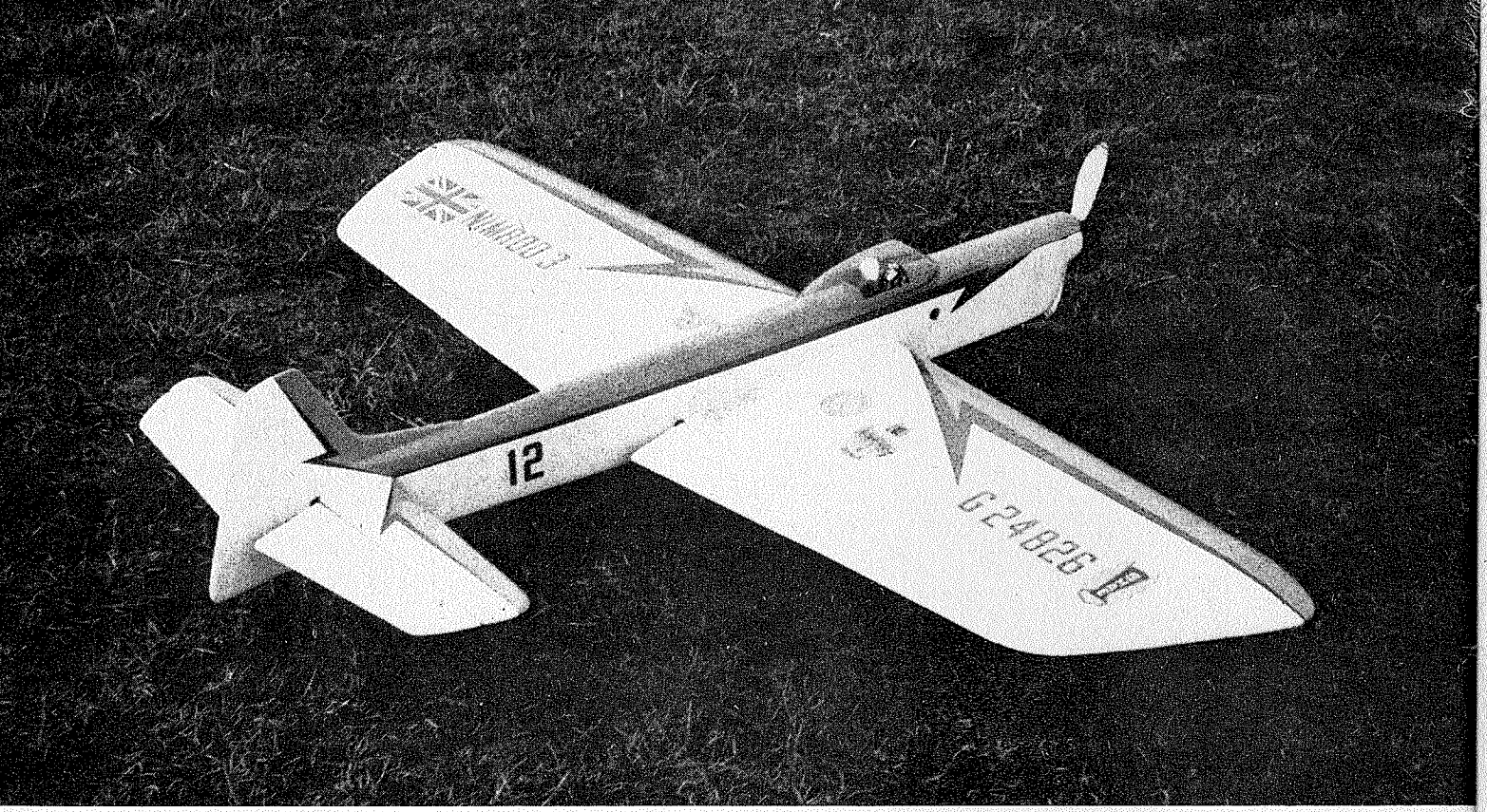
Phil Bernhardt's "Slick Stick," not modern Unlimited but a 1942 design from Air Trails mag.



Tern Aero of Chicago has added this fine little rubber-powered Free Flight to its good line.



FULL SIZE PLANS AVAILABLE – SEE PAGE 74



Nimrod III placed third in the 1971 British Nats, and if protest is upheld, may wind up second — its many wins attest to its contest performance.

NIMROD III

Eight consecutive years of design development to bring this fine Control Line Stunter to its present state of perfection in the art, a winner in British Nats.

BY JAMES MANNALL

How it's done—author didn't clue us as to the identity of his helper, but she enjoys her work.

• Since my first entry into competitive flying in 1962, I have always felt that the key to success lies in *absolute familiarity with the model.* This view seems to be supported by the fact that in Britain, and indeed in Europe as a whole, there are a great many old Stunters to be seen at competitions! To carry this argument a stage further I decided to adopt a standard model from the outset and to attempt to eliminate its shortcomings by continuous development from one version to the next.

My first models were built from a standard kit design, and in the early days I even used a standard color pattern for each model. This, I believe, helped in the early competitions by identifying the model, and hence the flyer, to the judges as a combination they had seen before. This is no reflection on the standard of judging, but as our judges are only human there is an unconscious tendency to look favorably on the established flyers.

It is impossible to say how much success has been due to the above philosophy. Suffice it to say that nine models of the first design were built. Number 1 was eighth in the 1962 British Nationals, Number 9 won the 1968 Nationals.

The first Nimrod design was drawn early in 1968. A different model was long overdue (or so my fellow flyers kept saying!), and I felt I could produce a more up-to-date design with a performance at least as good as previous

(Continued on next page)

models. Four models have been built and flown at this time.

It was decided to have the largest possible wing area without requiring a larger power unit than a .35 Stunt engine. Having been accustomed to flying a 600 sq. in. model, I decided to keep to a big (Thunderbird size) wing rather than the smaller (Nobler) type. Nimrod I was based on a 620 sq. in. wing of constant chord and a 20% thick section. The tail moment was 2" shorter on this first version. The performance of this model was disappointing, with a tendency to kick on square corners and wander in level flight.

A longer tail moment and a tapered wing were introduced for Mark II. The resulting design was a considerable improvement aesthetically and so should fly better—if it looks right it will fly right. I was concerned at this time with future transport difficulties and it was perhaps fortunate that at the 1968 World Championships in Helsinki I saw a detachable wing in use on a Stunter for the first time (Maznic, Hungaay). It was decided to try a bolt-on wing fixing on Nimrod II. A happy decision, as it turned out, since owing to the extra fuselage length two complete Nimrods will not go in my car! Like Mark I, Nimrod II had 1/16 sheet covering on all flying surfaces, and being well strengthened around the wing-fuselage joint, was rather heavy at 54 oz. Performance, however, was acceptable and a great improvement over Nimrod I.

The 1969 Criterium of Aces saw a trend toward a faster, sharper style of flying. Nimrod II had adequate turning ability but its full potential could not be used due to the high wing loading and relatively low flying speed.

For Mk III therefore, wing thickness was reduced to 17.5% and structural weight drastically reduced. This model weighed 47 oz. when new and is a delight to fly. It was first flown just before the 1970 British Nationals, which it won after about ten flights—a very short familiarization period.

Nimrod IV is very similar to its predecessor but has not been used in competition as yet, although its performance matches that of Nimrod III. Minor alterations have been included in the structure of Mark IV and Mark V (now under construction) in order to save more weight, and these have been included on the plan.

Construction is commenced by producing ply templates of the tip and root ribs. Cut 27 rib blanks from 1/16 sheet, labeling them in order 1A, 1B, 1C, 1D; 2A, 2B; 3A, 3B, etc. After shaping the ribs, laminate 1A-1C, and 1B-1D. Also cut duplicates of ribs 4A, 4B and 5A and 5B to make 1/8 ribs for the undercarriage mounting bays. Ribs 1A to 13 are for the inboard wing, 1B to 12B for the outboard wing. Join pieces of 3/8 x 3/8 and 3/16 x 3/16 as shown to form the trailing edge and the main spars. Cut slots 1/8 deep in the trailing edge for the ribs. Construction of the wing framework is commenced by pinning the trailing edge to the board with the slots uppermost.

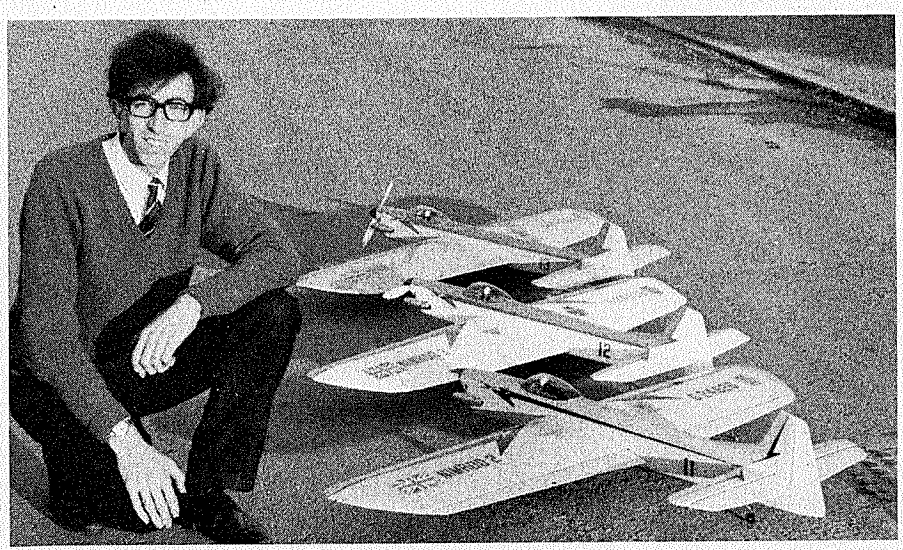
Ribs 1A, 1B, 12B and 13 are fixed in place on the trailing edge, taking great care that they are accurately aligned. The 1/4 x 1/4 leading edge pieces can then be added and, when dry, the rest of the ribs are inserted. Remove the assembly from the board and fit the 3/16 x 3/16 spars. The undercarriage legs and bellcrank platform should be added before sheeting the leading edge.

Build the flaps over the plan; after sanding them to shape, fit the flap horn and attach the flaps to the trailing edge with hinges at the positions shown. Install bellcrank, leadouts and flap pushrod making sure the flaps are at neutral with the bellcrank at its mid-position.

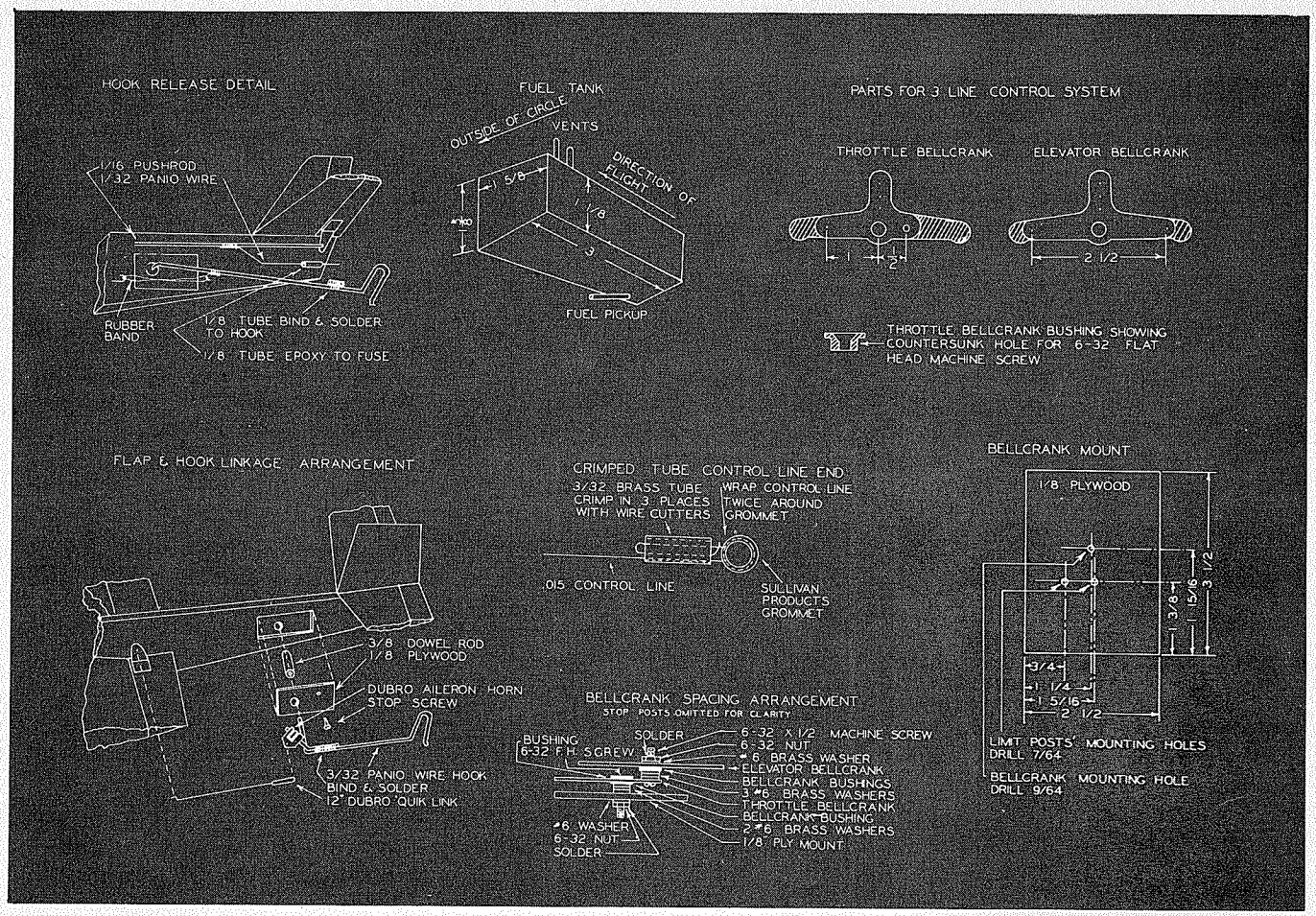
The wing structure can now be completed by adding the tips, center sheeting and all cap-strips.

(Continued on page 68)

Another how-to-do-it: inverted engines start better right side, also throw a lot of oil!



Author with his number 11, 12 and 13 ships. His philosophy of one design to perfection works!



Profile Carrier plane about to make an arrested landing on USS Chicago U-Liner deck. Note the shot-weighted bags at end of arresting cables.

...CARRIER FACTS

All the things you need to know about how to get started in Navy Carrier! Our "how-to" tells all of the basic facts about this very exciting Control Line event.

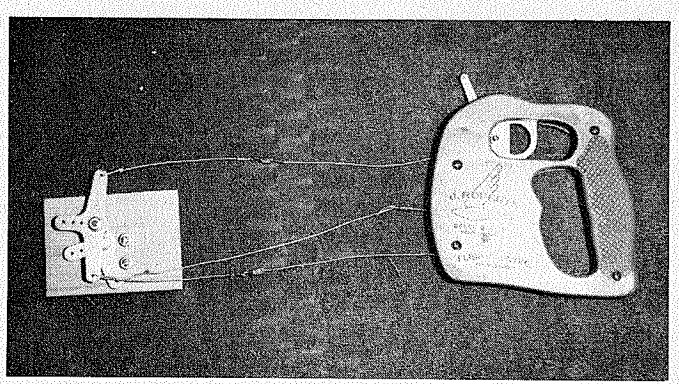
BY HARRY HIGLEY

● Probably any flyer, from the person who flies Sunday Sport to the diehard competition flyer would, on occasion, like to find a low pressure event in which he can be competitive without having to devote his life and fortune to achieve this end. Such events are attempted—Rat Race for example—but with time these become as out of reach as "C" speed. The Profile Navy Carrier event was created for a newcomer and is restricted in ways that will hopefully prevent a person with unlimited time and money from having an undue advantage. To date it appears that this has been accomplished.

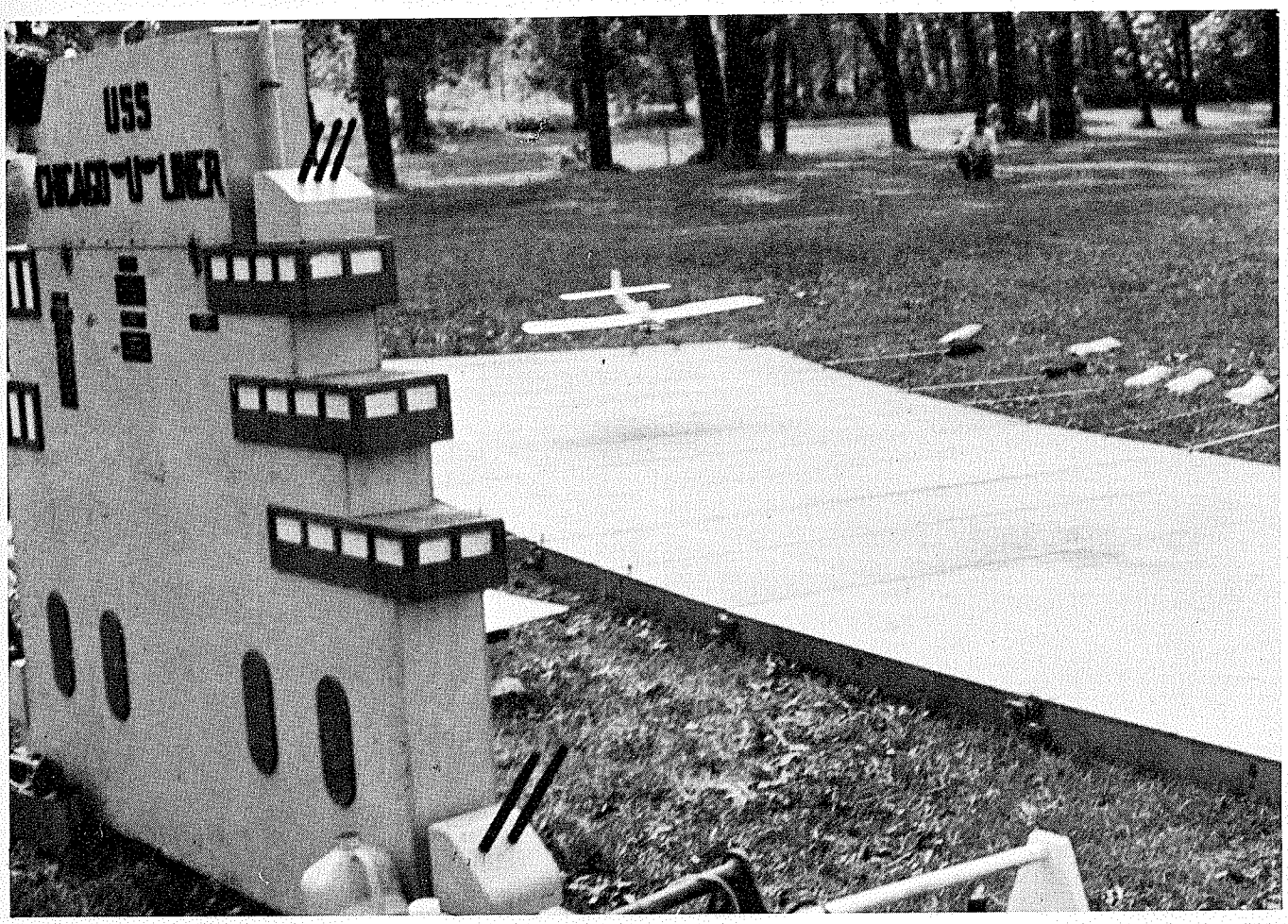
This article will show how to take a Sport Profile kit and modify it to take full advantage of the rules in an attempt to make a competitive ship. Few of the ideas given are new, since several are almost as old as the Carrier event; but it is hoped that this article will put together in one place those topics that are most frequently the cause of trouble for a beginning Carrier flyer.

First let's see if the type of competition provided by this event sounds attractive. The rules specify three attempts to make two official flights. They may

Well done Profile Bearcat by Dennis Downs has working hook, throttle, flaps, ailerons and retractable landing gear. Not a beginner's type!



The J. Roberts bellcrank system in its low speed configuration. Photo clearly shows the stop posts on the plywood bellcrank mount, handle also.



be made at any time during the contest as there is no requirement that a flyer be at a certain place at a certain time as there is in Goodyear or Combat. Carrier does not require great flying skill and endless hours of practice are not needed. A plane may have a life span of several years even if it is used for practice and Sport flying. Motors also last a long time as they only run wide open for seven laps at a time. Should a lean run occur, the flyer may shut the engine down rather than helplessly stand by watching it cook itself. There is very little human element in the judging as the event is flown against a stopwatch. You don't have to be famous or know the judges to win.

The scoring is very simple: 4 × high speed — 3+ low speed + landing points. High speed is timed for seven laps from the plane's release. Low speed is timed for seven laps after the flyer gives a pre-arranged signal to the judges. One hundred points is awarded for a successful arrested landing on the first pass, ninety-five on the second pass and so on. Consider the following hypothetical flight: 80 mph high speed, 25 mph low speed and a 95 point landing. 40 × 80 — 3 × 25 + 95 = 340. Sounds easy? This score will make you a winner anywhere, including the Nationals. Now let's look at the components of a winning ship.

The Plane: The following requirements are specified in the rules and should be used as a check list when planning a ship.

1. Fuselage must be Profile.

2. Landing gear must have at least two wheels.

3. Plane must be equipped with an arresting hook which is no more than one

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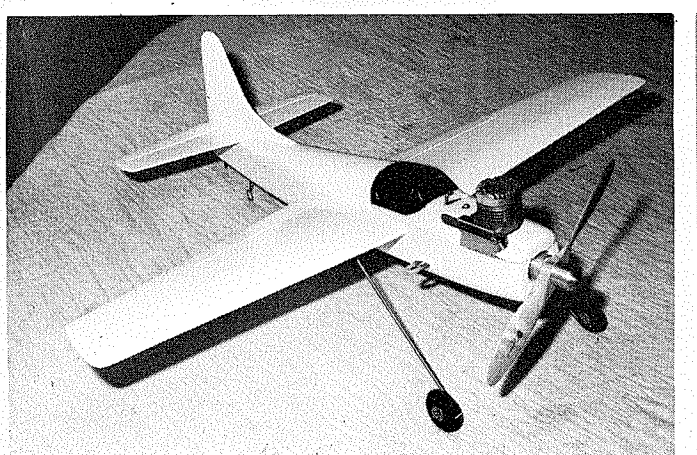
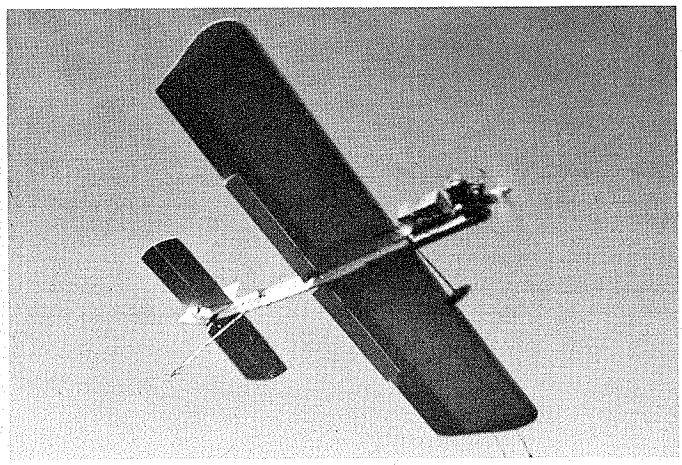
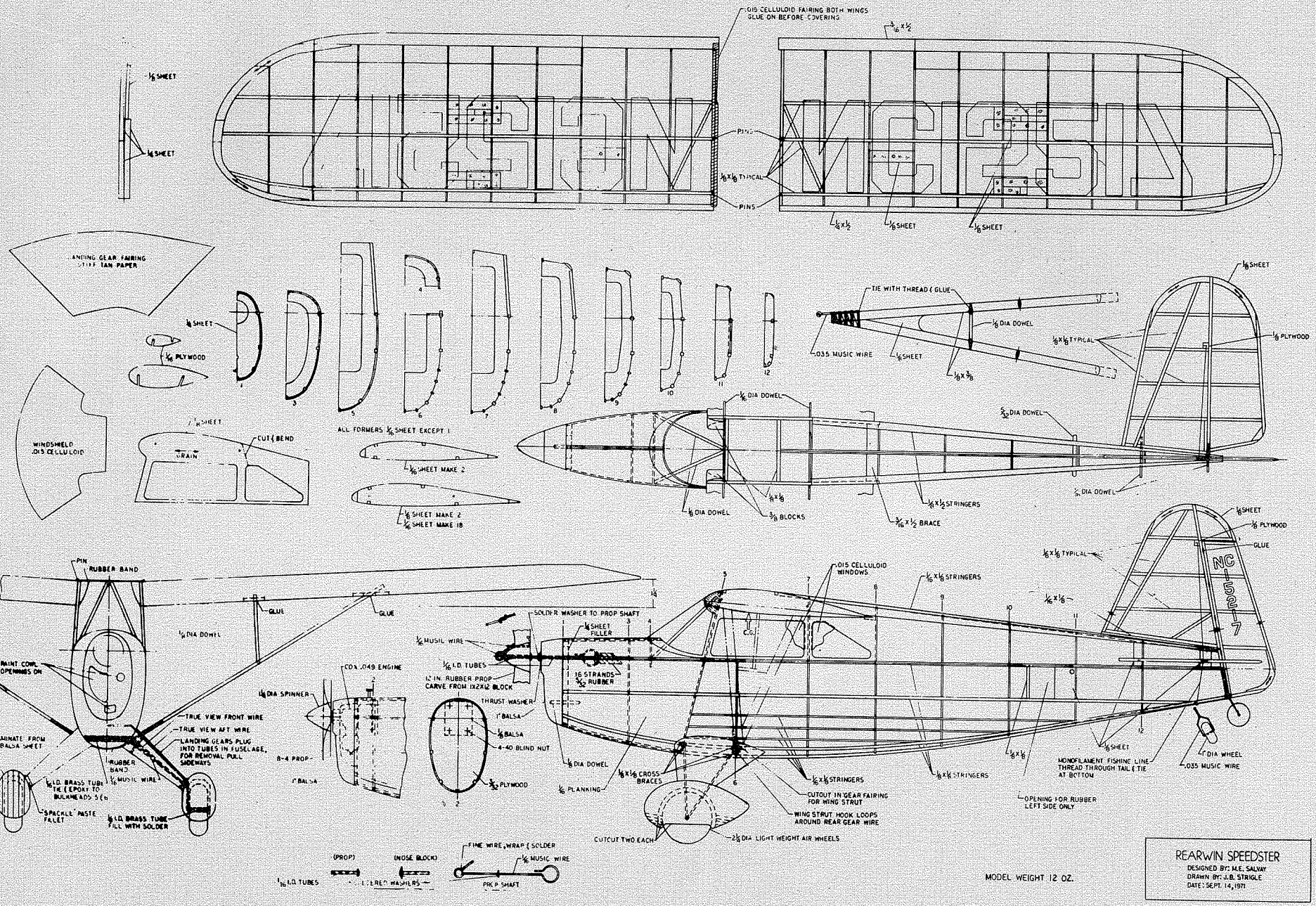


S/T 40 powered Class I ship—if Profile gets dull, move up to Class I & II.



A Profile ship using system suggested here on 17 mph landing approach.



FULL SIZE PLANS AVAILABLE – SEE PAGE 74

Author demonstrates slow, straightforward and gentle hand launch necessary for good flight.

REARWIN M-6000 SPEEDSTER

BY M. E. SALVAY

Exciting rubber or engine powered Free Flight scale by top designer of full scale aircraft who was on the inside or ground floor in hey-day of Speedster.

At rest on the tarmac, the Speedster shows its excellent lines, also author's good building.

• Those wonderful Rearwin's! After being out of production since World War II, many are still to be found flying regularly. No doubt the Rearwin plane that was the most popular with model builders has been the Speedster. In the past 30 years, there has never been a time when either a kit or a magazine set of plans hasn't been available to build a model of the Speedster. I would say that it must rank in the top five of the most popuar airplanes among the scale model builders. Subscribers to Model Airplane News of long standing will recall that in 1967 I started a series of scale plans on the Rearwin airplanes. In October of that year, M.A.N. featured the Sportster as a Free Flight gas model, and in November 1970, the Skyranger as an R/C model. In this issue of M.A.N. I felt the time had come to offer a rubber-powered model. Large scale rubber models seem to be returning to favor, because of the fascination they offer and the fact that they can be flown in any large park area. In this age of the ecology craze, a quiet rubber model doesn't seem to evoke any complaints. As for the remaining Rearwin airplanes, the most significant one yet to be modeled is the Cloudster 8135, a plane that vaguely resembles the Howard line of airplanes.

I don't want to repeat myself in this article, so will not go into the beginning of the Rearwin Company. My first acquaintance with the Speedster came in the summer of 1938 when I worked in the stockroom at the factory in Kansas City, Kansas, during summer vacation from college. We were trying to deliver one of the very few Speedsters ever built, and the touchy Menasco engine just wouldn't start. When it finally kicked off, after much, much hand propping, it was only two hours later before we got notice of a forced landing in eastern Missouri.

This was the probable reason for the Speedster's lack of sales in those days —an airplane's reputation was made by the engine it carried. To the best of my knowledge, no more than ten or so Speedsters were ever built, and the surprising thing is that most are flying today as antiques. The prototype Speedster flew in 1934 and, at that time, was equipped with the popular Cirrus engine. The 95 HP was not too large, but Rearwin quoted a top speed of over 140 MPH with that engine. The prototype had certain stability problems which plagued it, but finally with considerable redesign and with the 125 HP Menasco, the plane became a real show stealer. Although the Speedster had a designation as the Model 6000M, there were several external variations, mostly in the cowl lines, windshield contour

(Continued on next page)

Close-up of full scale bird from author's file.

REARWIN . . . CONTINUED

and cabin window treatment. The model presented here is copied from photos of the final Speedster configuration as featured in Jane's "All the World's Aircraft" of 1940. Although the Speedster was not the most popular Rearwin (possibly its 1938 $5,000 price tag had something else to do with it), it did become the father of another Rearwin plane called the Cloudster. The wings of the Speedster became the wings of the Cloudster and also of the final version of the Sportster. Probably the most novel feature of the Speedster was its landing gear. No doubt this streamline design coupled with the beautiful lines of the plane's nose made it a most graceful and appealing airplane. The performance with the Menasco was equally sensational. Rearwin quoted in their literature of 1938 a top speed of over 160 MPH. I am inclined to believe these figures because, during the time I worked for Rearwin as a designer, we did not inflate our performance figures to any degree on the later models designed there. One has to remember that the Speedster was not much heavier than a Cessna 150 of today. Somehow the old steel tube and fabric planes came out lighter than today's all-metal small planes. Such is progress.

The landing gear of the Speedster has always been the bugaboo of modelers. Just look at any of the Speedsters featured currently and none have the proper gear. In creating this model, I have attempted to incorporate reasonable accuracy, including proper fuselage contours, window treatment, airfoil section, incidence, and other details which make the model more authentic but do not affect its flying qualities. One final word on that gear—it was a welded truss arrangement using shock card as the energy absorber. Most people thought it carried the same design as a Stinson Reliant, but there was no resemblance in any manner under the fairing.

Here are a few statistics on the Speedster: wing span, 32 ft.; wing area, 145 sq. ft.; empty weight, 1,052 lbs.; gross weight, 1,700 lbs.; fuel capacity, 34 gal.; cruise range, 600 mi.

Packing in the turns: plenty rubber apparent, using conventional hand drill to wind rubber.

The plane had an absolute minimum of flight instrumentation and all were equipped with wood propellers. Wheel pants were standard. One large door was provided on the right side, and the cabin interior was doped fabric with metal bucket seats. The cabin noise was deafening with the four port exhaust manifold. If you didn't go fast, you at least had the feeling of speed. Needless to say, visibility by today's standards was substandard.

