MARCH 1969 60c 7/-

american aircraft MODELER

FOUR-COLOR VIEWS!
WW II SUPERMARINE SPITFIRE
BY KARLSTROM

STUNTER WITH A 60
FOR THE POLISHED PILOT
R/C: EL COCHINO
PAGE 20

PROFILE CONTROL-LINER —
ANOTHER FOR THE TENDERFOOT
MUSKETEER
PAGE 12

BUILD THE
MODEL ROCKET
SUNBURST
PAGE 26

IT'S SUPERTIGRE-68 NATS

OUR THANKS TO HARRY ROE FOR MAKING THIS EVENTS SUMMARY

CONTROLINE SPEED**

Possible Places	Places Won	Age-Event
5	5	J A-Speed
3	2	S A-Speed
5	3	O A-Speed
5	5	J B-Speed
3	3	S B-Speed
5	4	O B-Speed
3	0	J C-Speed
3	2	S C-Speed
5	4	O C-Speed
5	3	J B-Proto
3	2	S B-Proto
5	5	O B-Proto
2	2	J FAI Speed
2	0	O FAI Speed
54 Total	40 Places Won	

$\frac{40}{54}$ = 74% of Speed Placings won by Super Tigres

MISCELLANEOUS CONTROLINE

Possible Places	Places Won	Age-Event
5	0	J-Stunt
5	0	S-Stunt
5	1	O-Stunt
5	4	J Combat
5	3	S Combat
5	4	O Combat
3	1	J Scale
3	1	S Scale
3	1	O Scale
5	2	J Navy C. I.
3	1	S Navy C. I.
3	2	O Navy C. I.
3	0	J Navy C. II
3	0	S Navy C. II
3	0	O Navy C. II
5	4	J Rat Race
5	1	S Rat Race
5	4	O Rat Race
74 Total	29 Places Won	

$\frac{29}{74}$ = 39.2% of Miscellaneous Controline Events won by Super Tigres

FREE FLIGHT GAS**

Possible Places	Places Won	Age-Event
5	1	J A-Gas
5	0	S A-Gas
5	2	O A-Gas
5	2	J B-Gas
5	3	S B-Gas
5	3	O B-Gas
5	2	J C-Gas
5	2	S C-Gas
5	2	O C-Gas
5	1	J FAI
3	0	S FAI
5	5	O FAI
5	0	J-S Scale
5	0	O Scale
3	0	Helicopter
71 Total	23 Places Won	

$\frac{23}{71}$ = 32.5% of F.F. Events won with Super Tigre Engines.

RADIO CONTROL

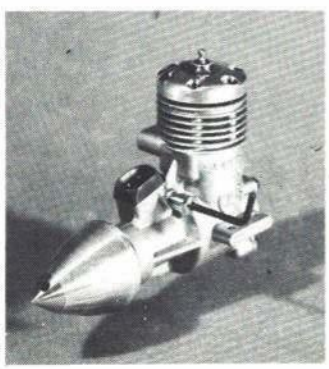
Possible Places	Places Won	Age-Event
5	1	J-S FAI Qualifications
5	0	O FAI Novice
10	1	O FAI Expert
10	0	JSO Finals
10	1	JSO Pylon
5	2	JSO Scale
45 Total	5 Places Won	

$\frac{5}{45}$ = 9% of R.C. Places won with Super Tigres

** ALL ½A EVENTS and JET SPEED NOT INCLUDED.
* THIS DATA FROM AMA OFFICIAL RESULTS.

WESTERN PYLON R/C WON WITH ST G21/40 R.V.

Norm Hooper, one of the fellows who fly up around Seattle with Doc Brooks, took first at the Western States Pylon Championships with a Supertigre G.21/40 RV. His time was 1:50:5. Norm was flying a Shoestring and had a point total of 25. Thanks to Doc Brooks for calling this into us here at World Engines and also thanks to the NMPRA — Ed Shipe, Editor, for the news release in his November 10th paper. The G.21/40 RV engines that Supertigre builds has real stamina which is the reason for its growing popularity in U-Control Rat Race. We hope to see more R/C Pylon racers winning with the G21/40 R.V. in the future. **$29.98**



G-15 RECORD SERIES

The G.15 series designates the latest configuration in Supertigre's Racing 15. This F.A.I. speed event is the international speed event and, of course, is an important competitive yardstick among engine manufacturers. Arnold Nelson placed second against a field custom engine with tuned pipes in this years U.S. F.A.I. speed eliminations in St. Louis September '67. The glow 15 and the diesel are available in front and rear configurations. The 19 in this series is a F.V. glow engine. We also stock a conversion kit for changing the front valve engines to rear valve engines. Bill Bertram holds an R/C endurance record with the F.V. Diesel of 11 hrs. 17 min. as of 12-20-67. The G.15 rear valve holds the U.S.A. Speed U/C record of 162 mph.

G.15 Speed w/spinner $17.98
G.15 R/V w/spinner 24.98
G.15 RV Diesel 24.98
G.19 Glow F.V. 19.98

NEW G-51 SERIES

This particular series of Supertigre engines started out as a rear valve induction type engine. The die was remade for the crankcase, changing the engine from a rear valve engine to a front valve engine. The crankcase size on this engine is larger than the standard 29 case and yet smaller than the standard 60 case making it a true intermediate series engine, ideal for either the 46 size engine or the 51 size engine. This series of engines sport all of the quality features found in Supertigres — twin ball bearings, chrome plated sleeve, special alloy piston, etc. If you want to invest in an engine for the long pull, consider the G51/46 series.

G.51 R/C 24.98
G.51 Standard 19.98
G.46 R/C 24.98
G.46 Standard 19.98

NEW "G" THROTTLE

The new "G" Series Supertigre throttle is being used on the G.71s, G.60, and the ST 51, 56, 60 series. This is a cam type throttle and is very unique in its design. When the throttle moves from high to low speed, the second needle valve blocks the flow of fuel through the main jet, thereby leaning out the engine. At the same time, the slide bar moves into the venturi area reducing it so as to still provide a high velocity air stream of low speed. This throttle provides good high speed, good transition and a good low speed. If you want to fiddle with the throttle you can get down to a steady 2100 rpms with an 11/6 or 12/6 propeller. Most radio controlled models land well at low speeds of from 2600 to 3200. To get this throttle down to this speed range is a lead pipe cinch.

G Series Throttle 7.98

WORLD ENGINES

INCORPORATED

8960 ROSSASH AVE. CINCINNATI, OHIO 45236

american aircraft MODELER

VOLUME 68, NUMBER 3 **MARCH 1969**

COVER PHOTO: Rare fly-by of two of WW-II's most famous aircraft, both North American: The P-51 Mustang, rear, and the rare P-64 fighter. The spectacular photograph was made over Milwaukee by Heinz Kluetmeier.

WILLIAM J. WINTER — PUBLISHER

Edward C. Sweeney, Jr., Executive Editor **Harry E. Harps,** Editor

Sally Barry, Managing Editor

Articles:

Features:

Academy of Model Aeronautics:

National Association of Rocketry:

Departments:

Published monthly by Potomac Aviation Publications, Inc., 733 Fifteenth Street, N. W., Washington, D. C. 20005. William J. Winter, Publisher; Edward C. Sweeney, Jr., Secretary; American Aircraft Modeler Business Manager, Harvey E. Cantrell.

ADVERTISING MANAGER: NORMAN J. WARD

733 15th St., N. W., Washington, D. C. 20005 (202) 737-4288

Harvey E. Cantrell, Business Manager — **Marsha A. Rubin,** Administrative Assistant

Midwest Advertising Representative: G. S. Anderson & Associates, 4621 Grand Ave., Western Springs, Illinois 60558. Tel: (312) 246-0837

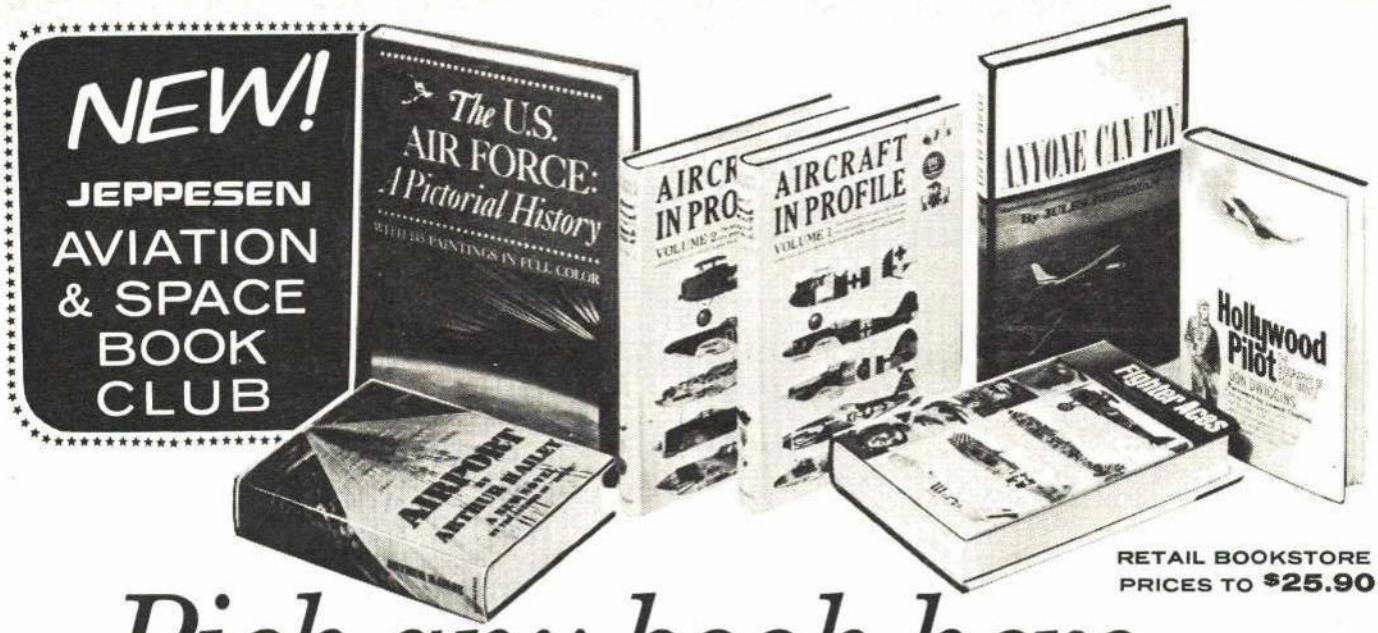
Western Advertising Representative: Aaron D. Viller & Associates, 5311 Venice Blvd., Los Angeles, California 90019. Tel: (213) 939-1161

Subscription Rates: In U. S., Possessions and Canada, 1 Year, $6.00; 2 Years, $11.00; 3 Years, $15.00. Elsewhere, $8 for one year. Payable in advance. Single copies, 60 cents. Six weeks are required for change of address. In ordering a change, write to American Aircraft Modeler, 733 Fifteenth Street, N. W., Washington, D. C. 20005. Give both new and old address as printed on last label.

We cannot accept responsibility for unsolicited manuscripts or artwork. Any material submitted must include return postage. When writing the editors address letters: Editorial Office, American Aircraft Modeler, 733 Fifteenth Street, N. W., Washington, D. C. 20005.

Second class postage paid at Washington, D. C. and at additional mailing offices.

Postmaster: Send Form 3579 to American Aircraft Modeler, 733 Fifteenth St., N. W., Washington, D. C. 20005.



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STRAIGHT AND LEVEL

More and more 'Juniors' want to get into radio. The demand calls for totally new concepts.

IT has always been considered that radio control was purely an adult hobby — or sport, if you prefer to call it that. Truly not meaning to criticize a contemporary, we note that one magazine had editorialized to the effect that radio is the most, if not only, important form of modeling, that it is for the men, and that nothing else matters. Well, for a long time it almost seemed that way. The trouble with loose and sweeping assumptions is that they are really near-sighted. The sun revolved around the earth. The earth was flat. The Eagles would lose all their '68 games. A grand assumption is a sucker for an upset. And this is the way now of any concept that only one form of modeling is important.

Young people want in. The only thing keeping them out of R/C, besides money, is unwarranted indifference to them on the part of the entire field, from its participants to its manufacturers. True, some manufacturers have low-cost, simple items — they sometimes can see that this does not have to be exclusively a rich man's pleasure. There are simple kits. And there are guys — too few, unfortunately — who will bother with the young and the beginner. A small minority of us see the significance of grass-roots activity, that the growth and welfare of any segment of the hobby — and this *does* include radio — depends on how well we promote it to *all* modelers.

If the magazines believe radio is for men only — and the average age is well up in the thirties — is not this editorial also guilty of assuming the nature of the field, when it states that radio can be given to the teenager as well as the well-off family man? Not at all!

Something inspiring has been taking place in our editorial offices. A happening. Now, this is not something which we can take credit for, nor brag about. It just so happens that young people who wish to get into radio have been expressing themselves through the mail. It is a recent development. And it is snowballing. The story lies in the accidental nature of this discovery. That it is accidental suggests opportunities if we all become aware.

Roughly a year ago, with the January '68 issue, A.A.M. inaugurated a letters-to-the-editor column called "You Said It." Since our policy covers the broad spectrum of modeling, it follows that mail would reveal all manner of reader interests. One young reader described his troubles in trying to get into R/C. Others chimed in. Now we have people writing each other via the letters column, and countless young people, 13-14-15-year-olds asking for help, stating their troubles. It is a sad tale.

Lack of money, naturally, is the big handicap. Many kids have half-completed models hanging on their wall, while they struggle with paper routes and other odd jobs to acquire the price of cheap, simple gear. Those fortunate enough to acquire the gear, usually cannot fly the model. They ask for help at the flying fields where they meet stoney indifference, stupid advice that they *must* join some club to get help, that they cannot even use the flying field if they are not club members!

Why is radio blind to the fundamental premise that this hobby has developed by giving aid and advice to those coming up? How can industry afford to avoid the young?

Why cannot 50,000, say, young people be brought into radio-control right now? Why can't we help them make a dream come true? All that stands in the way is another worn assumption: "There is nothing we can do about it." Horsefeathers!

Why cannot public-minded industry members put their heads together and come up with a "peoples" radio system — perhaps a complete package of radio system, plane, and engine. Will it tear down the temple to suggest that normal profit margins be forgotten? Sell the stuff at cost. Let the dealer do the same thing. Let everyone forget his margin — just on this one, monumental project. Its widespread success will bring in a fortune — if we must count dollars — because the young will buy progressively more expensive equipment and, some day, the same dealer, the same jobber, and the same manufacturer, will sell to the same customers exotic digital equipment and high-priced kits. Future markets will be enormously expanded.

Magazines can share the burden, even unite in a kind of Manhattan project. Plans and instructions could be published, reprinted and packaged with especially complete illustrated instructions — at cost. Appropriate advertising could be provided in the form of "house ads." Oh sure, there are problems. Aren't there always? But there are solutions as well for those with a sense of mission. Why take no for an answer?

* * *

AS we wind up March, the 1969 Annual breathes down our necks. Scheduled soon to go to press, it is loaded with plans and construction projects. You impatient types who just can't find enough projects to keep you in solitary, will think you have just wound up a summer full of three-day contests. And why do we tell you this? — simply because so many of you flooded us with suggestions. We are anxious to find out how well we've met your demands.

Action is the keynote. There are projects in free-flight, control-line and radio-control sections. Action in building, action in flying. Top-notch designers, many of whom are world famous. Attention has been given the beginner, with three more of those wacky Tenderfoot projects — kid stuff, it was thought, but now demanded and built by guys and gals of all ages.

— *the Publisher*

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Tenderfoot forever

I am enclosing 75 cents for your Oily Bird plans. I am a new reader of your magazine and I find it very interesting. I would like to ask one question about your magazine: Is "For the Tenderfoot" a regular feature in every issue or is it just a special feature?

Kevin Turcotte, Sudbury, Mass.

Yeah, man, Tenderfoot is here to stay — every issue. You designers out there — give us a hand will ya? How about some suggestions. The younger set is madly in love with these projects. We ain't just awoffin. Ed.

Who's mad?

Frankly, I am ashamed that a free-flighter would have the guts and lousy manners to write such a letter as that of Guy C. Markham, which you printed in the Nov. '68 issue. You certainly did not rate this abuse, and I hope you don't think all of us free-flighters think this way.

Mr. Markham is all wet, and needs his mouth washed out with soap and toilet paper! Just consider the source and forget it.

Jim Perdue, Coffee Air-Foilers, Tullahoma, Tenn.

We didn't mind Guy's letter, Jim. We did print it just to show how mad some free-flighters have been. Someone is always mad at us. Now it is the control-liners. We don't do right by them — we are free-flight oriented — they sez. On April 1 will introduce a new 1000-page magazine for $10 a copy. It will have everything — we hope! Thanx for the boost, Jim. Ed.

A good question

Every model magazine hollers and hollers about our losing flying sites, unless we start using mufflers.

Well, I took in part of the meet here at Indianapolis, Ind. Sept. 21, 1968. I saw . . . and several other top flyers there. I never saw a muffler on any of their planes.

Why is it the top flyers of the U.S.A. don't fly with mufflers, so as to set an example for others?

I believe in mufflers, and I use them on every model. Not only does it make for peace and quiet, but I believe it helps the engine on the idle.

Thomas A. Marcinko, Lafayette, Ind.

Don't blame the dealer

Why blame anyone? I am a new dealer, and I know that prices aren't what they used to be, and neither are the kits, for which we can all be thankful. You can still buy a scale rubber model for 50c to $1, but who wants a kit that is manufactured in the manner of the 1930's? Today, a 2- to 2½-ft. rubber scale model will cost $3.50 to $5, but look what you're getting compared to the same size model of 30 years ago.

The younger generation is much better off. In the 1930's, a boy could work all day for 50c (daylight to dark). Today, he can make more in one hour than he did all day then. When a boy or girl today can work fewer hours, and get a better product, I say forget the good old days.

The dealer doesn't make up prices. He just orders what the public wants, and tries to make a small profit. If anyone thinks a dealer is getting rich, then I say open up a shop and see.

Jay C. Dye, Strictly R/C, Portland, Oreg.

Kraft once a beginner

We have recently moved from Lexington, Ky. to Cincinnati, Ohio. In the M.A.C., back in Lexington, I was only one out of six members in the club, but here, when I tried to recruit some of the guys on the street, I was bitterly disappointed when I found only one boy interested.

It is said that a boy lived here before we did who was pretty good with model airplanes, but he also moved away about three years ago. I think this is all part of what your magazine calls the "Junior Problem," and I think it's a psychological, not physical problem. For instance, when young novice flyers are looking through a model airplane magazine and see a picture of Phil Kraft with his multi R/C Kwik-Fli, they can't get it through their heads that he didn't just sit down with a piece of paper and scribble the design of the R/C World Champion plane. He had to start out in airplane modeling just like they did.

C. David Gibson, Cincinnati, Ohio

Well said, Mr. Gibson. Any ladder has two ends: bottom (first!) and top. And that's the why of the Tenderfoot series. Ed.

He digs!

Just read your Straight and Level editorial in the Oct. '68 issue.

You are to be congratulated for covering the whole gamut of Model Aviation as a hobby in its true perspective. I feel that many in the Hobby Industry would benefit by reading and understanding your message — and the reaction would be more and better products aimed at the actual market that we have today.

Keep flying, Straight and Level.

Lee Shulman, Cranford, N. J.

Lee's words warm us. Timed his free-flights before WW II! He really knows the trade — and now flies R/C. Ed.

Zeppelins, Anyone?

We would like to announce the formation of the National Model Zeppelin Society.

Anyone interested should write: **C. Rollins, NMZS, Box 503, Mercersburg Academy, Mercersburg, Pa. 17236.**

A blistering experience

In your July '68 issue on the "Sketchbook" page, Robert Stemper suggested that formica makes a good firewall.

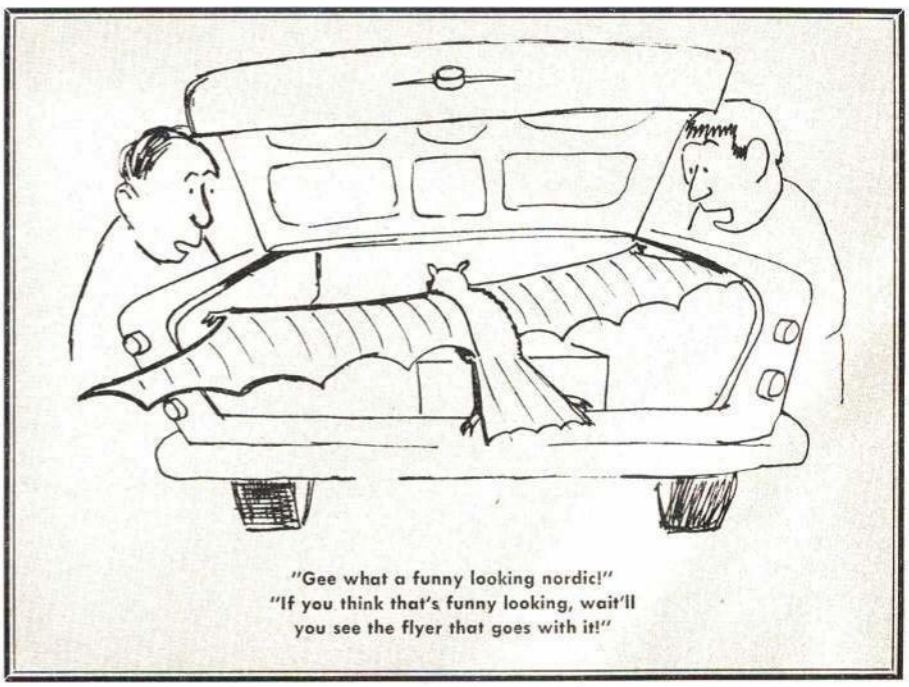
In past experience with formica, I've found that formica blisters and explodes when it gets hot, which could cause serious damage to the airplane.

Bill Goebel, Houston, Tex.

Needs data on installing controls

Last year I got the "Mambo Special" and the "Command Master" controls. Since then, I have almost completed the plane, but when it came to mount the controls inside, I got stuck.

I'm 13 and wondered if you had any other



"Gee what a funny looking nordic!"
"If you think that's funny looking, wait'll you see the flyer that goes with it!"

detailed instructions besides the ones in the control box about installing the controls. I like the airplane.

Terry Mesmer, Grand Island, N. Y.

Because of an earlier letter in You Said It, written by a Junior trying to get into R/C, we have received many letters from other young people who are hung up on R/C projects. They have even taken to writing each other through this column. It would seem that industry should seek better answers for these young men — improved instructions, low-cost outfits, etc. The magazine has answered Terry — but there are thousands more like him wanting help. McEntee's book, Getting Started in R/C (see page 41) is a recommended beginner aid. Ed.

Junior complaint

I am a junior and also an AMA member. A group of friends and I fly ½A models. One or two of us have gotten into larger models. I am trying to get everyone to join the AMA. So what is wrong?

Two things: First, no adult support. We would like to form an AMA club, but we have no adult supervision. Second, we have nowhere to fly. We have called the city many times, but they have not given us a real answer.

We have flown our ½A jobs at school grounds — illegally. But what happens when all of us become better flyers and step to bigger models? I have an adult who takes me to another city to fly, but you can't take a whole club.

Our club would like to sponsor contests for all of the kids around, but can't because of lack of supervision, nowhere to fly, and most of the little kids are afraid to fly because they have only flown trainers. They are scared of competition.

What can we do? I would appreciate suggestions. What can we do with no adult supervision, and nowhere to fly. What is wrong with us is wrong with the whole set of juniors who have no support. And we can't have the power to be heard.

Scott Conradson, Palo Alto, Calif.

If we are sincerely concerned about the "Junior Problem," we should stop talking out of both sides of our mouth. We help, or we don't. R/C has a wonderful opportunity now to bring in young blood — if we don't blow the chance. Ed.

Sick of wash-buckets

It's this way. I'm a scale modeler and I'm just about to throw up on articles like Nov. '68 issue's write up on weird, unheard-of, flying wash-buckets like the Continental K.B.-1, or Whitehead's flying contraptions.

For once, I'd like to see a write up on a modern fighter, bomber, war machines of WW II, or of newer vintage.

It's just plain logic that the "crowd-pleaser" of two aircraft types, such as a restored P-51D Mustang (or a modern jet fighter) and a Porterfield CP-65 "Collegiate" (as seen in Aug. '68 issue), the P-51D is going to be the glory-hog.

Wise up! I'm sure many modelers share my views on not really wanting to read articles on freak aircraft, but wanting to read about "real," interesting and modern aircraft.

Stephen Wellsfry, Chico, Calif.

Wish it was that simple, Steve! Actually, many collectors value *all* these items, though we grant you, the Continental

K.B.-1 is not an ideal modeling project. The Mustang would be ideal but the market and the magazines are flooded with Mustangs. The Collegiate, like the Cub, is a perennial favorite, for sport free flight and R/C. But we'll aim for subjects more adaptable for modeling. Ed.

Appreciates variety

Being a member of AMA, and a World War I aircraft buff, I'd like to commend you for a fine magazine which I have thoroughly enjoyed.

The "You Said It" column is most enjoyable, and I for one appreciate the wide selection of topics covered in each issue.

Even though I'm a Scale control-liner, your topics on R/C, F/F, rocketry, etc. interest me and should increase everyone's awareness of the whole sport; and that's as it should be. I don't feel that one can claim to be knowledgeable in a sport unless one is at least familiar with all phases of the sport, even if you specialize in R/C, C/L, or F/F. So I say, well done.

I would like to suggest that you also include occasionally a section or article on fuels. I mix my own, and would greatly appreciate some good advice on modification on new fuels.

Richard F. Wehr, Martinez, Ga.

We hesitate to recommend fuel mixing at home, for many practical reasons, some having to do with safety. For normal usage, one does not need to mix fuels. However, many clubs get into fuel mixing, Dick, and you might try joining one near you (see listing in AMA section, Jan. '69 issue). Expert competitors, notably in Speed, sometimes mix their own, but hot blends are available from specialist houses. Ed.

Like real

This beautifully detailed scale Travelair 2000 was built by Vince Micchia, Hobart, Ind. It is a 24" display model which Vince built for a fellow who once owned a real one.

The drag wires are ½A control-line cable and the landing gear shock system is functional, using small rubber bands for bungee cords. Note the streamlined object on the landing gear. This is a siren! The real airplane had one.

Jim Davis, Midwest Products Co.
Hobart, Ind.

An exchange from Korea

In writing this letter, I am very happy to know you as a modeler. I am a sophomore cadet of the Korean Airforce Academy and majoring in aviation parts.

My special hobby is model airplanes. It had been four years since I built airplanes. In the Academy, we had some airplanes and did some flying on weekends.

We flew a Nobler, Mustang, Ringmaster, Cessna, etc. We would appreciate it if you would introduce us to some American model airplane club or private club which

consists of young men like us. We want to change our flying intelligence and Korean air model news. It would help all of us. We want to receive any kind of letters from U. S. modelers who want to know Korean aircraft model news and activity.

I promise to do my best to send my country's air model news and pictures of our models.

Our model airmen consist of only five cadets, but we have courage and faith to learn more high skills and American air model productions.

I hope you make this possible for our Air Cadets in Korea.

Cadet Qutae Park, Seoul, Korea

Letters will be forwarded. Ed.

A college reference

Thanks very much for the copies of the November issue. The Whitehead article contained in that issue has already been digested by my present students and the copies will be used from here on out as an integral part of the history section of the college 350.25 Aviation course.

Howard A. Bueschel, Coordinator of Alumni Affairs, Trenton State College
Trenton, N. J.

Where is the participation?

I have just read the letter on RAFF (Dec. '68), and I agree with Mr. Thornhill. I have just one question for all: How do you get participation? I fly from a popular field in Mesquite.

All flyers from Dallas, Terrell, etc. fly there, but no one will participate in anything but the Southwestern Champions, and that's not enough. Several times I have encouraged my fellow flyers to have a contest just for fun, but maybe seeing this letter in your magazine will encourage some.

Incidentally, I am 16 years old and usually fly free flight. I used to have a friend that felt the same as I do, but he got discouraged and quit flying. His six-channel reed Champion hangs in his room — unflown in two years. For the sake of all in my area, please print this note.

Chuck Waller, Mesquite, Tex.

When an R/C job hangs unused on a young fellow's wall, there's got to be something wrong with our concepts. Are you local clubs/leaders doing a job? Ed.

Enjoys control-line and plastics

I would like to say that your articles about control-line and Scale Techniques for the Plastic Modeler, by John Townsley, are the articles I turn to first, although your editorials rate very high too.

I hope your magazine will be published for many years. I find American Aircraft Modeler stimulating.

Wayne Gregory, Shawnee, Okla.

He's new in R/C

Help! Boy, do I need it! I'm only 14 years old and I have just bought your Nov. '68 issue, and I'm left in the open about R/C.

This probably sounds stupid to some of you "old hands" at R/C, but I don't even know what a servo is.

I would really appreciate someone "throwing me a lifeline" with some helpful suggestions and explanations on kits to buy, ready-to-fly, and R/C in general.

I have just graduated from line flight to being a complete novice at R/C flight.

Joe Underwood, Belpre, Ohio

MUSKETEER

Beechcraft's biz-and-sport plane makes good control-liner trainer for 049 engine. Plan is full size.

JIM DAVIS

THE Musketeer, a common sight at local airports, is a popular craft for business or sport flying and flight training.

In a model, a good trainer usually must depart from scale because of the necessary change in nose and tail lengths, and the proper location of the C.G. (center of gravity). In this case, the Musketeer fuselage is a near-perfect scale profile. Only the wing and stabilizer area had to be changed to obtain gentle flying characteristics.

The Musketeer model construction was made as simple as possible to keep beginners' problems to a minimum. The secret of a good flying model is proper alignment; in this case, most of the construction is done on a flat board.

Every beginner has trouble installing elevator hinges properly, yet this is one of the most important phases of the construction. They must move freely in order to have good control of the model. The elevator hinge problem was solved by installing rubber bands in a figure-eight fashion. The method is simple and it is less likely that hinges will break in a crack-up than if cloth is used. This hinge method was used for years by the author for emergency repairs when flying in combat competition.

CONSTRUCTION

The plans are full-size. Instead of cutting up your magazine, take a sheet of tracing paper and tape it to the magazine page with masking tape, then carefully trace the parts. The tracings can be cemented to the wood with rubber cement, then cut out. If you have access to a jig saw or band saw, it will be easier to cut out the ¼" fuselage side. Make sure all the parts are cut accurately since they key together and align themselves. The tracing paper can then be peeled off and the remaining cement rubbed off with your finger.

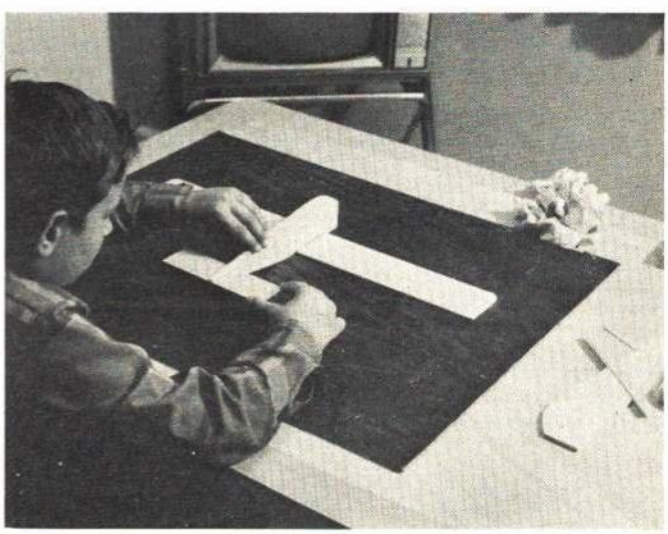
The wing is made of ⅛ x 3 x 24 balsa. Mark the center of the piece (12") and place the center portion of your tracing there. The tracings for the wing tips are then placed at the ends of the balsa piece. If you think the wing has an odd shape, take a look at a real Musketeer. It has the same shape.

Pin the wing down to a flat board, then apply cement liberally to the center of the wing and set the fuselage in place. Add the ¼ x ¼ x 3 fillets to each side and hold in place with pins. Use a small triangle to be sure the fuselage is exactly vertical. Apply cement to the center of the stabilizer and slide into position in the fuselage slot. Use your triangle again to be sure the trailing edge of the stabilizer is at right angle to the fuselage. Measure the distance of each tip down to the board to be sure they are the same. This is to be sure the stabilizer is parallel to the wing.

Add the two pieces of ⅛ x ⅛ x 2 fillets. Cement the three vertical fin parts in place. If desired, the trailing edge of the rear piece can be offset ⅛" to the right to give better flying-line tension.

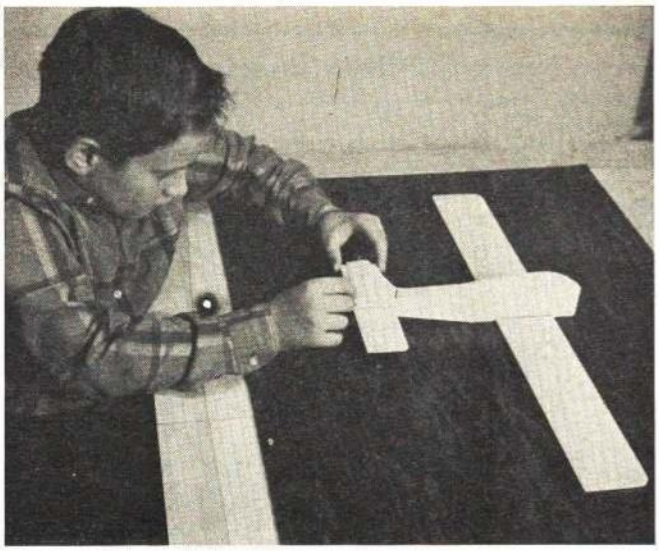
Apply cement to the back of the plywood firewall and also to the two ½" triangles and set them in place. Hold with pins. Be sure the firewall is up tight against the front of the fuselage.

Cement one of the 1/16" plywood pieces to the top of the wing at the bellcrank location. After you are sure all of the cement is dry, remove the model from the board. Cement the second 1/16 plywood piece to the bottom of the wing.

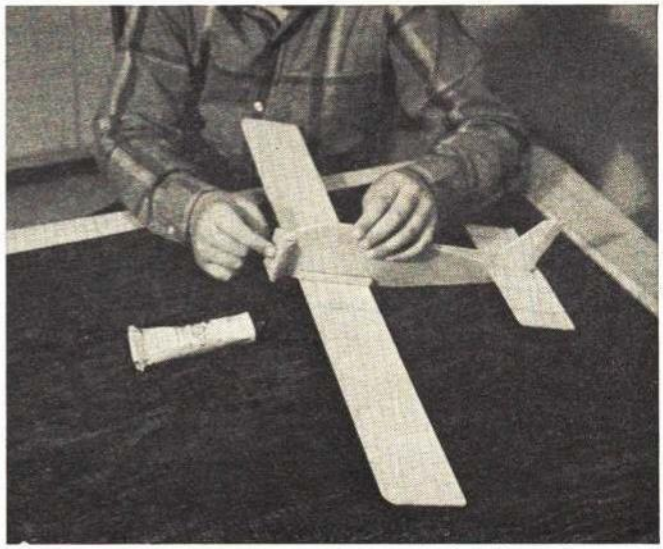


Above: Proper alignment is important on any flying model. With wing laid flat on the building board, the stabilizer is lined up.

Do a neat job putting on trim and decorations and your ship will gain respect at any flying site. Note muffler. Won't miss noise!



It is easy to glue fin on straight if you sight carefully along fuselage after ship has been placed flat on your building board.



The plywood firewall (motor mount) is glued against front of fuselage. Note the sturdy supports and the wing fillet pieces.

Cut a 2 x 4 strip of ordinary gauze bandage and cement it to the front of the firewall and around the sides. This reinforces the engine mount. Coat the top of the gauze with cement. It would be best at this point to allow everything to dry overnight. Then begin painting.

Since your Musketeer is being built for flying, not for appearance, keep the painting to a minimum. The fillets on the wing and stabilizer can be carved to triangular shape or left square. First, sand all surfaces and round all edges with fine sandpaper or 6/0 garnet paper, then apply a coat of clear dope. After it dries, sand lightly and apply two more coats of clear dope. When dry, apply the color dope. Since the wing is a long, flat sheet, the shrinking qualities of the dope may warp the wood. To prevent this, paint only half of one side then the entire other side; finally, paint the remainder of the first side. If a warp should develop, hold the wing over an open pan of boiling water and let the steam penetrate the wing. Do this to both sides then pin the wing panel down to a flat board.

After the final coat of dope has dried, the controls and engine can be installed. Mount the horn in the elevator then bend the pushrod, using the fuselage side view on the plan as a guide. Insert one end of the pushrod into the horn and the other end in the outer hole of the bellcrank. Set the bellcrank on the platform ($\frac{1}{16}$ plywood) and mark the location of the mounting screw with a pencil. Drill a $\frac{3}{32}$ hole into both plywood pieces and wing.

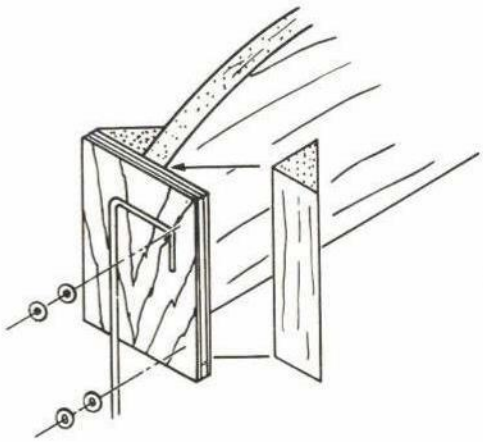
Bend loops in the leadout wires and attach to the bellcrank. Mount the bellcrank in place. Bend the wire leadout guide as shown on the plans and insert the leadout wires through it. Cement a metal washer to the bottom of the wing on the right side. This counterbalances the weight of the flying lines. Instead of a metal washer for weight, you can use ¼ oz. of modeling clay.

Use #3 wood screws to mount the engine. Place a #3 flat washer between the two left engine mounting lugs and the firewall for engine offset. This points the engine slightly to the right (towards the outside of the flying circle) for proper line tension. If landing gear is used, two washers may be necessary.

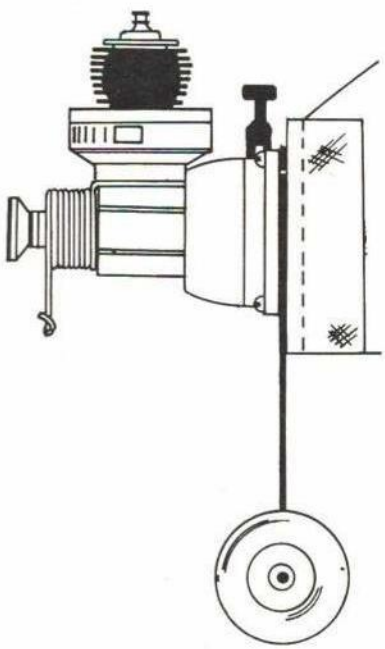
If you care to have a landing gear, one can be made from $\frac{1}{16}$ music wire and mounted between engine and firewall.

The landing gear is an optional feature mainly because it is difficult to take off on grass with a small model, while concrete will allow a takeoff but can cause severe damage in a crack-up. Therefore, grass is the preferred surface for a beginner. If grass, the model would take off by hand launch. When ready for takeoff be sure the elevator is neutral, then have your helper run with the model with the nose pointed level and slightly to the right. He should also be keeping the lines tight. Have him run until the model flies out of his hand and you be ready to step back if the lines go slack.

Let the model fly by itself and you correct the level of flight only when necessary. Most beginners will tend to over control. To prevent this, hold your arm straight out and raise and lower your whole arm instead of using your wrist to control the model. Above all, don't be afraid of a crack-up. If your model hits the ground, pick it up, dust it off, and try again. Any damage can be easily repaired with a little cement. Your model will last a long time because of its simple, wood construction.