But these don't interfere with nostalgia or model building. The model is not too difficult to construct and the plans are completely detailed. For those die-hards who can't go back to rubber, I suggest a Cox .049 gas motor as a substitute. Use an 8-6 prop and add a bit of weight to the tail for balance and I am sure you will have a real winner. I would suggest lightweight Silkspan and only three to four coats of thin dope.

(Continued on page 56)

Author's sons do their thing with the Speedster—Bennett, 15, holds, Michael, 11, packs in turns.

Line-up of Carrier contestants in a recent contest sponsored by the Albuquerque T-Birds of Albuquerque, N.M. All types are shown in photo.

ROUND & ROUND

Combat • Speed • Stunt Racing • Slow Combat

BY JIM DAVIS

• Does your club have a starving treasury? If it does, you're not alone. Most clubs are usually tight for a buck. There are times, though, when a little cash comes in handy for club trainers, equipment, flying fields, etc. More than once I have heard a modeler remark, "Boy, if we had enough money, we could do so-and-so or buy such-and-such. . . ." And that's as far as it goes. Sitting around and dreaming won't get you anywhere. If it's something you *really* want, then it's not impossible to get.

A good example of this is a report by Roger Stern in the "Prop Shaft" newsletter of the Salisbury (Rhodesia) Model Aircraft Club. Their fund-raising activity was an Air Show and although this was basically an R/C activity, it is food for thought for any type of club:

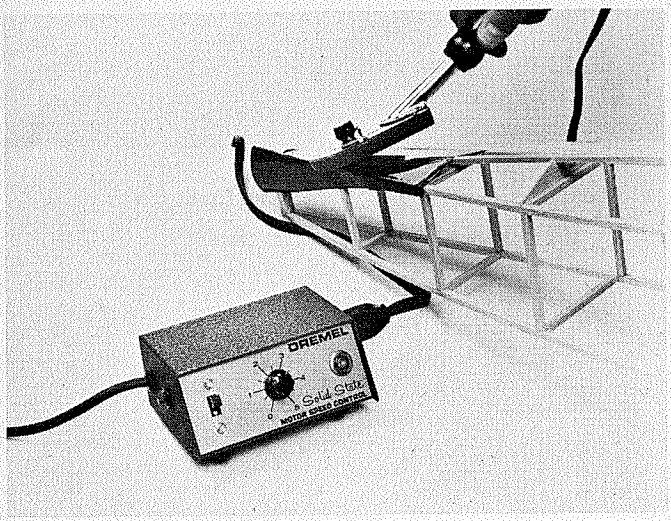
"This year's Annual Air Show, held on Sunday May 7th, was another combined club affair to raise money for the development of our new field. Show was a success again and, until the figures are finalized, an estimated profit of between $1,300 and $1,400 was cleared. This brings our development fund to approximately $4,000. This money is to provide the facilities at our new club field, work on which should be starting soon.

"The Executive Committee, this year headed by Collie Byron-Moore, were hard at work weeks before the show. Most of the expenses went to advertising (approximately $350), which was well done, giving a full coverage in the paper, T.V. and radio. In fact, they even managed to get Mike Cook, Ann Hunt and myself on a T.V. interview, with some of our models, on the Saturday afternoon prior to Show Day.

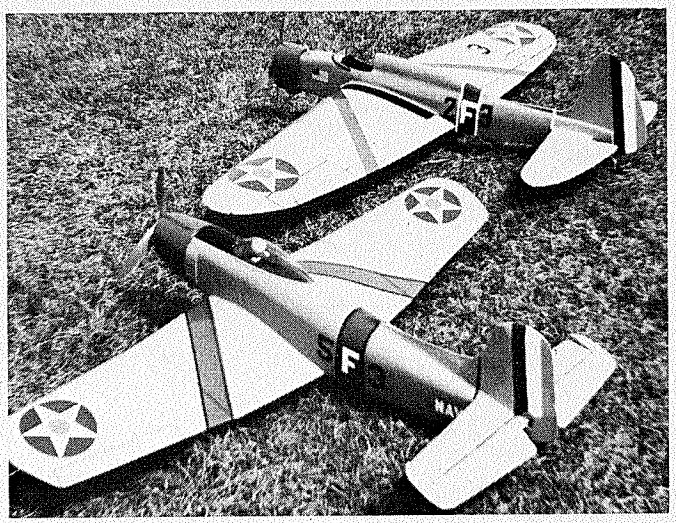
"The usual pattern of doing two separate two-hour shows, one in the morning and one in the afternoon, was followed. Events included Streamer Cutting, Limbo, Pylon Races, Aerobatic Display, R/C Gliders and Scale flying. Also included was some Control Line Combat and Free Flight launches, all following a closely scheduled timetable. The weather turned out pleasantly warm, but with a strong wind which upset the Limbo as the tapes would not hold. The first of three prangs happened here when Barrie York flew his Kwik Fly right into the Limbo pole. The afternoon Limbo was more of a success as the wind dropped and the tapes held well. Our second accident happened here as Bob Brown also hit a Limbo pole.

"The third accident was due to a mid-air collision during a Streamer Cutting event between Dennis Hunt and Barrie York (again?). Dennis' model was a complete write-off, but Barrie's *borrowed* Cherokee was hardly marked. All other events went off extremely well, with the most effective, I think, being the "middle stick" Pylon race where the pilots were not trying to win, but flew for the public and kept in a tight bunch all the time with the lead changing dozens of times causing great excitement in the crowd.

"One very successful innovation this



Dremel Speed Control unit can be used to control temperature of Mono-Kote iron, hot glue gun, etc. Gives precision control; $16.95 retail.



More Carrier birds: Martin Mauler and a modified Midwest Panther kit in pre-World War II colors. Fine models are by Chicago's Joe Averitt.

year was to have two teams allegedly competing against each other in the Limbo and Streamer Chasing events. This, coupled with excellent commentating by Peter Ashford throughout the two shows, really brought the public into the picture and everyone was shouting for their team. Even a week after the show, I heard complete strangers talking about "Looney Bell."

"With regard to the weather, we were extremely lucky to have a good day with plenty of sunshine. The week before, it rained on Sunday morning and on the Monday after the show. Then look at our C/L and F/F Nats, only two weeks after the show—cold and very windy. All in all, the show was a success and according to ticket sales, we had a total attendance of 4,786. Thanks must go to the Executive and Flying Committees, flyers, gate and parking teams and all the members who helped."

This is a good example of going to the "outside" for funds. In other words, instead of relying on members for revenue, offer something for the public to purchase. Control Line, being captive, can be flown in smaller areas than R/C, areas such as stadiums or parks which give a better control of the crowd and cut down on the free loaders.

Contests are usually money makers although most clubs have found they break even on the entry fees and make their profit on the concessions.

The most sure-fire way of making money these days is bottle-collecting. Although not as glamorous as an air show, it's a way of making a buck and you don't have to pray for good weather for it to be a success. Most communities have glass recycling facilities (no, you can't recycle that busted Combat ship!) and once you have located it find out what they require (usually all they ask is that you separate the different color glass), print up hand bills (mimeograph is okay) so the local citizens can save their bottles. Be sure to set a date when you expect to pick up. You could have a continuing cash flow by picking up bottles every two weeks, monthly or whatever, and people will get in the habit of saving them.

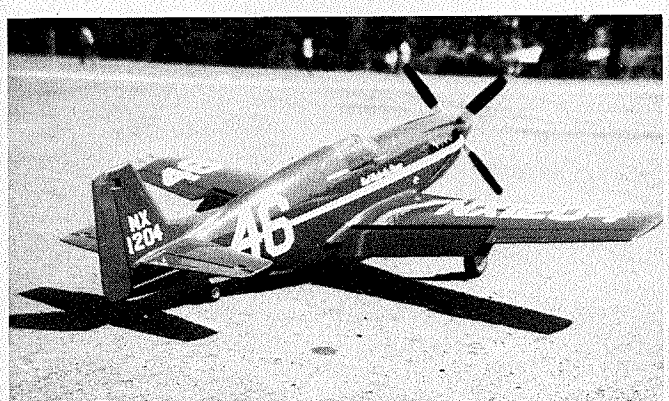
Empty bottles bring more money per pound than old newspaper, scrap iron, or any other collecting that I can think of.

Many companies offer items for resale such as candy, fruit cakes, candles, etc. and this is sometimes a tough way to raise funds by door-to-door selling, but many shopping center managers will allow groups to set up a table and sell items for fund raising. A project like this should be combined with a Static model display or even flying demonstrations to attract a crowd.

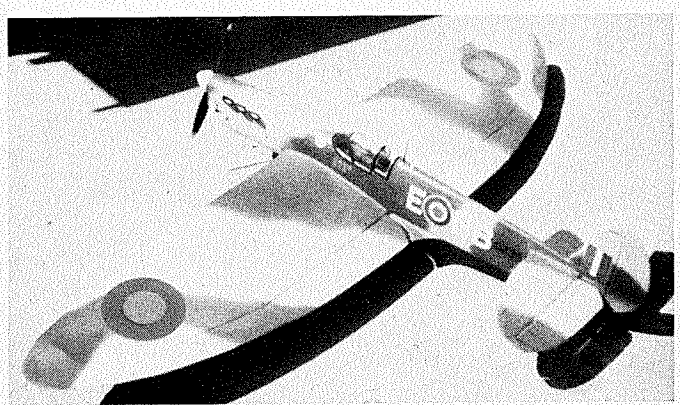
In order to generate and maintain enthusiasm among club members, you should not raise funds just for the sake of raising funds. There should be a definite reason why you need money—a goal. Club trainers for new members, a Carrier deck, Speed pylons, stop watches, even purchasing land for a flying field! So, step number 1 is to decide what the money is to be used for; then total the cost of the item(s) to be purchased. Be sure to include costs of raising these funds (i.e. renting tables, printing costs, etc.). This total amount is your goal. If your club has a permanent meeting place, make a poster with a graph or thermometer so all members involved can see the progress, for with progress you have continued enthusiasm.

Sometimes funds can be raised through donations from local merchants and industries. Before asking for dona-

(Continued on page 71)



Scale P-51 Air Racer with Paul Mantz paint job: George Miller's (Santa Rosa, Cal.) 44" model has sliding canopy, flaps, throttle, Veco 60 R/C.



Profile Stunter by Jack Tabor of Marseilles, Ill. 60" model is powered by a Fox 35, weighs 48 oz., Spitfire outline and camouflage job.

Radio Control SPEED & SPORT

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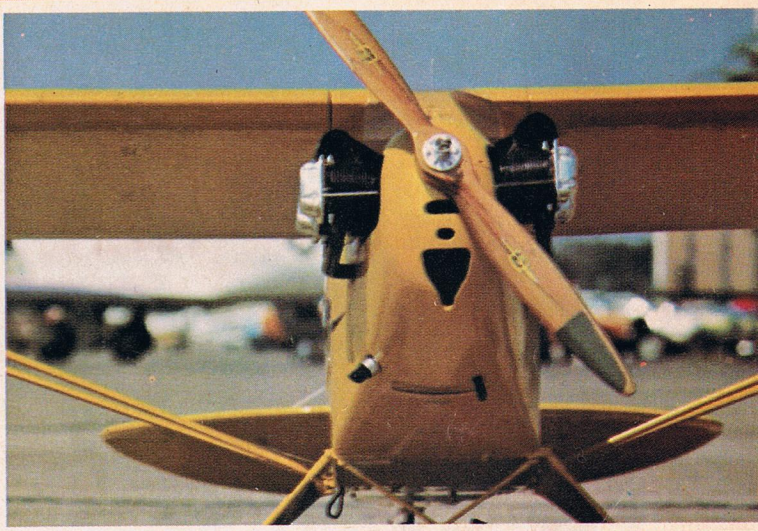
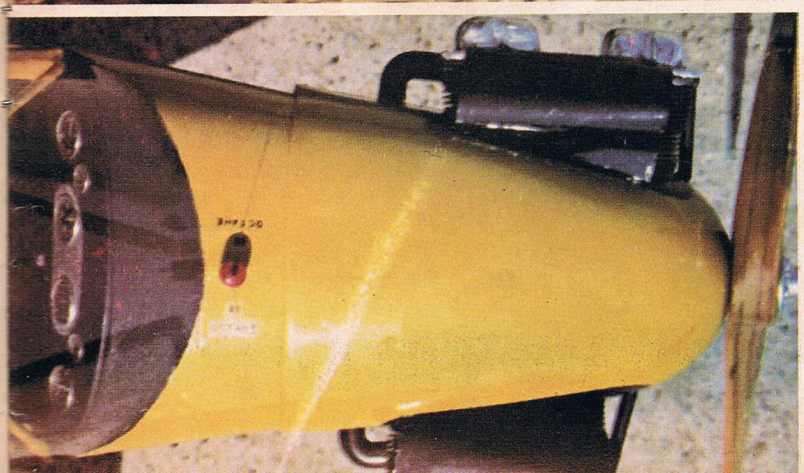
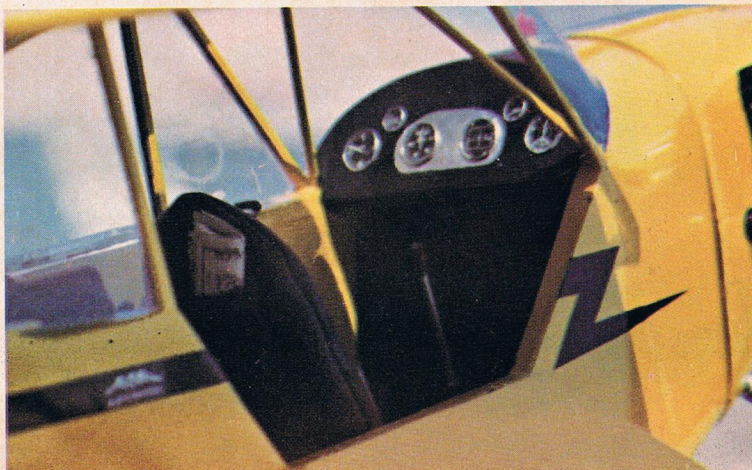
Magnificent scale Piper J-3 Cub shown in this series of photos was designed and developed from SIG kit by Charles Viosca, Dallas, Texas. Model just won 1st in Scale at Ft. Worth National Fun Fly with score of 395 points!







Author with two of these efficient birds in their military colors. Both have rudder only, but what a good size rudder. Note vertical receiver antenna.

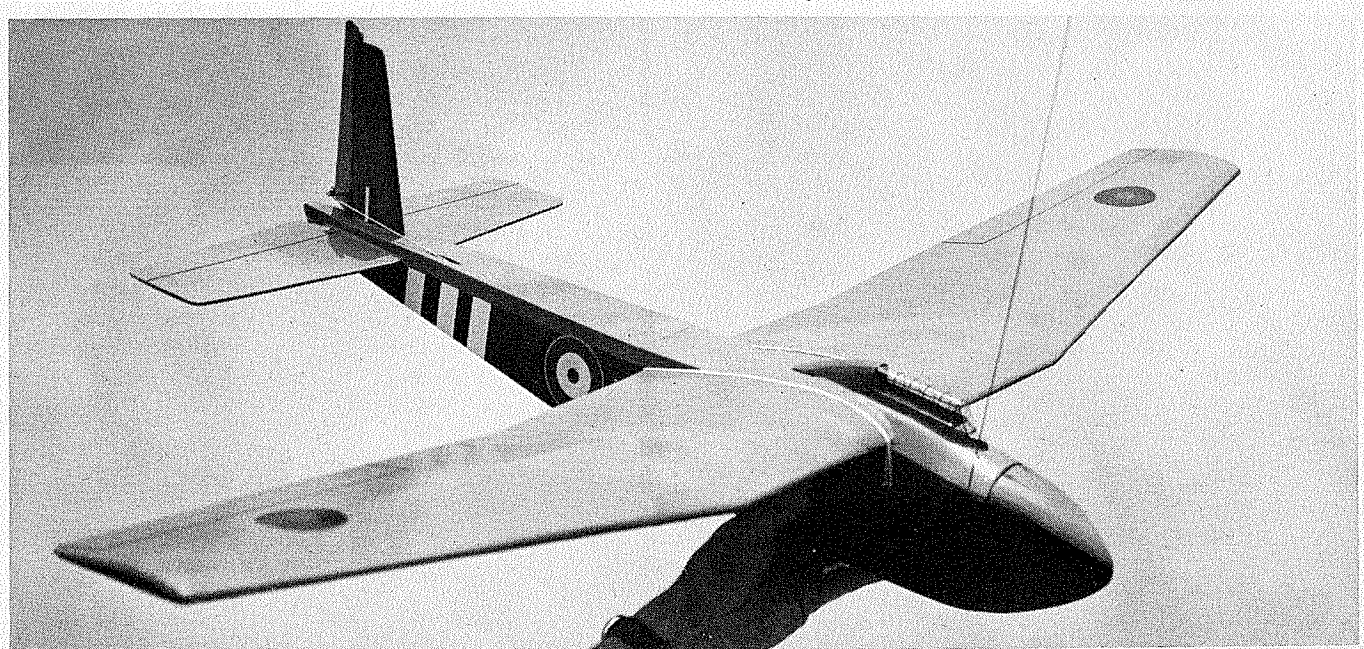
General Aircraft "HAMILCAR"

BY JACK HEADLEY

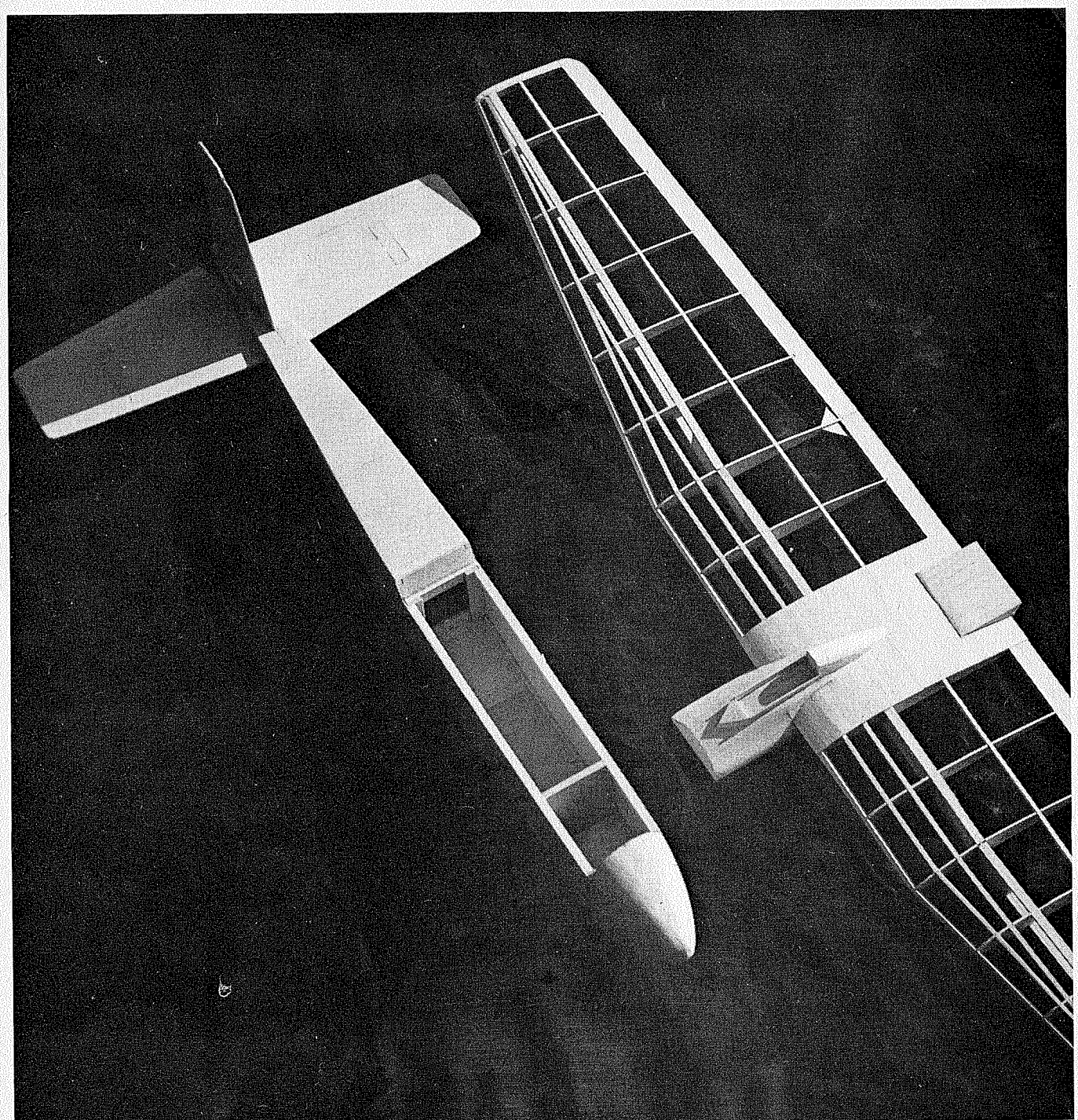
• We've been quite interested in single channel gliders for the last couple of years; maybe this is a sign of getting older, now that we like to do our flying standing still rather than 50 laps around Sepulveda Basin every weekend! (Still, one or two visits down the slopes to pick up a becalmed glider is quite sufficient exercise for a sunny afternoon.)

However, the fact that the local R/C glider slope is only a two-mintue walk from our workshop may have something to do with it. So, various shapes an dsizes of gliders have been produced, including some Scale types. The model we present here is one of our latest Scale models, the "Hamilcar." The full scale version was built in England during the 1940's by General Aircraft, and was the largest and heaviest glider used by the Allies in the Second World War. It was so big that a four-engine bomber was required for a tow plane, and it could carry a seven ton tank. Over 400 were built, and one version with its

Another view of the Hamilcar — note the simulated elevator and aileron outlines. Little greenhouse on top of wing shows comparative size of plane.



A true Scale version of a well-used WW II troop and cargo-type glider for single channel flying. Slope soaring is its main forté but can be towed for thermal hunting!



Uncovered fuselage and wing elements — simplicity is the keyword with sheet and block construction. Note inset strips of balsa in stabilizer.

own engines was begun. This was the "Hamilcar X," and although a few of these were constructed, they were never to see action. Our model is a true Scale version of the normal "Hamilcar" glider, with the exception of the fuselage width which we slimmed down a little.

Construction is quite straightforward and should present no problems. The following notes were compiled during construction to aid the prospective builder.

Fuselage: Begin fuselage construction by cutting out the sides from 1/16 sheet, and cementing in place the 1/8 square longerons and uprights and the 3/16 square strips for the wing rests. These sides are joined with frames 1, 2, 3, and 3B, and when these have dried, the rear fuselage is glued together. Now add the 1/8 square cross strips and the local gussets as shown on the plan. The bottom sheeting is attached next; note that the grain of the wood runs *cross-ways*. Make the stabilizer, omitting for now the trim tabs, and cement this into place. Add the upper fuselage sheeting, again cross-grained. The fin is slotted

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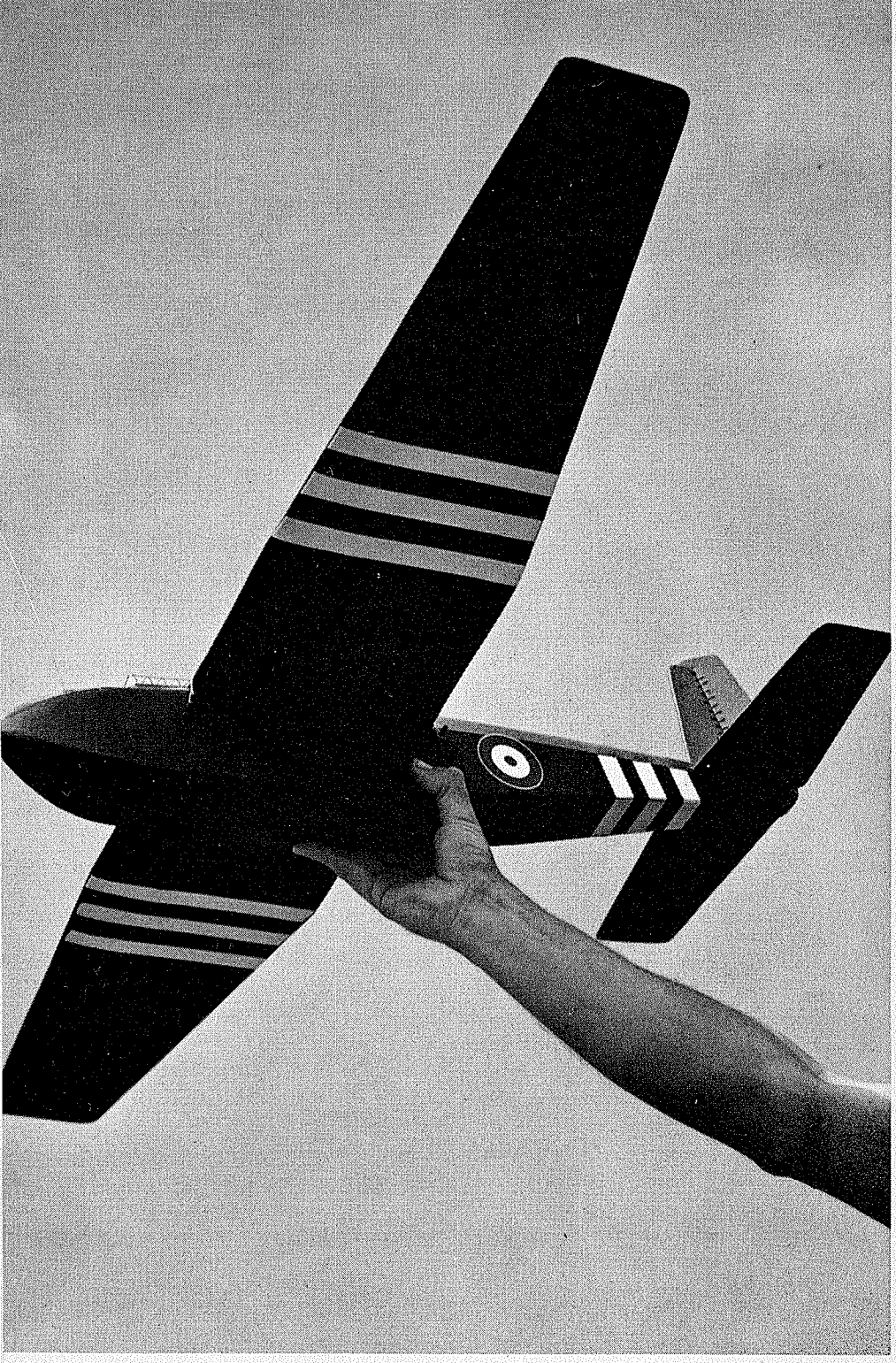
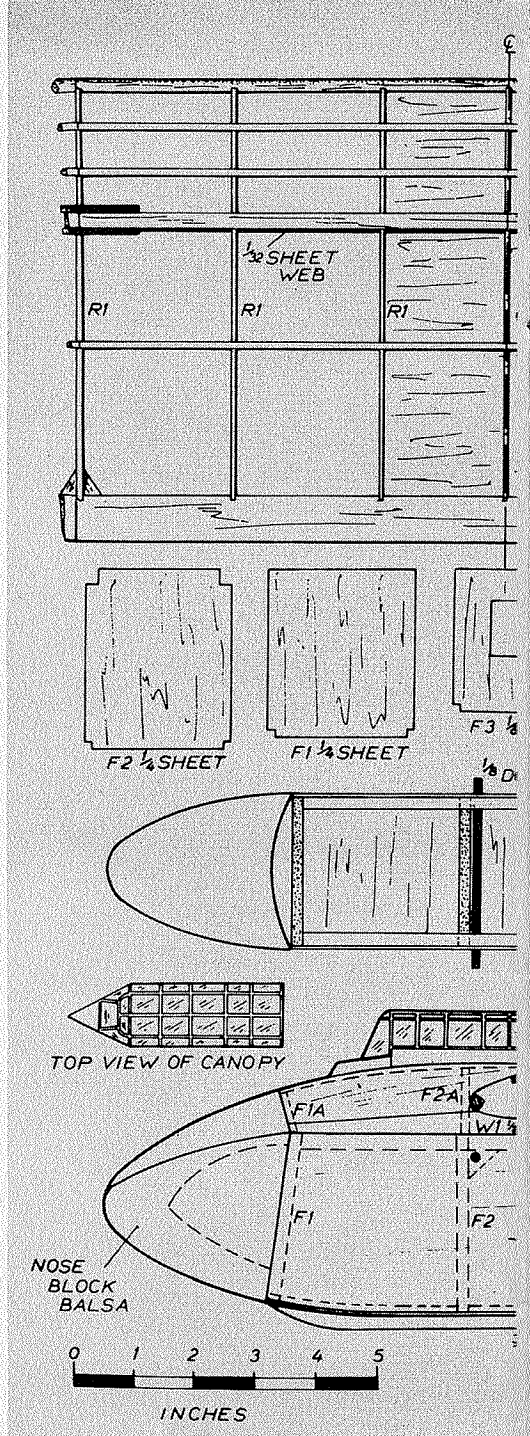
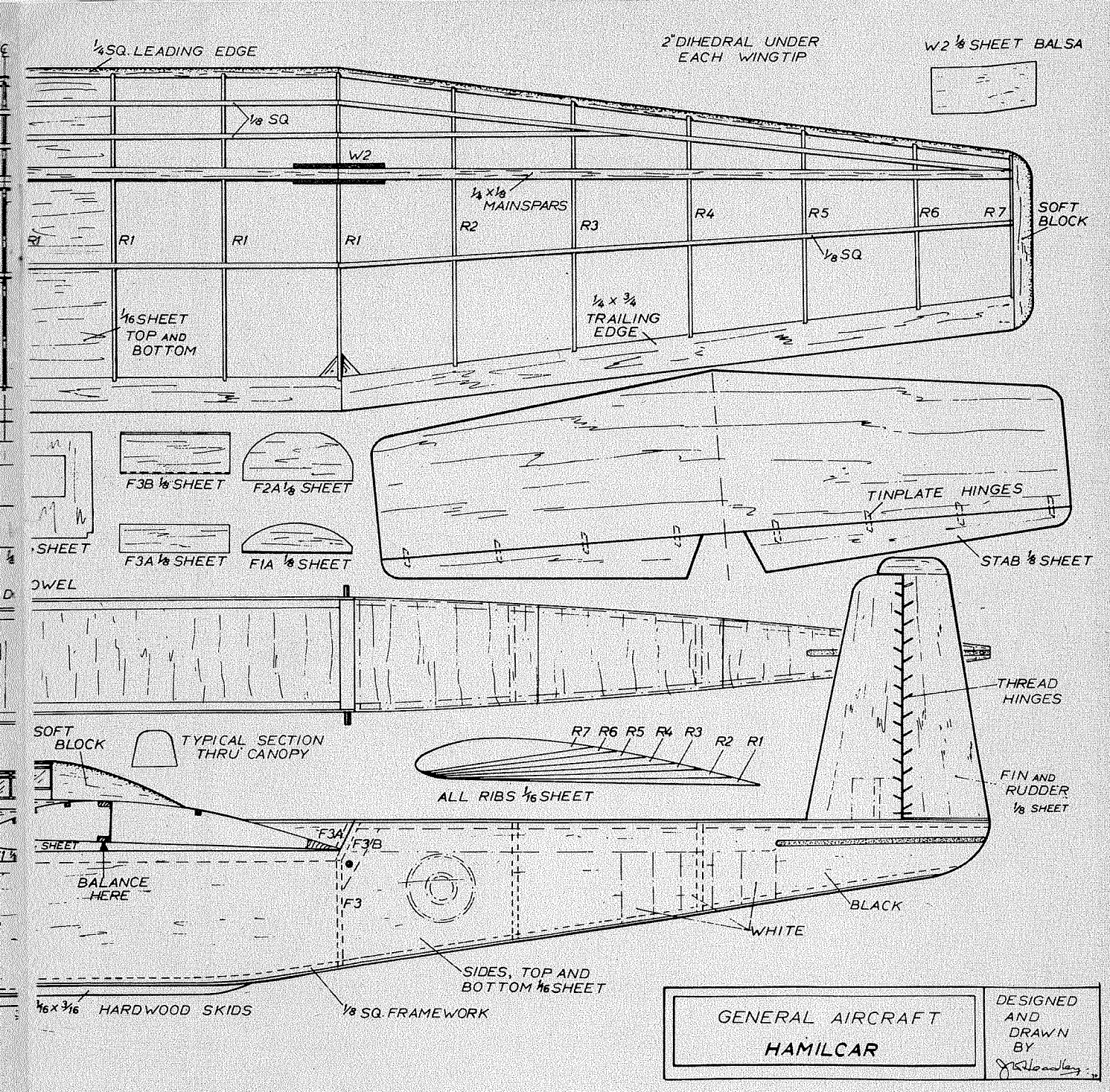




HAMILCAR . . . CONTINUED

into this sheeting. Hinge the rudder to the fin by carpet thread, or use your own pet system. The trim tabs can now be attached to the stab, using scrap pieces of tinplate. Make the nose either from a solid block of balsa, or laminate it from 1/2" sheets. Hollow this out as shown to provide a weight box. Addition of the two hardwood skids completes the fuselage construction.