Detail of engine mount. Washers tilt engine thrust-line toward the outside of circle.



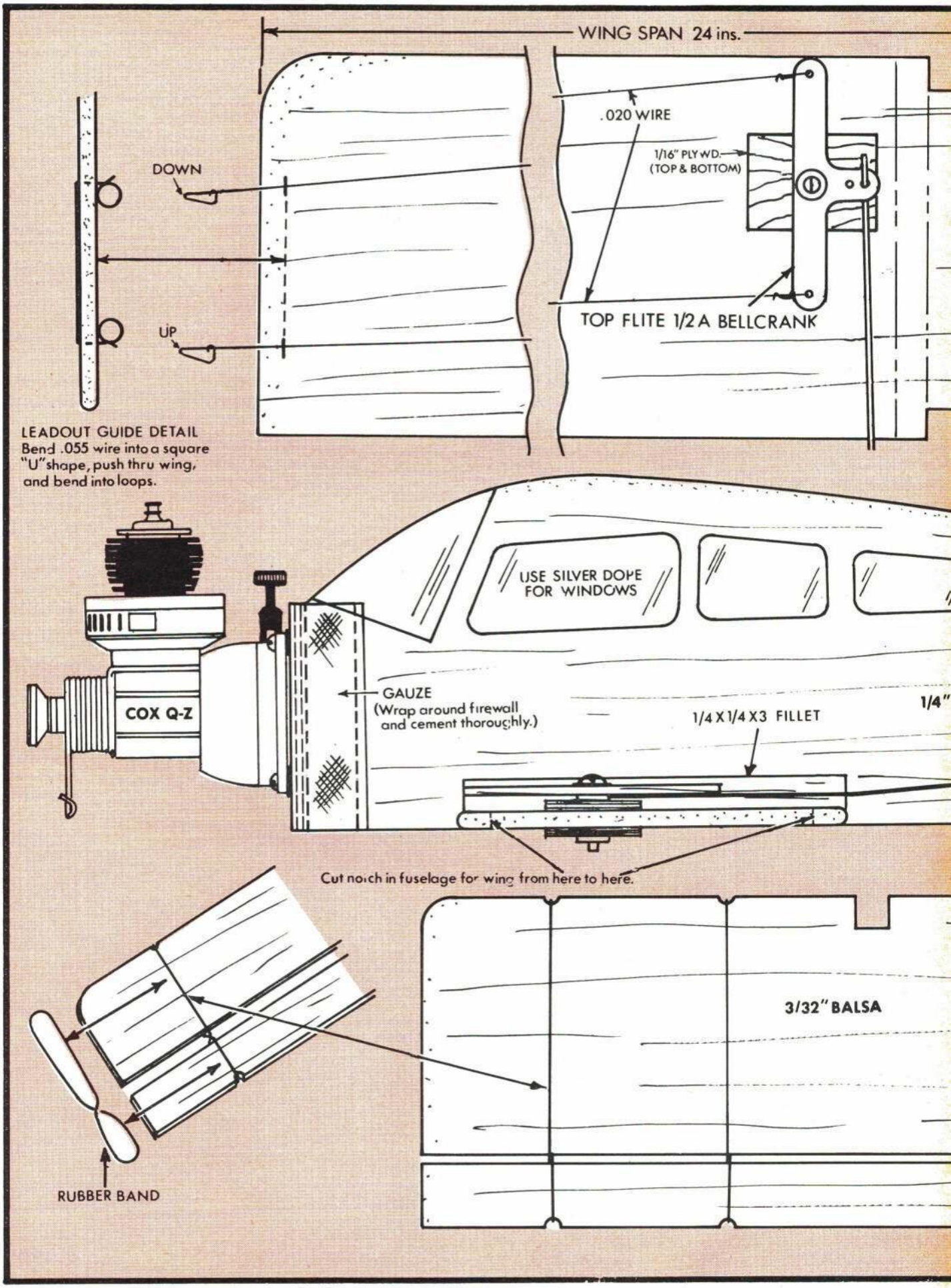
If landing gear is used, strut clamps in place between engine tank and motor mount.

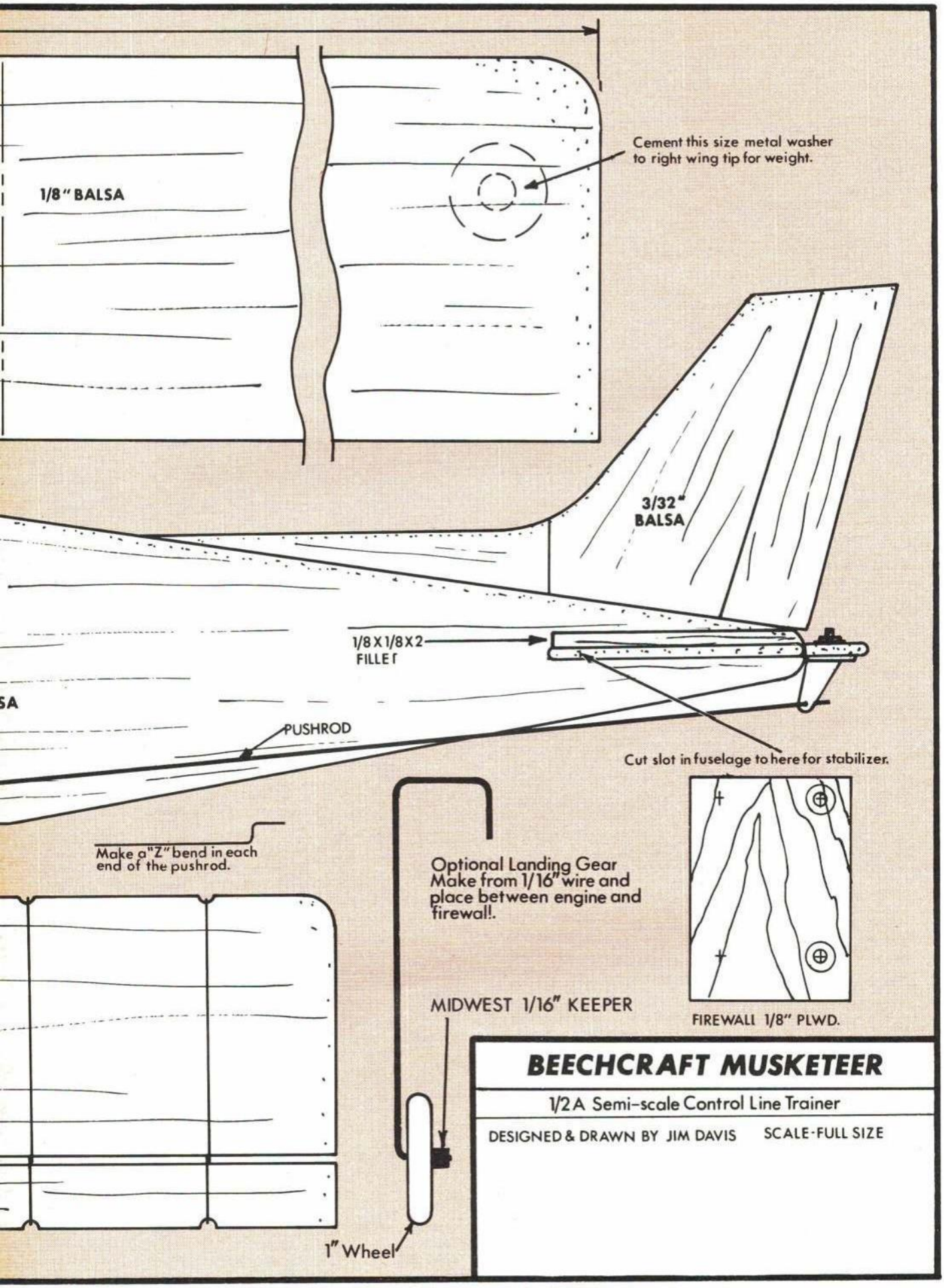
MATERIAL LIST

1 pc. ⅛ x 3 x 24 balsa
1 pc. ¼ x 3 x 12 balsa
1 pc. $\frac{3}{32}$ x 3 x 12 balsa
2 pcs. ¼ x ¼ x 3 balsa
2 pcs. ⅛ x ⅛ x 2 balsa
2 pcs. ½ x 1¾ balsa triangle
2 pcs. $\frac{1}{16}$ x ¾ x 1 plywood (thicker wood may be used)
1 pc. ⅛ x 1¼ x 1¾ plywood
1 pc. 2" x 4" gauze
1 ½A size bellcrank & horn
4 #10 rubber bands
1 pc. .055 x 12 music wire
2 pcs. .020 x 14 music wire
4 #3 x ⅜ wood screws
2 #3 flat washers
Clear dope
Color dope

1 .049 engine (see your engine instructions for prop size)
1 ½A-size control handle and lines
1 can ½A fuel
1 fuel pump
1 1½ volt starting battery
1 battery cord and clip.

Most hobby shops sell balsa and wire in 36" lengths only, so save the leftovers and you can later purchase another sheet of ⅛ x 3 balsa and have enough for another Musketeer.


WING SPAN 24 ins.
.020 WIRE
1/16" PLY WD. (TOP & BOTTOM)
DOWN
UP
TOP FLITE 1/2 A BELLCRANK
LEADOUT GUIDE DETAIL
Bend .055 wire into a square "U" shape, push thru wing, and bend into loops.
USE SILVER DOPE FOR WINDOWS
COX Q-Z
GAUZE
(Wrap around firewall and cement thoroughly.)
1/4 X 1/4 X 3 FILLET
1/4"
Cut notch in fuselage for wing from here to here.
3/32" BALSA
RUBBER BAND

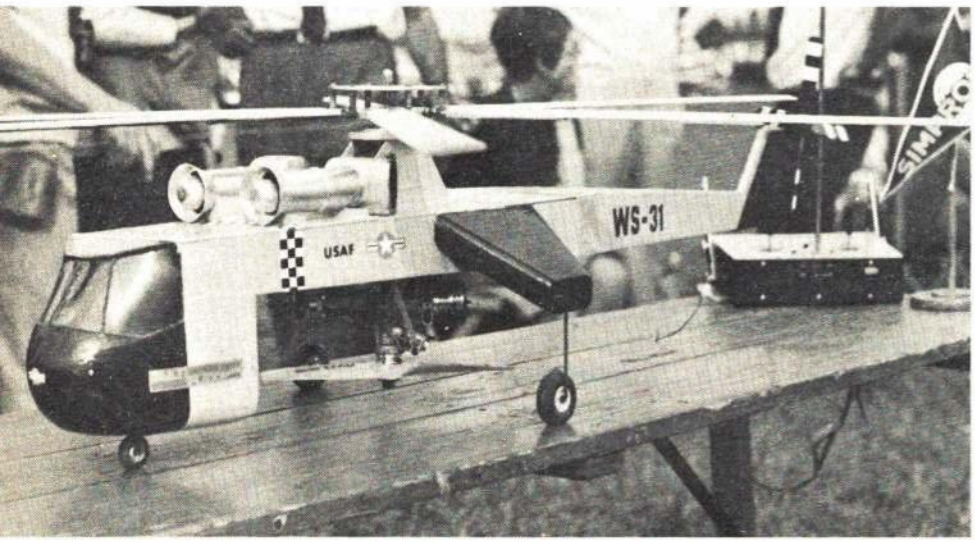


BEECHCRAFT MUSKETEER

1/2A Semi-scale Control Line Trainer

DESIGNED & DRAWN BY JIM DAVIS SCALE-FULL SIZE

Ewald Dietrich tuning up the motor on his torque-reaction helicopter. Fuselage is made of fiberglass polyester. Won second place in flight-evaluation event, a very short flight at that! Control system is non-proportional type, control by CG shifting.



Most of the models were torque-reaction types of several configurations, engine above, below, and even in the middle. This Sikorsky cargo 'copter by Dr. Schlattmann has motor below where cargo is hung. Fixed engine speed, collective-pitch control.

This interesting design by Bergenkotter has engine forward, driving rotor and anti-torque rotor. Uses Supertigre 60 with centrifugal clutch, bevel gears and belt drive at rotor. Engine, collective, and tail-rotor control. Although ingenious, did not fly.

model ...on the

First model R/C helicopter competition in Germany had one successful flight but 20 stomping, sputtering, crazy-crashing attempts, yet each model was an ingeniously crafted masterpiece.

MY purpose in attending the Harsewinkel Model Helicopter Show was to help provide an informational link between American and German modelers to keep everyone abreast of the latest designs and developments.

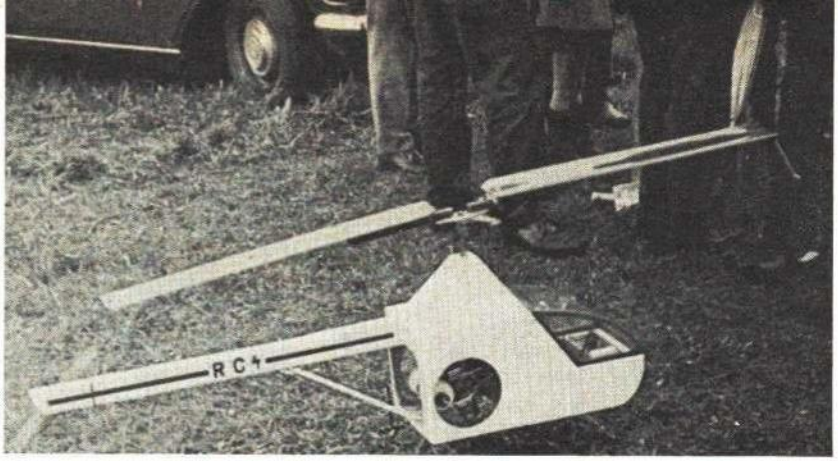
I armed myself with 50 copies of the Sept. American Aircraft Modeler, blueprints on John Burkam's "High Time" free-flight helicopter and a German road map.

Three years ago, Harsewinkel was a quiet little town of about 1200 persons. Today, thanks to Simprop Electronics and International Harvester, the population is in the thousands and growing.

The model flying field is just outside town, located in a nice flat area with perfect visibility. When I arrived there, several people were getting their models ready. After the first hour, all my copies of AAM were gone and I was in a daze from seeing models that staggered the imagination. (I could have sworn I saw Leonardo Da Vinci and Jules Verne walking around.)

I checked out a good and wild idea by Hans Knaf and his son. Would you believe 9½ pounds of Chopper powered by a Super Tigre 60, dual-output transmission (21:1 main rotor and 10:1 tail), a centrifugal clutch which cuts in at 3000 rpms and controlled by the new Simprop Digi-5 proportional rig? Hans didn't like all that hp going to waste out of the exhaust pipe, so he tapped it off and now it powers the oil pump for his transmission. He has to change oil quite often but the "tranny" works like a charm.

Sunday morning I stood in a light rain with a thousand other people and watched model after model snort, stomp, sputter, chase people and do everything . . . except fly. That's right. Not one model actually flew. There was one man who got his machine to lift off for a 20-foot flight straight up, and 21 feet straight down. That flight (?) got first place for Dieter Shülter who built a Sikorski CH-53 that must be seen to be believed.



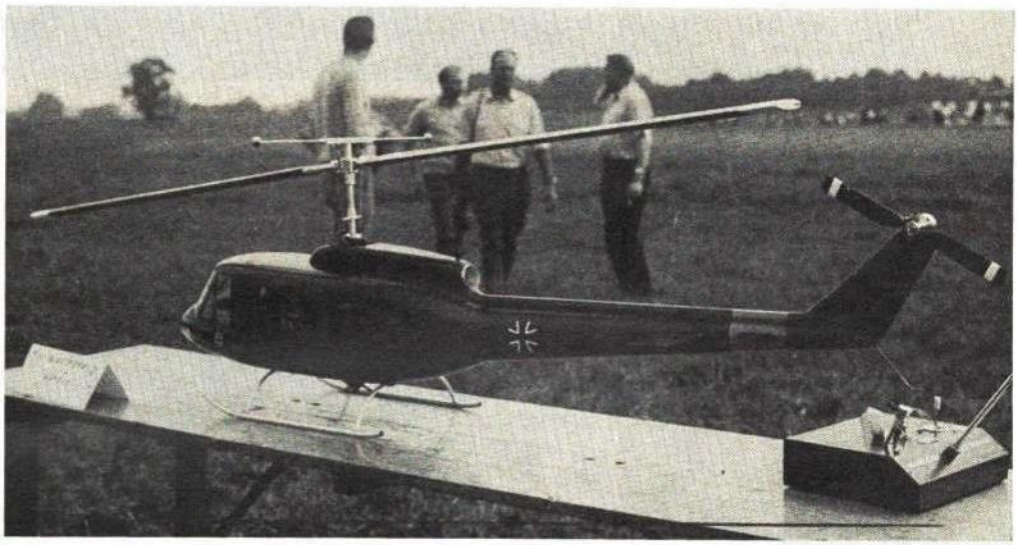
Willy Rolf uses transversly positioned engine, driven rotor, anti-torque control, and pitch action by CG shift. No provision for left-right control, so it only will be flyable under most ideal conditions. However, rotors are balanced for self-stability.

world international scene

Photos by Flug Magazine and the author.

This is a well-designed and built gyrocopter, but not flown because there was no event for it — perhaps there should be next year. Design by H. Glafey, has Supertigre 40, nicely shaped body, teetering and balanced rotor assembly, and rudder control.

A remarkable and way-out torque reaction 'copter with engine-driving lower blades and fuel tank, and torque turning upper blades. Fixed throttle and collective pitch on both rotors! Two engines geared to same shaft are balanced together. By Stehr/Dortmund. Wonder how you start the engine?

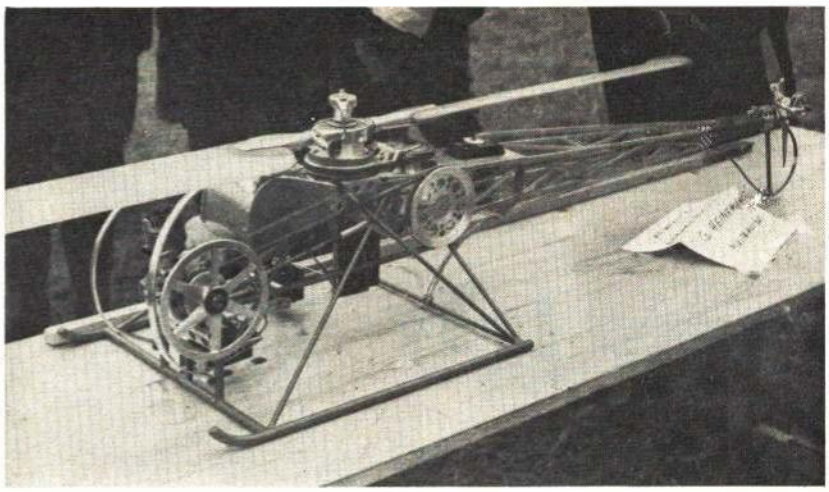


This UHD 1 scale model is an attempt to copy the rotor and control system of the real 'copter. Rotors are auto-stabilized, driven, have full control. Tail rotor also controlled. Did not fly successfully. Although designs may be flyable, pilot and control-system limitations may be the biggest 'copter problem.

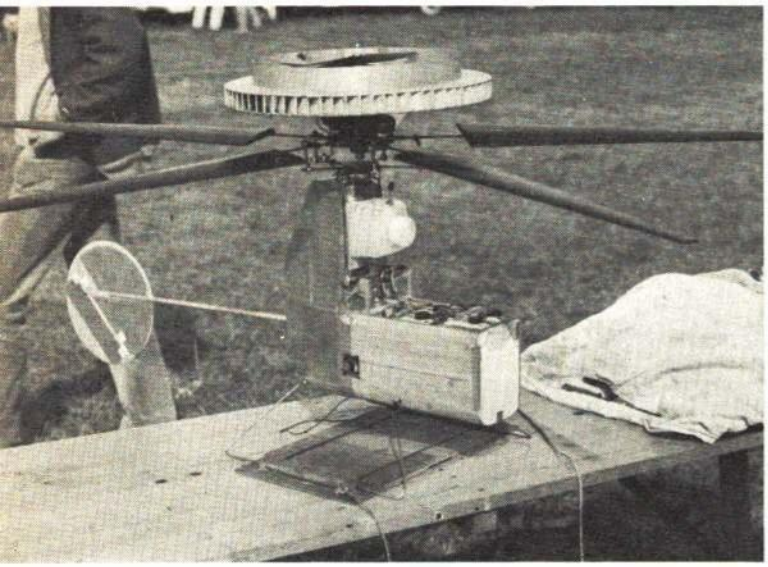
His design was a semi-scale job of the U. S. Marine Corps "Jolly Green Giant." Dieter spent four years of concentrated work to produce this 46" beauty. R/C was via the Simprop Digi-7, power by a Supertigre 60. What really shook me up was that his 9¾-lb. monster has over 11¾ lbs. of lift. A 15:1 gear box turns his scale rotors at 800 rpm for the main, and 3000 for the anti-torque rotor.

Everyone cheered as he collected over $500 in prize money, and 30 hrs. free instruction in a people-size helicopter. Dieter also received a special prize, an 18" bronze bust of John F. Kennedy and, for a fraction of a second, things grew solemn. Then Dieter smiled from ear to ear. The crowd went wild with applause.

After comparison of the designs I saw, four problems stand out as the reasons these models didn't fly. Cyclic pitch was almost non-existent. Rotor blades were too thick (some as much as ¾"). Receiver interference caused by static electricity generated by movement of the rotor blades, and the problem of too fast a model, and too slow pilot. If we can't solve the last problem, model helicopter flying might be restricted to those of us with two heads, five hands and good nerves.

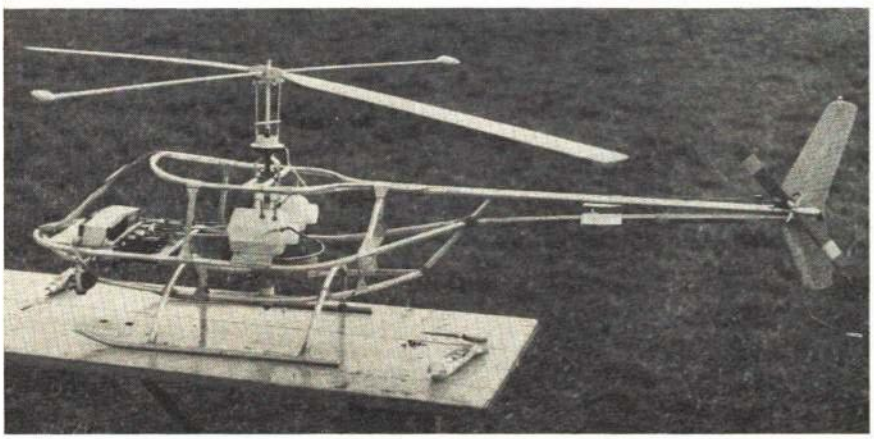


This belt-drive system 'copter had troubles with belts resonating and coming off the pulleys, so no real flight attempt was made. Its workmanship was the finest seen. Design is workable, has engine speed, clutch, collective pitch, anti-torque tail rotor, but no cyclic control. Design is by Heinemann, Supertigre-60 powered. Has clever use of cooling fan to oppose torque, in addition to tail rotor. Blades on several 'copters were just too thick, as on this one. Thick blades consume too much available power.



Vell, you zee, mein friend, if der mass equals angular velocity, unf if die wind ist gayen in das roundger spinnen . . . Would you believe, this is a workable design? Shroud around engine's propeller increases torque reaction. Controls appear to be collective, cyclic, with rudder and fixed engine speed. Design by Hultsch.

Although crude, this model has all normal helicopter controls, cyclic, collective, directional, and throttle. It did not fly at meet, but has flown before. Hans Knaf found he had too much power, so collected castor-oil-rich exhaust for lubrication for the gear box. Swiveling, teetering and self-stabilizing rotor.



Fascinating torque-reaction 'copter somehow transfers fuel to rotating engine from fixed tanks. Tail rotor is driven, fore-and-aft control by CG shift through rotor-tilting, and collective pitch. By G. Stoerig. Aluminum-tube frame.

Only three of the designs I saw could really be called true helicopters. The other designs were close except the motor was not in a fixed position. That means, if a large pusher prop is turning one direction and facing down, the natural torque causes the engine and its attached rotor shaft to turn in the other direction. Not a true "chopper" to be sure, but it sure solves the problem of too much torque.

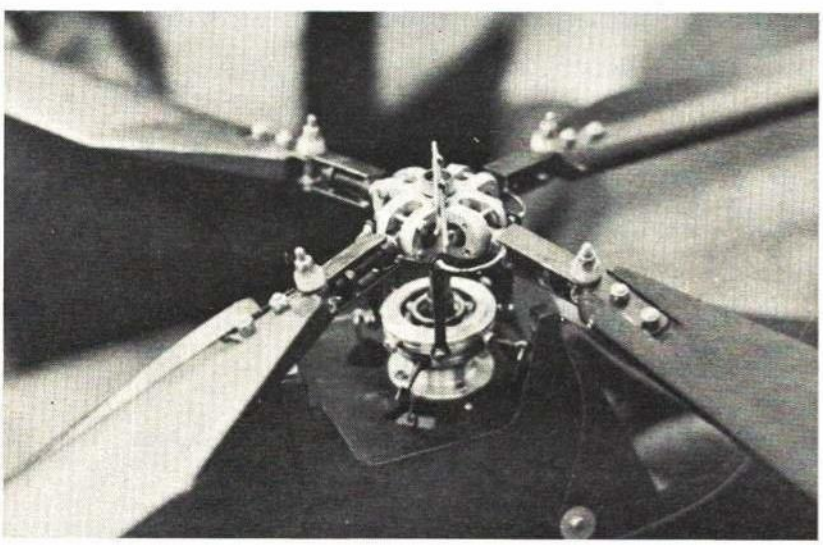
I was constantly asked by reporters from many countries and officials of the meet, "Where were American competitors?"

If you are getting tired of the lack of challenge offered by the normal run-of-the mill model (no angry letters please), let me know if you're interested. I could also use info on new ideas to tell my German friends.

I believe this is one of the last big challenges in modeling. Without stepping on anyone's toes, I'd like to know how many of you feel as much satisfaction as did Dieter Shülter. **By Jack L. Schlecht**

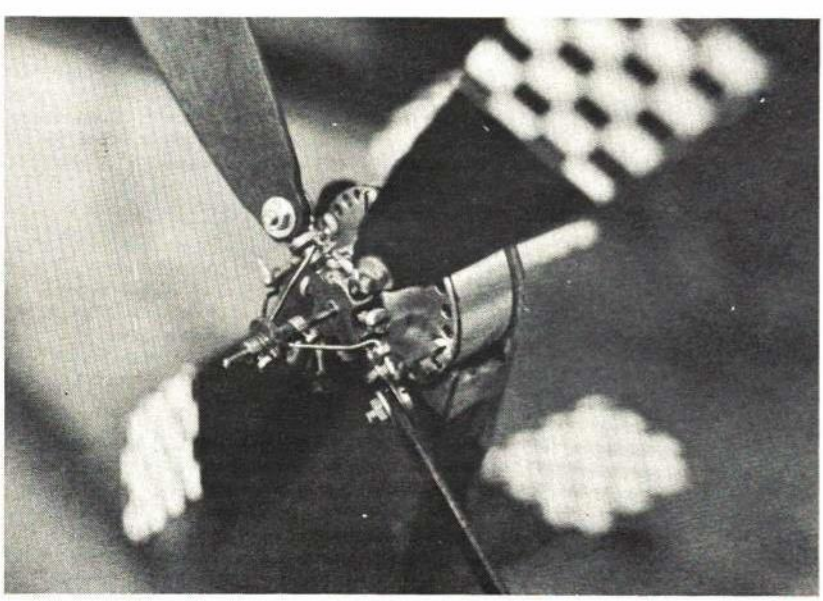
This is scale Sikorsky S58 by Dieter Schluter which won 500 marks for best flight, straight up — and down! It has fully controlled rotor and anti-torque tail rotor. Powered by Supertigre 60 with worm drive to main rotor.

Here is the one and only successful flight! It went up and down successfully under adequate control. Showed that model design is only half the effort.

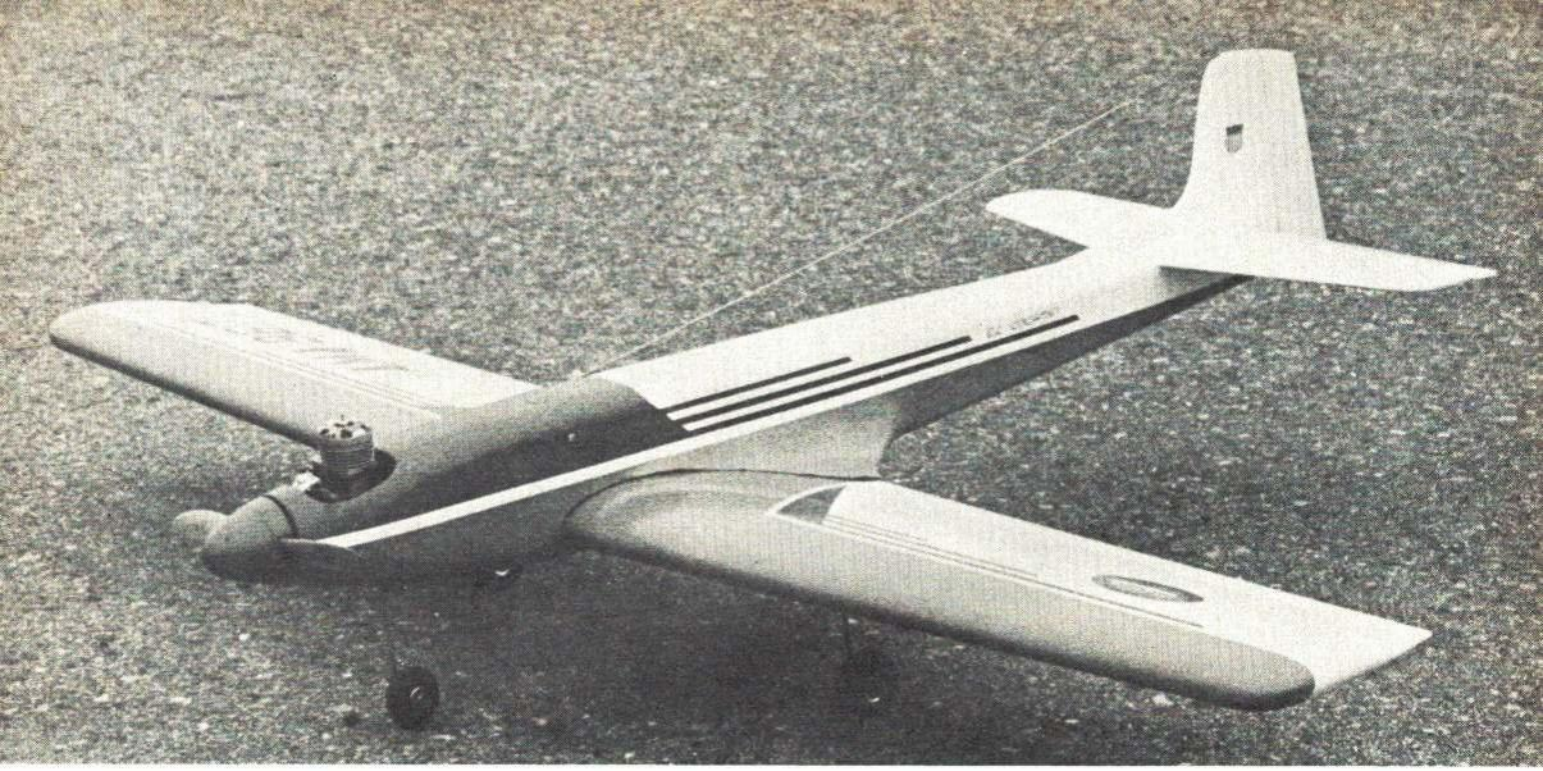


Most of the parts in the rotor head of the successful 'copter were handmade, carefully assembled by brazing, soldering, and bolting. Rotor blades can flap, swivel. Controlled in pitch collectively and cyclicly. Lots of work there!

Engine installation shows worm drive to rotor and direct to tail rotor. All-up weight is 9½ lbs. but lift is 11¾ to 12 lbs. Supertigre 60, proportional radio. Engine-to-rotor ratio is 15 to 1. Main rotor turns 800 rpm, tail rotor 3000 rpm. Tail wheel is realistically full-swiveling. Considering that a real helicopter requires constant operation of both hands, arms and feet, how does one fly a model with just two hands on transmitter control sticks?



The tail rotor is meticulously designed four-blade unit. At 3000 rpm the stresses on balsa blades and the fittings are great, but when properly balanced and tracked, they will give serviceable operation. No airfoil as such is used. Function is to oppose torque of driven main rotor, and for rudder steerage in flight.



Veterans will quickly see traces of the old Smog Hog and Astro Hog in El Cochino — which means "biggest hog of all."

El cochino

A Class C stunter with simple, functional lines uses the best ideas from R/C designs of the last several years.

BOB MORSE

EL COCHINO has been around for quite some time now, the first ship being built in 1963. We enjoyed it then and we're still having a lot of fun with its successors. Despite our "Charley Fumblefingers" approach to contest flying, old El Cochino has kept us pretty well up in standings in the West Coast contests. Our biggest contest showing was at a recent West Coast R/C Champ's meet when we were in third place after the first day's competition. We took care of this by "fine tuning" our engine before the next day's flying and promptly finished in fifth place.

Perhaps we had better get into the design philosophy of the ship and try to impress you all with painstaking effort we've put into shaking our slipstick and rattling our Reynolds' numbers in coming up with this arrangement.

We would like to, but we can't. The truth of the matter is that we've swiped every idea we've seen in the past that appeared to have any merit! You old-timers can see some Smog Hog, some Astro Hog and even a trace or two of Bob Palmers' old G-String in El Cochino. Those of you who understand Spanish will see the reason for our choice of a name (for those of you who don't, El Cochino translated is "the biggest hog of all").

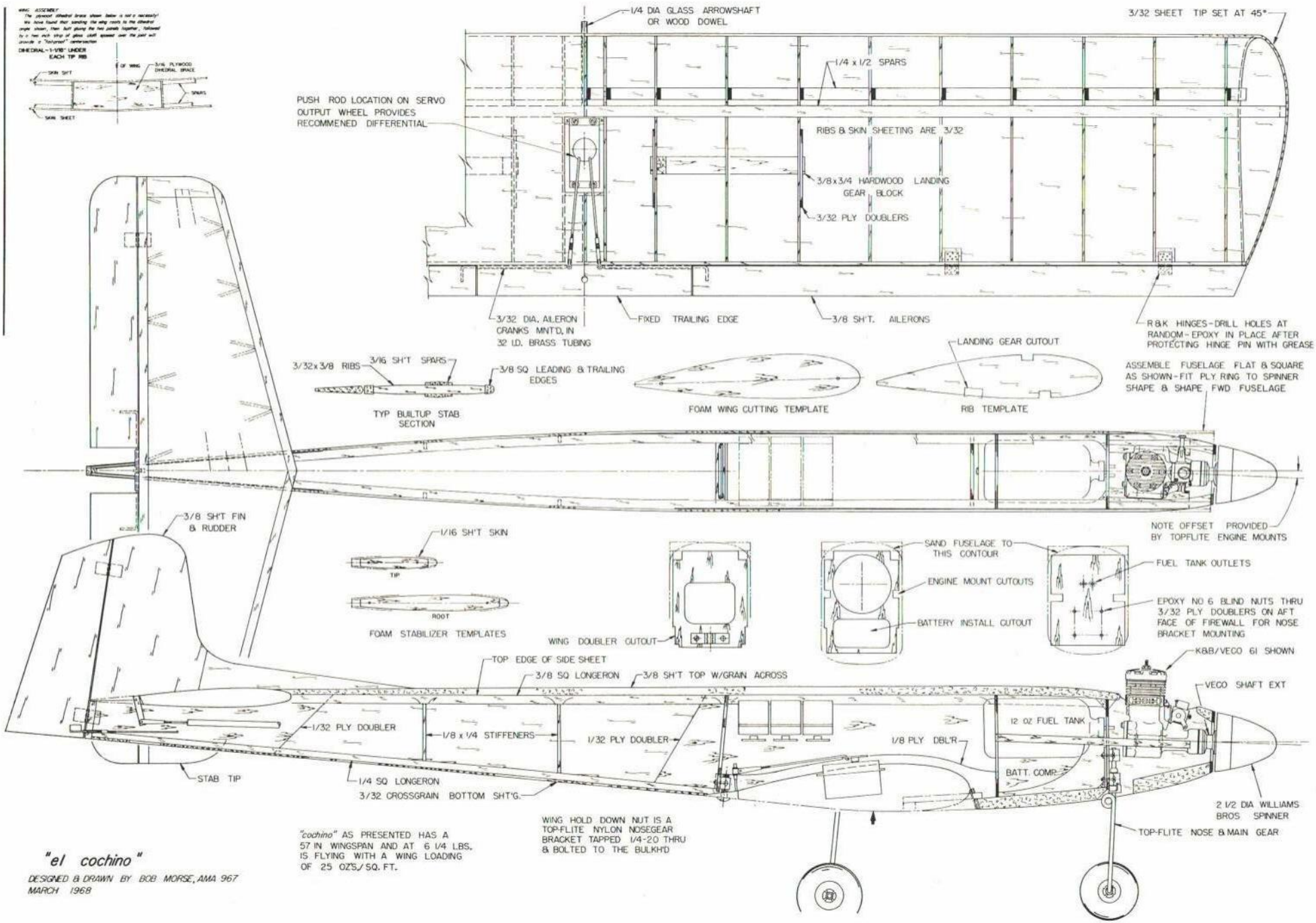
We've streamlined the ship some, reshaped it some to fit the changing radio equipment, inched a "moment" around here and there, but, basically, it is still a fundamental arrangement.

There have been about 20 or so "Cochinos" built in our area, and in all probability, no two of them ever initially flew the same. Of the eight ships I've had in the past five years, a few of them have grooved right off the board and the rest have required some degree of adjusting to get the good flights in. We've seen some ships that are flying the Lazy-J pattern beautifully but go all haywire when trying to do some AMA pattern work. The two most promising villains in this case are the CG and the angle of decalage (that's a long phrase that means the angle between the mean chord lines of the stabilizer and wing). So, if you would like some "on the wire" maneuvers, don't be afraid to fiddle a little with these!

We begin our adjusting with the wing incidence, trying to get it down almost to

Continued on page 65

The designer, shown here with his latest of eight Cochino's — there are 20 in his area — outlines a trimming and adjustment technique for "on-the-wire" maneuvers.



"cochino" AS PRESENTED HAS A 57 IN WINGSPAN AND AT 6 1/4 LBS. IS FLYING WITH A WING LOADING OF 25 OZ'S./ SQ. FT.

"el cochino"

DESIGNED & DRAWN BY BOB MORSE, AMA 967
MARCH 1968

So Sonny Soloed!

What do you do when your model-building boy asks, "Dad, can I borrow your Piper Cub today?"

HANK CLARK

MY boy turned 16 yesterday, and he soloed the day after, of course. He would have soloed on the same day if he'd had his way, and his medical, but that slip of paper wasn't available until Monday, when the Doc opened. Too, he had to go to school on Monday, so it wasn't till after three, that I scooped him up at the high-school steps, and drove him lickety split down to the seaplane base for the final test.

The written. For a week that bugged him. He looked up every reg and fact pertaining to solo flight in a plane, alone, with nobody but himself aboard. While junior waited for the written, I pushed the Piper Cub down the wet ramp into the water, and took off to get the overworked little Piper warmed up to the ordeal ahead.