Wings: The wings are made in three pieces, a flat center section and two tip sections. Cut out seven R 1 ribs, two each ribs R 2 to R 7 and slot for the spars. Pin down the center section trailing edge and spars, and cement into place the five central R 1 ribs. Now add the top spars, the leading edge and the webbing behind the main spar. The wing tips are made in a similar manner, the port wing tip being made on the back of the plan. No wing twist is required. When these three pieces are dry, they can be joined together. Pin down the center section flat, and prop up each wing tip two inches to give the required dihedral. Join the main spars with dihedral braces W 2; four of these are required. The last two R 1 ribs can now be installed. Add the soft block wing tips and the center section sheeting at this stage. While this assembly is drying, frames F 1A, F 2A and F 3A can be made, together with the wing mounts W 1. The canopy region is now attached to the wing structure. Pin down the W 1 pieces to the fuselage, and cement the wing in place, followed by F 1A, F 2A and F 3A. Plank in the remaining spaces with 1/16 sheeting, and add the canopy structure. The cock-



FULL SIZE PLANS AVAILABLE — SEE PAGE 74

pit canopy can be made either from celluloid or soft balsa blocks painted silver.

Radio: The original model used a Testor's "Simpulse I" system, but any other radio of around this weight should be suitable. No particular mounting system is shown on the plan, but for the Testor equipment we mounted the actuator on a plywood board which was glued between two 1/4 square strips in the main compartment. Receiver and battery were packed into the forward compartment with foam rubber.

Finish: One of the basic color schemes for operational gliders of this period was called "standard night bomber finish," and this is the scheme shown on our model. It consisted of black undersides, the black extending three-quarters of the way up the fuselage. This black is described as a "velvety non-reflective preparation," but we substituted flat black. The upper surfaces were camouflaged dark green and dark earth.

Gliders had little in the way of code letters; usually only a serial number was applied in red on the rear fuselage, a typical Hamilcar number being RR994. We also painted "D-Day" stripes to the fuselage and underside of the wings to relieve the black finish, and then applied the roundels in the usual places.

Flying: We would like to say that the model flew straight from the building board (everyone else's models always seem to do this!), but it wasn't so. The first flight was a series of tremendous stalls, the last of which deposited the model into a nice patch of soft rocks. However, no damage was done, and the addition of a small lump of lead soon cured this problem. The C.G. location so determined is shown on the plan. No other flying problems were encountered. ■

MCDONNELL RC CLUB

FLIGHT-A-MONTH AWARD

JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

The membership of the McDonnell Douglas Radio Control Model Airplane Club hereby acknowledges to friends and modelers everywhere that:

ED HENRY

has successfully operated the flight of a radio-controlled model airplane during each month in the year of 1971. This award is issued in recognition of this commendable performance requiring both skill and perseverance. Here to after, he shall be entitled to all honor and prerogatives of membership in the Flight-A-Month Club.

Issued this
4th day of December 1971
St. Louis, Missouri

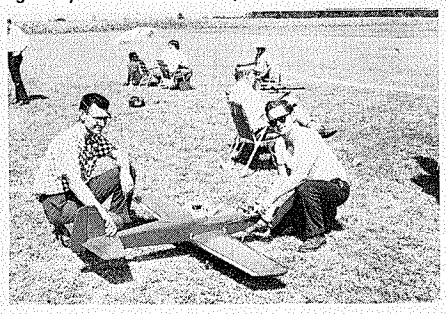
MCDONNELL RC CLUB

R/C News

BY ART SCHROEDER

All pix this page cover the annual R/C meet staged by the McDonnell R/C Club of St. Louis.

Jim House helps Ben Lanterman ready his Pattern bird for flight — looks like a Bar-Fli.



Al Signorino (Snoopy's Dog House) & Dave Abel prepare Red Baron for Snoopy dog fight.

What the well-dressed man will wear at McDonnell Annual: Larry Killian with Pattern bird.

Linda Stephens tries out Ed Henry's famous Fly Seat—Ed advises that plans are available.

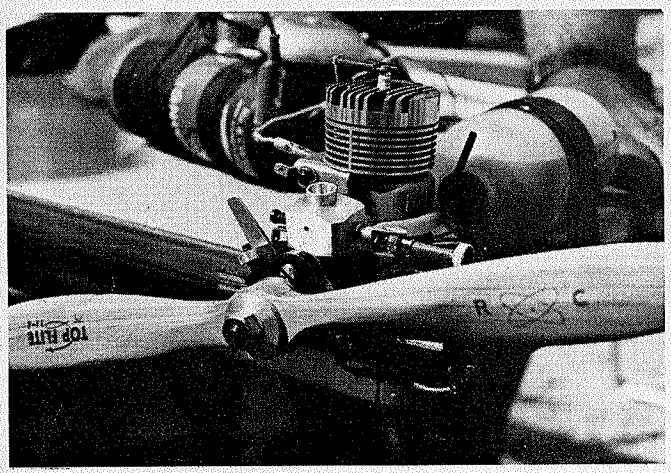
Another Ed Henry original, the Gum Drop; .020 powered rudder-only bird uses Ace Commander.

Fine Scale entry by Al Pickup. Al's excellent C-104 Jungman garners very many Scale points.

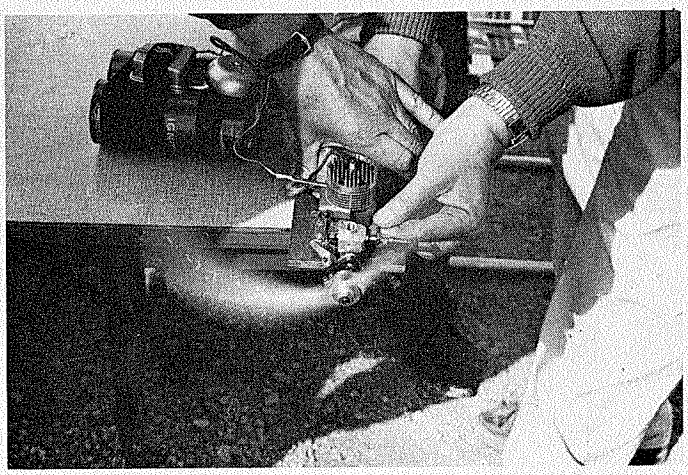
• Around the country there are clubs that have, for one reason or another, gained national prominence. This frequently results from affiliation of famous R/C personalities with the club, or just as frequently because of some special and well done activity. Sometimes a club's high visibility results from both factors.

Our vote for America's most active club could well go to St. Louis' McDonnell R/C Club, a club affiliated with McDonnel Aviation in that city. We base this on a number of items we have seen in recent months on a wide variety of activities that keep a club active and alive, all part of McDonnell R/C. Monthly meetings reported in their fine newsletter usually have a well-known speaker or program of intense general interest. Interesting, worthwhile meetings provide building blocks for a successful club, and a good newsletter, regularly published, provides the cement. But the St. Louis boys don't stop here . . .

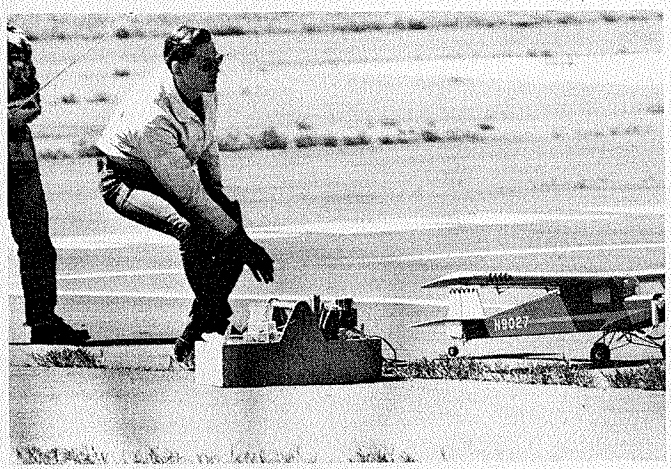
Each August this club runs the largest R/C meet in the mid-West and also holds numerous club events, Fun-Flys and demonstrations. "Get 'em out and flying" seems to be their motto. Enhancing the flying end of a club is a recent Flight-A-Month Award; in a nutshell, this award is given to any member performing at least one successful R/C flight during each month of the year—it's a great stimulant. McDonnell's operation isn't really different—just well done and varied: not only is the club active, they don't hide their light under a basket. Recent issue of the St. Louis Post Dispatch carried a full color, four-pages-plus story on club's activity along with the Greater St. Louis Modeling Association that promotes model aviation in the



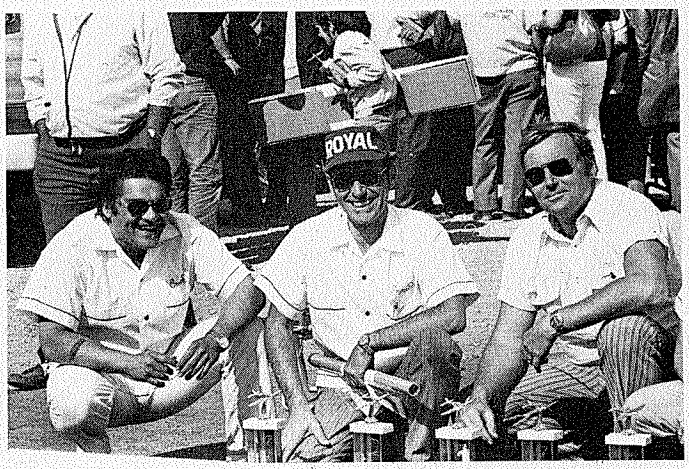
M.A.N.'s Al Novotnik readies Enya 60. Tlush ignition system—see text.



"Very smooth" is Al's report, as the Enya settles down to good power run.



Jack Frischornect gets off his Country Gentleman at R/V R/C Novice meet.



Scene at R/V R/C meet (L/R): Ernie Weiss, Ernie Emrich and Bob Viebrock.

area and ties together activities of R/C, F/F and U/C. Club has a very effective communication system with all modeling publications which provide exclusive (we wish everyone did) pics to each on their various activities. If you think your club is lagging, you might want to take a leaf from McDonnell R/C's notebook.

By-the-by, they have more than their fair share of personalities: Al Signorino (Mr. Snoopy, AMA Veep and the real hand behind the Club's publicity and newsletter program), Ed Henry (never to be forgotten flight seat and AMA safety program), Bob Underwood (well known Scaler), Don Baisden (electronic wizard), Al Pickup (Stuka) and, we are sure, many, many more.

* * *

We continue to kick a power/duration design around on paper and have finally settled on a set of design parameters that should fill a clear and present need for a non-arbitrary Power event (i.e., *you* against the *clock*). No longer do we suggest that this is an assumption of radio control by Free Flighters (they can—and will—join this thinking sooner or later), but we speak rather of a new R/C event.

We are presently looking at lines for a 600 sq. in. design for .19 to .23 power. Airfoil would be typical flat foil with high point at about 40% of chord (modified Clark Y) and a 10-12% thickness. Possible sink advantages of undercambered foils would, in our mind, be outweighed by climb ability of flat airfoils that have real ease of construction. High percentage of present winning Free Flights use flat bottom foils.

Stabilizer would be lifting with consequent CG placement at 70-80% of wing chord. It seems to us that basic yaw control would be enhanced by straight, moderate dihedral with a high thrust line roughly splitting the fin/

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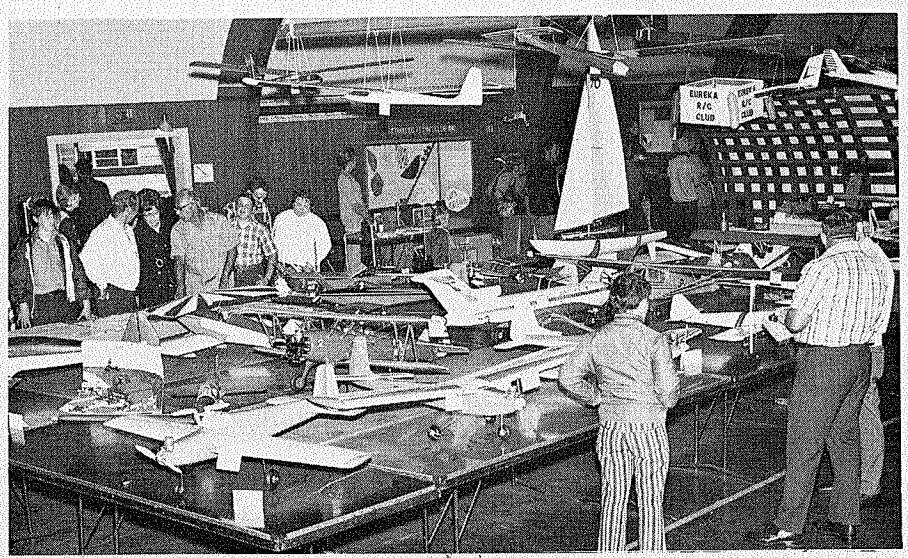
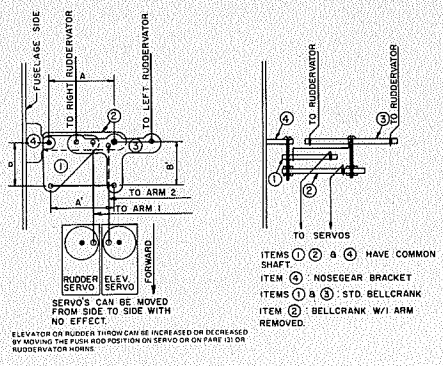


Eureka R/C Club of Eureka, Cal. display at local Kiwanis recreation show. 14,000 people attended.



R/C NEWS . . . CONTINUED

rudder. Equal taper wing has an appearance we prefer, so we plan for that; a 1/4" washout in the tips seems wise.

Pitch control would be handled by a relatively small hinged elevator surface; basic function would be one of trimming. Stab relationship to wing area would be 33% while 5% or so would handle fin/rudder. We like a positive wing (3-4 degrees)with stab at zero; engine thrust zero-zero. Flight tests to determine final settings. Nose moment very short with a long tail moment about 4-1.

Construction would be D spar for wing and profile/built-up for fuselage. Equipment needs to be served by any of the light-weight brick configurations.

A twist we would add to R/C duration that might satisfy the Free Flight purist, is power operation *without* radio! This would be insured by cutting receiver power *on* only after timer has cut engine power *off*. That ought to separate the men from the boys. Rules for Free Flight R/C (or R/C Free Flight) would involve limited engine runs and some max level, i.e. 15 seconds, 5-6 minute flights (anything longer would kill the event with waiting; tie breaker could be that final unlimited flight). Other rules for aircraft size and weight will delevop naturally — would personally prefer to see size limit of .15 to .19 engines. Airplanes of described size and power will climb like scalded cats and give plenty of glide performance to climb performance. Hit us with your thinking!

* * *

We're getting somewhat embarrassed by our inability to get into print final results of the interference suppression system for ignition engines. Our access to the testing equipment has been cut off for the past 6-8 weeks due to extensive job requirements at the plant where the equipment is housed. We could publish a system we believe will work, but without full testing, this would make us uncomfortable at best.

Our testing will involve a balsa box housing all ignition components—coil, condensor, nickel cadmium supply,

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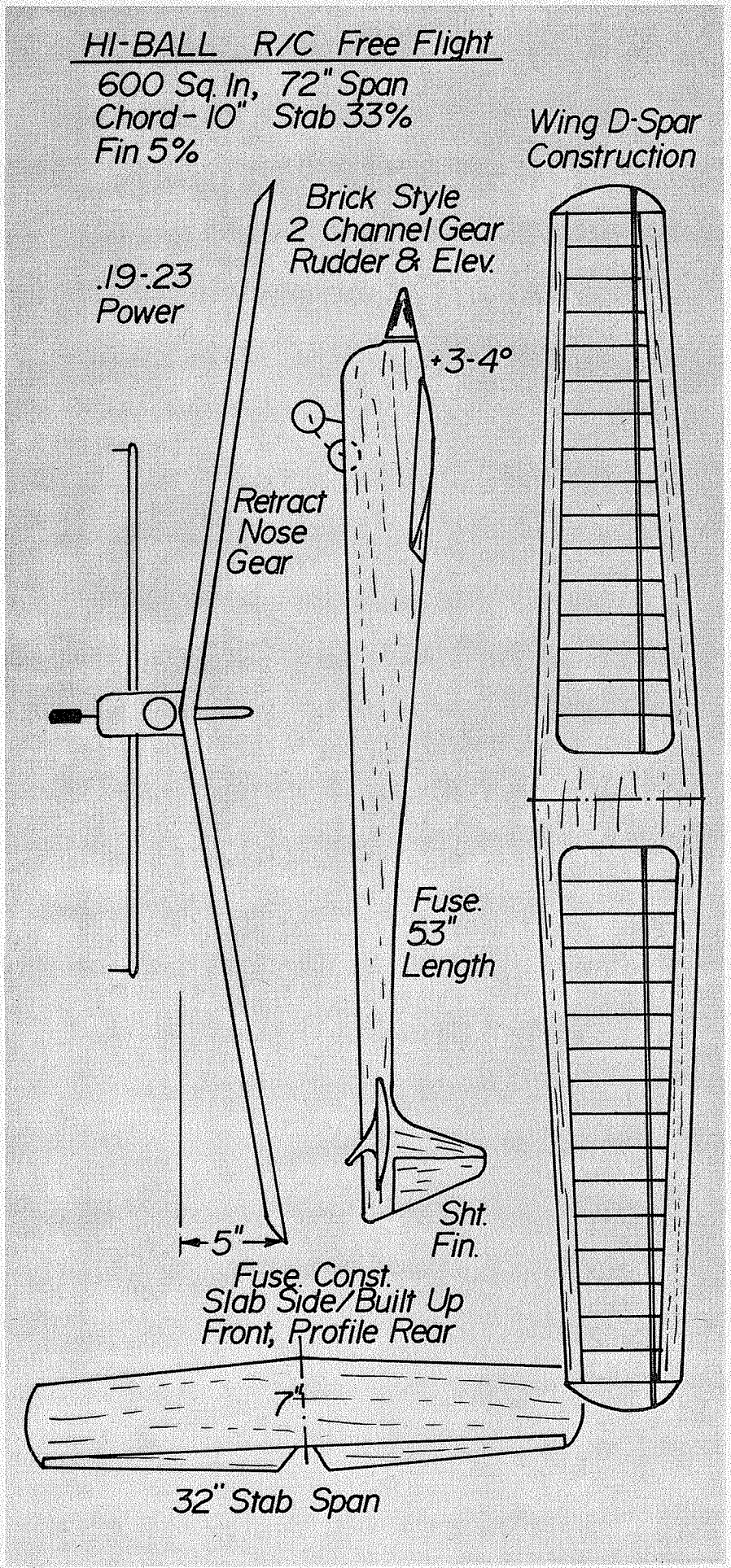
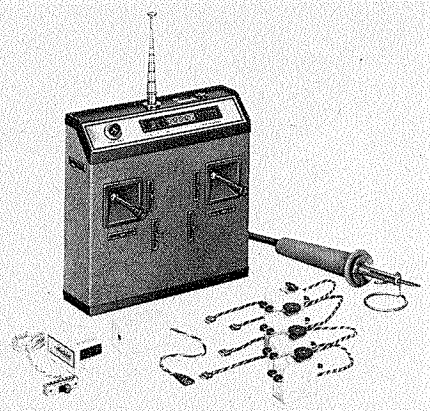


NEW ITEMS

OOPS, our New Items in the June '72 issue listed Prather Products' (1660 Ravena Ave., Wilmington, Ca. 90744) excellent All-In-One starting battery and plug tester at $299.95 instead of its regular list price of $29.95 — tell us, Terry, did you receive any orders at that remarkable price? At any price it's an excellent product and we wouldn't be without ours.

* * *



Heath Company, Benton Harbor, Mich. 49022, world's largest manufacturer of electronic kits, has announced new single or dual stick R/C systems that put 8 independent channels in a package no larger than most 4-channel units.

The single stick transmitter provides one-hand control of 3 independent channels. The gimbal-mounted stick actuates two functions and the third is controlled by a return-to-center knob at the top of the stick. The dual stick transmitter offers two-hand control of 4 independent channels.

Both transmitters have trim adjust tabs for neutralizing channel action without affecting stick position. Other features include a relative power meter, a two-position switch for landing gear, finger adjust tabs for auxiliary functions and two coin-switch adjacent channels.

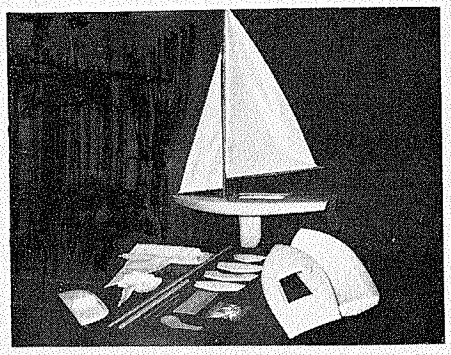
The single stick system, including transmitter, receiver, battery pack and four servos, is priced at just $269.95 mail order. The dual pack stick system, including transmitter and above standard accessories, is priced at $249.95. Both systems include all batteries (worth up to $39.00 retail).

Pictured above is the latest in the helicopter sweepstakes, this one by Kalt Sangyo Co. Ltd. of Tokyo, Japan and imported by Aristo-Craft of 314 Fifth Ave., New York, N.Y. 10001.

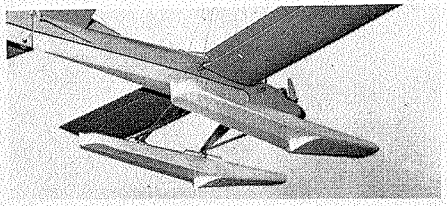
Model is the Bell Huey Cobra "450" and utilizes all Dieter Schlueter mechanical components. At 1/10th scale it is slightly smaller than the Hegi/Schlueter machine and uses a .45 size engine for power. It is the same helicopter that Mr. Oki flew so well at the Toledo Trade Show.

Sterling Models, Inc., Philadelphia, Pa., announces release of Great Lakes Trainer kit for Control Line flying.

A true classic bi-plane of the "Golden Thirty" era of barnstorming, the Great Lakes has long been a favorite of model builders everywhere. 36" model is authentic to scale, and kit's design-engineering makes assembly relatively easy, using pre-numbered die-cut balsa and plywood parts, shaped and notched parts, etc. Designated as kit C-13, Great Lakes Trainer span is 36", length 26½". It is suitable for .19 to .35 engines and is built to 1¼" = 1 ft. scale. Price $14.95; available now at all hobby shops.



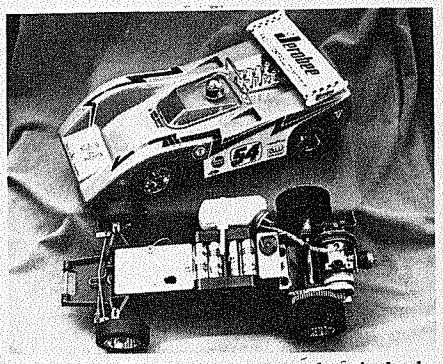
Snipe Type R/C Sailboat has been designed for the novice. Hull, deck, bulkheads and keel are fabricated of hi-impact plastic, all parts being completely formed and trimmed. Light sanding is all that's required prior to assembly — model can easily be assembled in one evening. Kit includes finished Dacron sails, ballast and all other parts required to complete the model. $14.95 ppd., available from Victor Model Products, P.O. Box 2168, Downey, Calif. 90242.



The Gee Bee Line, 143 E. Main St., Chicopee, Mass. 01020, has released its latest float for R/C seaplane operation Float is a radical change from Gee Bee's first float of several years ago—current model incorporates latest state of the art of blow-molding and R/C model requirements. Hundreds of test flights were made, one in particular with a model of only 370 sq. in. wing area, grossing out at over five lbs. Powered with an O.S. .35, take-offs with Gee Bee floats were beautiful; during rough water tests, model was in air before adequate flying speed was obtained as wing loading was quite high. At present only 33" size is available but smaller sizes will be forthcoming. List price with hardware (33" size float) $19.95, ready to fly.

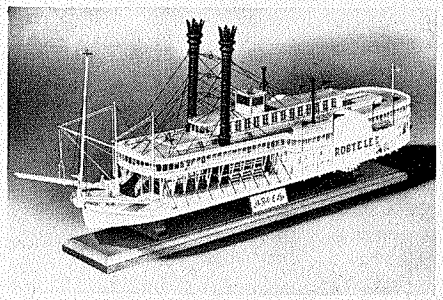
* * *

Kraft Systems announces a new Sports Series of Kraft proportional five-channel systems designed specifically for the major market of Radio Control users. It is a system that will be welcomed by the everyday flyer who is not contest-oriented: system will use a larger dead-band, KP-11A servos only, wire-wound pots, the older pencell-size nickel cadmium batteries. Available on 27 and 72 only, system will have no options and will use the regular, not the collapsible transmitter antenna featured in the '72 Kraft series. The Sport Series has returned the charge back into the transmitter. A letter to Kraft Systems (450 W. Calif. Ave., Vista, Cal. 92083) or local reps will get you all the info including fact that systems will sell for $299.99.



Now available, the most authentic looking racer ever produced in any scale . . . an exact likeness of the 8-B McLaren owned by Auto World and campaigned on the Can Am circuit by Oscar Koveleski and Tony Adamowitz. Every detail down to the tiny lightning strip included on the decal sheet. (Body, with wing and decal sheet, available separately — Part #305 — $6.95.)

In addition to looks, new car has many new race features: aerodynamic wing, brass front wheel bushings, chrome front and rear mag wheels, velvet touch brake, high compression glow head, heat sink for tank, 1 oz. LeMans fuel tank, trued rear race tires. Jerobee Industries, Inc., 120702A N.E. 124th St., Kirkland, Wash. 98033.



Now available from Scientific Models, Inc., is new Super Deluxe kit for the Robert E. Lee Mississippi Steamboat.

This famous side-wheeler model kit has all the "trimmin's" to make an historic museum-quality scale replica, including pre-carved wood hull, all precision cast metal fittings, pre-shaped smokestacks, formed deck railing and ruled, scale decking, color decals and pendant materials, beveled-wood display stand and mounting pedestal, handsome metal nameplate, and complete, easy-to-follow instructions.

Completed, the model is 24½" long; available wherever hobbies are sold with suggested retail price of $32.95. If not available near you, add $1.00 postage/handling ($2.00 outside U.S.A.) and order direct from the factory: Scientific Models, Inc., 340 Snyder Ave., Berkeley Heights, N.J. 07922. ■

Herewith the whole Wilson family convenes to help Pop get his huge bird into the air — with all this help Big Daddy had no choice but to fly well.

FIELD AND BENCH

BIG DADDY–TEXAS MODELS UNLIMITED KRAFT SINGLE STICK KPT-6SX 6 CHANNEL SYSTEM FOX .78 R/C ENGINE

BY BIG WILSON . . . It's an established fact that the smaller guys build the big birds and, vice versa, the big guys the small ones . . . now we dispute this, as here we have a project in which one of R/C's bigger men builds and reviews R/C's biggest bird!

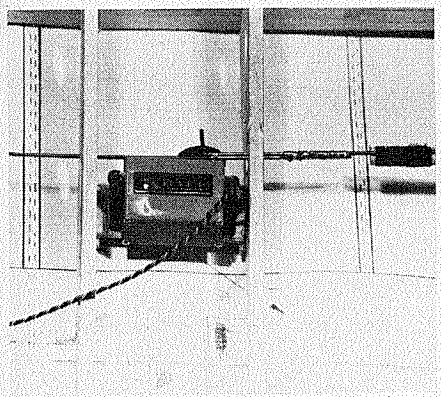
• Walter Schroder called and said "I'm bringing a 'Big Daddy.' I want you to do an article for M.A.N. Go to the lumber yard and get a birch door. They cost $4.98. You'll need it to build the wing."

I was thrilled. I didn't know what a "Big Daddy" was, but to be asked to build something for Model Airplane News was a high point in my modeling career. Mr. Schroder has often, while looking at my planes, referred to the "Wilson Warp." He mutters things like "Balsa Butcher" and "Muddled Model." Well, off to the lumber yard and the $4.98 birch door. It cost $13.95. I needed saw horses to put it on, so altogether, with fixtures, 2x4's, birch door, the whole deal was a scant $31.29.

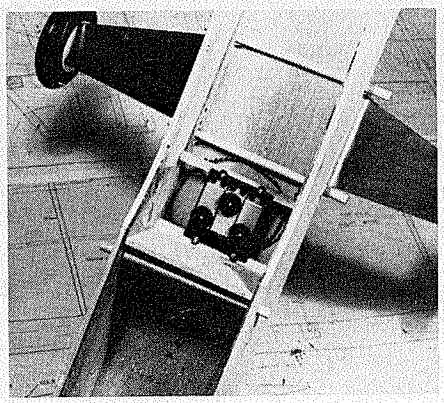
I had visions of my wife becoming quite upset; although she loves the hobby, she wants it not to cost anything. However, I knew I could soothe her by taking her out to dinner. So I did.

Mr. W. S. delivered the kit, and said "Go to it!" I opened the box, and was *amazed* at the size of the plane I was about to build. My first thought was to cover the birch door with MonoKote, and use it for the wing . . . But I couldn't figure how to get dihedral in it.

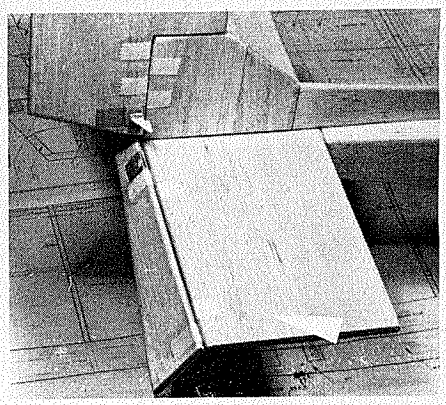
I laid out the parts. Everything was machine cut. All parts were numbered



Look inside wing to see KPS-10 aileron servo.



Inside fuse we see three lost KPS-10 servos.



Cloth hinges are used for elevator and rudder.

or labeled, and separated as to wing, stab, fuselage, etc. The kit is most complete. Landing gear, wheels, nose gear, motor mount—it's all here in this magnificent, monster kit.

Besides the three pages of plans, Texas Models Unlimited gives a 14-page booklet with check-offs as each step is completed. There are pictures in the booklet to show how it will look if you do it right. These Texas folks are pretty optimistic. There's a "flight log" in the kit, so you can log date and time of flights, duration, etc. Well, if they think I can build it so it will fly, so do I.

So far, the hardest part of this Field and Bench is building the saw horses for my beautiful birch door . . .

It was Friday evening. We had no social commitments, so I began (after we came home from having dinner out, remember?).

The wing ribs are about as big as the fuselage of the "Schoolboy," a little plane that my 11-year-old son and I fly rudder-only.

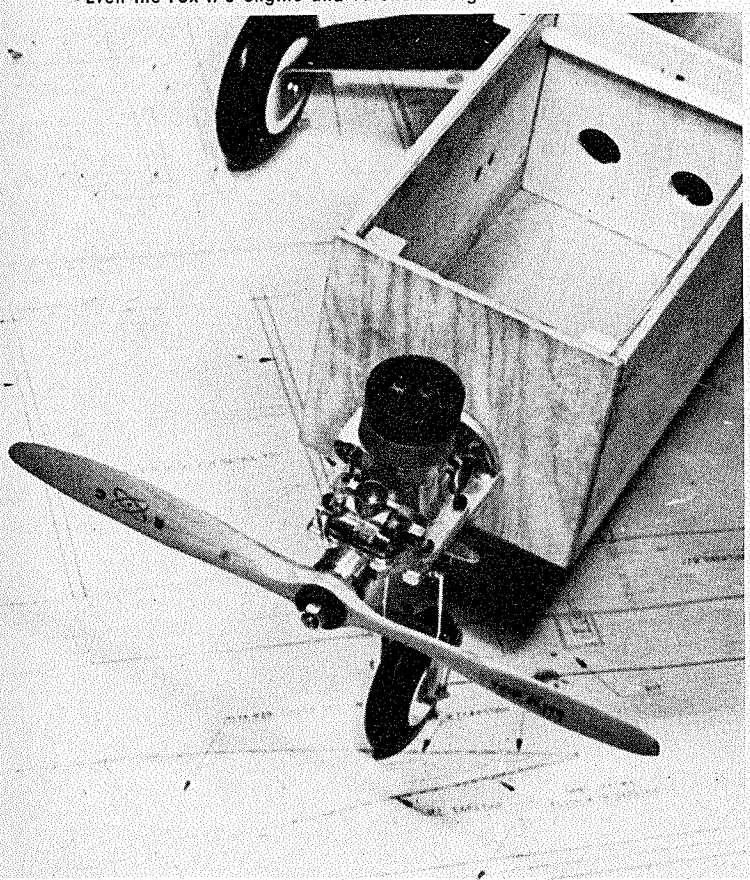
The spars are doubled in the center section. The main spars of spruce run the entire 88", top and bottom. When they're epoxied, as per the instruction booklet, the dihedral is set and you add ribs, trailing edge, then leading edge and spars, then sheeting, and finally cap strips. I'd forgotten what fun cap strips are. By the time I had them in place, I had snapped at my son, kicked the dog out, and told my wife she was putting on weight. (My shin is almost healed now.) To finish off the wing, flip it, and do it all over again. Now it's ready for the modeler's friend, sandpaper.

By the way, even if I had put dihedral in my $4.98 birch door, it would not have been long enough. If you'd like to look at the door in the room where I'm writing this, it's probably 78" high. The "Big Daddy" wing is 88". Do you remember the story of the guy who built a boat in his cellar, then couldn't?—well, never mind that now.

The tail surfaces are fun to make . . . just follow the steps in the booklet, and look at the layout in the plans. The fin, rudder, stabilizer and elevator are made like sandwiches. Lay out the machine-cut and numbered parts. First sheeting, then inner frames, then sheeting on top. It all goes very quickly. The movable surfaces have little plywood squares to double where the horns will fasten, top and bottom. I could not tell from the plans whether the ply was just glued onto the surface or whether it was to be inset. I decided it would look better inset, so that's what I did.

(Continued on next page)

Even the Fox .78 engine and Tatone nose gear mount look lost up front.



Nothing like being comfortable—Biggie cradles Kraft single stick x'mitter.

FIELD AND BENCH . . . CONTINUED

Now these are ready for good old sandpaper.

While waiting for the glue to dry, I went back to the wing, to add the bellcrank supports and the cranks. May I say again how complete this kit is. All horns, nuts, bolts, pushrods, wire, clevises, and bellcranks are included. The only additional expense will be for covering, motor, tank, and radio.

I completed (but not covered) the wing, fin, rudder, stab and elevator in three nights, a couple of hours each evening. I was getting a little tired of sanding. But sandpaper is our friend.

I again went back to the wing. There was little support at what would be the point of contact with the wing saddle, so I cut out the center cap strips and sheeted, making a little hatch for the servo.

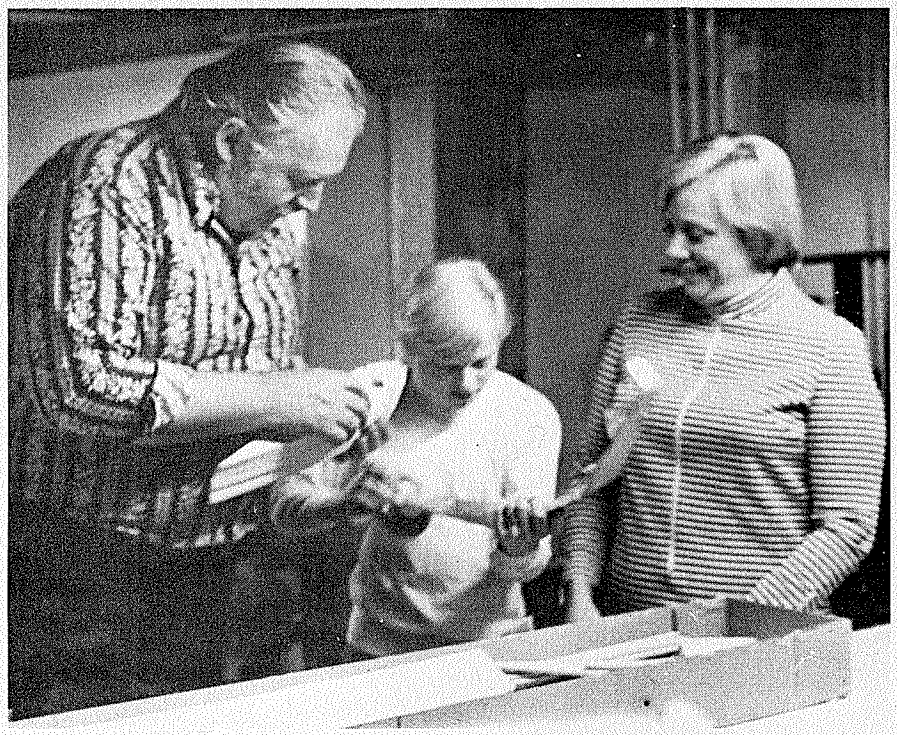
I saved the fuselage 'til last, determined to omit the "Wilson Warp." I was not successful. I followed the plans carefully. They call for a "good grade of epoxy" in making the fuselage. I used "Five Minute," which, if one goes by cost, must indeed be a good grade. Of course, by the time I noticed the warp, I had pinned it in and it was too late. It was very minor, though, and if one used a little slower glue (say "Seventeen Minute Epoxy"), it would be impossible *not* to do it right. I trimmed a little, used the sanding block, and even I couldn't notice the inequity.

The next night we had dinner out . . . Mr. W. S. said he knew of a dandy electric sander for only $9.95. He picked it up for me, and it came to $16.06. But I tell you, I needed it. That wing is 88″ long, with a 16″ chord. That's 1408 square inches to sand. But, since I needed the sander, Mother needed dinner out. It can be expensive, doing a Field and Bench.

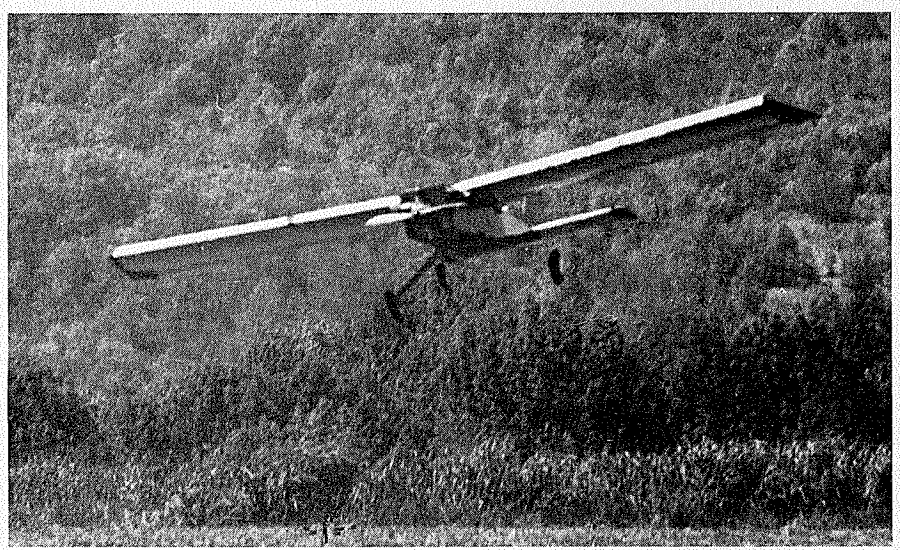
All the movable surfaces are hinged with cloth hinges (supplied). The instruction booklet warns to watch for vibration in the ailerons, so I moved the bellcranks outboard one rib farther. (The plans suggest this in a "flyer," tucked in the later kits.) I took my time with the hinges after carefully shaping the edges of the surface with the modeler's nuisance, sandpaper, making sure they were seated as close as possible. At the risk of alienating the plastics industry, I shall forever more use only cloth hinges. There is no danger of splitting the wood, no epoxy to gum the movement, and the freedom of movement is unbelievable. With cloth hinges, the hinged surfaces actually flop from their own weight, sort of like a "Jacob's Ladder," if you ever saw one.

Covering is next, after another few hours of that !%#/!″%! sandpaper.

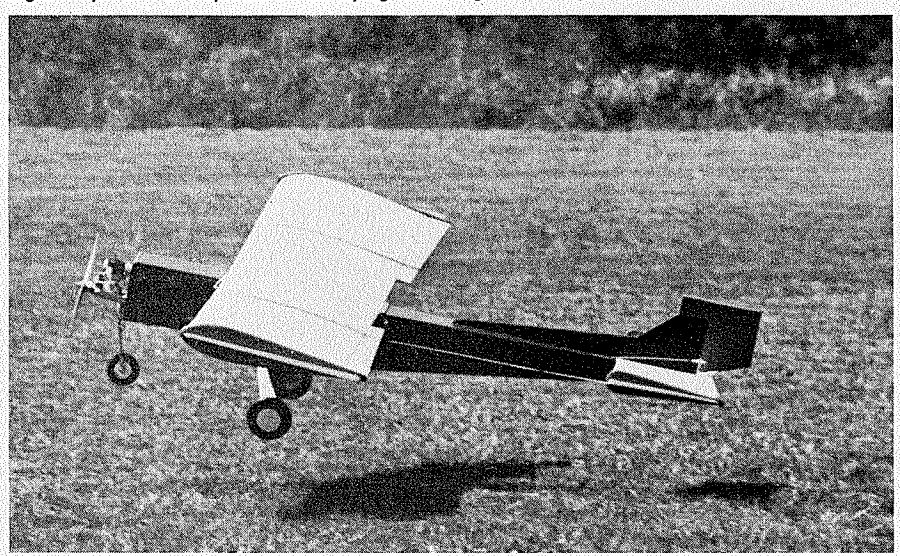
(Continued on page 77)



Biggie is amazed with wing rib size, son J. J. with weight of L.G., wife Jody enjoys it all.



Big Daddy finds its way back to the flying field, engine running, propeller stopped by camera!

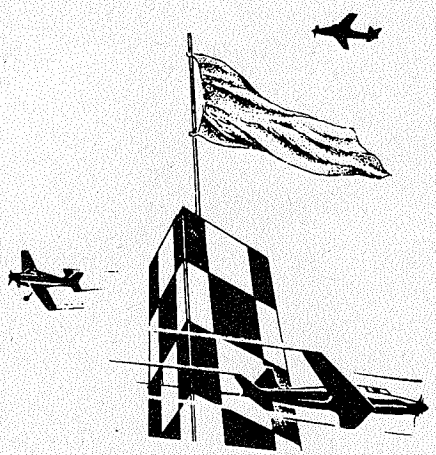


Big Daddy just jumped off on its first flight. Flew very well, very forgiving and quite a sight.

Aerial view showing only a portion of the 200-acre black-top flying site at Bakersfield, Ca. Ideal for Pylon flying, low humidity also helps!

Photos: John Wilson

And here the Champ, "perennial" would be best way to describe Bob Smith's very many wins.

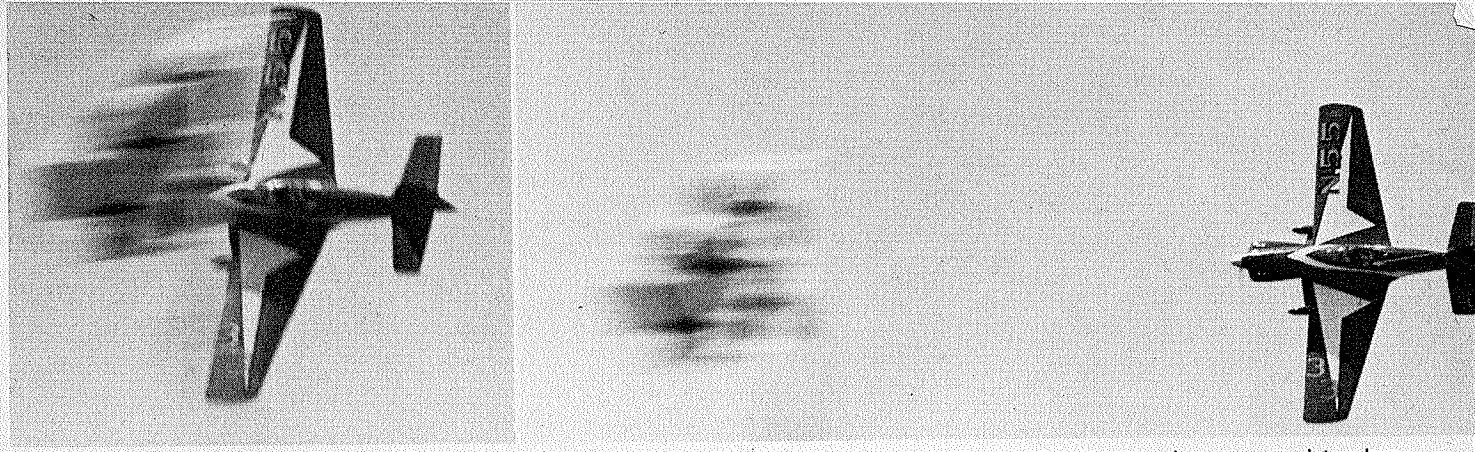


PYLON PIT PATTER

BY CLIFF WEIRICK

●

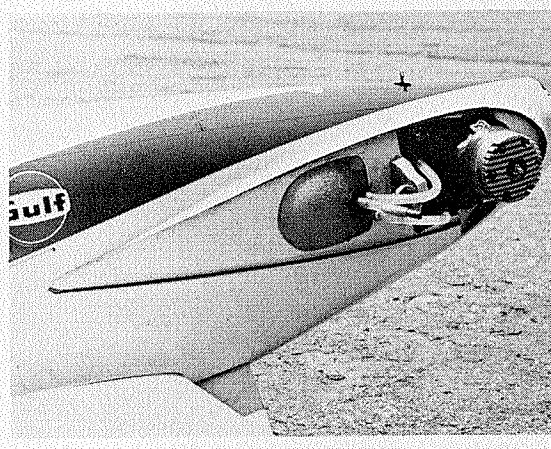
P.P.P. man devotes all of his space to Annual BARKS races held at Bakersfield.



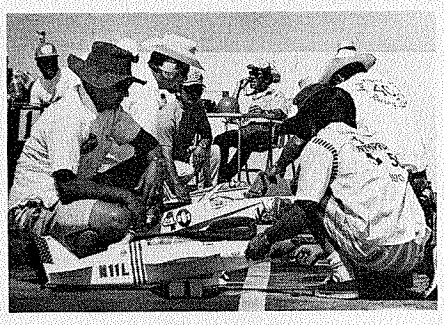
How it should be done — or is it? This Minnow closing in should be behind the pylon, not in front! And then we can be wrong . . . let us know.

It all boiled down to fly-off between Smith and Neufeld; Clarence couldn't light his fire!

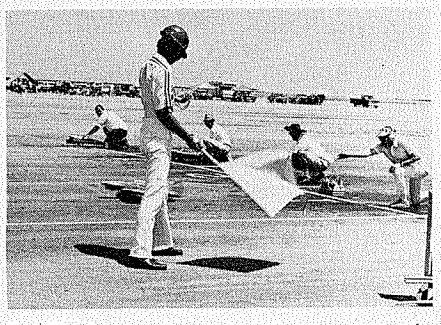
2nd place finisher Neufeld (left) with his pit man/caller Al Strickland and C.D. Glen Spickler.



View of the K&B Schnuerle which is currently making all the big noises in Coast comps.



On the starting line: Larry Leonard up front with Jack Stafford directly behind Larry.



BARKS starter Jerry Christiansen gets the action going. First off was Whit Stockwell.

BARKS racers (L/R): Howell, Neff, Neufeld and Boyce. In rear Redwine and Spickler the C/D.

• When was the last time you turned 1:31.2 and were second in a race? . . . well, it happened to me last weekend! Read on, racing buffs, and you shall hear, about the fastest races of the year . . .

Uncle Walt said that Bakersfield, California and the BARKS could have four pages, and here they are as done by Gale Enstad, their P.R. man. All photos are by John Wilson.

As the record book will prove, the annual Bakersfield Air Races have become Pylon racing's premier Formula I contest of the year.

Scoffers from the East who might think that statement is pure puff are invited to read on. To the sponsoring Bakersfield Aircraft Radio Control Society (BARKS), the claim is, to borrow a phrase from an old TV Western, "No brag, just fact."

From the beginning, it was evident that the June 3rd and 4th meet was going to be one to remember. The entry list read like a Who's Who in Pylon racing and totaled, even after several cancellations, 95 flyers, an all-time record number of entrants who brought with them 119 airplanes. (The Scale judges were the first to lose their minds.) Some airplanes were brought in the back seat of full-sized airplanes which landed on the adjacent strip and taxied to within 50 feet of the pits.

Word was spreading that the Southern California contingent running the new Schnuerle ported K&B's was zeroing in on the right props and needle settings. Somebody running a Super-Tigre asked Larry Leonard what his K&B was turning. He quipped "nineteen five," and nobody knew whether to laugh or gasp. Racing conditions were ideal; the weather was clear, hot (96°) and dry with just enough breeze to keep the heat from being uncomfortable. The course was laid out in the center of an immense asphalt expanse (over 200 acres) left over from World War II mass pilot training days. For landing Pylon racers it's a dream come true—you can glide forever.

The stage was set, complete with star performers and an excited audience. But let's jump to the ending, because that's where it all was at.

The former record of 1:30 flat, set at Bakersfield in 1971 by Bob Smith of Southern California, which had stood for a year like the four-minute mile, *was shattered three times* in the final two rounds of the meet! Everybody knew it was going to happen when a torrid race between John Brodbeck

(Continued on next page)

Winners of the 3rd Annual Bakersfield Air Races (R/L) in their finishing order: Bob Smith, his caller Jeff Bertken, Clarence Neufeld, Chuck Smith, Bob Bleadon, Bob Francis, Terry Prather, Ron Russell and Larry Leonard. All but Bob Francis are from the Southern part of good old California!

PYLON PIT PATTER . . . CONTINUED

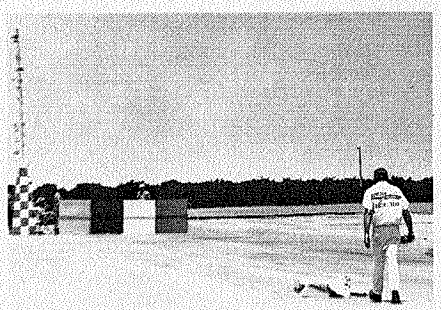
and Larry Leonard ended after 11 laps (each had a cut) and the watch read 1:38.4 for Brodbeck and 1:39 for Leonard! Even those who weren't good at math knew something had just happened.

Smith was watching, too, and must have realized the time had come. On his next time out he shaved two-tenths off the record for a sizzling 1:29.8. But that record stood for less than an hour. In the next round Leonard proved the 11-lap time was no fluke by letting it all hang out for a scorching 1:29.4. That was in the final round, Smith yet to fly. Maybe to Smith it was the challenge or the thought of being dethroned —who knows? But when the nitro fumes had cleared and the stopwatches checked on his final flight (there were three watches on him), the new record stood at an almost unbelievable 1:27.9!

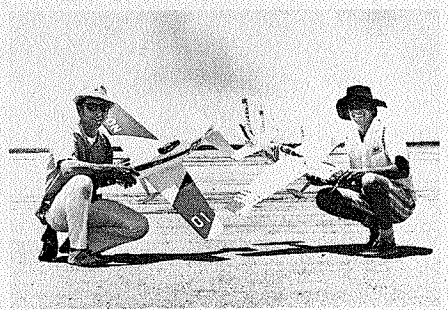
The Smith camp—formally BS Racing Associates—went *wild*. (It is reported that engine-builder Clarence Lee's toothpick even quivered.)

At the end of the seventh and final round, exactly 150 heats had been flown. But the meet wasn't over yet. Bob Smith had won all seven of his heats (his mother told me he hasn't lost a race yet this year), and to those who hadn't been paying close attention, he appeared to be clearly the meet winner. But BARKS members who had been cheering on one of their own for two days knew that Clarence Neufeld of Wasco also had seven wins, and a fly-off was due for the big trophy. The quiet, unassuming Neufeld, a three-year veteran of Pylon racing, was also running a Schnuerle K&B. He had been flying the course a hair on the tight side and had to go 11 laps for a couple of his wins. His best time of the day (1:30.2) was totally overshadowed by Smith's 1:27.9, yet he looked calmer than almost anyone else when he and pit man/caller Al Strickland headed out to the starting line with Smith and his caller Jeff Bertken (the "B" in BS Racing Associates). But Lady Luck frowned on Neufeld's white and gold Minnow . . . with Smith's engine singing at 18,000 RPM+ and the starting clock almost gone, it became painfully obvious that Neufeld's fire was not

A wild start as a Minnow attempts to pick up heading for scatter pylon. (P.S. He made it.)



A dejected flyer after ground loop. Note barricade at pylon #1; folds to reveal any cuts.



John Brodbeck (left) and Larry Leonard smile as they had a 1:38.4 and 1:39 for 11-lap heat.

going to light. Smith flew an easy 1:40 solo (the last several laps without a caller) for the win. For Neufeld there will will never be a second place that is less satisfying. "I wouldn't have minded losing to him in the air, but to not even get off the ground . . ." The ever good-natured Strickland was overhead saying, "The guy who said 'you can't win 'em all' hasn't met Bobby Smith."

With compatible frequencies all over the place, three more flyoffs were held to determine final standings in the meet. For third and fourth it was Chuck Smith and Bob Bleadon, each with six wins. Both were flying K&B-powered Miss Dara's. Again the Smith team dominated. Bealdon suffered two cuts and had to settle for fourth.

Super-Tigre fans had to wait until the third flyoff to root for the Italian product. The race for 5th and 6th place pitted Terry Prather and his George Aldrich ST-powered Minnow against Bob Francis with a new K&B in a Shark. Even Prather's championship form was shaken by the howling Schnuerle ported K&B and he had two cuts to drop him to 6th place.

Ron Russell had put together the right combination of wins and places to nail down 7th place without a flyoff. Perhaps this will offer some encouragement to those flyers who don't have access to the new Schnuerle K&B's as Ron's Denight Special was powered with a '70 series K&B.

For eighth place, Larry Leonard made sure he got to take home a trophy by turning in a 1:29.8 in the four-way flyoff.

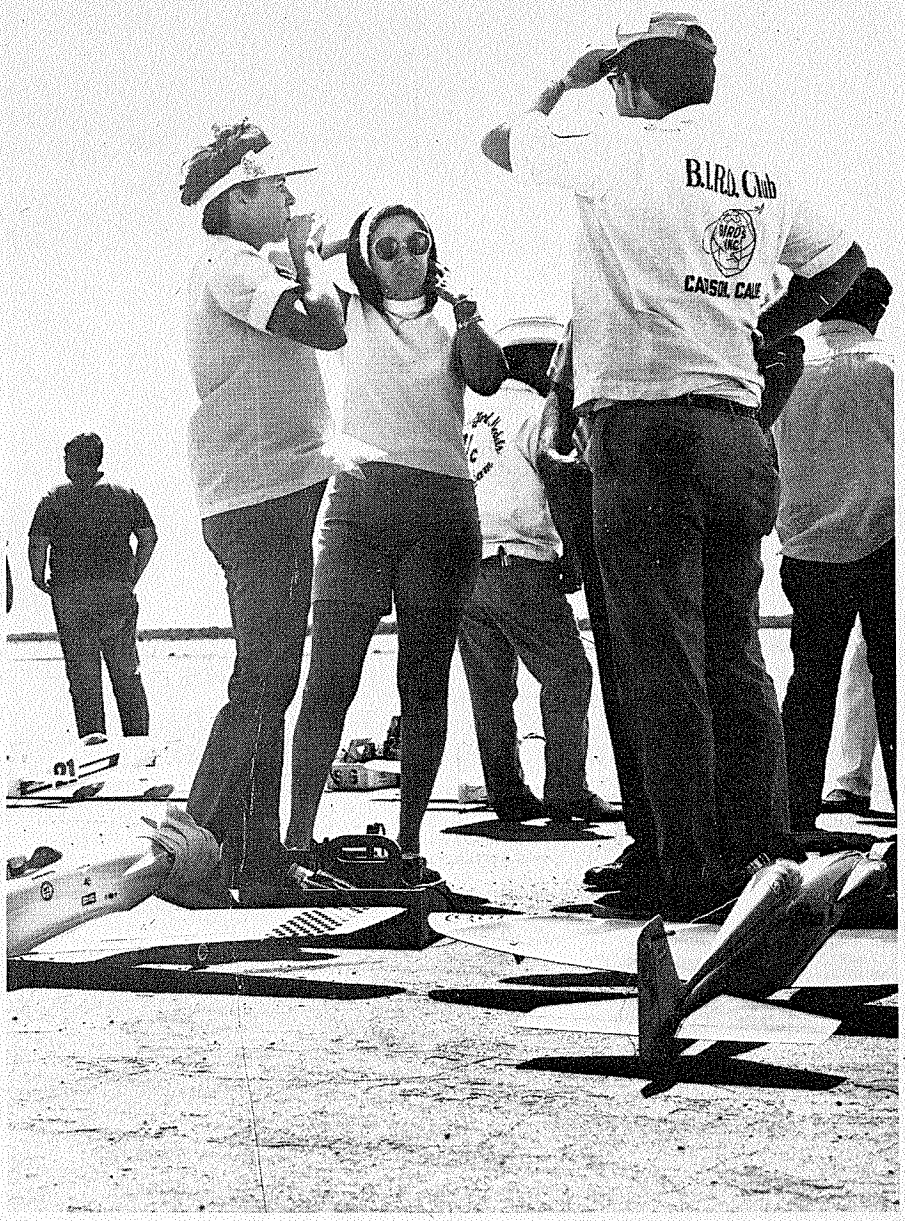
In a meet of this size it is impossible to do justice to all the fine flyers who competed. There were many, many flights in the low 1:30's which should have made headlines, but they were virtually obscured by the dominating flying of Bob Smith. To do justice to these other flyers we will list the top 20 finishers and their fastest time.

After the last engine was shut down many compliments were given the BARKS Club, its hardworking members led by president Wes Redwine, and to veteran C.D. Glen Spickler, also a BARKS member.

There have been suggestions that the BARKS host the AMA Pylon Nationals. It's an interesting proposition. Bakersfield's facilities are second to none and the club has certainly proved it can handle large meets.

For now, the BARKS are only wondering if the Fourth Annual Bakersfield Air Races will be even bigger and better than this year's speed-fest.

That's it for this month. See ya all in Chicago. ■



Loretta Hall of So. Calif. represented the dis staff side in races; had problems, didn't quit.

Excellent shot of No. 51c, Bob Smith's Minnow, rounding the pylon, clean and very smooth.

We have to admit that Gary Korpi does present quite an outstanding personality on the line!

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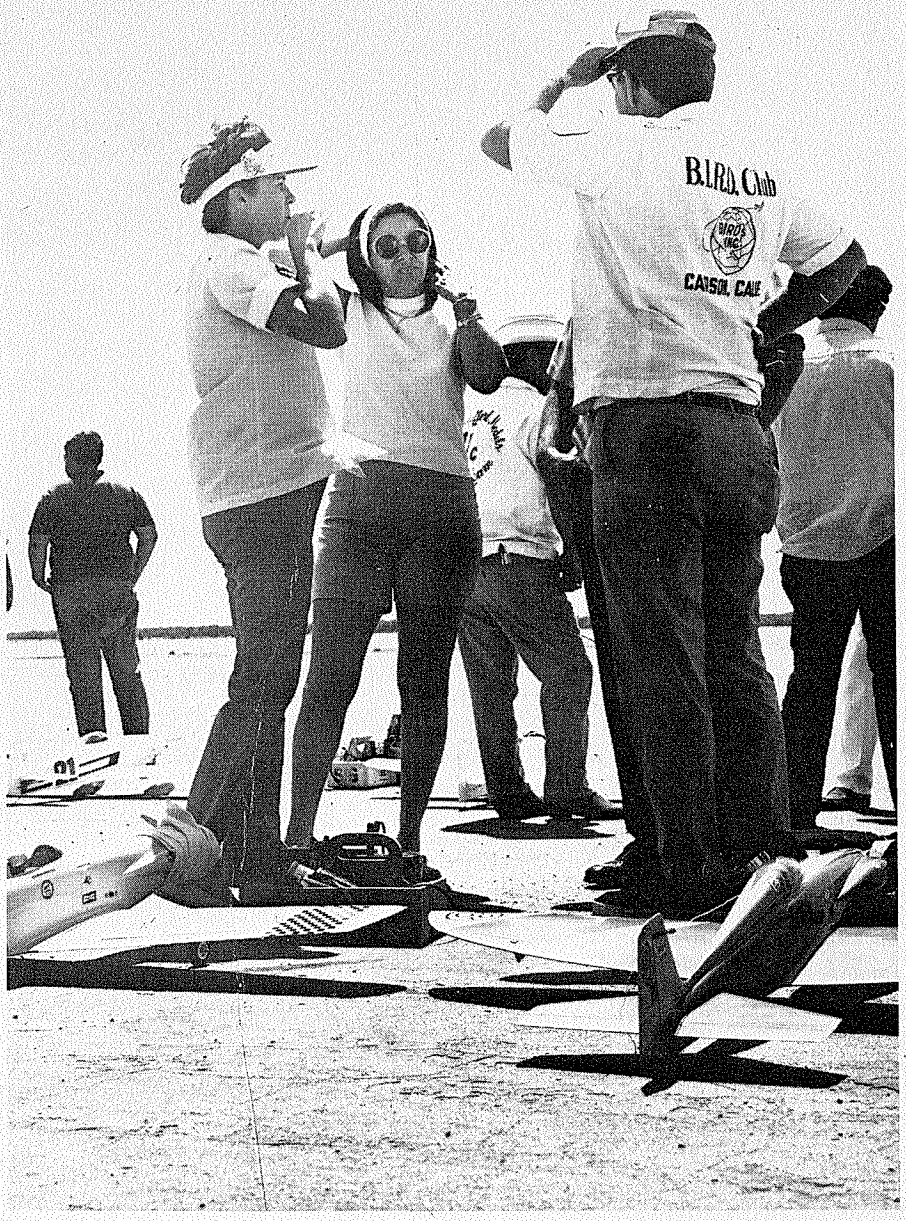


Loretta Hall of So. Calif. represented the disstaff side in races; had problems, didn't quit.

Excellent shot of No. 51c, Bob Smith's Minnow, rounding the pylon, clean and very smooth.

We have to admit that Gary Korpi does present quite an outstanding personality on the line!