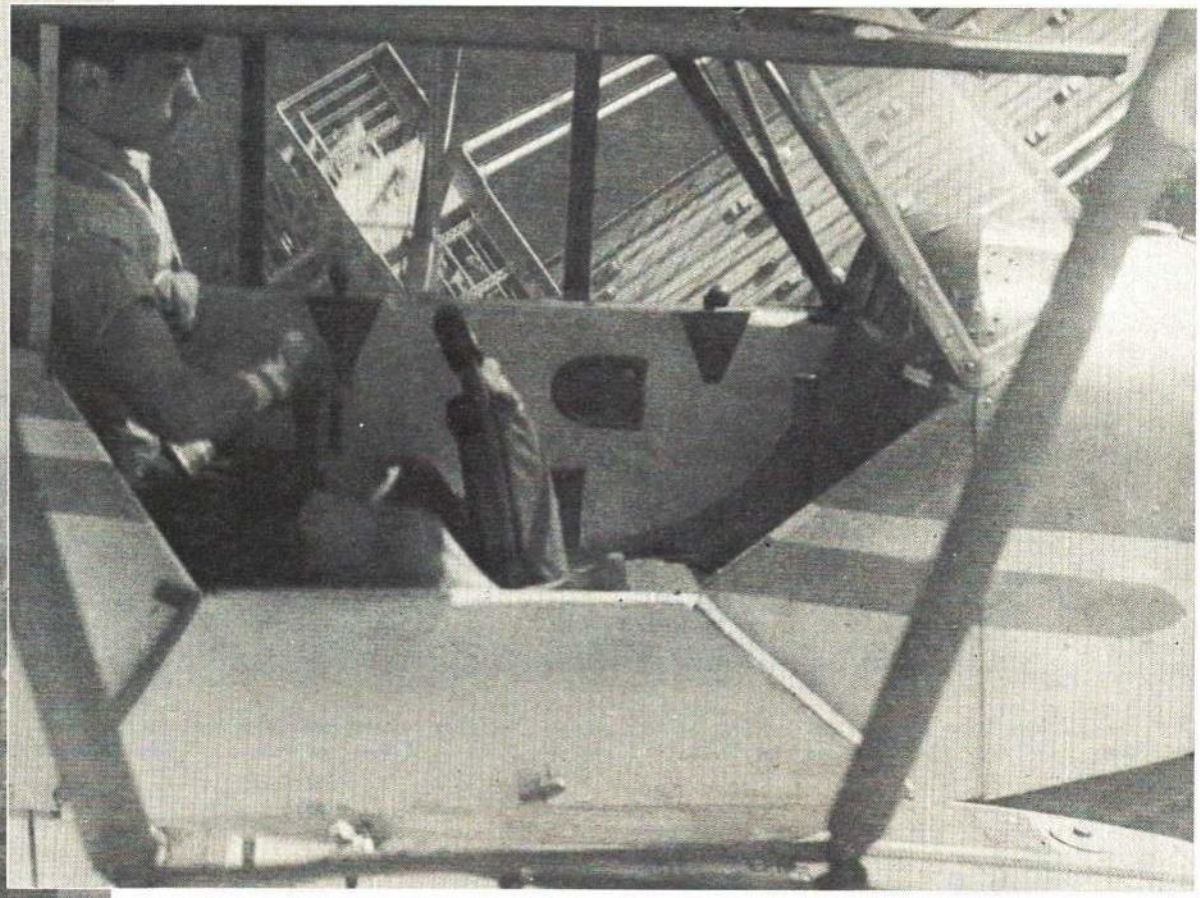
It had carried the boy and me aloft for 450 of my own hours, and 130 of his. Get that; 130 for a 16-year-old! Pretty great, and it had us all convinced that the solo would be only a matter of emptying the front seat of me. Which is true. Because that kid could do everything in the book, and then some, and leave me dizzy with wing-overs and falling-leafs and such, which was too much at times for me and my 53 years to take. But he never overstressed the Cub that I know of.

He handled it like a real pro, even though its cables needed tightening, trim crank was cranky, front right cylinder was not all there, and assorted other little ills plagued the poor Piper. Three years of this gyrating about the rivers, lakes and bays of the New York-New Jersey area, over and around all the big jump jets, and mingling in the area reputed to be dense with air traffic. I became less and less a fixture, and sonny became more and more important.

The first months I let him follow through, as they say. He was 13 then. Then my grip of the stick became less, and often you could pass a pencil between the stick and my skin. Eventually my hands wound up on my lap, mainly for lack of hand-holds in the none-too-plush Piper inner walls. Always the feet were near the pedals, and the left hand reposed near the throttle. Even those rest areas were soon abandoned, and after one year, and about 40 hours, I might as well have been absent.

I no longer paid attention to his takeoffs or landings. I could look out the windows and notice things I never saw before. One thing I never stopped doing — as I will forever continue to do — was to look for other aircraft. Luckily the boy does so well now, that it's natural for him to fly with his subconscious, and look about him with his conscious mind. An ideal position for all pilots, and I'm glad he's reached that point. How I would suffer if he had gone aloft alone after only eight hours dual, like a lot of poor fish have to do. Only much time at the controls is going to wake them to being seen, rather than to ball all over the sky enjoying themselves.

No, this lad soloed after 130 hours, and that relieves me greatly to know how much



In a steep bank over George Washington bridge, young Clark has his photo taken by wing-mounted camera. Older Cubs solo-flown from rear.

Left: Sailing high over the New Jersey Palisades, Hank's pride and joy is keeping a watch for traffic. Because of age, lad had 130 pre-solo hours!

he knows, and all I'm left with now is the fervent hope that he looks around before each and every turn or maneuver, because there is now only one pair of eyes up there with him. He's a solo flyer now, and even though we'll still fly many times with each other yet, I can't help feeling separated.

Not until the evening after his solo, did I lay awake wondering what to do with myself now. While I'm at the base, I mean. I have to drive the boy there because he's only 16, and can't get a driver's license. Those thing are too dangerous for kids!

For all he cares now I could be at home on my drawing board where I do free-lance art work. That was a thought as I lay that post-solo eve, that maybe he'll be going to the base by bus soon and leave me behind altogether, and then I can rush out the door when I hear an airplane over our house. This time, instead of some guy up there in a Cessna, it will be my own son up there in my own Cub. Only thoughts as I lie awake, but they are coming true, sure as shooting.

Though it's only two days ago he soloed, I feel we are walking separate paths. Poor wife has to trod both paths. There is one sure solution to save the whole picture of trio trips, and that is a Tri-pacer. On floats. And hang the cost. How safe Liz will feel then to have a pilot and co-pilot — never mind which is which — up front and whisking her along on all our wanderings where we boys previously went dual. She missed out on a lot of exploring as we flew to all compass points and went into waterways.

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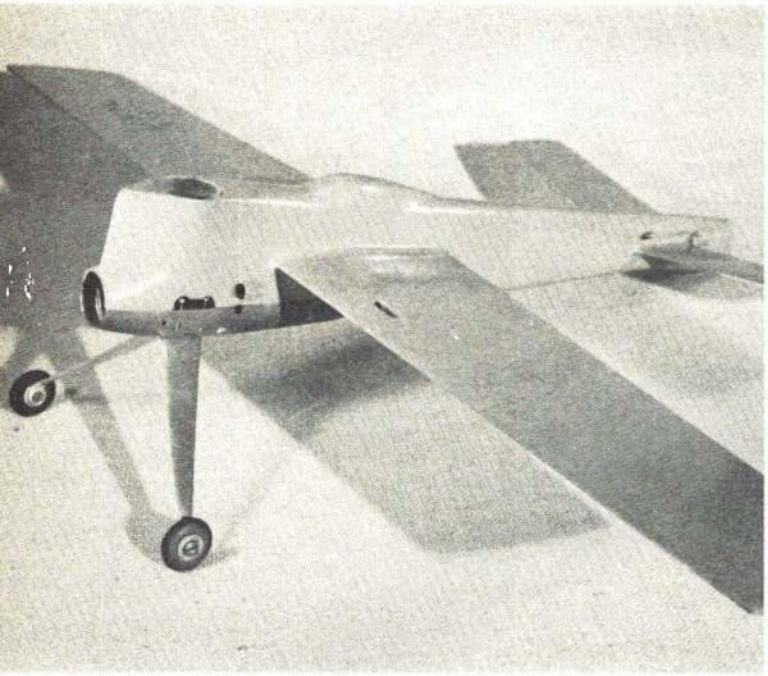
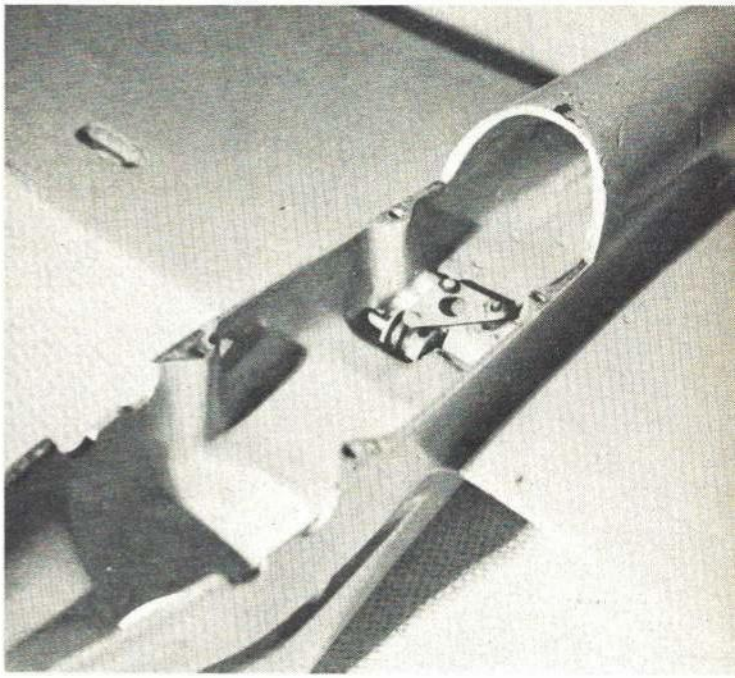
Dad and son share exuberance of boy's solo in family float plane. Each had built a flyable scale model of the well-worn Cub. Hank is a regular A.A.M. draftsman.



Good finish is imperative. Emanon has two coats of clear, one of Hobbypoxy Stuff, and two of sprayed-on Hobbypoxy orange.



Entire interior, as well as outside of nose, is finished with two layers of fiberglass resin, one layer light cloth.

Emanon

Holder of the Class B Proto Speed record at 151.20 mph, this light-weight design is a many-times contest winner.

Jim Delaney & Tom Lauermann
as told by Pat Flinn

THE Emanon holds the AMA Class-B Proto Speed record of 151.20 mph. It's name is "No Name" spelled backwards. The design is the culmination of a series of proto-speed airplanes developed by the speed team of Tom Lauermann and Jim Delaney, both from Chicago, Ill. The design dates back to the Fox .29X days. The ship first broke the record at the 1965 King Orange Internationals with a proto speed timing of 143 mph.

A proto speed ship is timed from the instant of release until the completion of the 14th lap, one mile. Contrasted to Proto a Class-B pure speed plane becomes airborne and gets a flying start for a much shorter, seven laps or ½-mile, clocking. Proto may be compared to an auto drag racer, except that the strip is four times as long. "B" speed is comparable to a Bonneville Salt Flats flying mile, except that it is shorter, only a half mile. Because of the increased distance, acceleration is a factor. The engine must peak immediately as soon as it hits the air. Proto speed is considered to be one of the toughest of all of the speed events.

As in any speed event, an excellent engine is of utmost importance. In Proto, however, the airplane itself plays a proportionally greater role than in the pure speed events. I believe that Howard Weaver and I adequately proved this point when we used our copy of the design, powered by one of John Barhardt's rat-race engines and fuel, to take second at the 1968 Olathe Nationals.

Another advantage, or disadvantage, depending upon your point of view, is the apparent unsuitability of the newest development in speed flying, the tuned exhaust pipe. The pipes presently being used give an impressive boost in the air but require a number of laps before the required resonant rpm is reached and they "come in." Their increase in weight also presents a serious problem. Anything that harms the first lap is disaster in a Proto run, for a poor first lap equals a poor Proto time, always.

In short, this airplane fills the requirements of a good Proto ship, i.e. dependable takeoff characteristics, lightweight for good acceleration, and stable flying habits coupled with a clean design for maximum air speed.

However, this is definitely not a beginner's ship. It is strictly built for high performance at record or near record speeds. It is rugged enough to take any of the loads imposed upon it in normal flying, but one goof and you start over. Build heavy and the performance of any Proto drops off drastically.

Good craftsmanship is important throughout construction. Accurate alignment of the surfaces will go a long way in determining the ultimate performance of any airplane.

Careful wood selection is important, i.e., just enough strength to do the job and no more. This will do much to hold down the maximum ready-to-fly weight to an ideal figure of 21 to 23 oz. Since the largest volume of wood is in the wing, contest balsa was used. The first step in constructing the wing is gluing the spars in place with white glue. White glue should be used for maximum strength wherever a hardwood joint is involved. The front and back halves of the wing are then grooved for the Mono-line stem. This can be done by hand with a small X-acto gouge, a Dremel tool or by using a table saw. A Mono-line jet unit was used on the original. This puts the $\frac{1}{16}$" diameter music-wire pushrod on top of the wing where it cannot rub on the bladder and possibly break it. There is ¼" sweep-forward in the Mono-line installation. This cuts down the outward yaw angle and permits a slightly higher airspeed due to the fact that the model is more streamlined as the slipstream is not hitting the model obliquely. Jim says that this model flies very lightly, yet is stable, on the line. Caution must be exercised in increasing this angle, however, or you will run into torque-roll problems on takeoff.

After the Mono-line unit is in place, the front of the wing is glued in place with a wing-tip guide made from a flattened piece of $\frac{3}{16}$" diameter brass tubing. Smooth, free-working controls are imperative as any stickiness or binds at 150-plus mph means disaster.

A good tool to rough-shape the wing to its symmetrical airfoil is a small razor plane. A line made with a ballpoint pen, halfway from the top and bottom on the edges of the ⅜" thick wing blank, is an aid in planing a uniform airfoil. A slight amount of washout at tips is desirable.

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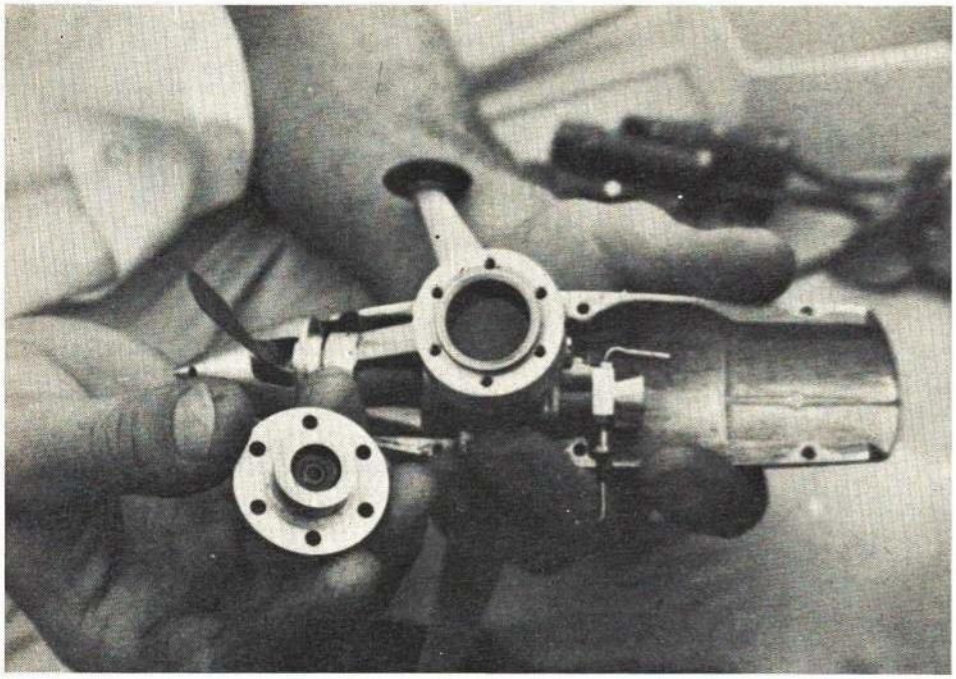
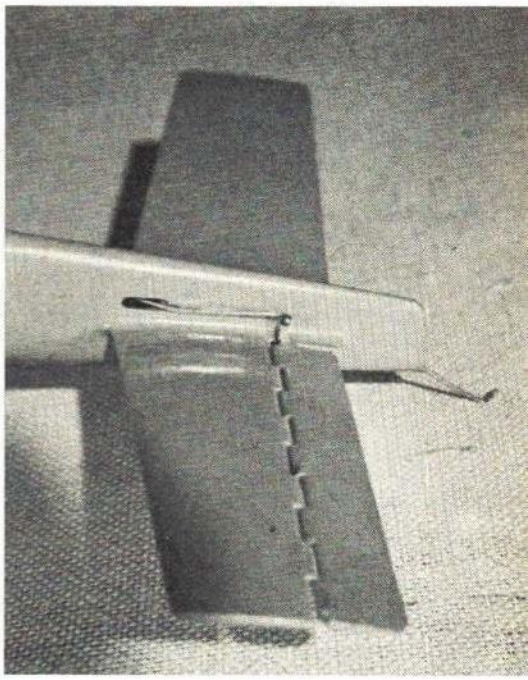
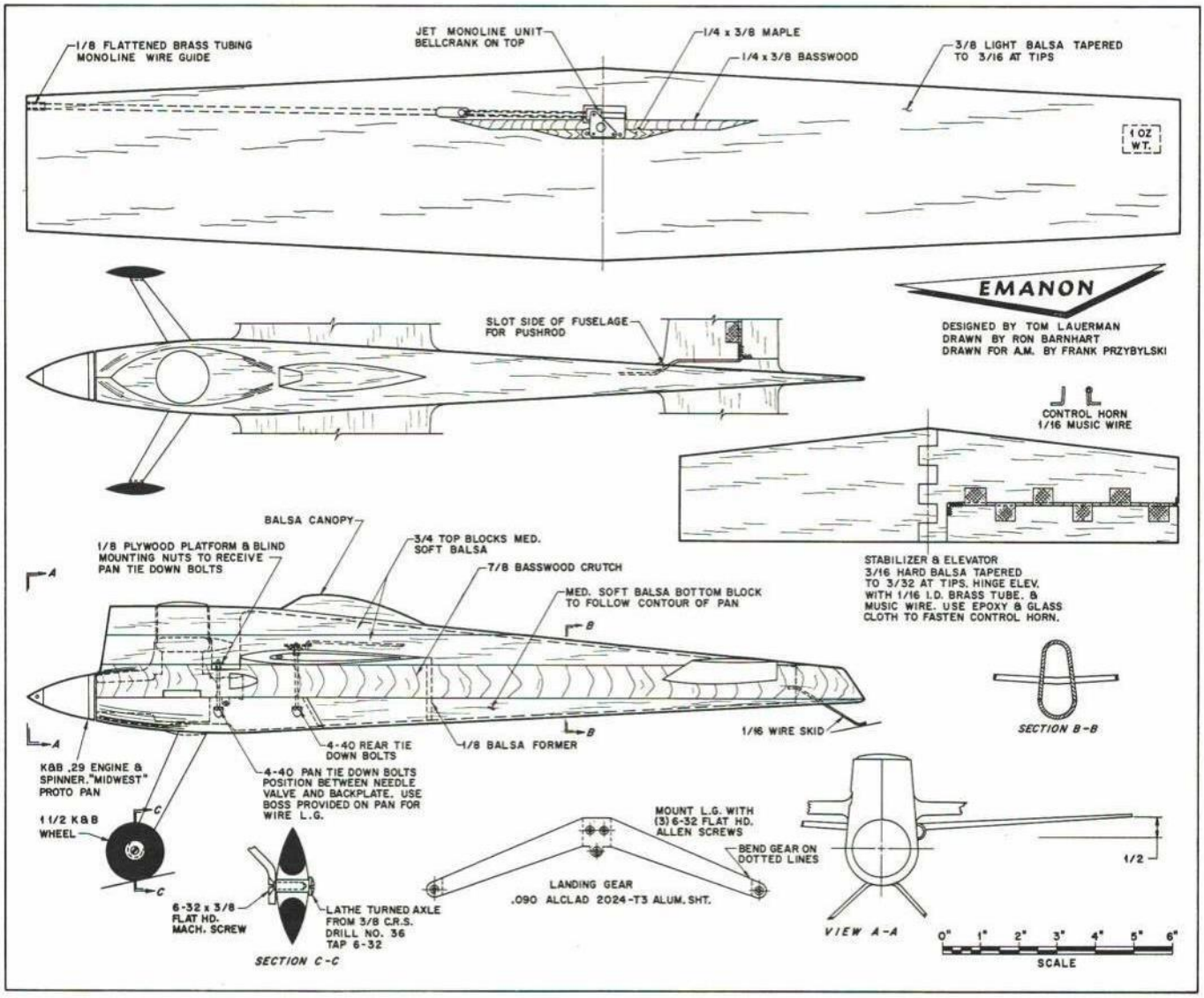


The record-breaking Supertigre 29 mounted on cut-down Harter half-pan. Crutch is basswood. Article describes modifications made to engine for perfect mechanical setup.