Winners of the 3rd Annual Bakersfield Air Races (R/L) in their finishing order: Bob Smith, his caller Jeff Bertken, Clarence Neufeld, Chuck Smith, Bob Bleadon, Bob Francis, Terry Prather, Ron Russell and Larry Leonard. All but Bob Francis are from the Southern part of good old California!

PYLON PIT PATTER . . . CONTINUED

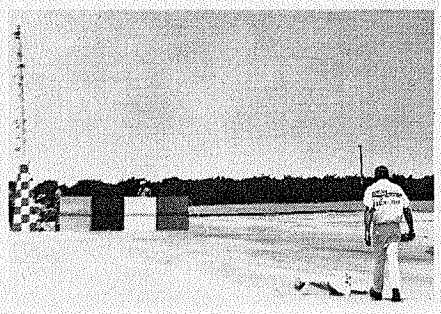
and Larry Leonard ended after 11 laps (each had a cut) and the watch read 1:38.4 for Brodbeck and 1:39 for Leonard! Even those who weren't good at math knew something had just happened.

Smith was watching, too, and must have realized the time had come. On his next time out he shaved two-tenths off the record for a sizzling 1:29.8. But that record stood for less than an hour. In the next round Leonard proved the 11-lap time was no fluke by letting it all hang out for a scorching 1:29.4. That was in the final round, Smith yet to fly. Maybe to Smith it was the challenge or the thought of being dethroned —who knows? But when the nitro fumes had cleared and the stopwatches checked on his final flight (there were three watches on him), the new record stood at an almost unbelievable 1:27.9!

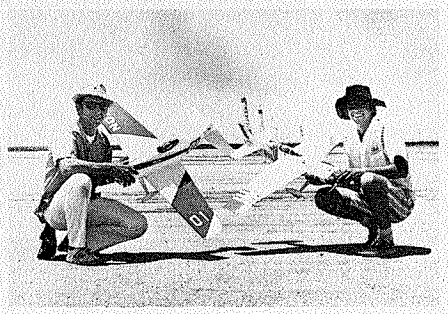
The Smith camp—formally BS Racing Associates—went *wild*. (It is reported that engine-builder Clarence Lee's toothpick even quivered.)

At the end of the seventh and final round, exactly 150 heats had been flown. But the meet wasn't over yet. Bob Smith had won all seven of his heats (his mother told me he hasn't lost a race yet this year), and to those who hadn't been paying close attention, he appeared to be clearly the meet winner. But BARKS members who had been cheering on one of their own for two days knew that Clarence Neufeld of Wasco also had seven wins, and a fly-off was due for the big trophy. The quiet, unassuming Neufeld, a three-year veteran of Pylon racing, was also running a Schnuerle K&B. He had been flying the course a hair on the tight side and had to go 11 laps for a couple of his wins. His best time of the day (1:30.2) was totally overshadowed by Smith's 1:27.9, yet he looked calmer than almost anyone else when he and pit man/caller Al Strickland headed out to the starting line with Smith and his caller Jeff Bertken (the "B" in BS Racing Associates). But Lady Luck frowned on Neufeld's white and gold Minnow . . . with Smith's engine singing at 18,000 RPM+ and the starting clock almost gone, it became painfully obvious that Neufeld's fire was not

A wild start as a Minnow attempts to pick up heading for scatter pylon. (P.S. He made it.)



A dejected flyer after ground loop. Note barricade at pylon #1; folds to reveal any cuts.



John Brodbeck (left) and Larry Leonard smile as they had a 1:38.4 and 1:39 for 11-lap heat.

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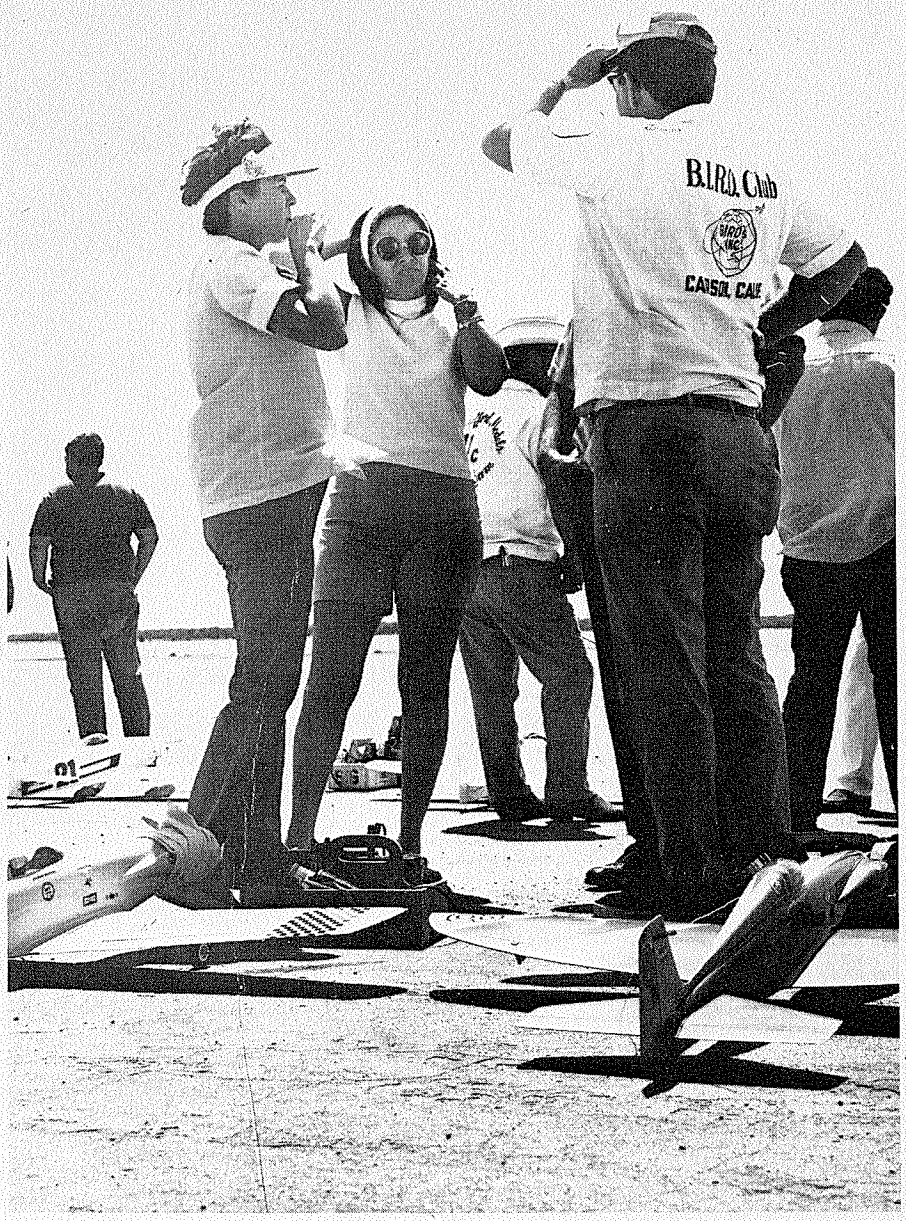

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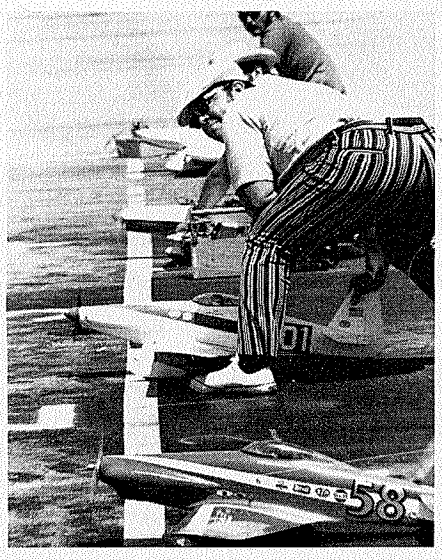


We have to admit that Gary Korpi does present quite an outstanding personality on the line!

Here the author demonstrates two important things: it flies and does its flying in small places.

FIELD AND BENCH

DU-BRO WHIRLYBIRD 505

The Whirlybird that started the whole thing makes an excellent subject for the review not only because it is different but because so very many are waiting for it.

Every project should have some glamour and Paula Hail provides setting for the Whirlybird.

BY NATE RAMBO

• I first saw the Du-Bro Whirlybird "505" at the World Championships at Doylestown last September. It was a case of love at first sight. After a short talk with Walt Schroder, things were set into motion for this Field and Bench article.

Before going further, please be assured that this article is a true product report written from first hand experience. It will cover the very basic theory of the "505" design, the quality of the kit, building information, and, finally, the saga of flying. Note the word "saga." You haven't lived until you've tried to fly a model helicopter! But more on that later.

The design of this helicopter is ingenious and reflects favorably on its creator, Dave Gray. Now let's look at the way Dave approached the helicopter problem. As can be seen from the photographs, the .40 size engine and propeller sit on top of the "505" main rotor. This rotor turns from torque reaction in a direction opposite to the propeller. Lift is varied only by changing engine throttle setting, there being no collective pitch mechanism as on full size helicopters. A very large percentage of the lift comes from the propeller. The rotor generates some lift but is used primarily to effect control. By utilizing the spinning engine technique, Dave has been able to avoid an expensive gear box, clutch and blower. This system also avoided torque input into the fuselage thereby easing the pilot's problems.

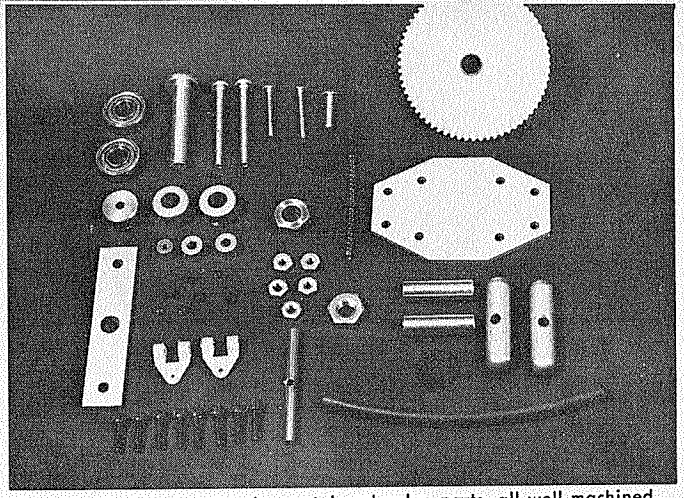
Let's now take a simplified look at the rotor and its control principles. The rotor is rigid, therefore the blades cannot teeter or flap; they can, however, change pitch, and the helicopter's flight direction is controlled by the cyclic change of blade pitch using what would normally be the elevator and aileron controls. The rotor blade pitch is not controlled directly but via linkages to a flybar which may be seen in the photographs. This acts like a large gyroscope that stabilizes the helicopter.

The tail rotor is super simple to understand. It provides yaw control and operates like the tail rotor on a big helicopter. It is gear and shaft driven from the main rotor shaft. The rudder servo controls the pitch of the tail rotor to achieve "steering" of the helicopter.

Having some idea of the principles of the 505, let's critique the hardware. The kit is really impressive because of the numerous parts; it's an inventor's dream. Most of the fabulous little metal pieces and machined parts are packaged in plastic bags, each one labeled so that the builder knows what subassembly the parts fit. For instance, one package is labeled "Tail Rotor," and in that bag are all the little pieces re-

(Continued on next page)

Kit package with the parts spread in orderly fashion—132 different parts.



Kit packages full of many tiny metal and nylon parts, all well machined.

PHOTOS BY TOM ROE

quired to build that assembly. This is pretty important when you consider there are 132 different kinds of parts or pieces in the kit.

The large number of parts in the kit brings up the next thing. With all those pieces it takes one darn fine instruction book to put them all together. Dewey Broberg didn't spare the effort here. He includes with the kit a 34-page instruction book consisting of Heathkit type step-by-step instructions, exploded diagrams, and a parts list. The builder can order spare parts from DuBro using the latter.

Assembly of the parts is relatively easy and a lot of fun. Instead of building just another routine Pattern ship, every part and every step is new. Frankly, the kit puts fun back into modeling because of the novelty. The building time required by the author, however, was more than the advertised eight hours. Someone who has built one before could do it in eight hours, but a more realistic time is 25-30 hours, if it's the builder's first 505.

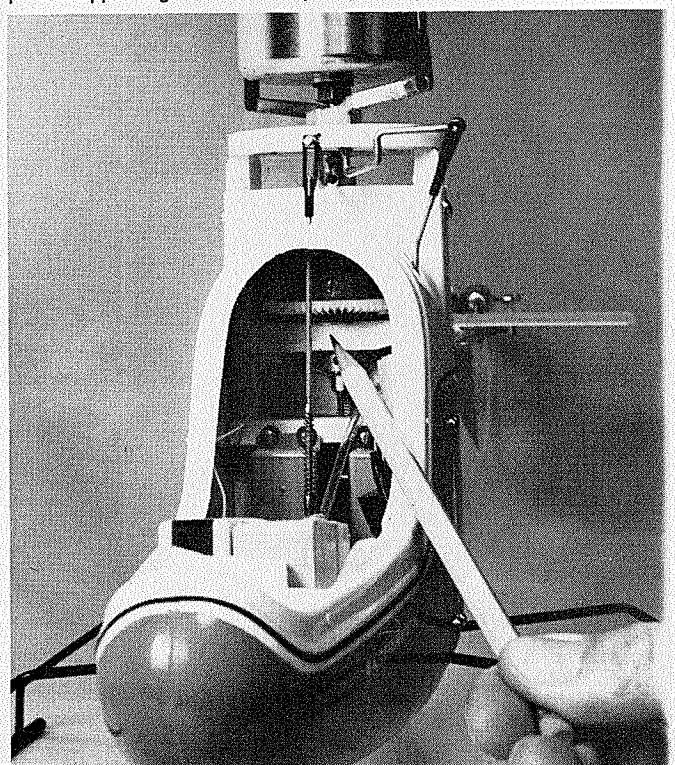
The 505 is intended for a small, lightweight radio system. I employed a 1969 Kraft Gold Medal Series six channel receiver with KPS-10 servos. With this equipment installed, the 505 weighed four pounds; this is two ounces above the suggested flying weight. Unlike a fixed wing aircraft, flying weight is critical. A radio system weighing more than mine (about 14 oz.) may be too heavy.

My particular 505 was arranged to operate with a two-stick transmitter. A question arises with this type of transmitter concerning set up of the left stick. I elected to rig the yaw control like an aircraft. This is in contrast to Dave's method which is the opposite (i.e. left swings the tail left rather then the nose). Then arises the question about throttle control. I again made mine like an airplane but another local flyer rigged his the opposite and the reasoning there is pretty sound (i.e. pulling stick back makes model rise). My only conclusion from this whole business is that a single stick transmitter would appear to be a much more logical approach. All of the controls would move exactly in consonance with the helicopter's movements.

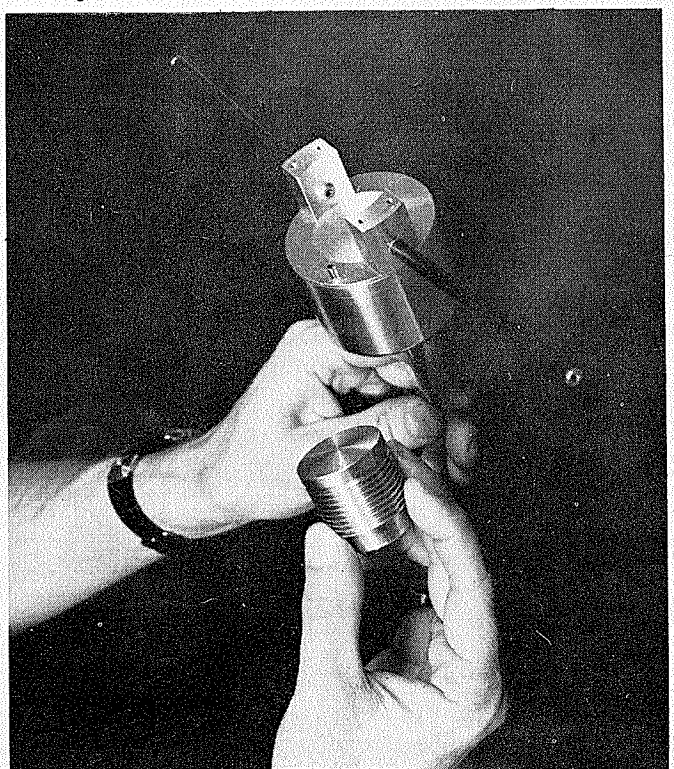
And now we get down to the heart of this whole article—flying the 505. Perhaps a better description of the following would be "Learning to Fly a Model Helicopter." None the less, here we go. I had no factory help and started with an untested and untrimmed model just like most people will have to do. There were no model helicopter pilots available to inspect, check-fly and trim the

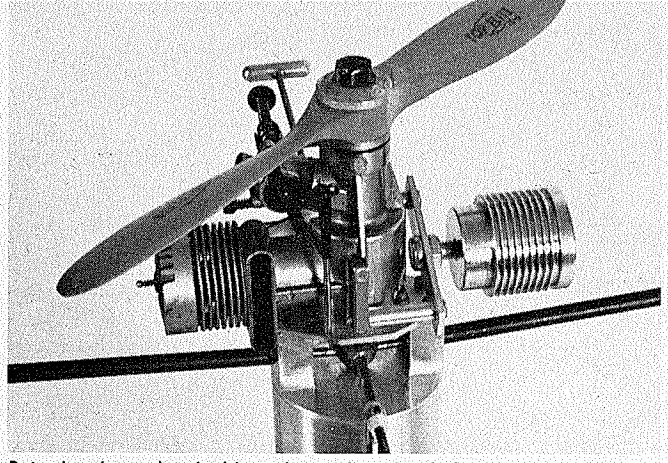
(Continued on page 46)

Large crown gear on main shaft drives tail rotor. Receiver and battery pack strapped together to save space. Note springs on control pushrods.

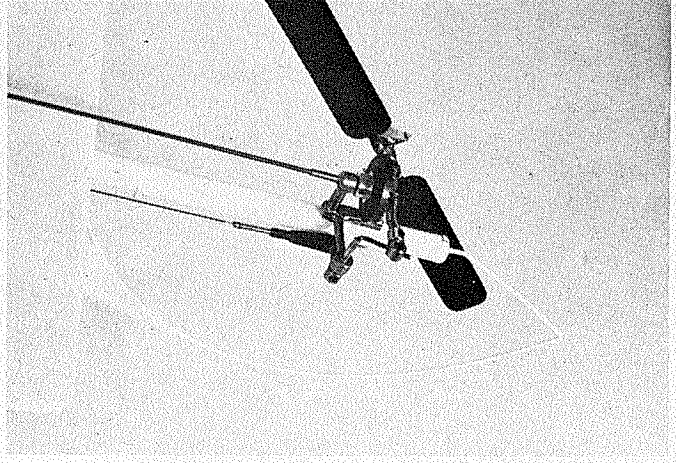


Very clever engineering here with combined fuel tank and counter balance. Engine bearer attached to the two drilled stubs, well machined.





Rotor head completed with engine and counter balance installed. Muffler can be used but requires careful relocation of the balance weight.



Completed tail rotor assembly with pushrod attached to actuating horn. Large gear drives rotor, pinion gear changes pitch angle of rotor blade.

FIELD AND BENCH . . . CONTINUED

machine in the air. Being qualified in glorious fixed-wing competition all over the world was absolutely of no help. I found that I really was a mere mortal after all. Let it be very clear that *flying a model helicopter involves learning a new skill.* To acquire this skill takes time and patience . . . there were many times during my early flights when I questioned my own limitations and capabilities or cursed the 505 for not doing what I wanted. Dale Willoughby put it very aptly when he said, "You don't carry on an idle conversation with friends while flying a model helicopter!"

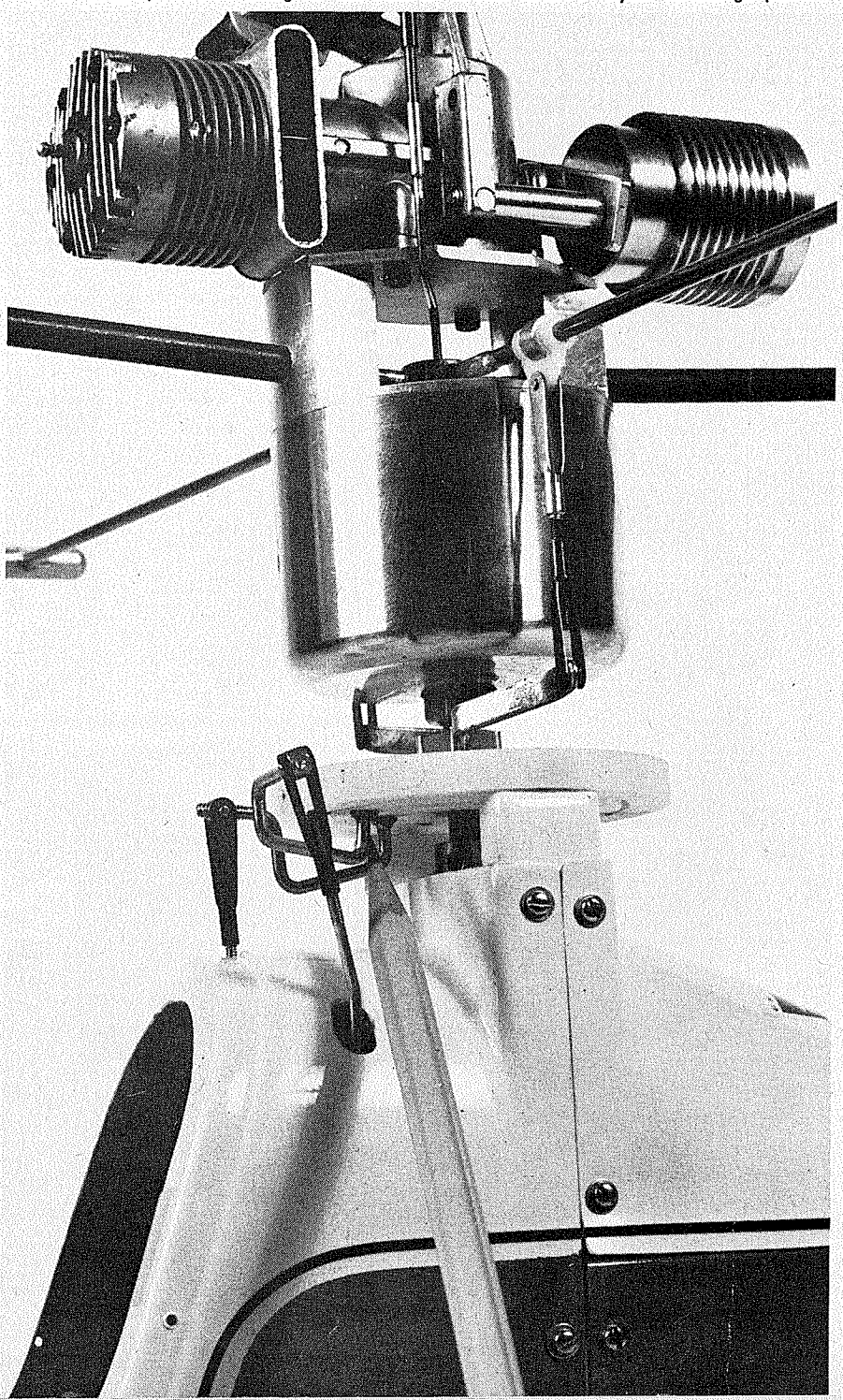
My approach to learning was to use the Gray approach of using two tether lines held by friends. This helped me out of trouble and gave me some feel of the controls. During the early flights, I learned as much about rigging the 505 as about flying it. For instance, I found how tight to fit the gears, how much slop to leave in the swash plate follower, and so forth. I also learned to start and adjust a vertically mounted engine, which was quite awkward for awhile.

It was between early flights that I made some minor modifications to the 505. First, four small straps were added around the landing gear skids and soldered to the legs to prevent the solder joints from breaking due to my terrible piloting. The second modification consisted of two extra set screws installed in the large crown gear to make it run true on the main shaft. The third modification involved a slight revamp of the tail rotor assembly to lengthen the pitch spring and control arm; this was to reduce friction and achieve better control linkage ratios. While the above changes may not have been essential, I considered them highly desirable for getting the most out of my particular 505.

For wind shelter, most tethered flights were conducted in a large aircraft hangar. This is much better than a small garage because it allows space to move. After about eight or ten flights

(Continued on page 67)

View of swash plate and linkage which transfers control forces to flybar to change pitch.



Carrier Facts

(*Continued from page 15*)

third the length of the fuselage.

4. Maximum wingspan, 44".
5. Minimum wing area, 300 sq. in.
6. There must be a three line control system.
7. Maximum weight, four pounds.
8. The plane must be painted in traditional Navy colors with Navy markings.

Assuming a kit is to be built, the choice is almost endless: Flight Streak, Shoestrings, Magician, Ringmaster and so on. Most of these planes require some modification to meet the rules. The wing must be clipped to 44" or less, and at the same time the area must be greater than 300 sq. in. Three hundred and twenty is a good number, enough more than the minimum to avoid questions, without being excessive.

Other changes involve a personal touch with an aim toward improved performance: the airfoil could be thinned; efforts should be made to make the plane light (for example: 1/16" plywood doublers should be used on the fuselage sides instead of 1/8"); motor mounts should be as short as possible; choice of a kit with good wood can save another two or three ounces.

The model should be finished with epoxy or MonoKote though a dope finish is all right if low nitro fuel is to be used. It should be mentioned, however, that eventually nearly everyone goes to high nitro fuel.

The rules call for "traditional colors and Navy markings." While this phrase has never been carefully defined, four color schemes that are never questioned are: all white, all yellow, all blue, and all gray. National insignias on the upper left, lower right wings and fuselage sides have been acceptable "Navy markings" in every contest I have seen, including the Nationals.

Since the plane flies at very low speed, it can have a tendency to "come in" on the flyer. One method of preventing this is to have working ailerons and rudder. This is very effective but requires the use of rather elaborate linkages. A much simpler and only slightly less effective way is to have three or four degrees motor offset, 15 degrees rudder offset, and one and one quarter ounces of weight in the outboard wingtip to offset the line weight. We conducted tests and found only a slight loss in high speed using the latter method.

All these suggestions are rather trivial, indicating that there is not much required of the basic plane. Just about any Profile ship near the minimum configuration mentioned has winning potential. The necessary hardware is another matter.

The Control System: The person can go wild here but extra gadgets can triple the work of building a plane. Further, all the gadgets in the world are no substitute for a carefully installed elevator and throttle control system and a reliable well-broken-in engine. Many contests have been won by planes equipped with only motor and elevator control and a hook.

The system we suggest is based on engine and rudder offset, and wingtip weight to maintain line tension at low speed. On full down the hook drops and pulls the flaps down. A J. Roberts-type of control system is used for motor and elevator control. A discussion of this system follows.

The first item of hardware we'll consider is the arresting hook which should be made from 3/32" piano wire. It pivots in a 3/8" piece of dowel rod which goes through the fuselage. (See the sketches for details.) The hook should be loaded to

drop with a weak spring or a rubber band and it should be made the full one third fuselage length that the rules allow. The hook release probably seems as though it would hinder the controls but this is not the case. The force on the release wire is slight and a little grease here will insure that it will never give any trouble.

This system permits the flyer to drop the flaps and hook for low speed or leave them up and lower them for only the landing. On a very windy day, this may be desirable as the plane will be less likely to be blown in.

Flap area should be kept at about 1.5" or 2.0" x 20" total area. The sheet balsa flaps that are used in most kits are adequate but only the inner 20" should be used as moveable flaps. The amount of desirable deflection is highly variable. As a general rule, slower speeds possible on calm days permit more deflection. If the plane maintains level flight with nose-down attitude, there is too much deflection for that speed. Thirty to 45° is a good starting point. The linkage arrangement shown allows for easy adjustment.

Most beginners find the J. Roberts system rather confusing. Examining the system will reveal that pulling both elevation control lines moves the throttle one way, while pulling the throttle line moves the throttle in the opposite direction. Pulling the elevation lines should move the throttle to the high speed position while pulling the throttle line should move throttle to the low speed position. This is simple enough; the probable cause of confusion therefore lies with the handle. When the trigger that outwardly appears to activate the throttle line is pulled, this line becomes longer rather than shorter because of the linkage arrangement in the handle. To put it another way, pulling the trigger has the effect of pulling the elevation lines. The following table shows the proper arrangements:

	High Speed	Low Speed
Handle	Trigger back	Trigger forward
Plane	Elevation lines tight	Throttle line tight

The elevator control installation is critical and must be done right. At low speeds, there is very little line tension and the controls must be absolutely free. The J. Roberts bellcrank is adequate but the one shown can be made cheaper, stronger, and, more importantly, easier to install because it gives more working room and is less likely to bind as it has fewer bearing surfaces. The Roberts bellcrank has the advantage of maintaining a fixed distance between the elevator bellcrank pivot and the elevator control horn throughout the throttle range. Thus the elevator position does not change when the throttle bellcrank is moved. The price paid for this is a large number of bearings and linkages that tend to bind if the unit is not installed perfectly. The homemade system does not maintain a constant distance because the elevator bellcrank pivot travels on the arc of a circle and hence the elevator moves slightly when the throttle bellcrank is moved. This can be minimized by using the outer hole in both elevator horn and bellcrank. When this is done, the change in elevator position is so slight that it does not noticeably affect the flight.

The motor control must be smooth and free. During low speed, any binding or snag will produce unpredictable results. Tightness can normally be traced to a pushrod end not lining up with the hole in the throttle arm or the bellcrank. The rod end and the hole must be parallel. Any misalignment will cause a torsional or flexing force on the pushrod which normally becomes worse at the extremes of throttle travel.

The control unit including the bellcrank mount is a carefully dimensioned system and the plane must be built around it. Make the control system before even opening the kit. It may be necessary to change the location of the center wing ribs to accommodate this mount. Do not cut the mount to fit between the stock rib locations as the system needs all the room the mount provides. The limit screws for the throttle bellcrank are the centers of posts which this bellcrank butts against at its limits of travel. The post is made of a column of five #4 brass washers, 5/16" in diameter. The throttle linkage should be such that the throttle bellcrank hits the stop post just before the throttle hits its step in the wide open position. This insures that the fragile throttle will not be subjected to the force of a pull test or a high speed run. The stop post on the bellcrank mount absorbs this.

The control lines are .015 cable and since there is no provision for adjustment on the J. Roberts handle, they must be cut to the exact length. This job is a pain in the neck, but some of the following suggestions may make it easier:

*Don't try to do it alone.

*Have the motor mounted and the throttle control linkages attached when the lines are cut to length.

*Use the crimped tubing method of fastening the ends. When used on cable, this method is fast, safe and dependable, despite the publicity to the contrary. The method shown conforms to all the rules.

*Mark a length equal to 60' 3" on a sidewalk and put the grip of the handle and center of the plane on these marks. Cut the elevation control lines so that they satisfy your feel of level and are tight when the plane and handle are on these marks.

The finished system must be between 60′ 0″ and 60′ 6″.

*Now the motor control line is cut to length. Hold the handle in a horizontal position so the elevation control lines are off the ground and run parallel all the way to the plane. *It is important that the next operation be done exactly as explained:* the handle is held with the trigger back, and the elevator control leadouts in the plane are pulled all the way out so that the throttle bellcrank hits the high speed stop post. The motor control line should be crimped so that it sags *slightly more* than the elevation control lines. "Slightly more" means as little as possible without sagging less.

The J. Roberts handle completes the control system. Don't try to improvise here; the handle is a *must*. The only suggestion for improvement is to block off some of the hole in the trigger as it is much too large.

The Engine: This is the name of the game; the event is won or lost here. The rules, however, are very restrictive, and this has kept the event wide open, inexpensive, and fun. These are the engine requirements:

1. .36 cu. in. maximum displacement.
2. Engine must have a sleeve type crankshaft bearing. No ball bearings are allowed.
3. Engine must be front induction.
4. "The throttle must be of the same make and displacement as the engine" or "the engine is acceptable if it is advertised and sold as a factory produced ready-to-run unit." The new McCoy 35 is an example of such an engine. It is sold as a ready-to-run unit but comes equipped with a Perry instead of McCoy carb.
5. No pressure fuel systems.

There are many engines readily available to choose from and no one engine has established itself as *'the'* engine. Fox, McCoy, Super-Tigre, O.S. and Enya all presently manufacture an R/C .35 or .36 that meets the rules. A very popular setup in our area is a Super-Tigre ST 35 Combat fitted with a Mag III throttle, though this is frequently beaten by other engines.

The engine should be well broken-in before it is run wide open on high nitro fuel. Running like this before proper break-in is achieved will do subtle damage to the piston and sleeve which will adversely affect top end performance. It takes hours of running to break an engine in to the point where it can safely be run on 50 percent nitro fuel. I would recommend a lot of Sport flying to break the engine in. During this period one could gradually increase the nitro content of the fuel. Probably 10% increments are satisfactory. When no sag is apparent during a fast run, the engine is sufficiently well broken-in for that fuel and prop. When a contest comes along, enter the plane with whatever fuel and prop the engine is then using. A 9-6 or 9-7 propeller seems to be very popular. During this Sport flying break-in, experiment with the low idle—I doubt that a very low idle can be achieved until the engine is moderately well broken-in. It would be a mistake to feel that no damage can be done at low speed. A lean run at low idle will ruin a piston and sleeve as fast as running at full rpm.

There are times when speed is not sufficient to guarantee that the fuel will form a wall on the outside of the tank. At these times the plane hangs by the prop in a nose-up attitude; hence, the fuel pickup should be near the outside, rear, bottom corner of the tank. If a commercial tank is used, it should be rectangular, of about 3-3.5 oz. capacity, and the fuel pickup should be replaced with one in the correct position. The tank shown in the sketches has a trapezoidal cross-section so that fuel will always flow to the outside of the tank regardless of speed or volume left in the tank. It probably isn't necessary to go to this extreme, but it does seem to work very well.

When the topic of engine modifications arises, there is always a flood of things to do that are sure to produce a winner. The best that can be said of most of them is that if done correctly, they do no harm. If done incorrectly, they may ruin a good engine. I will suggest two modifications that can provide a substantial rpm increase and are difficult to foul up. First, the crankshaft should have end play. Most engines do, but if the shaft cannot be moved in and out with a prop bolted on, there is no end play. This can be corrected by filing a couple of strokes off the front of the case. The amount of end play is not important on this type of engine, just so long as there is a little. The second modification involves freeing up the crankshaft bearing which is invariably too tight. The shaft should rock up and down slightly. Use some jeweler's red rouge mixed in oil as an abrasive to lap the bearing and shaft. Put the shaft in the stripped case, chuck and run the shaft in an electric drill for about a minute, then clean both parts thoroughly in alcohol or thinner. If further "hop up" is desired, consult articles written by well-known Speed flyers and avoid the bull-session experts.

Flying: Treat a Profile Carrier ship as a Sport plane and enjoy it as a Sunday flyer. It is not easy to damage and the hook will normally catch in the grass during landing and prevent a nose over. The apparatus for practicing arrested landings can easily be made and transported. All you need are two five pound sandbags and ten

feet of 200 lb. test line. The bags we use are available from any person who reloads shot shells. The lead shot is sold in them. The arresting cable, a heat shrunk nylon line is about 1/8" round, is available from sporting goods stores and is used for trolley line. No stakes or eyelets are needed—just tie each end of the cable to a sandbag and stretch it perpendicular to the line of flight about an inch off the ground. If a raised deck is not available, a number of these cables may be laid out on the ground for competition. The rules allow this.

Proper flying techniques are learned by moderate practice and by watching good flyers. The mistake common to almost everyone involves a fast high landing approach. This will invariably result in the plane careening off the end of the deck. A low, slow approach is best but be careful not to let the hook touch the ground or ramp as that ends the flight. About two feet high is a good approach altitude.

Almost any competition Carrier flyer will be more than willing to help. The very best flyers are even willing to open up their Class II ship, let you take a look and answer your questions. The event is low pressure with firendly competition, and Profile Carrier lets you get started with a minimum of expense. ■

Rearwin

(Continued from page 20)

The rubber model flies beautifully and with its long flat glide has shown very little damage on landing. I am sure that a model of the Speedster will be an eye-catcher at your local model flying field.

(Editor's note: *I don't want to steal anything away from Gene's excellent report but I have an interesting side comment. In the mid-thirties, to please a very young son, I built a $1.00 Megow 36" span Rear-*

win Speedster and in spite of my crude building, poorer finishing, it flew quite well and for that reason only I have continued with modeling to this day—Walt Schroder.)

CONSTRUCTION

Fuselage: Trace bulkheads #3, 4, 5, 6, 7, 8, 9, 10, 11 and 12 onto tracing paper or onion skin for a template of each. My method for making formers of this type is to cut templates from the transparent paper, about 1/16" outside the contours, and then glue to balsa with model cement. Enough oil is in the papers mentioned to prevent sticking permanently to the wood. Select several sheets of hard 1/16 x 3 balsa and glue the templates to one sheet. Pin a second sheet of balsa under the one with the templates attached and then cut out together two sets of formers on a small bladed jig saw. In this manner identical formers are obtained. Do the same technique on bulkhead #1, except use medium 1/4" balsa. Next, cut out two window frame formers from medium 1/8" balsa. Note the partial cut made on the window frame to permit it to form to the slight narrowing in width of the fuselage near the trailing edge of the wing at bulkhead #8. Select several 1/8 square and 1/16 x 1/8 balsa strips to make the fuselage stringers. It is suggested that pieces of equivalent stiffness be chosen for both the left and right halves of the fuselage to allow for minimum warpage when the halves are eventually glued together.

With the formers and stringers now available, lay a sheet of wax paper over the plans. Pin the upper and lower 1/16 x 1/8 stringers to the plans. Align each of the fuselage formers in place and pin sturdily to the plans. Now lay the three 1/8 square balsa stringers in position and glue all joints. Note that the stringers all protrude out from the formers by 1/16". Check bulkhead contours on the plans for a representation of this particular requirement. As soon as dry, attach the window frame to the fuselage structure still pinned to the plans. It is suggested that the two 1/16 dia. holes for the wing dowels be added to the window frame prior to its being assembled to the fuselage structure. This will insure proper incidence in the wings with respect to the propeller axis. Next add the three side 1/16 x 1/8 stringers. When they are all dry, remove from work board. Hold the lower stringer installation until the two fuselage halves are glued together. To make the right half of the fuselage, proceed as follows by either of these methods:

Method "A": turn the plans over and trace the location of all frames and

the upper and lower stringer contours on the back side of the paper.

Method "B": trace the plans onto a sheet of tracing vellum in a like manner and merely turn the paper over to get a reverse direction plan.

In any event, construct one left-hand and one right-hand half of the fuselage in the manner described above. It is essential that the formers be pinned *exactly perpendicular* to the plans. Use a small drafting triangle to check each former as it is pinned to the plans. This is extremely important, as both window frames must be in alignment with each other. Both halves can now be blued together. Apply adequate glue to the former joints as well as to the upper and lower stringers. Check fuselage alignment in a top view and bend the structure as necessary to obtain a straight centerline.

Proceed to add the 1/8 dia. dowels in the windshield area as well as the 1/8 square cross braces in the wing center section area. Add the 3/16 x 1/2 balsa brace at bulkhead #8. Glue this brace to #8 bulkhead as it takes quite a lot of punishment from the wing trailing edge in the event the model contacts the ground on a wing tip. Next, add the upper corner 1/8 x 1/2 tapered balsa stringers as shown. Note how these are rounded off to give a smooth radius for the covering material. Blend this stringer into the window frame rib section. A bit of wood filler will do wonders at this juncture.

Cut two pieces of 3/32 O.D. brass tube for the landing gear installation. Make these the width of the fuselage at the intersection of the lower longeron and bulkheads #5 and #6. Tie and epoxy in place as shown on the plans. Be sure the 1/8 square lower longeron balsa cross braces at bulkheads #5 and #6 have been installed prior to attaching the tubing. Refer to the plans carefully. Install the remaining 1/16 x 1/8 lower stringers after the gear tubing has been fitted. The nose planking can now be completed. This builder used 1/16 x 1/4 medium balsa strips on the nose upper surface and on lower section. The sides were sheeted with 1/16 medium balsa. Add the 1/8 hard sheet balsa fillers for the horizontal stabilizer supports and the rubber motor rear dowel supports as shown on the plans. At this point, I would rough shape the nose block. Trace the nose contour on a 1" thick block of medium balsa. Glue on the round 1/4" sheet balsa washer that fits the large hole in bulkhead #1. Drill and add the 1/8" dowel. The nose block can now be finish-sanded. Also sand the sheet stock and nose block together as an assembly. Add the 3/8 balsa block fillers on the inside surface of the window frames at the leading edge of the wing rib and bulkhead #5. Refer to the top view of the fuselage plan. This serves as a support for the celluloid windshield. With a light sanding of the fuselage, it is now finished and can be laid aside temporarily.

Wing: Start the wing construction by selecting very straight medium grade balsa strips for the leading and trailing edges. See plans for proper size. Cut wing ribs out of medium grade balsa. Note that the inboard end ribs are made from 1/8 stock. Drill the 1/16 dia. holes in the 1/8 end ribs as per plans. These must match the holes in the rib glued to the fuselage. A suggested method for building the wing is as follows. Take the six strips of balsa that make up the wing spars and leading and trailing edges and lay them on the plans. Mark the width of the ribs (1/16) and (1/8) lightly on the strips with a ball point pen. When this has been done, pin the trailing edge of the wing carefully over wax paper onto the plans. Lay all the ribs onto the plans, except the tip rib, upside down, and carefully pin to the trailing edge. Align the ribs accurately to the plans. Next, pin the leading edge onto the ribs. Very gently push the bottom 1/8 square spar strips into the rib notches. Pin as necessary. Glue the assembly in this condition. Allow to dry and then unpin from the plans and, turning over, add the upper spar caps. Be sure and align all the marks on the spar stock with the ribs. This insures a straight wing.

Laminate the tips from 1/4" and 1/8" soft balsa. Note how the splices are staggered. Glue the tips in place, aligning them parallel with the leading and trailing edge strips. Be sure to make a left *and* right hand set of wing tips. Locate the tip rib in place and glue. When dry, bend and fit

the 1/8 square strips into place as per the plans. Add the diagonal brace at the root end of the wing structure. Next add the various strips of 1/8 balsa to the lower surface of the wing for the wing strut attachment and the jury strut dowel. These sheet strips not only structurally tie the struts to the wing, but also provide a surface for the covering to attach to. Shape the wing leading edge, trailing edge and tip to the contours shown on the plans. Lightly sand the entire assembly (always using a sanding block), and the wings are now complete.

Empennage: Both the vertical and horizontal tails are similar in construction. All members are medium grade 1/8 square balsa and 1/8 sheet stock. The rudder is built as a unit separate from the vertical stabilizer and is spot-glued as shown on the plans to the vertical. Note the small 1/8 plywood gussets for attachment of the empennage support nylon thread. Round off the leading and trailing edges and tips as shown. Round off the leading edge of the rudder. After sanding, glue the rudder to the vertical as shown on the plans.

Wing Struts: Build two strut assemblies. Allow excess length as shown on the plans. Glue the 1/8 x 3/8 members to the 1/8 sheet gusset. After drying, shape the struts to the contour shown on the plan. Install the 1/8 dowel, glue and tie as shown. Do *not* install the 1/8 dowel jury strut at this time. Form the .035 wire hook at the lower end of the strut vee point. Tie and glue as shown. At this point, both strut assemblies are the same—no left and right required. Hold for assembly onto the wing.

Landing Gear: Cut out 12 formers of 1/4" thick soft balsa for the wheel pants. Four are to have the outside contour only, four are to have the larger radius inside, and four are to have the smaller inside radius. Before gluing the formers together to form the wheel pant block, chamfer off the inner radius on the formers with the smaller inside radius. Refer to the front view of the wheel pants for this picture. Be sure and chamfer as left and right assemblies. It is suggested that a pin hole be made at the axle location on both sides of the wheel pants. Shape the wheel pants to a streamline shape in the top view. Round off all corners. Sand lightly and give two coats of dope at this time to seal the wood. Take 1/16 dia. music wire and bend a set of front and rear gear wires for both the left and right hand landing gear struts. The plans show the two different templates. Round off the ends of the wires so that they will plug into the fuselage tubing with no restriction. The wires plug into each side of the fuselage. Cut a piece of 1/8 I.D. brass tube 1/8" longer than the width of the wheel hub. Solder the gear wires into the axle tube.

In order to insure an accurately aligned gear assembly, it is suggested that all four gear wires be plugged into the fuselage, and that before soldering on the axles you check the alignment, cross-ship and fore and aft. Slip rubber bands over the wires to hold them securely into the fuselage tubes. Apply solder until it fills up all the void inside the axle tubing. (The axles will probably be larger than the holes in the nylon wheel hubs.) Drill the hubs out to 5/32 dia. Next, bend the tail wheel frame from .035 music wire. A rubber-tired solid wheel should be used here. Shape to the plans and tie and glue to the aft fuselage members as shown on the plans.

Returning to the wheel pants, drill a 5/32 dia. hole through the inboard side of each pant where the previously marked axle position was noted. Do not drill through the outboard side. Slip a pant onto the axle up to the edge of the vertical wire segment of the gear strut. With the pant in proper side view alignment, mark, with a ball point pen, the location of the wires. Remove the pant, and with a pointed X-acto knife cut into the pant inboard side. The notch will be 1/16 wide and a full depth cut into the 1/4 side balsa former. Continue to fit until the pant slides all the way onto the axle, so that the vertical gear wires are flush with the inside of the pant. Do both pants alike, making sure they are each in identical horizontal alignment. When satisfied with the fit, slip the wheels inside the pants and push the assembly into position on the gear wire. When both pants appear perfectly aligned, apply Sig-Bond (or white glue) to the notch. Carefully work glue into the notch to completely contact the gear wires. If properly fitted and

glued, the pants will take considerable punishment without any loosening.

Cut the large and small gear fairing formers out of 1/16 plywood and glue into position on the gear wires. Cut out the stiff tan paper gear coverings according to the template on the plans. With the gear still plugged into the fuselage, wrap the fairings around the formers and glue into place. Pre-form the leading edge of the fairing over a 1/2 dia. dowel rod. Use generous amounts of glue during this process. Be sure the trailing edge is a straight edge. Use 1/8 square balsa on the upper and lower outside surface at the very trailing edge and pin through the assembly to keep in place. Any balsa that sticks can be trimmed off later with a razor. If done properly, the gear will look very authentic to the original airplane. Use a bit of "Spackle" stucco patching paste from the tube variety to form a fillet between the pant and the gear covering. Also fill the notch in the pant caused by the gear wires. Sand lightly, then give the entire assembly one coat of clear dope.

Model Assembly: The sub-assembly of the model can now begin. Cut two pieces of 1/16 dia. dowel and glue into place through the holes marked on the fuselage window frames. These should fit against bulkheads #5 and #7 as shown on the plans. Glue to bulkheads as well as the ribs. However, be careful to permit replacement of the dowels in event they are broken off from a bad wing impact. Slide the wings into place on the dowels, through the holes marked on the wing inboard ribs. At this time, check that both wings have identical influence. Check by sighting from the front and rear of the model. Make any adjustments at this time and be sure to reinforce any elongated holes in ribs which might result. Check the fit of the wing root rib to the fuselage rib. Trim or build up the fuselage as necessary.

Now comes the critical fit of the wing struts. Turn the fuselage upside down on your work table. Lay a one inch thick block in between the cabin roof line and the table, to provide the required dihedral. The wings which are now slipped into place will lie with their outboard ends on the table. Take each wing strut assembly and carefully insert in the openings provided on the lower surface of the wings. Remove each landing gear and notch the stiff paper fairing at the rear gear wire to permit the strut wire to hook around the gear wire. Be sure the gear wire is pushed completely into the fuselage tube. The wing lift load is carried down the wing struts and into the rear gear wire and thence to the fuselage. A rubber band looped around the gear wires holds the gears from pulling out in flight. Friction from the angular pulloff actually is adequate, but the rubber band insures a margin of safety. Pin the strut into the wing structure and glue thoroughly. Before the glue dries, pull the model off the table, and placing it on its wheels, check that each wing has identical height off the work table. Add the 1/8 dowel jury strut as shown on the plans. This should be glued to the wing and the strut cross brace. A bit of thread wrapped at the cross tube will help retain the joint. The wing and strut assembly are not detachable from each other. With the wing snug up against the fuselage, cut and attach to the wing celluloid strips which cover the wing rib to fuselage rib joint. The wing is now ready for cover.

At this time it will be proper to fit the horizontal tail. Cut a 1/16 dia. dowel and insert into the aft fuselage 1/8 side doublers at the position shown on the plans. This dowel must be parallel to the wing axis. Carefully drill a 1/16 dia. hole into each inboard end of the horizontal tail at the rear spar point. Although the wing has considerable incidence, the author's model flew best with the horizontal tail installed parallel to the thrust line longeron. The first flights were made with the tail pinned into position for easy adjustment. This can be done or you can proceed to install the front spar 1/16 dowel, similar to that just done. The horizontal tail is removable as is the wing. The model is now ready for covering.

COVERING

Use lightweight Silkspan. Coat with two coats of clear dope all surfaces of the model which will be in contact with the covering. Sand lightly after each. The Silkspan should be laid in sheets across the frame and then sprayed lightly with water. Pull the Silkspan tight around curves and when the paper has dried, slightly brush on dope at the points where you wish the paper to stick. Several coats of clear dope applied to all surfaces will be sufficient to strengthen the paper. Cut pieces of celluloid for the cabin windows and windshield. Glue to outside of structure. Apply purchased decals to the wing for registration numbers. The vertical tail numbers are hand painted in place. Refer to the photos of the model and real airplane to get an idea of authentic factory trim. Black tape 1/16" wide makes a good trim for outlining ailerons, elevators, door openings and cowl seams.

The vertical tail can now be glued in place and, with the horizonals installed, tie in the empennage guy wires as shown on the plans. A spot of glue will prevent the threads from slipping at the tie to the surfaces. The author carved his own pro-

peller, made from pine in order to provide adequate weight in the nose. Install 16 strands of 5/32 lubricated rubber.

FLYING

The author's model weighed in at 12 oz., which may seem slightly heavy, but it is not a contest model. The model *must* have the C.G. as shown. This provides a good balance between power "ON" and "OFF" trim. Hand-glide the model dozens of times in tall grass and use clay to obtain a good flat glide when thrown fairly hard. As noted previously, author pinned the leading edge of the tail in place first to determine the proper setting. At the most, the leading edge of the stabilizer may have to be raised up to 1/16" from level, but no more. Naturally any warp in the wings or tail will vary the proper trim settings from the plans. Be sure rubber bands are added on the wing upper inboard ends and lift struts as shown on the plans. The model as trimmed will usually make one large turn under power and then glide in a straight line or slightly right turn. The author's model makes consistent flights of 30-40 seconds. It is extremely realistic and fast in flight and moderate wind is no problem. The model will take off with ease. Authentic coloring for the Speedster would be all vermilion, with silver trim. Black strips were added to the edge of all trim. ■

Field and Bench

(*Continued from page 46*)

the tethers were removed and free flight attempted. The result was a series of minor crashes. The next 20 flights were spent on and off the tether lines which at times seemed to hamper me more than help. An important thing to suggest here is addition of a training landing gear, if the weight can be tolerated. Two 1/4" dowels with rounded ends (or wooden balls glued on the ends) can be lashed to the 505 undercarriage in the form of an "X." In my case, they contributed immensely to finally winning the battle of learning to fly a model helicopter. This attachment permits the model to be flown free with far less chance of a minor accident. Like most helicopters, the 505 landing gear is small, and the machine can be easily upset unless it is equipped with such a training gear.

At the time of completing this article, I am able to hover the 505 under calm air conditions; I am able to control it with reasonable success and move it back and forth at low speeds. I have really just begun a long learning process and I feel that any model helicopter will require the same level of piloting ability.

As any other model helicopter, the 505 is easily damaged. However, it is very easy to repair. I "bent" my 505 numerous times and expect to "bend" it more before achieving the demigod status of a fully qualified model helicopter driver. Damage on most occasions has been a broken rotor blade and some bent music wire, but this is very easy to repair and I would suspect that no other model helicopter on the market today can be put back in the air so easily. I found that a simple field repair kit can be carried including epoxy glue for rotor blade repair, a Bernzematic torch kit for soldering, and a spare large gear for the tail rotor mechanism. With these items, I have always been able to facilitate repair of the 505 on the field no matter how hard I flew it into the ground.

As the reader can readily grasp, the 505, like any other model helicopter, opens up great new flying fields like the front street, the driveway, and so forth. The ship likes these hard top surfaces which permit it to slide when landing rather than turning over. Most of my free flying has been on a little-used side street behind my house.

I found, however, that the 505 should not be flown over dirt. The dirt situation is bad enough on any surface because the oily engine exhaust on the fuselage picks up dirt which re-circulates with rotor wash. There are several areas of concern here besides covering the whole ship with a greasy dirty mess. First, engines don't thrive on dirt, so a Perry air filter or similar device is mandatory on the carburetor regardless of how clean the flying conditions are. Secondly, dirt causes excessive wear to the tail rotor components which, on the 505, have a limited life. My only answer to the latter problem is to buy extra crown and pinion gears for the tail rotor from Du-Bro prior to needing them. Changing gears is a simple matter and their cost is reasonable.

There is one very important item concerning flying the 505 which I have not covered—the ship seemed to be sensitive to wind. With my limited piloting ability, I was only able to fly in morning and evening calm conditions because of lift-off and touch down difficulties. With self-imposed time constraints for submitting this article, it was impossible for me to really assess the limitations of the machine in wind and find how many of my problems were solely pilot-induced.

In conclusion, the modeler today who is shopping for a model helicopter kit should seriously consider the 505. It is an intriguing and challenging helicopter to build and fly. The price tag and ease of repair make it an attractive project for the beginning helicopter modeler to learn basics. It is most rewarding to see your own 505 in beautiful hovering flight about four feet in the air, within an arm's length. However, be careful of one thing. The "Whirlybug" may bite you as it did me. Anybody like to buy a Pattern ship? ■

Nimrod III

(Continued from page 13)

Start the fuselage construction by laminating the 3/32 sides and 1/32 ply doublers, not forgetting the coaxial socket in the outboard side. The 3/8 x 1/2 bearers are Araldited to the sides before assembling the fuselage with bulkheads F1, F2, F3 and the 1/4 x 1/4 tail-post. At this stage check to see that the wing is a good fit against the fuselage sides; if not, trim the sides as necessary. Add former F4 and additional 3/32 formers as shown on the plan, not forgetting the slots for the elevator pushrod. The wing bolt attachments F5 and F6 are made up as shown, each with two 4 B.A. nuts sandwiched between 1/8" ply and 3/32" sheet. Apply plenty of Araldite *(We call it "epoxy": Ed.)* around the nuts to prevent them turning in use.

Before the assemblies are dry a well-oiled bolt should be run through each nut to insure that the threads are not clogged with Araldite, after which the fixings can be Araldited in place against bulkheads F2 and F3. Fit the 3/32 wing supports leaving 1/8" of the fuselage sides clear inside the wing housing.

The wing is located sideways by a 1/16 spigot on the center section. This consists of 1/16 sheet with its grain running across the fuselage, shaped so as to be a good fit between the fuselage sides. Cement the spigot to the wing making sure that the wing-fuselage joint is square and that the fuselage is central on the wing. A similar central strip of 1/16 sheet is added to the underside of the wing to provide extra strength for the 1/16 ply straps.

1/16 sheet is fitted inside the fuselage wing housing against the bottom faces of the wing supports leaving a 1/16 recess for the wing locating spigot.

Make up the assembly of 1/8 ply lugs and 1/16 ply wing straps, insuring that the bolt holes are correctly spaced. When the assembly is dry, locate the wing in position on the fuselage, apply Araldite to the curved edges of the straps and bolt the assembly loosely in place. At this stage there should be a very small gap between the lugs and the bearing faces of bulkheads F2 and F3. In use the wing can be bolted tightly in place, the lugs being restrained against F2 and F3 to prevent excessive strain on the wing structure. To prevent wear on the 1/8 lugs, a 4 B.A. washer is Araldited in position at each bolt hole. No locking devices such as spring washers are needed as there is sufficient elasticity in the structure to prevent the wing bolts loosening in flight. However, for the first few flights while the structure is bedding in, it is wise to check the bolts before each flight.

Drill the bearers to suit the engine and fit the mounting bolts. Wire up the outboard pair of bolts to the body of the coaxial socket with heavy duty (i.e. low resistance) copper wiring (used for glow plug starting battery connections).

Tailplane construction is straightforward, but when fitting the tailplane and elevator unit to the fuselage do not forget the pieces of sheet which extend down through the tailplane inside the fuselage sides. Before fitting the tailplane, bend the elevator pushrod to shape so that the flaps and elevators line up at neutral. Note that the slot in bulkhead F3 provides a guide for the pushrod to prevent it from disconnecting itself from the flap horn. The pushrod end at the flap horn should be 3/8" long. When the wing is lifted off, the pushrod passes below the end of the slot and can be moved sideways to disengage. Do not

forget the other guide midway along the elevator pushrod.

After completing the fuselage construction, including the engine cowling, sand it to shape before adding tank vents, fin and rudder. Cut away the top sheeting for the cockpit area and finish the cockpit details as required. Cover all flying surfaces with heavyweight tissue and the fuselage with lightweight tissue. The original was finished in plastic enamel followed by a coat of fuel-proofer.

Fit a wide-bladed 10 x 6 propeller and fly on 60′ lightweight lines. A .35 engine provides adequate power, although Nimrod is at the large end of the range of .35 Stunt designs.

To get the best out of any Control Line Stunt model, *careful trimming adjustments* must be made to the control surfaces during the early flights. The object is to produce a model which shows no tendency to roll when the lines go slack and which does not tend to climb or dive in upright or inverted level flight. Any roll can be corrected by twisting the flap horn to move one flap up and the other down as appropriate, and a tendency to dive can be corrected by bending both flaps upward or vice versa. Then tendency to roll is best seen at the top of a wingover when line tension is low. After trimming the model as above, performance in inside and outside square corners should be equal in terms of handle movement required to produce an equal turning radius.

One final point: when flying, whether in practice or competition, it is not worth taking unnecessary risks. My first consideration is the preservation of the model, and this makes sense because *practice is essential* to achieve success with any Stunt model, and if you crash the model you have nothing to practice with! Remember, no two models are exactly alike and it takes time to become accustomed to a new model. After that, there is only practice between you and the contest winners. ■

Foreign Notes

(Continued from page 7)

(Formula I) were really something to watch and fly and let's hope they'll be back before too long."

These sentiments are in marked contrast to the views of the majority of Pylon racing enthusiasts in the United Kingdom, where Pylon is more popular (80 entries in this year's Nationals) than anywhere outside the U.S.A. At the season's first two major Pylon events, for example, entries in FAI outnumbered those of Formula I by more than three to one. The FAI racers, benefiting from more intensive competition, are now often as fast, sometimes faster, than the Formula I jobs. Alan Mann (2nd to Telford/Violett at last year's Doylestown Internats) clocked 1:54.2 at the first meet, nine seconds faster than the winning Formula I time. Writing in *Radio Control Models & Electronics,* Tony Dowdeswell comments: "Regrettably, the low entries in Formula I are now reducing this class virtually to nuisance value. The question inevitably arises, how much longer can it be justified as part of the contest program? We wonder what proportion of the Pylon racing fraternity would prefer to see this class die and allow more time at race events for the now far more popular FAI category. Or, if Formula I must go, should we perhaps be considering replacing it with a Half-A or Quarter Midget event, thereby appealing to a far wider cross-section of Pylon enthusiasts?"

A new outfit, called the Midland Flying Club, has begun making the rounds of British R/C events. Their equipment includes a converted bus, and if you think that's a bit extravagant for transporting models, we'd better mention, in passing, that these include a couple of scale whoppers. The smaller of the two is 10 ft. 3 in. span Handley-Page Halifax (British WW.II heavy bomber) powered by four O.S.30's and weighing 20 lb. The other one is a 14-foot long model of the Anglo-French Concorde SST, powered by two HP.61's and weighing 28 lb.

Australia

Silvertone Electronics, long established as one of Australia's leading Radio Control manufacturers, are promoting the idea of safer flying with a couple of new products. The first is the Silvertone Failsafe Package, a device to convert existing servos to failsafe type operation. This simply plugs into the appropriate servo lead and operates 0.5 sec. after loss of radio contact, returning the servo to neutral (control surfaces) or, in the case of the throttle servo, to the idle position. Of course, we all know that this doesn't eliminate the possibility of a crash with today's highly maneuverable and, consequently, lacking-in-inherent-stability-type models, but it should mean a somewhat less abrupt descent in most cases and give everybody more time to get out of the way.

The second item is the Silvertone Parachute which is intended for use in conjunction with the Failsafe Package or as a separately activated safety device. The 'chute comes in two sizes: 8-section, 35-inch diameter for models of up to 6 lb. and a 10-section 42 in. diameter for 8 lb. models.

New Japanese Motors

When Japanese engines are mentioned, one automatically thinks of O.S. and Enya as these are the best and most widely known motors produced in that country. For many years, however, Fuji Bussan Ltd.

has been making sizeable quantities of general purpose motors in the .049 to .35 cu. in. group. These are simpler and cheaper than most O.S. and Enya products, being intended for the Sunday flyer rather than the contest enthusiast, but are quite well made, if a little uninspiring in design. However, after some years without any significant changes, Fuji is now introducing several new models.

Briefly, these consist of replacements for the Fuji 19, 29 and 35, plus an entirely new 40 (the company's first venture into this class) and a revised version of the Fuji 15 Outboard. This latter model includes an integral starter unit—something, we have always thought, that is very desirable with a model outboard motor. The 40 is not due to appear until production of the 19, 29 and 35 is under way. Release is provisionally scheduled for September. Unlike previous Fuji motors, all of which have been plain or bushed bearing motors, the 40 will have a twin ball-bearing shaft. Prototype units had square-finned cylinders and the design includes Schnuerle scavenging with shaft valve induction.

The production of both K.O. and Ueda engines has ceased, but Hiness, whose twin ball-bearing .20 was briefly described in the July issue, have introduced a single ball-bearing .09 and will be following up with a .15. An intriguing bit of news is that this firm is also testing prototypes of a twin-cylinder 40.

Russia's "Rhythm" Diesel

This 2.5 c.c. class (.15 cu. in.) motor is one of the standard quantity-built engines available to modelers in the USSR. It has been in production for about ten years but the example illustrated is of more recent construction and was acquired for our personal collection.

The specification of the engine sounds well enough. It includes a twin ball-bearing shaft and rear rotary drum valve induction, plus radial porting somewhat on the lines of the British Oliver and Eta diesels that were so successful during the late fifties and early sixties. Unfortunately, however, all this is spoiled by rather poor quality construction which is reflected in below-average performance. The engine uses permanent mold castings for crankcase and backplate assembly. The crankshaft is of hardened steel and runs in 7 x 19 x 6 mm. and 6 x 15 x 5 mm. Russian-made brass-caged ball-bearings which, on our sample, are an excessively sloppy fit in their housings. The hardened steel drum valve is 9.5 mm. dia. and has an oval port fed from an inclined intake with brass spraybar assembly. The valve remains open for approx. 157 deg. of crank angle.

The piston is of cast-iron, orthodox in design and runs in a hardened cylinder which has four radial exhaust ports (open for 140 deg. of shaft rotation) and four inclined bypass ports (open for 116 deg.) fed from channels machined in the main casting. The cylinder is encased in a turned alloy finned jacket, the whole assembly being tied to the case with four long screws. The cylinder jacket, prop driver and spinner-nut are all anodized to a pale green color.