Hinging of elevator to stab consists of short pieces 1/16" I.D. brass tubing.



FULL SIZE PLANS AVAILABLE — SEE PAGE 60

SUNBURST

Class-4 altitude rocket uses standard parts for minimum vehicle with maximum power.

TOMM V. ALDRIDGE

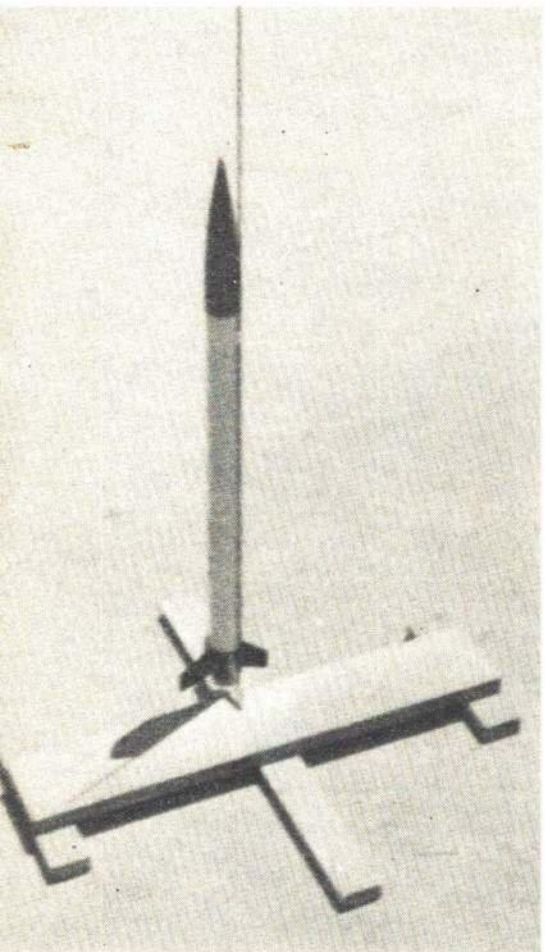
THE Sunburst is not a rocket for the beginner. However, for the sake of model airplane readers and other newcomers, the text goes into details which ordinarily would be given for beginners.

While appearing very simple, its high-performance characteristics make a precision construction job mandatory. The Sunburst is designed to use a maximum of power with a minimum of vehicle. It has been test-flown many times to check out details of construction and especially the very critical relationship between CG (center of gravity) and CP (center of pressure).

Since the Sunburst is designed to fly in the high subsonic and transonic speed ranges, some design compromises were made. A four-fin arrangement was used because the aerodynamic force coefficient is higher than on a three-fin arrangement; this makes it possible to use smaller, lighter and stronger fins. On a rocket traveling at 500 mph plus this is a very important feature. Other details such as a small-diameter launch lug, high-performance nose shape, and the very potent F 18-8 propulsion system make this a very competitive rocket.

The total length of the Sunburst is 23.25″. When loaded with the Flight Systems F 18-8 engine for which it was designed, the CG is 17″ aft of the forward end of the nose cone. The CG (center of gravity) was found by balancing the loaded rocket on a knife edge. In order to have a stable rocket the CG must always be forward of the CP (center of pressure).

The CP on the Sunburst is 19.1″ aft of the forward end of the nose cone. This is less than two calibers (two body diameters)



One important feature is use of four fins rather than normal three larger ones.

Top of page: Author-designer prepares Sunburst for launching. Although performance is highly competitive, design is simple. Above: Dad and author before blast-off.

behind the CG. This is enough to give the required stability. The CP is a point on the rocket body where the wind pressure from the side is balanced or equal. That is, pressure of the wind is the same above this point as it is below this point. This is an over simplification but will do for our purposes here.

For a full discussion we suggest Centuri's TIR-30, *Stability of a Model Rocket In Flight*, or *Basic Rocket Aerodynamic Stability* by Luther W. Gurkin for MAR Technical Service, or Centuri's TIR-33, *Calculating the Center of Pressure of a Model Rocket*. This latter is also available from NASA as the *Barrowman Report*.

Construction of the Sunburst is simple and straight forward. The parts list is as follows: (It is strongly recommended that parts be purchased ready-made because of accuracy of dimension and strength.

1 — 1.22″ outside-diameter (1.15″ inside dia.) body tube, 17″ long (Centuri #LT 115-B)
1 — 5.75″ balsa nose cone (Centuri #BC 115-B)
1 — 1.15″ outside-diameter paper engine stop (Centuri #FM-115)
2 — 5/36 x 1/2 nylon launch lugs (Centuri #LL-1)
1 — screw-eye (eye should be 1/4 to 3/8)
1 — 6″ length .049 braided steel cable
1 — 36″ length of 3/8″ elastic sewing tape (from the local 5 & 10) for shock cord
1 — medium-size snap swivel (from your fishing kit or nearby sporting goods store)
1 — 18″ silk parachute (construction details follow)
4 fins cut from 6 x 12 x 1/16 plywood (SIG)
1 — Borden's Epoxy or White Glue (suggest Epoxy for engine stop).

Construction can begin at almost any point; however, the base of the vehicle is the body tube. Inasmuch as none of the commercially made tubes come in the 17″ length, it will be necessary to cut the tube to length. A very simple way to do this is to use the V-notch found on the front of a drawer of a bureau, dresser or kitchen cabinet. This V is formed where the front facing of the drawer is fitted to the drawer body. Measure a point 17″ from the end of the tube, lay the tube in the V and hold a pencil so the point touches the tube at the 17″ point. Rotate the tube slowly until a mark is made all the way around it 17″ from the end. Now, replace the pencil with an X-acto knife (preferably a straight cutting edge) using a gentle pressure as you rotate the tube several times to sever the tube.

Next, prepare the engine stop for mounting. The engine stop performs two functions. It is a thrust-ring for the engine and an anchor for the recovery system. Start by drilling a .0625″ hole .25″ from the end of the engine stop. Then thread through this hole about 2″ of the 6″ length of .049″ braided steel cable. Twist the cable around itself very tightly, cover with epoxy and wrap with thread. Make a similar loop in the free end. (See diagram.)

After the epoxy has dried, thread the 36″ elastic tape through the free loop. You should have two ends each 18″ long. Sew the tape together just in front of the free loop. On one 18″ end attach the snap swivel by pushing about one inch of the elastic tape through the ring at the end of the swivel and sew together. This is the part of the shock cord for attaching the nose cone. The other 18″ portion of the shock cord is for attaching the parachute. This will be explained later.

Now comes a very delicate operation that must be done swiftly and accurately the first time. This is the installation of the engine mount into the rocket tube. Equipment needed is an old brush (medium size water color brush or similar) and glue or epoxy, and an FSI F 18-8 engine or casing. Use epoxy if you feel very deft and sure of yourself. Otherwise stick to white glue. If you goof this one then you start over again. Mark the brush handle so that you can swab glue on a band between 5.75″ to 6.75″ up inside the tube, being sure to coat the tube wall thoroughly. Now, drop the shock cord into the tube so that it hangs toward the long end, insert the engine mount and use the F18-8 engine or old casing to push the mount into position. The engine should be marked to show when the lower end of the mounting ring is 5.75″ from the lower end of the body tube; .25″ of the motor should extend from the body tube. When the ring is in place, withdraw the engine quickly, otherwise you might find it glued in place.

It might seem that you have an abundance of fin material, however, it is better to have too much than too little. Using a piece of tag board or other stiff paper, draw and cut out a fin pattern. Lay this on the wood and draw the fin on the wood. Use the pattern for all four fins — *do not* use one fin to lay out another fin. Sand so that the top edge is rounded and taper to a point at the lower edge. The root edge (the

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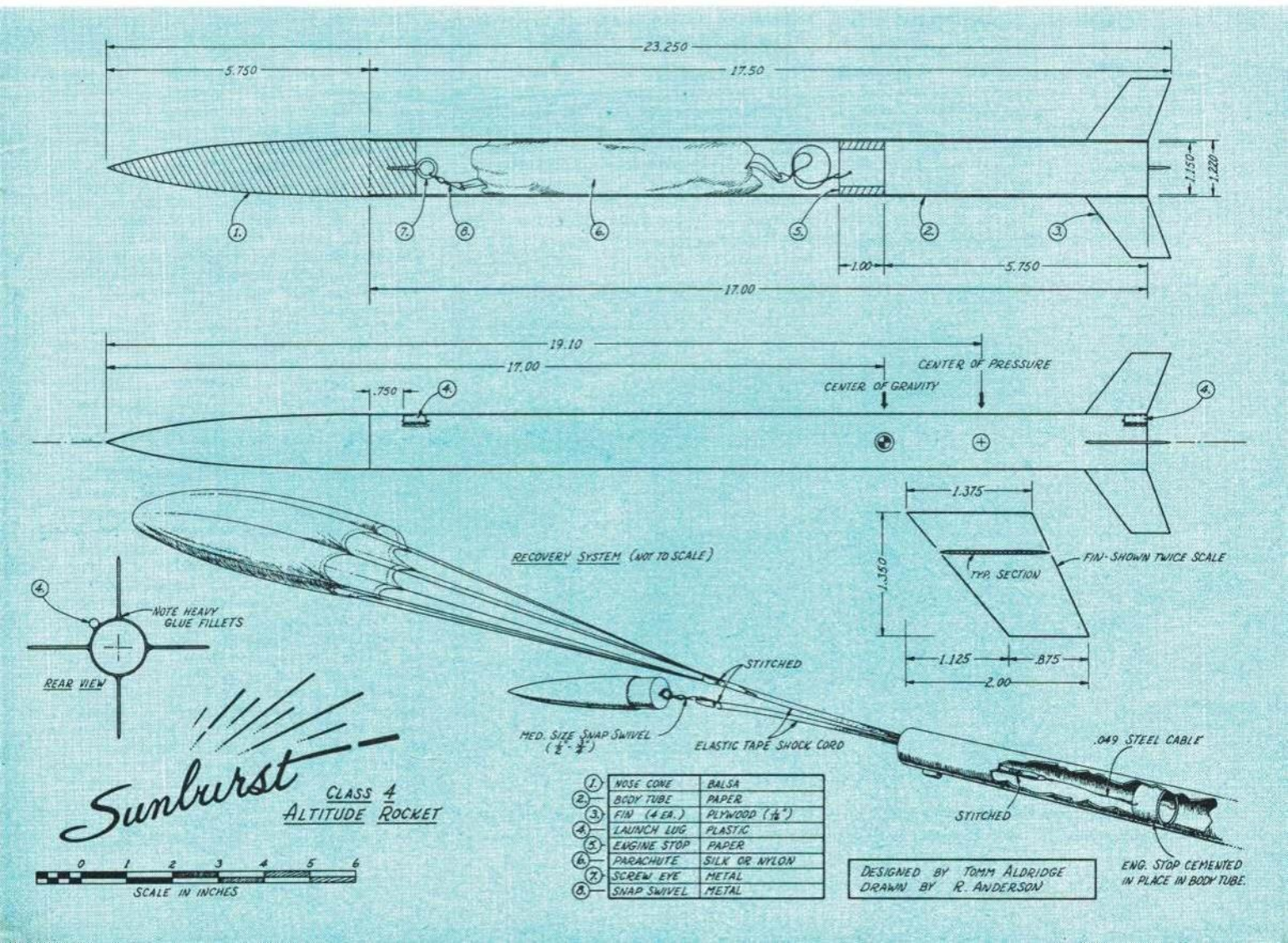
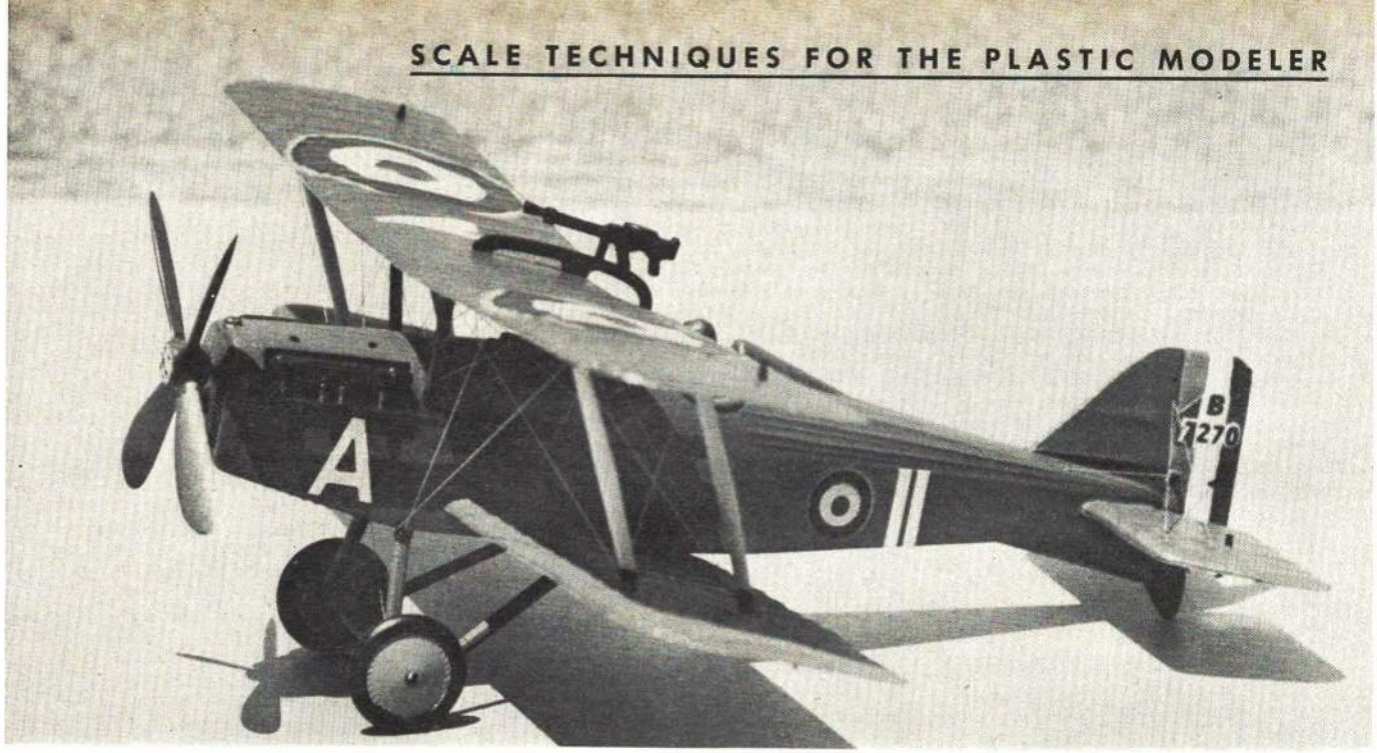




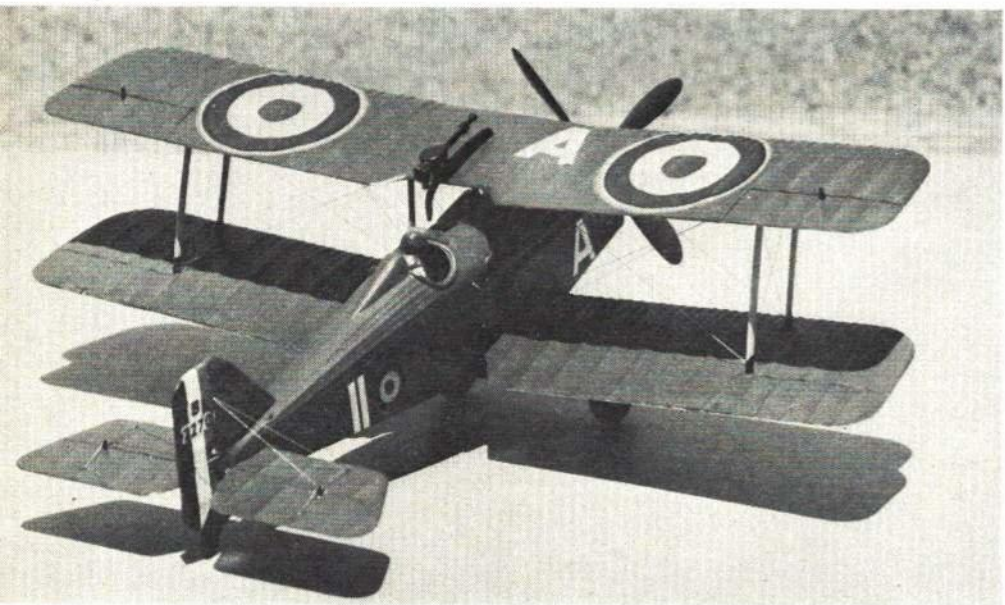
Falcon of the Air–the S.E.5a

This tough, powerful WW I English fighter had uncomplicated coloring and markings—some variety is possible.

JOHN N. TOWNSLEY

THE S.E. 5 series of aircraft was designed by H. P. Foland, J. Kenworthy, and Major F. W. Gordon of the Royal Aircraft Factory. The first prototype S.E. 5 carried Serial No. A-4561 — this type went to France on April 7, 1917 for service with the famous 56th Squadron. Major Blomfield, the O.C. of the 56th made a number of changes: the celluloid greenhouses which covered the cockpits were replaced with flat Triplex windscreens, the gravity tanks were moved from the top of the wing to a position inside the center section, and a few of the aircraft had faired headrests.

The basic difference between the S.E. 5 and the S.E. 5a was that the latter had a 200-hp Hispano-Suiza geared engine in place of the 150-hp engine and the aircraft also was fitted with all-steel undercarriage in place of the wooden undercarriage. The original undercarriage was very susceptible to breakage in anything other than a perfect landing.



The model featured this month is a 1918 series S.E. 5a from the 41st Squadron. Instead of the 150-hp engine of the S.E. 5, the 5a had geared 200-hp Hispano-Suiza.

The model featured in the article is a 1918 series S.E. 5a from the 41st Squadron. This Squadron received the S.E. 5a's as replacements for D.H. 5's in November 1917. The 41st operated largely over the Somme area and when the German offensive began in 1918, the Squadron was with the Third Army at Lealvillers. The Squadron markings from November 1917 until March of the following year consisted of two white vertical bars in front of and behind the cockade, but in 1918 this was changed to two white vertical bars aft of the cockade. The 41st Squadron markings may be used on your model, or those of other Squadrons, notably the 56th, which is given in following paragraphs.