The "Rhythm" has a nominal bore and stroke of 14 mm. x 16 mm., for a displacement of 2.463 c.c. or 0.1503 cu. in. It weighs 6.7 oz.

Those Soviet Records

As was reported in the March Foreign Notes, the Central Aero Club of Moscow held a special meet at Simferopol in the Crimean peninsula, last fall, for the express purpose of establishing a number of new national and international model aircraft records. At the time, our information, which came direct from the Soviet Union, was that two FAI world R/C records had been broken. In fact, it later transpired that several other new records had been claimed. Submitted to the FAI in Paris for ratification, some of these records caused some worried frowns but apparently the FAI found no just cause for rejecting them and most of them are now official.

Strangely, very little information concerning the meeting and next to no technical details of the models involved have been given in the Soviet model and aeronautical magazines. The only on-the-spot report of which we are aware was by Leonid Aldoshin, himself one of the participants. A translation of this has now been published in the July issue of (British) *Aeromodeller* magazine and makes interesting reading. From it we learn that Miakinin and Gukun's final R/C speed mark was 344 km/hr (nearly 214 mph), not 204.4 mph. As we mentioned earlier, they used a modified Super-Tigre G.60 ABC Speed engine (tuned pipe equipped) turning a 9x11 prop. The model, a fairly conventional shoulder-wing design with long tail moment, had a span of 52 in., and a wing area of 345 sq. in. R/C equipment was West German Varioprop. A few days later this same model was fitted with pontoons and established an R/C hydro speed record of 182 mph.

Aldoshin's 422 km (261 mile) close-circuit R/C glider record was disallowed by the FAI (apparently because notification of the claim did not reach the Paris headquarters within the 48 hour time limit), which was hard luck on Aldoshin as he had stuck with it, cold and tired, for eight hours and 35 minutes. For the present he has to be content with a Soviet National record. His model was also Varioprop equipped and carried a 1000 MAH battery pack. Spanning 68 in., it had a

wing area of 485 sq. in. Aldoshin had better luck with his R/C glider speed record claim in which he returned a two-way average of 182 km/hr (113 mph).

Quite the most astonishing device that appeared at the Speed trials was a Free Flight Speed job by C/L Combat champion Dubinetsky. This was virtually a dart with an engine stuck on the front and was launched by being whirled around on a short line, then released—just like a Combat model getting away. Using a Super-Tigre G.20/15, this "model" clocked 169 km/hr (105 mph) over the 50-meter course and four days later, raised this to 121 mph with a G.21/29.

The privately expressed doubts about the validity of some of the Soviet records center mainly on the question of timing speed runs where the present FAI regulations seemingly allow too much room for error, no matter how conscientious the participants may be. It is hoped that the CIAM will find the answer to this whole question as soon as possible.

Apologies . . .

. . . to anyone who is still waiting for a reply to a letter addressed to this column or to the Engine Review department. We have an "In" tray full to overflowing. Please bear with us. We hope to answer all in due course . . . ■

Round & Round

(Continued from page 23)

tions, it might be wise to list your club as a non-profit corporation with your state. This makes donations tax deductible. Requirements vary with each state but usually the minimum membership is only three and cost is from nothing to about $25.00 for filing. The major additional cost is attorney fees for investigating to be sure no other corporation has the same name in the state. The secret here is to locate an attorney who is sympathetic to your cause (a lot of them are modelers) who will provide this service for you for nothing. Although the AMA is a non-profit organization, I don't think AMA-chartered clubs have this same privilege. Should you care to investigate this, a note to John Clemens or the AMA office would clarify this.

Also from Rhodesia, from the same newsletter, comes a report on Rhodesia's 1972 Nats by Peter Wilson:

"Competition standards at Rhodesia's 1972 Nationals were very good. Entries in the various events were among the best we have had—thanks to a strong South African contingent which outnumbered the local entries. Once again, the lads from R.M.A.C. took most of the trophies back across the border with them, winning everything except F.A.I. Combat, Open Speed and Concours. Major surprises at this year's Nats were failure of the Allan van Breda/Mike Todd team in F.A.I. Team Race and Rat. Selected to represent South Africa in the World Champs later this year, they had the ability to win both. They also had the speed, noticeably faster than their opponents in both classes—but again, it proved that without reliability, speed itself means very little.

"The F.A.I. model did not record a time, and the Rat was shaded out of the final. Neville Koch took the F.A.I. T/R honors after placing in the final for the past few years, and John Bilyard won Rat —giving him the Transvaal, South African *and* Rhodesian titles in one year. This was no mean achievement, and after getting to the top of the tree John told me he thought it might be the right time to pull out of the Rat scene. But we will probably see him next year with the familiar R & B 40 RV powered ship. My report on the Nats this year is regrettably short, due to organizing committments at the Championships and pressure of work after it.

"F.A.I. Team Race: Had a record eight entries this year, with Rhodesian hopes on the Van Breda/Todd and Wilson/Sutherland teams. A newcomer was Errol Myburgh from R.M.A.C. The first round heats gave most competitors troubles of one kind or another, and Allan van Breda knocked the tail of his model on a missed catch. Nev Koch also lost a tailplane in a landing pile-up, and neither recorded times. Most other entries were reliable but not very fast. In the second round, Allan's Moki really played up, refusing to keep going for more than a lap at a time. Trouble appeared to be in the fuel system, but it was not solved in time and did not complete its heat. Wilson/Sutherland had starting troubles with the Eta Elits, putting in times that were well below practice recordings. Pat Parsley from R.M.A.C. flew consistently and posted a time in the first round that should have qualified him for the final. But the model was wrecked in a second round landing. Although it appeared to come down quite slowly, it spread itself over the tarmac and was totally smashed. Pat did not bring a reserve into action (I don't know whether he brought one) and Wilson/Sutherland got into the final because of this. The three who went into the 200-lap decider were Myburgh/Bilyard, Koch/Duncan and Wilson/Sutherland. The final was uneventful, with Nev Koch flying consistently to beat Errol. Wilson/Sutherland were left a long way behind and withdrew.

"Rat Race: Also drew a record nine entries, but there was a big gap in proficiency between the front runners and the rest of the field. Mike Todd's St 40 model was the fastest, but suffered setting prob-

lems and a loose needle. John Bilyard posted the fastest heat times with a very efficient performance, followed fairly closely by Ken Cloud, also of R.M.A.C., who held the trophy from last year. The final, with Bilyard, Cloud and Pat Parsley's "B" Team racer was fast and well flown, with the two Rats considerable faster than Pat's "B" ship. It would have been even closer if Ken had not had an extra pit stop near the end of the 140 laps—he had not filled the tank completely on the second stop. Congratulations to John for getting the trophy after several years and capturing all the available titles in Southern Africa.

"½A Team Race: Had only three entries but was a *very* fast event. Heat and final times were new Rhodesian and National records. Entries in ½A this year were Pat Parsley, Allan van Breda and Alan Duncan. This event was also well flown, with Pat Parsley coming out on top followed by Allan van Breda.

"Class B Team Race saw the ST 29 RV ABC motors in great form . . . Allan Duncan, Pat Parsley and Ken Cloud, all from R.M.A.C. used the Super-Tigres while S.M.A.C.'s only entry by Wilson/Sutherland had an ETA 29 up front. The ETA had very poor range and did not make the final. Allan Duncan's racer was one of the most impressive team race machines seen in Salisbury—performed superbly on the ground and in the air, setting new records in the process and gaining the Class B trophy for Allan.

"Mouse Race had only two entries and was abandoned after neither of the models was able to complete more than a few laps.

"Open Combat drew seven entries, and was the most time consuming event of the Nats. Models were written off with regularity, and R.M.A.C. members Alan Duncan and Neville Koch battled their way through to the final. In the decider, Neville had a clear win over Alan, putting Nev well on the way to winning the high points trophy.

"F.A.I. Combat saw S.M.A.C. members excel. Philip Edwards, Mike Guiness and Barry Hunt flew well with very fast models, shutting out the South Africans from the final. Mike and Philip flew what was considered by onlookers to be one of the best Combat finals they had seen. Mike used his high-revving M.V.V.S. diesel against Philip's St G15 glow motor. There was little difference in speed, with the diesel shading the glow on the tight maneuvers. Mike scored decisive cuts to win the event and put himself right in the front of Southern African Combat fliers. His success followed his second placing in the South African Champs, earlier this year.

"F.A.I. Speed had only two entries after S.M.A.C. flyer, Clyde Sutherland, had pulled out of the event. John Bilyard, flying a much-used ST G15 model, was up against clubmate Pat Parsley. Their flights were efficient and wasted little time, but speeds were not outstanding. John came out on top with 104.4 m.m.h. against Pat's 82.03.

"Open Speed was used as a practice event by most entrants. Rats and Class B models predominated, with Mike Todd putting up the fastest time of 114.65 m.p.h.

"Stunt had only three entries—Neville Koch, a regular competitor, John Henry Dawes, a newcomer from R.M.A.C. and S.M.A.C.'s Philip Edwards. Neville was clearly a long way ahead of the others, being a very experienced Stunt flyer. Henry's experience showed in the advanced maneuvers, but he flew well for a Stunt beginner and attempted most of the Pattern. Philip had a very well-finished "Skylark" and flew it well in the first round, but he left a pull-out too late on a vertical eight and wrote the model off. Neville won the event without any difficulty, flying a veteran "Thunder-Bird."

"Scale had only one entry—Henry Dawes flying a Fokker bi-plane (sorry I have not got any details). The large, green model did not like the wind and flew a heart-stopping 30 or so laps. But it looked good in the air and Henry took the title. I hope that next year there will be some good competition in this event.

"Concours d'Elegance had four entries, with Allan van Breda putting in his ½A F.A.I. Team race models. Nev Koch entered his F.A.I. team racer, as did R.M.A.C.'s Dougie Wood, and Henry Dawes entered his large "Protor" Stunt model. Allan's well-made and well-finished ½A model took the trophy (it also won

this even at the S.A. Nats) followed by Neville's racer."

Never in my years of modeling have I seen such an interest in ½A racing. Now a new one has cropped up—½A Unlimited Scale racing. Dock Schneider, editor of the "Sky Rebel Yell" newsletter of the Cobb County Sky Rebels of Marietta, Ga., recalled this event starting in their club last year. The models are 1/2 inch to foot scale Profiles of the Unlimiteds raced after WW II (surplus fighters), and must be a model of an airplane that *actually* raced. Included in the list is a DC-6, which qualifies if you've got the guts since a DC-6 has been raced recently in the Unlimited Class.

The following rules have been written by the Sky Rebels; their intent is to provide a competitive event for both Novice and non-Novice builders and flyers which is both realistic and cheap. It is *not* their intent to create an event which develops expensive racing engines and airplanes:

Engine: Stock Cox .049 "Babe Bee." No changes.

Lines: Dacron, 28 ft.

Fuel: Stock "out of the can."

Airplane: Profile Scale of any aircraft which participated in an Unlimited Racing event since WW II. Size to be 1/2" = 1'; finish should be representative of racing aircraft finish and markings but not necessarily scale. Racing numbers on the wing and vertical tail or fuselage are encouraged. The only types of modifications allowed to the shape of the model are those actually used on the full scale racing aircraft—such as clipped wings and small bubble canopies on Bearcats, Mustangs, etc.

The following aircraft types may be modelled: Bearcat F8F, Mustang P-51, Aircobra P-39, King Cobra P-63, Sea Fury, Corsair F4U, F2G, Lightning P-38, Invader B-26, Douglas DC-6, Mosquito, plus any others that actually participated in post WW II Unlimited Racing.

We will wind up this month with an article from Ron Wilson of the Victorian Control Line Aeromodelers in Australia containing some good poop on modifying the Super-Tigre diesel for F.A.I. Team Race:

"After four years experience in racing Super-Tigres, I have found the following modifications necessary to achieve a constant speed.

"Firstly mark the top of the piston to indicate the exhaust side, then dismantle the motor and clean and check all parts. The bearings may be moved by warming the case to 450° in an oven (about 10 minutes is sufficient) and tapping the case on a piece of softwood. Do not hammer the bearings as this will damage the ball cages.

"While the bearings are removed from the case, check to see that they are a sliding fit on the shaft. If the bearings are tight on the shaft, polish the shaft using a fine emery tape until the bearings slip on. To prevent grit entering the bearings, mask them with tape on both sides and route the tape away from the shaft. Polish the rest of the plain bearing area of the shaft to obtain a free sliding fit in the crank case. Keep away from the edges of the shaft induction hole.

"To replace the bearings, heat the crankcase to 450°, put the rear bearing on the shaft to keep it square, then push it right home. Slip the front bearing down the crankshaft and press it in while the case is hot, using a piece of wood with a hole drilled square through it.

"Next, still with the case hot, fit on the collet and prop driver and prop; tighten the prop and allow to cool. The shaft should spin freely.

"Now for the piston: measure the amount of sub-piston induction using feeler gauges when the motor is partly assembled. Measure the length of the piston and file the skirt away until you have a total of .060 sub-piston induction. You may have to file some of the crankcase away to insert the feelers.

"Remove a further .060" from the transfer side of the piston, taking care not to exceed the width of the transfer port.

"Remove all burrs from the piston. Now it is ready for lapping into the liner using a 1200 carborundum grit with an oil base paste. Heating the liner will facilitate the removal of the contra-piston, by tapping with a half inch wood dowel. The open jaws of a vice will support the liner.

"Lap with the piston upside down using a figure eight motion until the piston starts to lap the contra-piston area. Lapping should be done by an experienced person, because piston and liners are about $12.00.

"Scrub the piston and liner with detergent and check for cleanliness using an oiled white rag, which will show discoloration from any remaining grit. The cylinder head has four 1/8 holes drilled through to the contra-piston area for additional cooling.

"A nylon adaptor is required to fit a Cox .049 choke. Drill the venturi out to 9/64 diameter and taper-ream it to restore venturi shape. The jet holes are drilled to .030 diameter. Screw the choke and needle block into the adaptor, then insert into

the case and lock with radial carburetor cotter (Super-Tigre part no. ST B 15/19/7).

"A socket head screw replaces the compression screw and enables a finer adjustment using the length of the key for leverage.

"Run in using an 8 x 6 prop out to 7½ dia. for 10-15 minutes on a fuel mixture of 50% kero, 30% ether, 20% oil, 3% amyl nitrite and 1% nitro benzene. Start off with the engine under-compressed and finish rich. Increase compression slowly after 10 minutes until full revs are reached. The motors we are using will turn a 7 x 8 prop at 13,500 to 14,000 on the ground." ■

Engine Review

(Continued from page 17)

or Lear-Jets, are not numbered in tens of thousands. In these Ross multi-cylinder engines you are paying for something exclusive. You are not merely purchasing four cylinders instead of one: you are buying the time of skilled craftsmen, and a great deal of time obviously goes into each engine. Even assembling one must take as long as a dozen ordinary engines.

Precision engineering is vitally important with a multi-cylinder engine. In a conventional single cylinder model motor, a certain amount of misalignment, slop and lack of rigidity need have no really drastic effect on performance: in a twin or multi-cylinder engine this can *never* be so. We recall testing, many years ago, a .60 twin which had a struggle to equal the power of a good .09 and the main reason for this was the engine's poor mechanical efficiency resulting from insufficient shaft stiffness and inadequate and inaccurately aligned main bearings. By contrast, the Ross engine is an object lesson in how to do the job properly.

As in the case of the Northfield-Ross Twin, the body of the Four is a one-piece light alloy investment casting incorporating the crankcase and integral full length cylinder casings. The crankcase barrel is accurately bored for all four crankshaft bearings, thereby insuring precise bearing alignment. The crankshaft has three large diameter (1/2 in.) closely spaced main journals: one at the front, one in the center between the front and rear pairs of cylinders and one at the rear. These are supported in four Fafnir 1/2 x 1⅛ x 1/4 in. seven-ball steel-caged bearings, two at the front, one in the center and one at the rear. All this makes for really excellent shaft stiffness and support.

The horizontally-opposed four-cylinder two-cycle layout used by the Ross Four is inherently one of the smoothest running of reciprocating engine configurations. By combing the simultaneous firing of opposed cylinders with the alternate firing of the front and rear pairs, it achieves almost perfect balance plus the smoothing out of torque impulses provided by 180 deg. firing intervals. This, of course, requires that the front and read crankcase chambers be separated from one another.

To achieve this, the Four's crankshaft is fitted with an aluminum filler block immediately behind the center ball bearing, equipped with an O-ring on its periphery to insure gas-tight contact with the crankcase bore. The shaft itself, as in full size engines having a center ball-bearing, is of a built-up type. It is made in two parts, press-fitted and pinned at the front end of the center journal after fitting the filler block and bearing. The crankshaft has six crank disks and is stress-relieved and hardened and ground to a very high finish.

The piston and conrod assemblies are similar to those of the Ross Twin. Pistons are machined from aluminum alloy bar stock and are fitted with Dykes type rings which are now pegged to prevent rotation. The connecting-rods, offset to enable opposing cylinders to have a common axis, are drop-forged from 2014 T4 alloy. They have split big-ends, two small Allen screws being used to bolt each cap to its rod, and there are oil holes at both ends. The case-hardened, tubular wrist-pins are fully floating, 3/16 in. dia. with PTFE pads. Cylinder sleeves are also case-hardened and highly finished and are a smooth slip fit in the casting. In place of the cast cylinder heads of the Twin, those of the Four are machined from the solid. They form wedge-shaped combustion chambers and have deep cooling fins.

Cylinder porting is of the conventional open-loop or crossflow scavenged type with

four exhaust and four bypass ports. The exhaust and bypass periods are shorter than those of the 60 Twin dealt with earlier, the average exhaust period being just over 127 deg. of crank angle and the average bypass period 118 deg. Actual measured timings varied from 125 to 130 deg. (exhaust) and 115 to 121 deg. (bypass). While slight discrepancies are not unusual in a multi-cylinder motor, we believe that the timing differentials on this engine are deliberate as a definite pattern emerges which, we suspect, is aimed at compensating for the uneven charging that occurs when two cylinders are fed from a common crankcase chamber. We know that Lou Ross was working along such lines nearly two years ago as part of his program to overcome the tendency (common to all earlier horizontally opposed model engines) for one cylinder to prematurely cease firing when the engine is throttled down. As we shall see in a moment, this problem seems to have been virtually eliminated in the Four.

As previously noted, the current production Northfield-Rosspower Four uses reed-valve induction. This type of automatic intake valve which, apart from its use in some small model engines, is featured by many highly successful outboard motors, has much to recommend it in a multi-cylinder model engine, especially in the interests of compactness and mechanical simplicity of the power unit as a whole. On the Ross-Four, the entire induction assembly is mounted on a flange formed on the wall of the crankcase, containing two large rectangular ports, one to each crank chamber. Each of these ports is covered by a valve unit and carburetor assembly. Standard Perry carburetors are used, fitted into separate machined alloy intake housings, each of which is secured to the crankcase flange with four Allen cap screws. Single 0.003 in. valve reeds are employed, clamped between the intake housing and the crankcase flange. Our engine and other early production models were fitted with valves made of blued steel, but we understand that the most recent models have an improved valve made from special stainless steel, rolled and work-hardened.

The throttles of the Perry carbs are neatly linked together to work in unison and there is also a Y-fitting to connect the two fuel inlet nipples to a single delivery pipe from the tank. The carbs are, of course, independently adjustable, as is most desirable with an engine of this type, in order that any slight variation in the operating conditions of each pumping chamber and its respective pair of cylinders (e.g. cooling differences or slight mechanical discrepancies) can be compensated with appropriate mixture adjustments.

The method of mounting the Four is the same as the Twin—i.e. via tapped vertical lugs, except that eight, instead of four, lugs are provided top and bottom. Machined "T" mounts are obtainable from the manufacturer at $10.00 per pair to enable the engine to be bolted to the firewall.

With power strokes every 180 deg. of shaft rotation, instead of the 360 deg. of a single-cylinder (or simultaneous firing twin) two-cycle motor, the Northfield-Rosspower Four naturally has a much higher frequency exhaust note than one is accustomed to for any given prop speed. The exhaust noise is not offensive on the bigger props that the engine is capable of turning, and in any case, it can be subdued by fitting a pair of square section manifolds (derived from the 60 Twin exhaust stacks). These have the added at-

traction of protecting one's fingers from the hot exhaust gases when making carburetor adjustments and also give a slight increase in power. Obviously, a proper exhaust system is desirable for cowled scale installations and we understand that Northfield will have mufflers available for the Four in due course.

Whenever presented with something unusual to test, we tend to expect trouble of some sort, but the Ross Four was an absolute gem as regards its general behaviour. We half expected to have a reed-valve fracture before the end of the tests so we took the precaution of asking Lou Ross to let us have some spare valve shim but, in fact, this proved unnecessary: the Four came through without the slightest trouble of any kind. The four Fox idle-bar plugs also survived the entire test program.

The smoothness of the engine was uncanny. We have a Frahm frequency meter that gives a very good indication of the level of vibration transmitted by engines on test. This instrument is sensitive enough to detect the vibration of a high quality electric motor and has to be partially insulated from the test rig to avoid damage when testing engines. With the Four, we actually had to remove nearly all this insulation in order to pick up sufficient vibration to obtain a positive reading. Northfield's claim that the Four will eliminate radio failures attributable to engine vibration seems to be entirely justified.

Northfield-Rosspower Fours and Sixes are run for about ten minutes before they leave the factory. Our motor had an excellent "feel" when turned over and, right from the word go, started easily. We took the precaution of using a cool 3 to 1 methanol/castor oil fuel blend for the first few runs, along with slightly rich needle settings, but the engine was obviously quite free. It showed no tendency to overheat or lose power when leaned out to the optimum mixture strength.

Setting up the two carburetors is not at all difficult and it seems that one need have no worries about accidentally leaning out one carb too much and causing damage to its pair of cylinders. The drill is to start with both carbs on the rich side, then to close each needle, in turn, a few degrees at a time. As soon as one needle produces a drop in revs, it is backed off and the second needle is closed until it, too, produces the same effect. The final balance is not at all critical. We found it helpful (and more comfortable) to add temporary extensions to the needle-valve knobs in the form of one-inch lengths of 1/4 in. i.d. Neoprene tubing into which were inserted short "handles" of 3/32 x 3/8 balsa strip—useful, too, for seeing relative needle settings at a glance.

For performance testing, our standard five percent pure nitromethane R/C engine test fuel was used. With a displacement of 1.2 cu. in., the Four obviously needs propellers of somewhat larger diameter than those commonly available at the model shop, but the British-made "Punctilio" wood props do come in a number of sizes well suited to the Four so we used these, along with an old 18x4 Tornado and a couple of 14x6 Top Flites. Figures recorded included 6,600 rpm on an 18x6 Punctilio, 7,900 rpm on the 18x4 Tornado, 8,300 rpm on a 17x4 Punctilio, 8,400 on a 16x6 Punctilio, 9,200 on a 16x4 Punctilio, 9,700 on a 15x4 Punctilio and 10,400 on a 14x6 Top Flite maple.

As the dragster exponents say "there ain't no substitute for cubes," so it is not surprising that the Four, with twice the displacement of the biggest engines normally dealt with in this series, turned all these props a good deal faster than anything we have handled previously. (In any case, most 60's wouldn't be happy on props larger than 14x6 and would be grossly overloaded on the 17 and 18 inch diameters.) There is no point, however, in using anything smaller than a 14x6 on the Four since, according to our performance curves, it delivers its maximum horsepower at between 10,000 and 11,000 rpm and will therefore speed up beyond its peak in flight and lose power if so under-propped. Fifteen and sixteen inch props will probably be the most useful with the sort of applications envisaged for this engine, unless sheer model size dictates the need to go to 17 or 18 in. dia.

Converting the torque figures recorded to brake mean effective pressure values, it is interesting to note that the Four did rather better than the original standard Twin on the same fuel. Similarly, by returning 1.56 brake-horsepower, its specific output was also better at 1.30 bhp/cu. in. against the Twin's 1.17 bhp/cu. in. It may be recalled that, on the Twin, we ran a second test, using a 40 percent pure nitromethane racing fuel and managed to boost power output by some 20 percent. Lack of time (plus, we have to admit, a certain reluctance to expose a precious piece of machinery to what might appear to be unnecessarily callous treatment) has so far deterred us from repeating this experiment with the Four, but it may be observed that, if the Four should respond to such a fuel in the same manner as the Twin, a power output not far short of two bhp may well be within the bounds of possibility.

The smoothness, already remarked upon, of the Four, is due primarily to the engine's inherently superior balance and secondly to its 180 deg. firing intervals. These latter, by reducing the magnitude of torque fluctuations through the cycle, are also a very considerable aid to achieving low idling speeds. We had no difficulty whatsoever in holding idling speeds below 2,000 rpm even on the smallest practical prop sizes. On the 16 to 17 in. dia. props, safe idling was in the 1,500-1,600 rpm bracket, going down to 1,400 on the 18x6. Moreover, the Four held these speeds indefinitely and picked up again immediately when the throttles were opened, provided, of course, that the carbs were properly adjusted. Mid-range throttle response was also excellent, with progressive speed control from idle to full power.

It was rare for the engine to fail to fire on all four cylinders. Once or twice a plug clip came adrift on starting, causing the engine to run on three cylinders. Even on three cylinders, however, the Ross was remarkably smooth and the average onlooker would be unlikely to detect that

anything was wrong. A drop of 1,000 revs and one cold cylinder are the clues.

Being a reed-valve engine, the Northfield-Rosspower Four is capable of operating clockwise or counterclockwise. Sometimes a hand-start will set the engine running in the opposite direction—easily dealt with, if repeated, by swinging the prop the other way. Alternatively, an electric starter can be used. The engine's 1.2 cu. in. displacement, since only half of it comes up for compression at a time, is no problem for any standard model engine starter.

In all, we find the Northfield-Rosspower Four hard to fault on the strength of our experience of it to date. It is a remarkable piece of model engineering and a delight to behold and operate. What else is there to say? Price? Well, yes, it costs $465.00. . . . Too much, you say? Nonsense! Why not put up with last year's radio, save the $400-plus you would have spent on a new "professional" outfit, and give yourself a real treat?

Summary of Data

Type: Horizontally-opposed four-cylinder two-stroke cycle glowplug engine with four ball-bearings, reed-valve induction and twin carburetors.
Checked Weight: 26.6 oz. (28.4 oz. with exhaust manifolds).
Displacement: 1.206 cu. in. (19.77 c.c.)
Bore: 0.800 in. (20.32 mm.)
Stroke: 0.600 in. (15.24 mm.)
Stroke/Bore Ratio: 0.75 : 1
Specific Output (as tested with exhaust manifolds and 5 percent nitromethane fuel): 1.30 bhp/cu. in.
Power/Weight Ratio (as tested with exhaust manifolds and 5 percent nitromethane fuel): 0.88 bhp/lb.
List Price: $465.00
Manufacturer: Northfield Precision Instrument Corporation, 4400 Austin Boulevard, Island Park, Long Island, N.Y. 11558. ■

Field and Bench

(*Continued from page 36*)

I guess you'll use what you *like* the best, what *works* the best, and what *looks* the best when you're done. For me, that's MonoKote . . . dope doesn't agree with me, silk doesn't do what I ask it to do, and I find MonoKote clean, light, and very easy, especially since my wife does the covering. She really does a good job; she's interested, artistic, more methodical than I, and it gives us some fun together in model building. We chose yellow and blue as our color scheme. I must tell you here that I picked up a Polytherm Electric Heat Gun at the W.R.A.M.S. show in White Plains, N.Y., and I really can't tell you what a marvelous job it does on MonoKote. You seal the edges with an iron, as always, then with a circular motion about two inches from the surface—watch that MonoKote shrink up. I will say we did a better job on the wing than on the fuselage. That may be because the covering is over wood on the fuselage, and you have to watch for "pulling-away" at the edge. Be sure your edges are sealed.

Let us not forget the size of "Big Daddy 88." It took 1¼ acres of MonoKote to cover it. (That may be an exaggeration, but remember those 1408 squares . . .)

You may ask "What engine will pull this 'Big Daddy' off the ground, and lazily through the skies?" You do ask good questions. I remembered an old power lawn mower out in our shed house—but I didn't know how to put a prop on it, so I thought I'd ask the Old Expert at M.A.N. He wasn't there, but Walt S. was, and he said "How about a Fox .78?" I've always thought a Fox engine was one of the finest names in Ukie engines . . . dependable, and all that; I was assured that although that was true, Fox was also one of the finest names in R/C motors as well, and I figured a .78 ought to be O.K.

As I said, the kit is most complete, with the engine mount/steerable nose gear included . . . the Fox .78 was just a trifle wide, but after a few seconds of grinding with my new Dremel tool, she slipped right in. (I needed that Dremel anyway, and besides, she didn't want dinner out, either, she wanted new shoes . . . $18.98 . . .)

I did not use the pushrod doweling that was included. I used arrow shafts, full length, and still had some flexing in the piano wire, so I braced and supported the rods. There's a lot of surface to move.

The radio . . . do I have a system that will do justice to the "Big Daddy?" My Ace pulse single channel? My Digit Midget with a "kick-up" elevator? Perhaps not. While working on this Field and Bench, I was also studying for my ham license, with the help of some friends who are technicians with NBC radio. I did pass the test, and received my license (WA2FNX), so what better time to get a new radio system on 53 Mhz? That frequency is reserved for hams, with less danger of being shot down. I talked it over with my lady. After a few days' discussion, both she and the marriage counselor said "okay," and I decided on the Kraft Series 72, single stick, six channel system. It arrived complete with two kinds of servo trays, all screws, grommets, etc., wheels and arms and those beautiful KPS 10 servos. It also comes with a new four hour charger. If you wake up at 8 A.M. Sunday morning, and the sun is shining, plug it in, and off you go to the field at one in the afternoon,

with a fully charged system. Neat? Another feature of the Series 72 is that the transmitter and the receiver can be charged independently. If you have two flight packs, the second could be charged without overcharging the transmitter.

Those KPS 10's are lost in the fuselage of the "Big Daddy." Placement of the battery pack is not critical, because the whole system is too light to make any difference in balance.

I bought a 16 oz. tank for the Fox .78, stuffed about a ton of foam in the hatch and floated the tank in it.

The plans call for the hatch cover to be held down by rubber bands hooked to four bolts . . . two on each side. This is not very pretty, to my mind, so I used a dowel in the front, a hunk of hardwood and a screw in back. Much neater.

The wheels (huge ones, included in the kit) were mounted on the landing gear by M.A.N. at Work himself. I couldn't figure out the bolts and stuff . . . the way I had it, the wheels looked nice, but they wouldn't turn. Himself also drilled and threaded the motor mount, making for easy installation of that Fox .78. It might be of interest to mention that when Mr. S. arrived he brought an extra wing for that "Schoolboy" referred to earlier . . . its wing is the same length as the stabilizer of the "Big Daddy," but only *half* the chord. *Will this bird fly?*

The moment of truth arrived on a Monday afternoon. I get home from my show about 4:30, and there's plenty of light left. The rains had finally ceased. Mr. S. said, "Let's get some pictures of that thing in flight."

We arrived at the field at 5:30, W. S. and his son Anthony, I and my lovely wife, and son J. J.—and another party called the "Big Daddy 88." The breezes were from the south at about 12 knots steady. The Fox .78 was ready to swing a 14/6 prop. I gassed up, tested the equipment (find out now if the ailerons are backwards), put the battery to one side of the dual ignition, put my finger over the intake for a couple of turns, then flipped it. J. J. was holding the box, I motioned for "low" motor, since he couldn't have heard me if I hollered. He did, and it did, and I took the Kraft single stick in hand (my first time on single stick). I smiled for the "birdie," then gritted my teeth for the take-off. I remembered it all: hold a little up, feed in a little throttle, steer with that nose to keep it straight. I had a total of about 15 feet to remember those points, because after that "Big Daddy" was *in the air!!* I eased off on the elevator, ready to trim. It was flying level and straight. I eased her up, flew around the field for a couple of pix, then gained some altitude to try a manuever or two . . . an aileron roll was a cinch. It took about 15 minutes to roll, though. Well, anyway, it *seemed* long. But it just *flies!* Inverted flight is as easy as right side up. A low fly-by, then up again, and into the landing pattern. I throttled back, and that beautiful bird settled in like a Champ. (You know the one I mean.) In on three wheels, almost by herself, and a taxi to the flight box. This is one of those days that makes devoted fanatics out of all of us.