Number 56 Squadron was the first squadron to be equipped with the original S.E. 5's and in June 1917, the first S.E. 5a's; many famous aces flew with the 56th. Capt. Albert Ball commanded "A" flight from April 1917 when it arrived on Western Front until his death during the following May; Capt. Ball's S.E. 5 had a large windscreen, no headrest, and was serially numbered A-8907. The serial number appeared in white on the fin with the letter in line with the figure. Capt. "Jimmy" McCudden commanded "B" flight of the Squadron from August 1917 until March 1918 when he returned to England. The serial number on McCudden's aircraft was A-4891 and carried the numeral "6" in white just aft of the cockade and above the starboard wing. The "6" beneath the lower part of the wing was painted black. A-4891 had no headrest, but sported a large red spinner from a captured L.V.G. aircraft. The Squadron markings current before March 1918 were used and consisted of an 18-inch wide white band painted around the rear fuselage just ahead of the tailplane. In March 1918 these markings were replaced by two sloping white bars with the tops innermost painted just ahead

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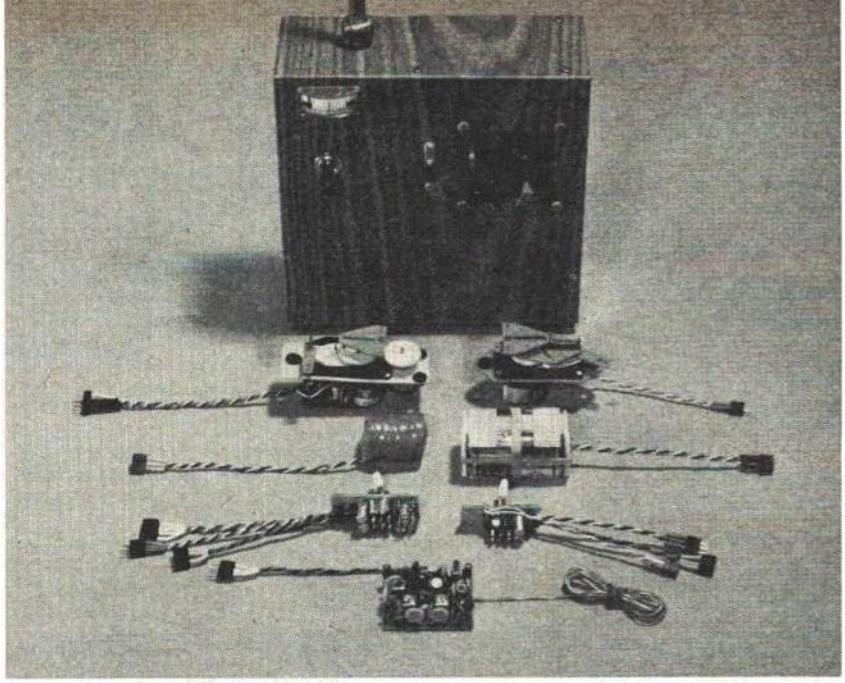
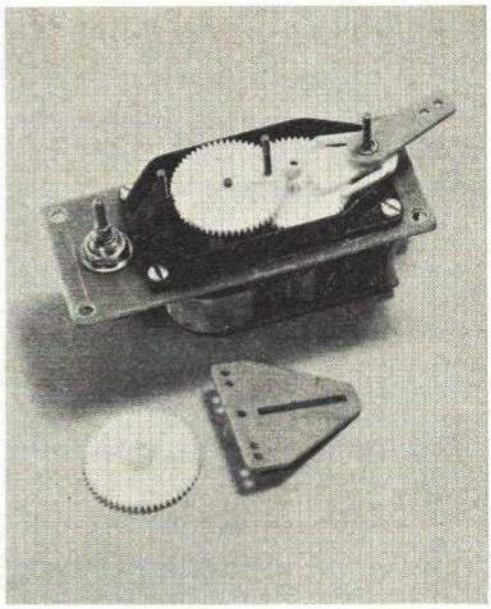


Two versions of Versapro single-servo system are shown with Versapulse transmitter. You can start with very inexpensive pulsing servo set on right, and later modify it to lighter, more-powerful feedback system using 250-mah batteries.



Go-around feedback Rand servo gives smooth non-wiggling action and throttle control. Triangle and gear removed to show filed-down shaft.

PART I: AMPLIFIER FOR RAND LR-3 AND SINGLE-SERVO SWITCHER/FILTER.

VERSAPRO SS-1

Versatile single-channel system for pulse and feedback operation with Rand servos is light, compact, expandable.

FRED M. MARKS

IT is often said that the presentation of material for the experimenter, not including kits, has been lacking in model publications. The passing of the popular Grid Leaks from the scene and the tremendous rise of digital equipment has largely been responsible. The usual question from many who are more interested in flying than in learning how equipment works is: "How can scratch-building or experimentation possibly compete with modestly priced new equipment or kit systems?" For the person who is not interested in tinkering and who has not invested in the simpler pulse proportional systems, this may be true. But there is no more pleasant way of learning the basics of modern electronics than through single-channel pulse systems.

There has been a number of good, simple pulse-proportional systems marketed in recent years, ranging from rudder-only to electronically decoded proportional systems. Many have used the Rand servo, a pulse-width/pulse-rate transmitter, and a straightforward relayless receiver. During the coming issues of this magazine, a series of developments designed to permit maximum use of existing or inexpensive new equipment will be presented.

The first, presented here, will be the basic conversion of the Rand HR-2 or LR-3 servo to an analog proportional servo, plus a filter network which permits feedback proportional rudder and positionable throttle. Next, will be an advanced pulse-proportional transmitter capable of operating in

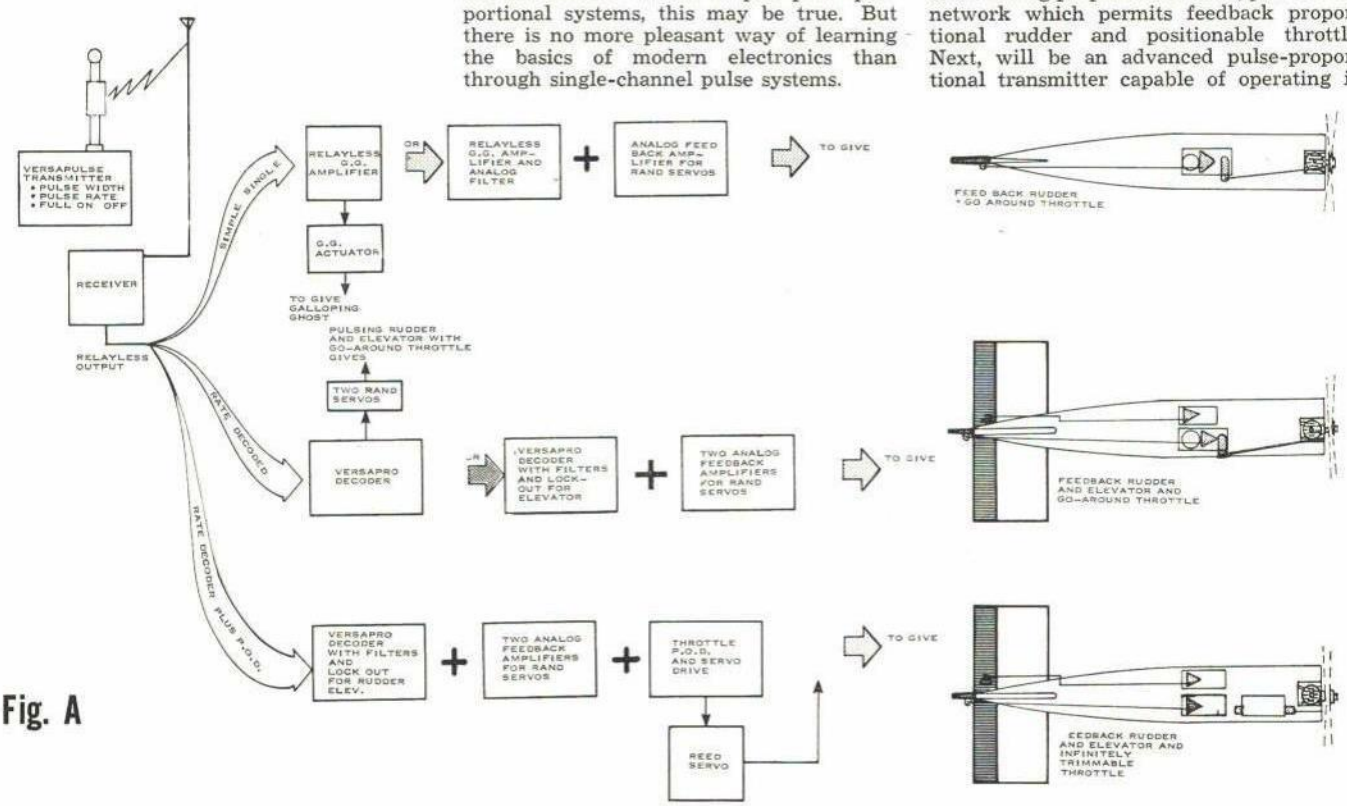


Fig. A

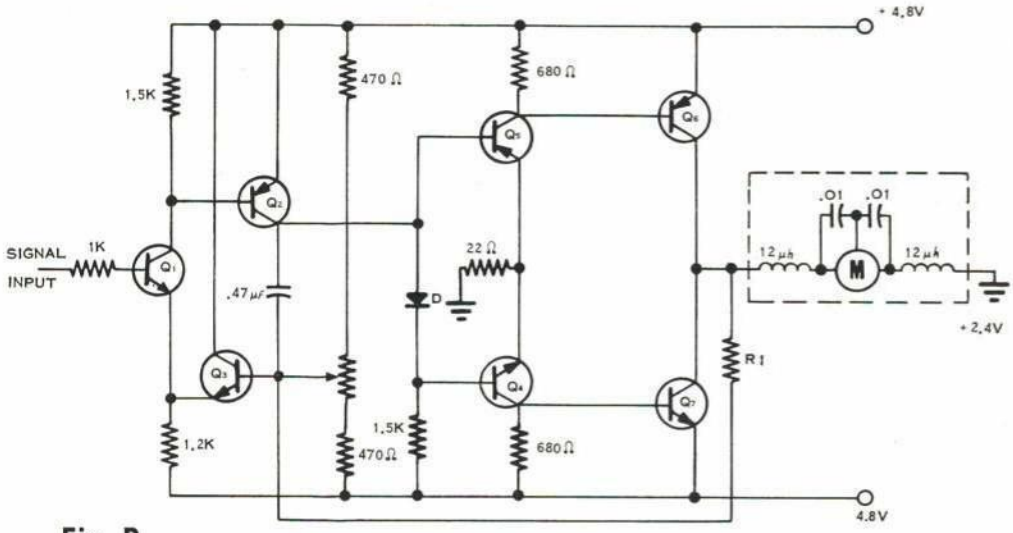


Fig. B

Fig. C

Full-size copper-side printed-circuit layout for servo amplifier and switcher/filter. Circle on left board is cutout for mounting amplifier to servo motor. Circle on right board is for on-off switch mounting.

any pulse-proportional mode ranging from magnetic actuators requiring up to 95-to-5 pulse-width ratio at rates as low as 4 pps, to analog feedback systems requiring a repetition rate of up to 50 pulses per second and 70-to-30 pulse-width ratio. The third item will be a decoder designed to operate from standard single-channel receivers and pulse transmitters to provide pulse-servo operation or analog-proportional operation of rudder and elevator with trimmable throttle. See Fig. A for a family tree of these systems.

The approach is one of simplicity and ease of reproduction without use of special equipment. All items will be complete in one presentation; no need to wait for endless bits and pieces. Parts procurement and trouble-shooting will be simplified. Above all, the equipment will be versatile and flexible.

A readily available Galloping Ghost servo used for only proportional rudder and trimmable throttle with a feedback amplifier has almost no current drain except in transit to a rudder position or during throttle changes. Hence, use of the following feedback Rand servo for rudder and motor control will give extremely long battery life or permit using very small 225 mah cells. Conventional relayless superhet receiver drives a squaring amplifier and filter to operate the servo. This system gives 2-lbs. thrust with ½" travel on the rudder control, perfect for boats, cars, big sailplanes, small gliders, and power planes. The trimmable function offers throttle or elevator trim in a plane, brakes in a car, or sail winch in a sailboat, etc. With 225 mah batteries, Commander DE superhet receiver, filter, and converted Rand servo flying weight is under 6 ozs. This system is ideal for radio-assisted-free-flight and light-weight thermal-soaring gliders.

Rand conversion: The development of good analog feedback servos has been almost eclipsed by the wildfire development of digital equipment. Hence, it is not generally realized that there are a number of analog servo amplifier designs which are capable of essential digital servo performance. In addition, failsafe operation is attainable simply by locking the servo input to the servo supply center tap. This feature has almost totally disappeared from digital servos.

The basis for this relatively new improved performance is the use of silicon transistors in the differential and driver stages of the servo amplifiers and an improved differential amplifier which places amplification in the feedback path. The amplifier design is shown schematically in Fig. B. The transistors are inexpensive and not difficult to obtain. The germanium output transistors Q_6 and Q_7 are heavy-duty units with the

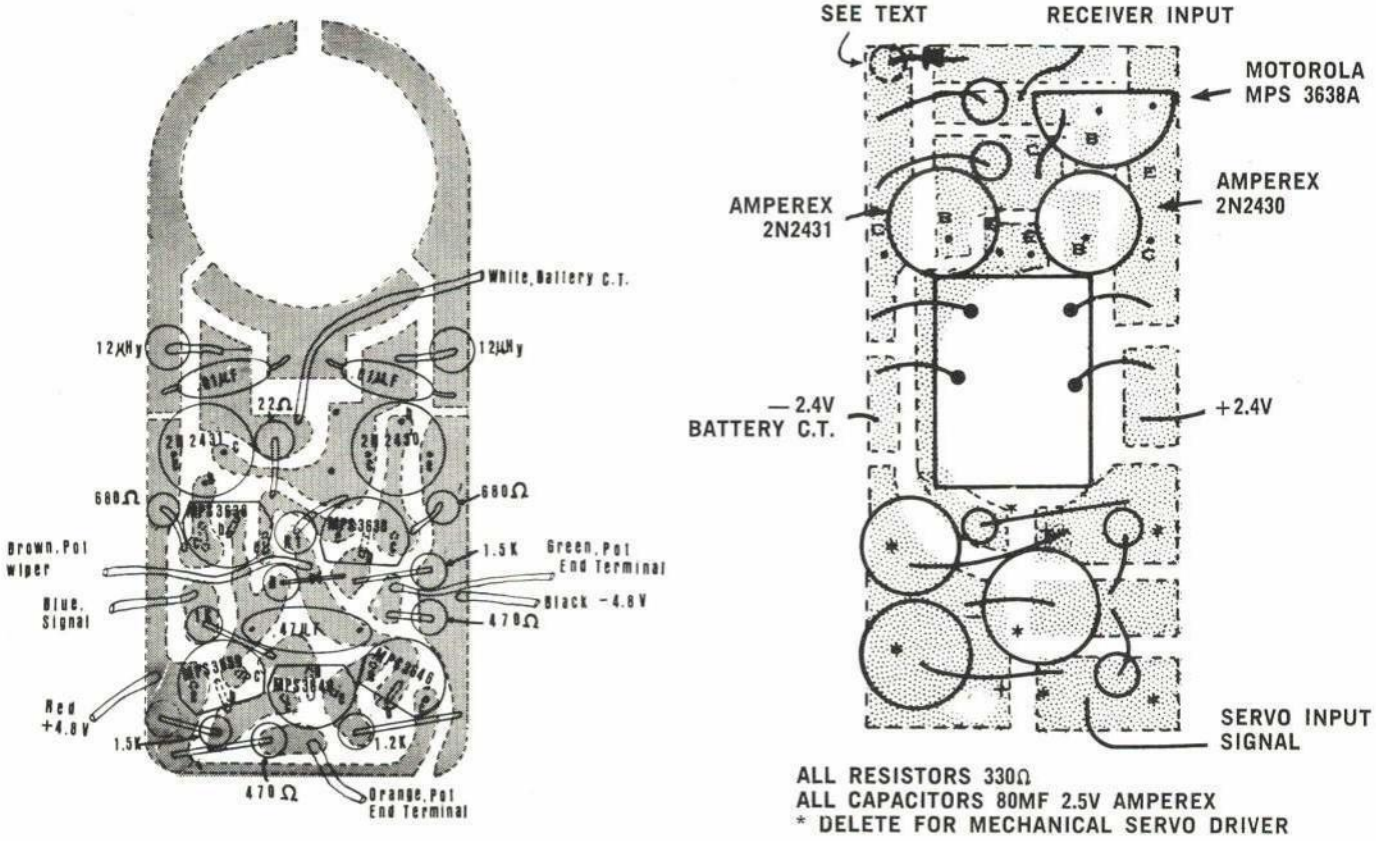
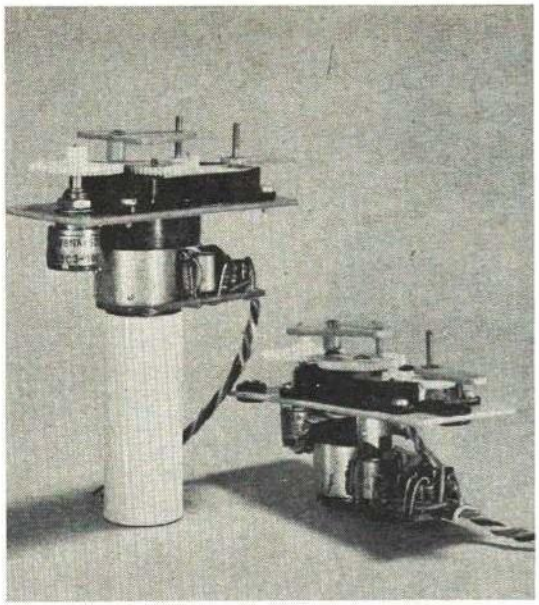
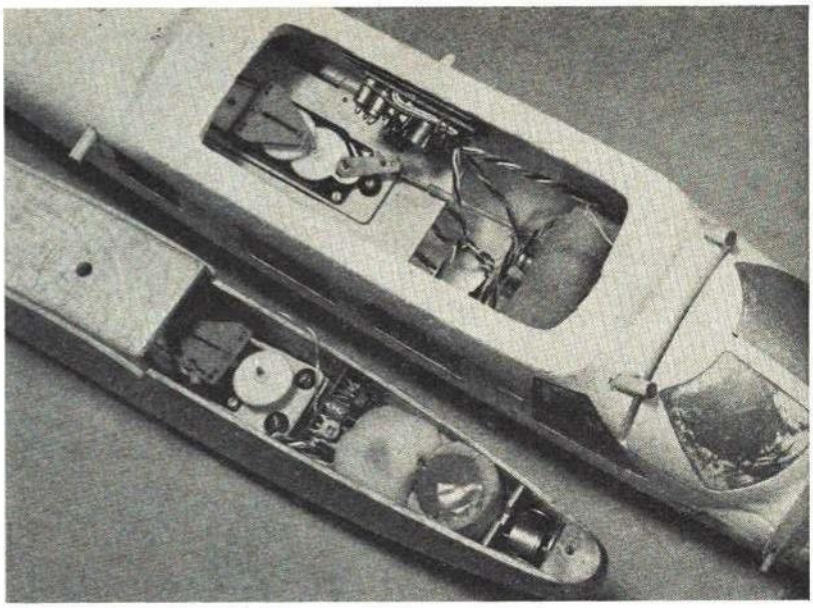


Fig. D **Component placement for the amplifier and switcher-filter. Square area on right is the on-off switch with which the board is mounted in your plane, boat, or car.**



Pot is positioned so that its gear meshes with idler gear of Rand servo. Strain-relief routing of wires under resistor leads at front of board recommended.



Above: SS-1 in MRC MU2 foam plane for rudder and throttle. Below: A very light Nordic A2 glider with SS-1 operating rudder by cable, and also giving trimmable elevator by servo throttle arm. Less than 6 oz. installed weight!

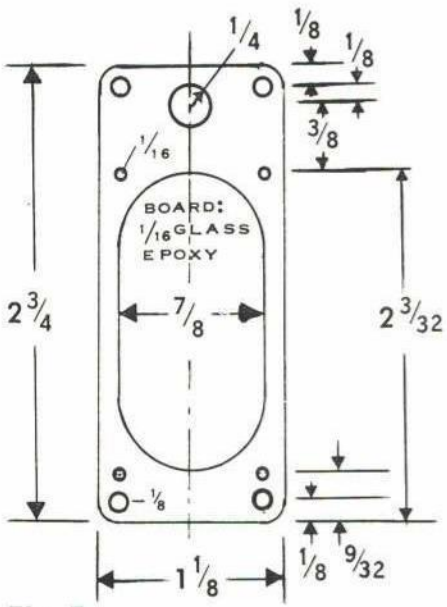


Fig. E

gain required for analog operation, which have come into general acceptance in a number of applications. (I first found them in a Heathkit phonograph amplifier designed for three watts.) A few features of the circuit bear explanation, however, it is not felt that detailed description and calculations are necessary. Q_1 and Q_3 form the differential amplifier stage. Q_2 is an inverter stage. The DHD806 diode reduces the deadband, or neutral width, of the servo. The 0.47 MF capacitor and resistor R1 provide dynamic damping and prevent high-frequency harmonics which cause transistor heating and high current drain. The 22 ohm resistor is there to provide a load for Q_4 and Q_5 via Q_6 and Q_7, otherwise there would be a "lightning path" which could cause these transistors to fail. R1 may be adjusted to provide proper damping with any analog proportional system.