I'm looking forward to a couple of hundred flights on the "Big Daddy." I'm sure its size alone will cause a stir among the club members. But when they see it fly like a lazy bird, and settle in for that slow, soft landing after some very fine aerobatic manuevers, lots of guys will be heading for the hobby shop to *get that kit.* If it gets to *you* that way, I know a good marriage counselor who happens to be in the hobby. . . . ■

VTO

(*Continued from page 9*)

gram run can be approximated by

$$\frac{13.12}{15.20}\ (30) = 25.9 \text{ sec.}$$

Now we have three things which are going to reduce the total flight duration: shorter motor run, reduced altitude at end of run, and faster glide—and thus, sinking speed. Let's see how bad things are! First the motor run is 25.9 seconds instead of 30. The total altitude gained is 81.6 feet instead of 102 feet and the glide speed is 15.2 feet per second. The glide path is 735 feet long (9 x 81.6) and glide time is 48.3 seconds, making the total flight time 74.2 seconds (I think I could have taken 25% of 100 seconds and arrived at the answer more easily), which is hardly a max.

"So what do we do to fight back? One approach is to increase the prop pitch and put the motor run back up to where it was. Hopefully the overall prop efficiency will remain the same and the same altitude will be reached. Further info on this can be obtained by reading the latest NFFS Sympo text. Another approach is to increase the wing area and get the glide speed back to 13.12 feet/second. This would give a glide time of 55.9 seconds and a total time of 85.9 seconds with a 30 second motor run. However, the new drag of the increased area will cut the total altitude reached at end of motor run. This is difficult to estimate and I will not pursue it further. The above conclusions mean that we must try harder.

"It will be more important than ever to secure good rubber for Cd'H and to wind them fully. We should follow the practice of the Indoor flyers and Bob Wilder—wind with a torque meter. This assures max turns and also helps to prevent breaking a lot of good motors through overwinding. We must practice our javelin launching—it will be important to give it a good heave, just as in Wake. Fifteen feet or so extra altitude is possible with a heave. Controlling high speed launches and power burst will probably lead to auto trim mechanisms, now that the model must be heavy anyway. The above model analysis was enjoyable—now to the flying field to test my theory!

"My first flight, with 100 hand winds, resulted in a quick right turn into the ground! Last year's trim with this year's weight just wouldn't do! After many trials I eliminated 1/32 down and right in noseblock, added 1/16 wing incidence and finally, a few degrees of stab tilt to in-

duce a right turn. Prop diameter had to be cut 1/2". When I got it climbing and gliding reasonably (on 16¾ dia. by 18 pitch prop), my times were as follows: 45 seconds, with 15 sec. run (200 turns); 72/26 (350); 88/26 (350); 75/28 (380); 76/29 (390). Importance of a fresh motor is shown by flight three; weak motors give poor altitude. Any stall or upset during power run will quickly put you down to a minute or less. My runs are still a bit long—I am going to trim some blade width to cut run. My conclusion: the extra 20 grams really cuts performance and puts great emphasis on rubber, winding techniques and power trimming. Therefore it may discourage beginners (which it was supposed to help) since a light airplane is really easier to fly. FAI has done it again with a counter-productive rule."

WFFA INTERNATIONAL CHALLENGE

Bill Hartill and Bill Bogart have cooked up a fine potpourri of activity for this event at the WFFA Annual September 2nd. Included are FAI Event Flyoffs (no need to max out, just start flyoff flights) and a model-retrieving race through the Taft dump, Kitty Litter factory and California Aqueduct! Reminiscent of 1971 WC is an engine taching contest (no flying). On Sunday they get serious with seven one-hour rounds for Power, Wake, Nordic. Proxy entries are being sought from USA and foreign flyers. For more details on this extravaganza, contact Manager Bill Hartill, 7513 Sausalito, Canoga Park, Ca. 91304; phone (213) 340-1704. All you proxy entrants get set for a real Taft experience.

HAND CARVED BALSA PROPS FROM OREGON

Balsa is coming back! So are old-timer kits and planes. More suitable accessories are needed, especially since most obscure or old-time aircraft must be built from plans, not kits. We are manufacturing an item which we hope will fill a need in this area—balsa props for rubber-powered craft.

These props are hand-carved, balanced and a prototype has been successfully flight tested. They perform as well as the plastic jobs currently available, but are more appealing, at least to my mind. Local hobbyists have been quite impressed with them and we are currently planning to also develop Peanut scale and three-bladed models. The props sell for 95¢ each and are available directly from the manufacturer through the mail. There is a 15¢ handling and postage charge in addition. Write Stan Fink, 80 Crest Drive, Eugene, Oregon 97405.

RODEMSKY REBUTTAL ON FAI INDOOR RULES

One of the most capable and knowledgeable Indoor flyers we know is American Airlines pilot Erv Rodemsky, who will be covering the Indoor World Champs action at Cardington for M.A.N. Erv is the father of Pennyplane (and now has some new ideas on rules, including limiting wing area to 70 sq. in., stab to 30 sq. in. and motor to one half pennyweight) and says this about FAI:

"Since I am one of the "bad guys" who pushed for a weight rule in FAI indoor, I would like to rebut Tom Vallee's criticism published in M.A.N. Forum, June 1972.

"I do agree with his comment that the rule was hastily and poorly written. The reason was for simplicity. *All* rule changes are unpopular with "experts" who are winning under the old rules; but, invariably these changes bring out creative thinking *and* new participants. (The reduction from 90 cm. to 65 cm. gave us World Champion Jim Richmond.)

"So, in attempting to keep it simple (an excellent principle), the rules writers did not go far enough. The intent of the one gram rule was to increase the strength of Indoor models. That goal could have been accomplished by putting limits on wing and tail area, as well as requiring a weight of one gram. Cutting performance can be accomplished by limiting the weight of rubber (perhaps 1/2 gram). 'It puts too much of a premium on good rubber,' they scream. If a competitor doesn't know how important good rubber is *now*, he's not paying attention!

"Tom blames the lack of balloons for the problems in Romania. This is a half truth. They would have been invaluable in retrieving, but can you imagine 'steering' a 26" span, transparent model, 180' high in a dark, drafty salt mine? If you want to reduce hang-ups, stop the time as soon as the model touches *anything*. This will eliminate rafter banging. I think steering should be limited to sites with less than a 50' ceiling.

"Tom's observations on design trends are accurate, but it wasn't the 10" chords, 20" props, and 18" motor sticks that made the team! All three members used relatively conventional, well-trimmed models that were capable of handling large motors. No one ever said a weight rule would make a poor builder into a champion, but it sure opens the way for some original thinking, as evidenced by the proliferation of new designs seen at contests. If for no other reason than encouraging some new builders to give Indoor a try, the weight rule is worth it.

"Analyzing the results of contests under both sets of rules brings out one very obvious advantage of the weight rule—an *equalizer*. Contrary to Tom's allega-

tions, top time was lowered; but, more importantly, the spread from first through fifth was much smaller. Isn't that where it's at—close competition?

"In closing on a positive note (as did Tom), rule changes should be *provisional* before becoming final, and perhaps tried in other events such as Pennyplane."

PSST!—WANNA BUILD A CLASS D TOWLINE GLIDER?

My comments last month about the lack of interest in Old Time Towline led me to looking for a substitute event. I found a letter from an Australian penpal and Nordic flyer, David Anderson, describing just such an event. Here are Dave's remarks: "...Our club had a gala Sunday Feb. 13th and held an Open Sailplane contest. Five 3 min. flights off 164 ft. line, but the models had a *minimum* total area of 1000 sq. in. I built one with a wing chord of 11 in. and 7½ ft. span with tips tapering to 9 inches, 3 ft. center section, 8 in. dihedral. It weighs out at 33 oz. with 60% CG. The monster glides real well but pulls heavily on the line. This contest created a lot of interest—ten machines were built and 8 flew. The biggest one was a stretched "Leprechaun" with a total area round 2000 sq. in. All these machines really had no trouble getting a 3 minute max, especially the ones designed around modern A2 lines. Allen Coppock had one built with 1000 sq. in. total area weighing only 19 oz. Contest was won with about 700 seconds total, using only 4 flights.... The wind was awful and finished up blowing about 20-25 mph. This mucked up what could have been a closely fought contest. So, if anybody's got about fifty bucks worth of balsa lying around, here's a chance to make a machine that will make the R/C sailplanes green with envy.

"On the other hand, maybe Old Timer HL glider would make a better substitute event—take a look at some of the reprints of the pre-war Zaic yearbooks for inspiration. There's a glider by Huguelet in "Model Glider Design" that looks mighty modern and broke 50 seconds indoors under a low ceiling before the war. Some ships observed in the same Chicago armory at the last few Nats had trouble doing so well."

DELTA DARTS MAX OUT IN OREGON

Bill Gaiser of Portland, as well as being a fine FAI flyer, is really into the Delta Dart Program. He even graphs it and evaluates results. Bill says:

"Following is a report on the OMSI Delta Dart finals flown at Lynch School Gym on May 15. The 51 finalists resulted from some 1300 models which were built and flown in the 40 schools represented. We originally had 1200 kits and bought about 100 more from the Y—Indian Guides program, which I will report on a little later.

"I have attempted to make a few observations — mathematical and otherwise, which may be of interest. We ran three contests, 4-5th grade, 6-7th grade, and 8-9th grades. Nineteen schools were represented. A summary of averages is as follows:

Grade	Number of Flights	Average Number of Flights per Flyer	Average Time per Flight
4 & 5	191	14.6	16.7
6 & 7	311	14.1	17.3
8 & 9	226	14.1	15.4
All	728	14.2	16.5

We awarded small prizes for 1st, 2nd and 3rd in each grade classification. Eight schools were represented in the nine awards. Two of the awards were won by girls. I think it is interesting to note that in the 4th & 5th grade group, every flyer had at least one flight of 22 seconds or better. Also #610 (Kelly Patterson) made 21 flights with none below 20 seconds for an average of 24.4 seconds—pretty consistent flying. The Lynch gym is small so most flights met the ceiling or walls at some point. We used 1/8" Pirelli lubricated with castor oil and wound each flight to 500 turns.

The results, I think, clearly show that model trimming pays off. We attempted to help each kid trim his model as the contest proceeded. We also changed rubber after the noon lunch break (mostly 11 or 12 flights). I believe performance of all contestants should really jump up on Flight #13, and decrease thereafter. In other words, I believe that most models were trimmed close to their optimum at the end of twelve flights, and then performance jumped up due to new rubber which tapered off then due to declining torque at 500 turns. I wound myself during the afternoon and the decrease in zap was very apparent with successive windings.

"The photos were taken at St. Helen's Hall School at their school contest. This contest was also covered by local T.V. The building program from all reports went well. I only observed two of the school programs myself. The flying programs don't go as well unless you have trained modeler types available to assist in trimming. You can see that the contestants at the finals, who were presumably the best from their respective schools, arrived at the contest with 13 second airplanes. Due to the size of the program and the geographical separation of the schools (75 miles), it was just impossible to give much flying help at the school level. This is something we must work on for future programs." ■

R/C News

(Continued from page 32)

switch and most wire. Only three wires will extend from the box; two (ground and hot point connection) will be twisted together and the third (hi-tension lead) will contain an appropriate resistor. All wires will be shielded, grounded and kept as short as possible. In addition, all radio equipment will be separated as far as possible, commensurate with balance and design.

Big feature is shielding and grounding of the box with aluminum foil with all seams sealed with copper foil tape. As indicated in July's issue, we believe this will reduce (or eliminate) interference to a level permitting absolutely safe operation of ignition engines with 72 mhz and 6 meter equipment — we're sure it will work okay on 27 mhz. We hope to clear this up by next month.

Ignition experiments have not been confined to OT efforts. Advantages of such operation to develop total realism in Old Time Free Flight via R/C are obvious; less obvious are advantages for ignition engines in regular Pattern or Scale operation. A modern ignition engine hasn't been developed because glow engines brought simpler operation, less weight and fantastic power-to-weight ratios. Nevertheless, we feel that ignition operation can serve a useful purpose in today's hobby field.

Ignition can produce a very reliable and effective idle with transition to high speeds proportional and non-fouling. Such idle stems from positive control over two variables, fuel mixture and ignition firing. Cleaner operation is possible with more complete combustion and fuel economy in both cost and flight requirements. Components for a gas/oil mixture are considerably below cost for glow fuel and gasoline operation gives far more air time per ounce than alcohol. A four to six ounce tank would handle any Pattern flight (one way to make up the weight disadvantage of an ignition system). We have always liked nitrate dopes and these would be compatible with gas/oil operation. Overall fuel-proofing would be much easier. Gas/oil engines have exhibited the kind of torque to turn large propellers for heavily loaded Scale aircraft. Design development could lead to top end capability in RPM equivalent to today's glow power. We would also look for magnetos and transistorized ignition systems to develop.

Al Novotnik, of M.A.N., has been experimenting with just such an engine. In this case basis is MRC's fine Enya 60 converted to ignition with a Tlush timer and points. Engine has been run and appears to develop an excellent top end—idle is fine. We haven't tached the engine yet since some problems with point bounce and fuel feed need correcting. Neither problem appears to be major and we expect to shortly fly the first true ignition R/C Pattern engine. One thing sure, the sound is different and great — deep throated, husky roar that speaks of power, power for 14-16″ propellers. Engine is presently running on a 14-6 and it hardly works up a sweat with this diameter. Further, the ignition Enya was very easy to start (as it is in glow configuration), unlike some of the engines of the '30's.

* * *

Recent flying session found our Migi-Ball almost impossible to handle on take-off run. While two-wheel gears tend to be a bit harder to maintain an absolutely straight run with, this was ridiculous. A fast check showed some toe-out had developed in a minor altercation with a curb, week-

end before. Toe-out is a nuisance on trike main gears and absolute murder on a two-wheeler. A little bending put things right and it may serve as a good reminder for those of you having similar problems. Wheels on mains should be straight, or, better yet, have a bit of toe-in.

Speaking of landing gear, we've just looked at Carl Goldberg's newest retract revision. This one is for two-wheel retracts and puts the coil spring in proper relationship with landing shocks. New strut makes installation in thin wings a lot easier. We have used this gear and recommend it highly. An adjustable feature for strut length is now included on all Goldberg retracts.

From Desert Flyer, newsletter of the Arizona R/C Society (Phoenix, Bill Cranston, editor) comes the following: "One of our members, Larry Taylor, was interested in finding out just how fast the tip of a prop was moving. Having a Xerox Data Systems computer at his disposal, he came up with the following info. Calculations are based on an engine speed of 10,000 RPM. Tip speed of 8″ prop = 237.879 mph; of a 9″ prop, 267.614 mph; of a 10″ prop, 297.348 mph; of an 11″ prop, 327.083 mph; of a 12″ prop, 356.818 mph. Can you think of a better reason *not* to use a nylon prop?"

* * *

Congratulations to the Academy of Model Aeronautics! They broke the 40,000 member mark in May and are now looking toward 45,000. The bigger the number, the stronger our voice when time comes to be heard.

* * *

Interesting system for V tail or aileron/flap combo which originally appeared in East Coast Soaring Society's newsletter, and subsequently in the DC/RC Newsletter, was designed by editor, Stew Vance. System is one of the best of this type we have ever seen—it will give proportional control to pushrods for any controls that require opposed or simultaneous control action at the same time, using only two servos. System can be used for a combination to control flying wings (*Dactyl would be a good example*: Ed.). Also it may be used to change the camber on a wing section via strip ailerons.

The Vance V tail gear is very accurate and friction free to the point that it can be used with Galloping Ghost. The only critical dimensions are A and A^1 (which must be identical) and B and B^1 which must also be identical. They may be much smaller or even larger than shown on the accompanying drawing.

Rudder action passes from rudder servo by a rod attached to (1) which is translated into a lateral motion on (3). If rudder motion is to be reduced, the point at which the rod connects to the servo can be moved in closer.

The elevator action passes from the elevator servo to the arm (2) on which the final action crank (3) is mounted. Again the elevator action may be increased or decreased by lengthening or shortening the distance from the pivot point on the servo output connection. A third point of adjustment of the combined action of both elevator and rudder in (B) may be the distance from the pivot of (3) at which the control rods to the rudder/vators are attached.

Naturally, the fourth point is the length of the horns on the rudder/vator. Leave enough space between the fuselage side and the forward tip of (1) to permit adequate rudder swing.

The bearing surfaces of the pivots at which (2) and (1) are pivoted (4), and the pivot of (3) and (2), should be broad and strong and have little or no slop in them. Want something different to tinker with?—give this system a try.

* * *

Welcome Aboard to "Fleagle Gram," newsletter from the Condors of Arizona's Luke Air Force Base. New effort is quarterbacked by Ken Peterson and in only two issues shows very professional results. Congratulations!

COMING EVENTS . . .

Montreal R/C Club will host the Canadian R/C Nationals, sanctioned by MAAC, August 5th and 6th at St. Jean Airport, PQ. Full schedule of events include MAAC Pattern in Classes A, B, C and Scale and FAI Pylon. MAAC rules will apply for all classes and events including weight and power. Registration forms available from C. Larson, Zone Director, C/O CDN Nats (R/C), 671 J. F. Kennedy, Terrebonne, P.Q. Info on motels and camping grounds also available from same source.

West Jersey Radio Flyers are presenting a most unusual event in their WW II Scramble, a sort of "phase 2" Rhinebeck. This will be, according to CD Chuck Gill, the biggest gathering of R/C WW II aircraft in the world, all vying for over $2000 in prizes and trophies. Any WW II subject from the years 1939 to 1945 will be accepted. Events include AMA Scale, AMA Standoff, Maneuvers, Mission and Combat. Meet will be held at Lakehurst NAS August 19 and 20. Check with Chuck at 835 Gilbride Rd., Martinsville, N.J. 08836 (201 469-3082).

* * *

"Pattern Patter," newsletter of Diablo Valley Radio Controllers, Inc. (Concord, Calif.) has a philosopher in the person of editor Bill Doughty. Examples: "Dead

batteries do produce results! Up elevator is not always up, when inverted! He who runneth nylon propellers can be expected to flyeth off on tangents! Invisible paint has finally been produced. It is light blue on an R/C plane!"

* * *

For five years the Rockaway Valley Radio Control Club (R/V R/C) has been operating a Novice meet in New Jersey. We don't know of any other club addressing itself to the task of bringing new blood to the competitive ranks. Trouble has been, and remains, in defining Novice.

Past definition has excluded "any 1, 2 or 3 place winner of any AMA Class C or D event." This should have brought only A and B flyers, and many came, as well as newcomers. Unfortunately, the club found some entrants were "professional" B flyers (fellows that should have moved to C long ago). Interestingly, these few "ringers" didn't warp results—the real problem stemmed from highly competent Sunday flyers who had *never* before entered a meet.

Last year's meet was won by a total newcomer to contest flying who, in just a few additional meets, became a highly competitive CX flyer.

To give the true Novice flyer a better chance, three classes were instituted in '72's meet held recently at Lakehurst NAS. Group I was reserved for those who had never before entered an R/C meet and were, hopefully, new to the hobby; Group II covered present A-B flyers, and Group III covered present B-C flyers. Difference between the two possibilities for B flyers was determined by whether an individual had ever won a B meet; if so, placement was in Group III.

Rules worked okay and cleared up the "ringer" problem but highly advanced Sport flyers still dominated the meet. Club now feels they are hitting a cross section, and if they convince some to join contest flying it will all be worthwhile. One thing sure—an awful lot of Sport flyers *could* give the "top-guns" a real run for their money.

Meet was held in very un-novice like 25-30 mph winds with temperatures remaining in the '60's (June should do better) all day. Group I (A Pattern) was won by Steve Witko of Paramus, N.J. for his first contest win of any kind, *ever*. Heinz Wohlers (a visitor from Germany) flew an Eyeball to win in Group II in *his* very first contest. Top class was won by Bob Viebrock of Boundbrook, N.J.; a 10-year veteran, Bob had never done better than 5th in A or B.

High winds kept entry level down from last year's 60 contestants to only 40 making the scene. Average entrant brought 12.5 years of modeling experience and 5.5 years of R/C experience to the meet! Novice?!

* * *

Eureka (Calif.) R/C Club recently exhibited our hobby at local rec show sponsored by Kiwanis Club. They drew 14,000 paid admissions out of a population of 24,000 for a spectacular turnout. Exhibit covered everything from sailboats to scale model airplanes, with flights held outdoors. All members of the club stood booth duty to present R/C'ing in the best possible light. A 727 was selected as "best" model by a vote of the attending public. Eureka R/C'ers fly at an old Navy lighter-than-air base nearby.

* * *

We close with a gem sent by Frank Schwartz of Glow Plug, Middle Tennessee R/C Society. Piece is by K. Armstrong, National Bureau of Standards, Wash., DC:

1. One boo squared = 1 BOO BOO

Bicycling isn't complete... without this new magazine.

If you're one of America's 75 million bicycle riders—or if you're just thinking about joining the fun—here's a new magazine you'll want to keep from the very first issue.

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At which point we feel it's time to leave. See you around! . . . ■

M.A.N. at Work

(Continued from page 2)

company and his family if anything were to happen to him. Knowing Phil, we all know that the Kraft products will continue in their present quality form and we can expect bigger and better things with this change. Our good wishes go to Phil, his new enterprise and his new associates.

I was away from home when I first heard this bit of news and could hardly wait until the following morning to call his Eastern rep, Tony Bonetti, for the details. He informed me of much of what I report, the balance corroborated by Phil. I did find something of real interest from Tony which only supports my belief in this company. Most of you who fly at Mitchell Field, Long Island, are well aware of the interference problem at this fine site, but for the edification of those who don't know let me tell you of the horrors at this field. Nassau Community College, based at this field, has recently installed a high power radio and TV station as part of its regular curriculum, and broadcasts at regular intervals, putting out a high power signal. After many crashes and glitches it was determined that the college was the culprit and the club members took the problem to Tony who in turn discussed it with Phil and others at Kraft. It was determined to test the belief that possibly a dual conversion receiver utilizing two crystals, more IF cans, etc. might be the answer. A receiver was made to these requirements and Tony and the club members tested it to see if they were correct in this assumption. A test was conducted using three different receivers, one the regular or standard type, second a regular that was desensitized, and the third the dual conversion unit. First flown was the desensitized one and this performed reasonably well as long as it was flown *away* from and not toward the station antenna. Next Tony flew the regular unit and just barely managed to get back on the ground; it was bad, but they already knew this, and the dual conversion unit was an eye opener—flew his plane to the tower, over the tower and could have flown completely around the tower without a problem. All those who participated in this testing program are convinced that a good, safe method was found for flying at Mitchell. Tony has persuaded Kraft to make these dual conversion units available only to the club members who use Kraft Systems and Mitchell Field, at a trade-in arrangement of their old receivers plus dollars to be arranged at that time. (Incidentally, the dual conversion receiver is available as an optional item for those modelers who fly in high interference areas. The option must be specified at the time the system is purchased.) Just one more confirmation of just how far we have advanced in our industry today when a company will take its time and engineering staff to resolve one lonely isolated problem area in this large country of ours. It gives me a warm feeling and, I'm sure, most of you who read this, to know that our problems are no longer ours alone but part of the whole

modeling structure for modeler and industry alike!

Speaking of problems, the rest of this opus will be devoted to the saga of Butch and his Dad coping with this contest thing. On the Saturday before the Hadley, Massachusetts May races, Butch decided to make one test flight with his Minnow which, as so frequently happens, was its last. The wing structure failed around the wing hold-down area, bolts and plywood remained attached to the fuselage and the wing took off on its own . . . balsa, wing skin and foam core failed and now one more airplane has met its maker.

As this was his only racer, things were rather down around our diggings. However, he went to the races, most likely to feel bad but he managed to talk one of his buddies out of a Minnow that wasn't being used and came home ready for the wars once again. He would continue working on the projects underway but this purchase would permit him to continue to fly during this time; then on Thursday of the same week I received a big package from World Engines containing the new Pilot Formula I ARF kit. Immediately called Butch and asked "Should we?" and he said "Why not?" So Pop stays home from the office the next day (Friday) to start the big push on the plastic Minnow; by six that evening I was completely worked out but had accomplished about all of the construction minus installation. Butch arrived home that evening and planned the next day's activities which were to include first flights.

This he managed, with the exception of first flights as that day and evening were windiest we have experienced in sometime. He did manage one very hairy flight with the Minnow that he had bought but couldn't tell too much the way it was being blown about!

Nothing daunted, next day we are at Granby for their June races, and with the luck of the draw and frequencies, guess who was in the very first heat of Formula I?—that's right, the Pilot Minnow made its flying début in the first heat of the day. After an unbelievable take-off with an almost 120 degree left turn dragging through the grass, he managed to get it up, straighten it out and get around the number one pylon and then settled down to win the heat—imagine *first* flight, *first* heat and a *win!* To summarize Granby, it was four firsts and a second to finish second for Formula I—quite an impressive day. Combination of Pilot ARF, S/T .40 RR and MRC 710 really put on a show, but there were some very sturdy lessons learned; *don't* tap in wood for metal machine screws as the threads just disappear in the wood (on his second flight the landing gear was hanging on by just one very loose machine bolt). Fix here was to scrounge some sheet metal self-tapping screws to replace the machine screws; these have remained since.

Next thing we learned was that the high nitro (60%) racing fuel was not at all compatible with the plastic of the bird. Raw hot fuel has a very deleterious effect on ABS and between each round it was necessary that the removable cheek cowl be held and remolded by hand until it was firm again. If this wasn't done the material deformed and curled into many shapes—as a matter of fact, at our second set of races a large water tumbler was used to hold the cowl in shape while it rehardened.

We were worried that the plastic might work-harden and crack but after two series of races it has not shown any indication of this happening at all. We have experimented with all type of paints and varnishes to fuel-proof the plastic and finally feel we have a solution, if you aren't afraid of adding a bit of weight. We have found acrylic lacquer (auto finish) will adhere to the plastic and we know that it is not compatible with hot fuel so we intend to use the lacquer with a covering coat of clear epoxy finish.

Other materials tried were polyeurethane varnishes, which are much too heavy and are attacked by the hot fuel as are the Epoxy varnishes used for refrigerators, etc. Also tried were the epoxy finishes used in our hobby, but adherence is a problem. Our first suggestion is a good one and should be followed if you want to use hot fuels in these excellent kits.

Week after Granby, we attended the two-day racing show put on by the Endicott Aeroguidance Society at Tri-Country Airport in Endicott, N.Y., and managed four firsts, a second and two thirds, not bad at all when you realize that Butch managed to strip out the threads in the head of his S/T and had to replace it with a stock head which took considerable rpm off the top of his engine. It appears that changing glow plugs after every flight plays hob with the threads in the head, so *gentle* is the word with the glow plug wrench.

To sum it all up, our two-day bird has, in its short history of two races, managed eight firsts, two seconds and two thirds which to me is a *very* extraordinary record for a total of only 12 flights, every one in a heat. Butch has flown the bird so tight and tough that it actually bends on the course, the wings flex and the most amazing part of the whole thing is that not one wrinkle has appeared at any place either on the fuselage, wing or empennage

POXY POINTERS

Hi there:

Are all of you aware that we now have three (count 'em) three different hardeners? Each is formulated for a specific painting application. The result is greater flexibility in picking the right finish.

Of course, we still have that mainstay, **Gloss Hardener. That's the one you have been buying and using ever since Hobbypoxy hit the model scene.** It gives the highest gloss of any finish you can use, along with strength and resistance to abrasion and the normal assortment of crud you all seem to get on your bird.

But some of you don't like a high gloss, so **we now have Flat Hardener, the first on the market which gives a true military matte finish.** I mean, it really is flat! And if you want something in between the high gloss and dead flat, just mix the two of them together before you add them to the Part A (color). **With a little experimentation, almost any degree of satin-like finish from egg shell to semi-gloss can be achieved.** And to make it easy to tell one hardener from another, Flat comes in a can with a GREEN label. Look for it!

But there's more to the hardener story. **How about our new Quick-Spray** (which comes in a BLUE labeled can)? This is another specially-designed-for-you hardener that should be used only for spray applications. **It is quick-setting, so quick in fact, that it should not be used for brushing.** 'Cause if you do try to brush with it, you'll be sorry when you see the lap marks. So be a good fellow, and use it only when you are in a hurry to get that spray job off the bench and into the air. **Quick-Spray is high gloss, just like regular hardener, but faster acting.**

And a final word about all of the Hobbypoxy hardeners, also known and loved as Part B. **They should be mixed with Hobbypoxy color Part A in a 50/50 ratio. Changing the mix ratio will not retard or speed up anything.** But I can guarantee you that it will make a mess out of a paint job if it isn't mixed as directed. And, after all, a 50/50 ratio is not very difficult to do. **Just take one half of Part A (color) and one half of Part B (hardener of your choice), mix them together thoroughly in a glass container, let the mixture stand for 45 minutes, and go to it.**

Just in case you think we have forgotten about the Part A color side of things, don't you believe it. We just added a new one to the line. Military GRAY. So you can quit fooling around with black and white. We've done the mixing for you. And it'll be the same shade every time. Oh joy!

Your hardened Hobbypoxy hustler,

John E. Poxy

John E. Poxy

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section and, most important, not a crack of any sort including the areas attacked by the hot fuel—to repeat, it's amazing and the kit sure has stirred an extraordinary amount of interest wherever it has appeared.

Now to the Minnow that Butch bought; it didn't do to well at Granby—some engine problems among other things and it managed to complete only three of its five heats and those finished were quite ordinary. At Endicott, it was a different story as it really began to move only to lose its engine in the first heat. In the second heat, it really took off with Butch and Mike Helsel in a dead heat for two laps when suddenly Mike's bird hit a down elevator right into the macadam and totaled a plane and engine—two laps later Butch did exactly the same thing in exactly the same place but managed to land on the grass. Two down elevators in a row and then a bit later Pete Reed had the same experience in the same place, also with a total. Butch's fuselage tore up quite a bit but the wing flew off and landed about 30 feet away where it was promptly chewed to bits by a large hammermill grass cutter being drawn by a large tractor. Sad and deplorable thing here is that it was unnecessary as the tractor driver deliberately drove over and destroyed the wing and I wish you could see what a hammermill will do to a servo. (Next month's Pylon Pit Patter will include a photo so that you can see first hand.)

It so happens that the tractor operator is down on the world with a particular dislike of model planes invading his airport—considerable restraint was shown by both Butch and myself but if total hate could destroy, that particular individual is going through a bit of hell at this moment. The nice guys of the Aeroguidance Society are shook and intend to take steps but they should feel no responsibility as the man was not there by their choice. He had a mowing assignment for that day and nothing would deter him—odd thing was that all of the down elevators took place while he was mowing and none after he had ceased. Incidentally, the races were stopped until he finished his chores. The airport manager was not on hand and he just wouldn't cease and desist. While the races were shut down considerable discussion went on and it was surmised that just maybe the tractor's magneto and ignition system might have been the culprit that caused the down elevators. All systems were working after the crashes so it's hard to pin down—we would appreciate thoughts and opinions on the subject. And so ends the saga of two days of hard building and two weekends of extraordinary success!

* * *

ADDENDUM:

Old Fumble Fingers did it again! In my July column I gave credit to George Bahrman for the Featherlite covering tissue Anthony and I used for our Free Flights. George had submitted the samples that we used but the tissue properly should be credited to Marlow Engineering, George's suppliers. To Len Marlow our apologies; all inquiries should be directed to Marlow Engineering, 6850 Vineland Ave., No. Hollywood, Ca. 91605. Please correct your files accordingly. ■

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