First drawing of Fig. C presents the full size layout for the 1/16" thick glass-epoxy printed circuit board. The circular section within the copper lands is removed after the board is made to permit it to fit on the Rand servo motor.

The component layout is the first part of Fig. D. The existing arc-suppression chokes and capacitors are removed from the Rand servo and placed on the amplifier PC board. If a PC board with these components is on the Rand servo, remove it. It is important that the servo amplifier board be constructed using the highest gage of resin solder you can obtain (No. 22 Ersin Multicore is recommended) and a fine-tipped iron, otherwise solder bridges will result in later headaches. It is recommended that components be soldered to the amplifier board working aft toward the servo motor.

At this point the builder must decide if the servo is to be used simply for feedback operation or if the go-around throttle will be used. The first permits the most compact arrangement and is more desirable in any system not requiring go-around throttle operation. The potentiometer for the first arrangement is a 5000 ohm heavy-duty Mil Standard ½ watt hotmolded carbon pot Clarostat part No. RV6NAYSD502A. The only difference for the go-around throttle conversion is selection of a 1000 ohm pot of the same type; part No. RV6NAYSD102A. In either case, two simple changes are made. First, the shaft is turned or filed from 1/8" diameter to 7/64" diameter by chucking it in a drill or lathe and carefully turning it down, starting at the C ring and working out for at least 3/16". Cut off the excess shaft length. Next, the back cover and element are removed to expose the plastic wiper holder. Remove the C ring from the wiper assembly shaft and with-

Continued on page 78

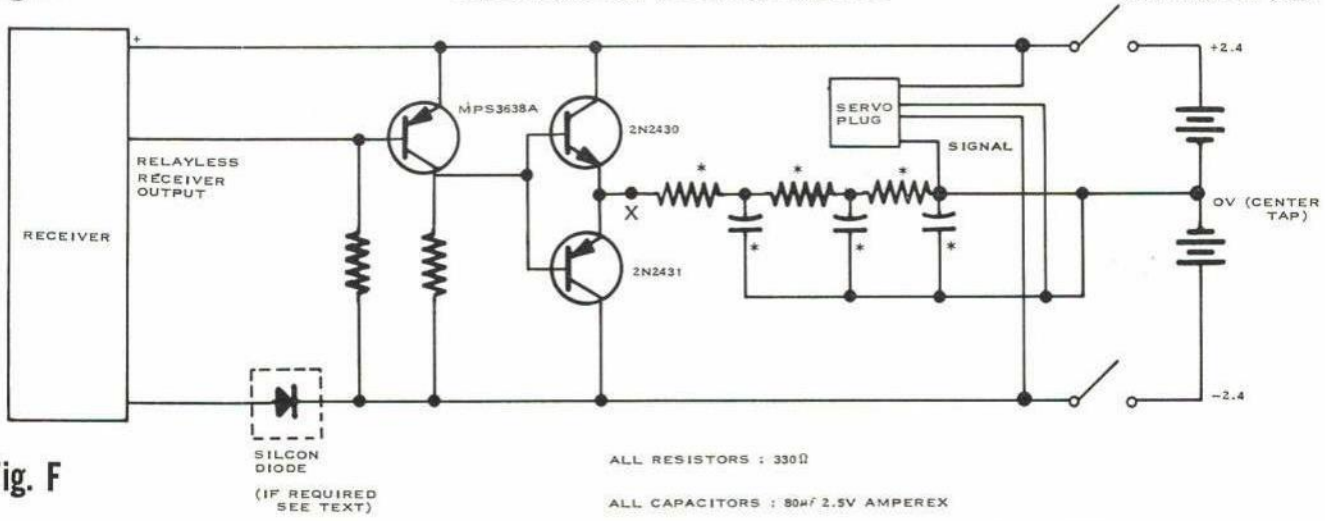


Fig. F

A sure prize-winner, design goes back ten years!

Down-Draft Dodger

This hand-launch glider gets its winning performance by design, finish, trimming, and practice, not from just a mighty heave.

KIT BAYS

OF all the free-flight events that beckon the trophy-seeking contest flyer, hand-launch glider undoubtedly offers the greatest penny-for-penny reward. For the beginning flyer, HL glider also provides more practical experience in the basic mechanics of flight trim than any other type of model. In trimming a free-flight model, the beginner is faced with a barrage of technical jargon — moments of inertia, decalage, wash-in, wash-out — the list is endless. But these seemingly obscure concepts take on real meaning when the neophyte is challenged with adjusting the most basic type of free-flight model for consistent stable flight. The bounty of experience gained in flying HL glider is directly applicable to the more "sophisticated" types of free flight. And the experienced contest flyer who pooh-poohs HL glider as somehow not worthy of his time, might be better advised to take advantage of this staple of basic free-flight knowledge.

The Down Draft Dodger is the latest in a series of designs dating back to 1959. Over the years many combinations of size, weight, airfoils, etc. have been used in the attempt to develop a design that would combine the virtues of easy adjustment and consistently high contest performance. Many have been built and the design has been quite successful in the hands of both experienced flyers as well as relative novices.

Construction is relatively straightforward but a few critical points warrant mention.

Wings: Light quarter-sawn wood is a necessity, preferably stock of 4-6 lbs./cu.-in. density. It is frequently impossible to get this quality of wood in 4" widths, so it may be necessary to join 1" and 3" widths with white glue. After cutting the blank to the proper outline, glue the $\frac{1}{16} \times \frac{1}{16}$ spruce leading edge after tapering the edges as shown so that they may be fashioned to the tip shape.

Before shaping the airfoil, trace the highpoint line on the blank with a soft dull pencil being careful not to score the wood. In carving and final sanding, be certain to maintain this high point consistently throughout the span. Check this airfoil frequently when sanding — a sanding block is indispensible.

Putting in the dihedral breaks is the most critical step in the operation; the need for *exact* alignment cannot be overstressed. Again use a sanding block with medium

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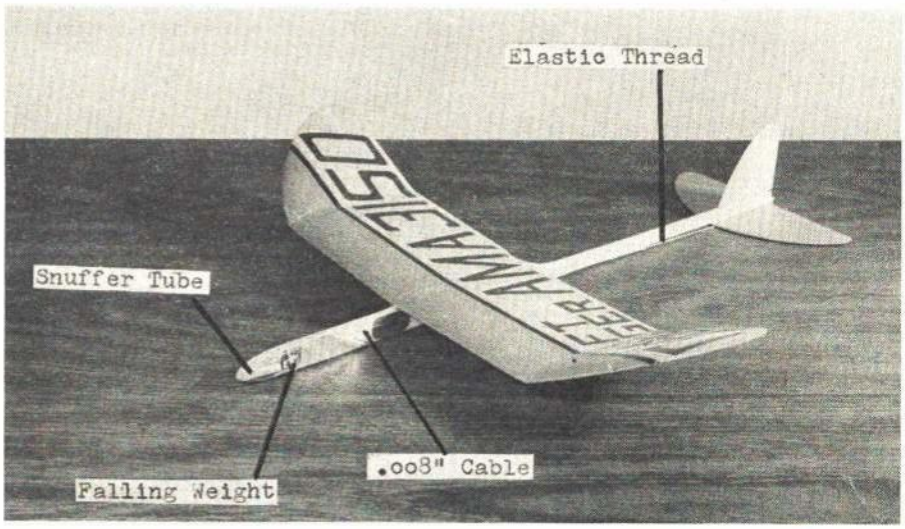
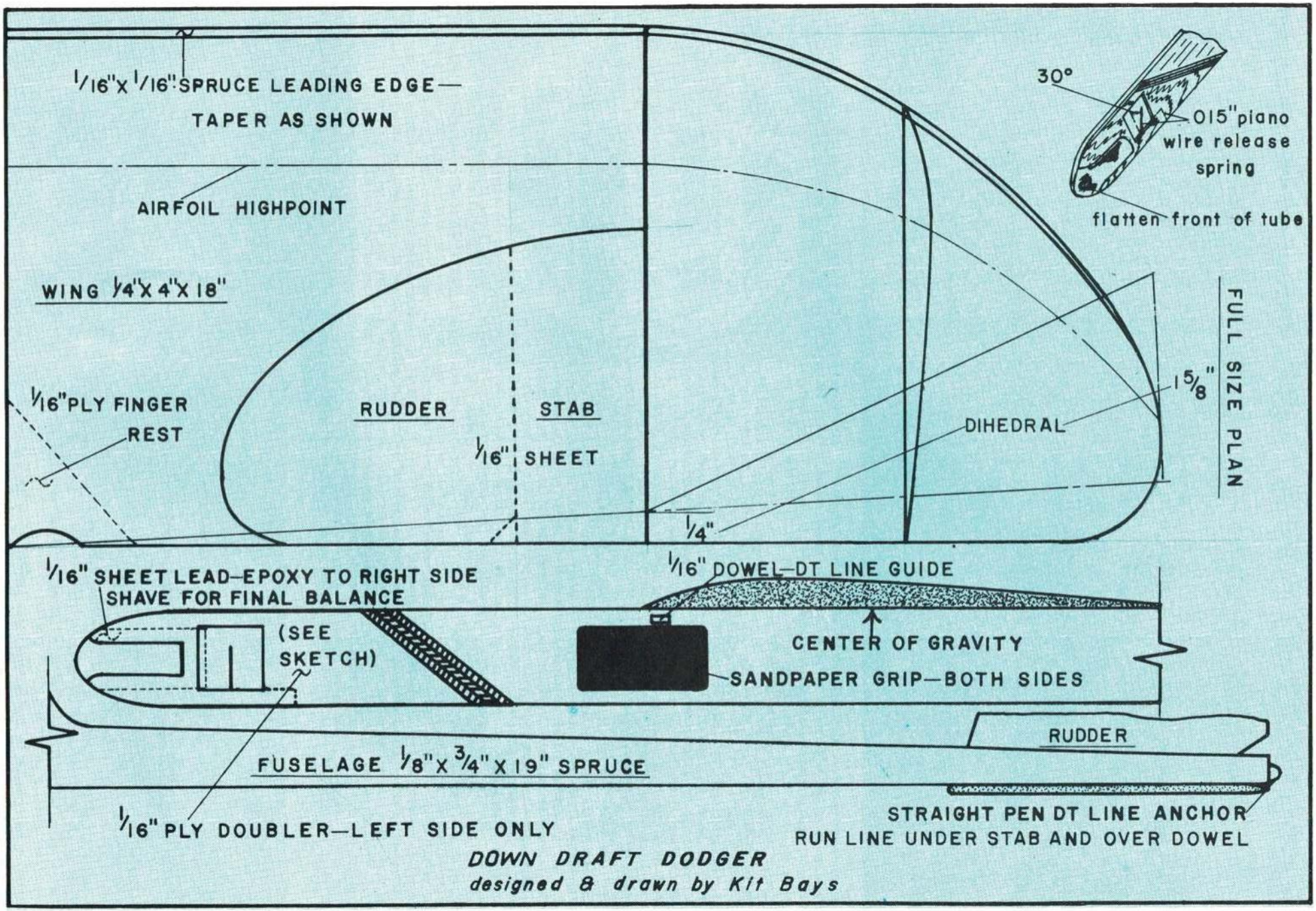
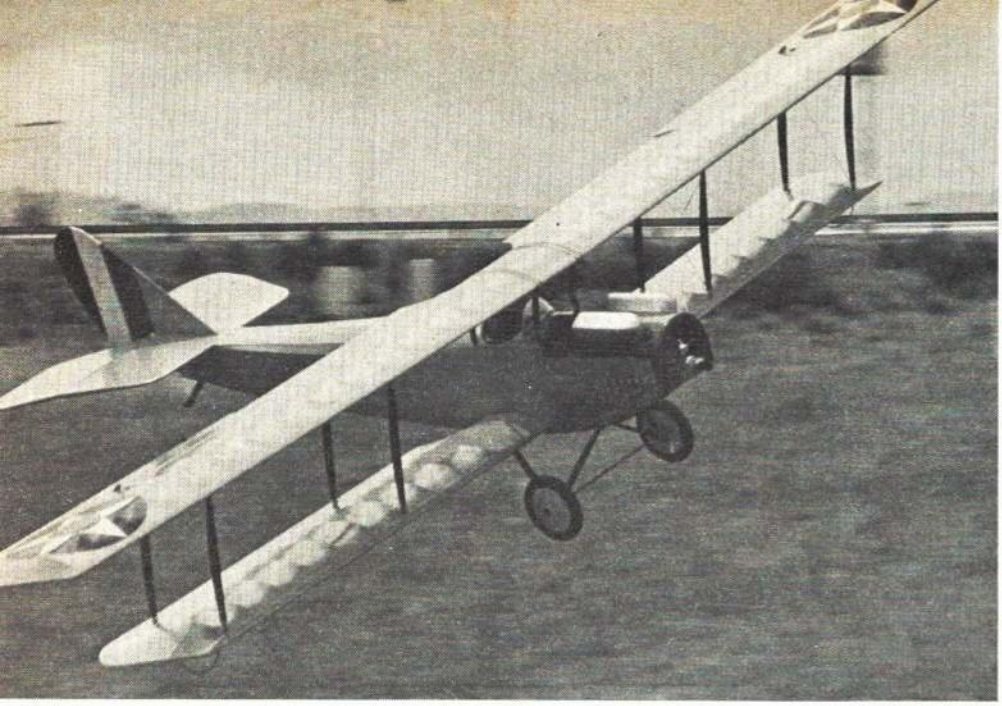


A dethermalizer is worthwhile on efficient model. This one operates by throwing ship drastically out of trim. Will escape strongest "lift." Seldom seen idea, but it really works.


1/16"x 1/16" SPRUCE LEADING EDGE—
TAPER AS SHOWN
AIRFOIL HIGHPOINT
WING 1/4"X 4"X 18"
1/16" PLY FINGER REST
RUDDER
STAB
1/16" SHEET
1/4"
DIHEDRAL
15/8"
FULL SIZE PLAN
30°
.015" piano wire release spring
flatten front of tube
1/16" SHEET LEAD—EPOXY TO RIGHT SIDE
SHAVE FOR FINAL BALANCE
(SEE SKETCH)
1/16" DOWEL—DT LINE GUIDE
CENTER OF GRAVITY
SANDPAPER GRIP—BOTH SIDES
RUDDER
FUSELAGE 1/8"X 3/4"X 19" SPRUCE
1/16" PLY DOUBLER—LEFT SIDE ONLY
STRAIGHT PEN DT LINE ANCHOR
RUN LINE UNDER STAB AND OVER DOWEL
DOWN DRAFT DODGER
designed & drawn by Kit Bays



Dick Hansen's near-scale Curtiss Jenny JN-4D has been flying for several years. Slow and steady, big bipes easier to photograph. Flying wires and struts are functional. Sure catches attention.

Graupner name on this plane, but photo was taken in Japan where O.S. is also developing a Wankel engine. Here is two-lobe 60 version being started by electric motor.

Technical Notes

50 MHz monitor: Finding no monitor on the market that would allow checking all the AMA-suggested R/C spots on the 50 MHz ham band, we decided the only out was to modify an existing transistor receiver to our needs. Search for one that would not require extensive alterations focused upon the Lafayette "Guardian 11" (stock #99-3534L from Lafayette Radio Electronics, cost $21.95). It's an 11-transistor unit covering 30-50 MHz on the high band, also has the regular broadcast band.

Unusual in FM receivers (which the high band is), this set has a form of automatic gain control, which prevents overloading on strong signals; it can thus be used to monitor your own transmitter output (leave the antenna fully collapsed for such use). To change the FM section output to AM, suiting our present transmitters, we swiped an idea from Art Morgan (see p. 28, June '66 issue of A.A.M.), simply reversed one of two diodes following IF stages.

A rough layout of the principal parts associated with our mods is seen herewith; the diodes are in a metal shield at lower right. Unsolder corner indicated, carefully bend out the shield side, and remove the diode you'll find close to the edge of the PC board. Reinstall the diode "the other way around," then rebend shield and resolder the corner. All other changes take place around the variable tuning capacitor. It's necessary to remove the PC board from the case for the diode reversal, then you can reassemble the receiver. Other changes, and dial recalibration, are most easily accomplished with the PC board in its normal place.

Original tuning range was 30-50 MHz; we wish to shift this to about 50-54 MHz (you could make it even less, if you just wish to cover the actual R/C spots). The circuit shows the changes needed. The Instruction booklet with the receiver shows the full circuit, so you can compare part numbers with those we have also used on the circuit; components with C and L numbers are those already in the receiver, while the four capacitors with just microfarad values must be added. These four should be tiny silver-mica or zero temperature coefficient ceramic units; actual capacitances as measured on the four units are indicated.

All but the 16 mmf are standard values; a 15 should do here too. The 8 mmf across L3 was removed from the tuning capacitor and reused; however, some receivers may have a different value. The PC board drawing shows connections before mods were made; remove C6 and C13, and leads C and D from the variable capacitor. L2 is the RF inductor, L3 is osc. inductor. E is ground lead from variable capacitor to PC board (it is retained). The 12 mmf capacitor goes between wire C and lug A on the variable; the 8 mmf cap. goes from junction of C and the 12 mmf, to E. Similarly add the two new capacitors on the RF side, retaining C5 as shown.

Location of the 10.7 MHz VHF IF "cans" is indicated, but our advice is to leave them all alone, except the two at far right, which will need touching up, following the diode reversal. Note location of the two VHF trimmers on the variable capacitor, and turn both to mid-range (you can see the plates through the adjusting screw holes).

For recalibration, we simply cemented a strip of white tape over the original 30-50 MHz calibration. This receiver has a "slide rule" dial, another reason for its choice, since the new markings are easy to add. If you have access to a signal generator, the entire new scale can be fully calibrated, as was the case here. If not, you can check just the R/C spots you need, using R/C transmitters as the "generator." For full calibration, our system was to set CT4 (osc. trimmer) for the desired total frequency

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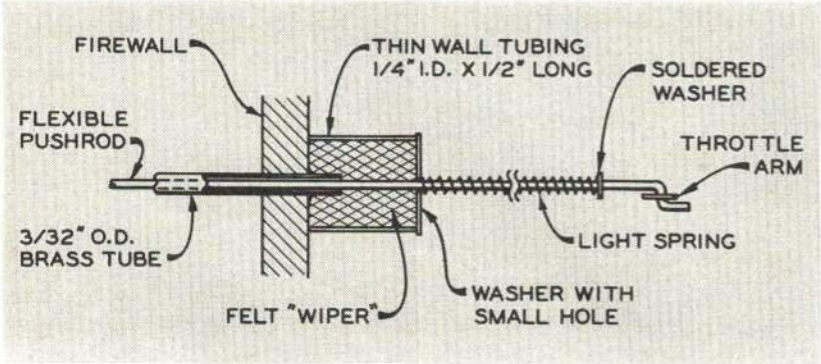
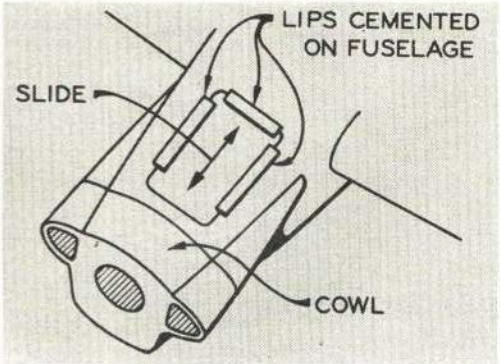
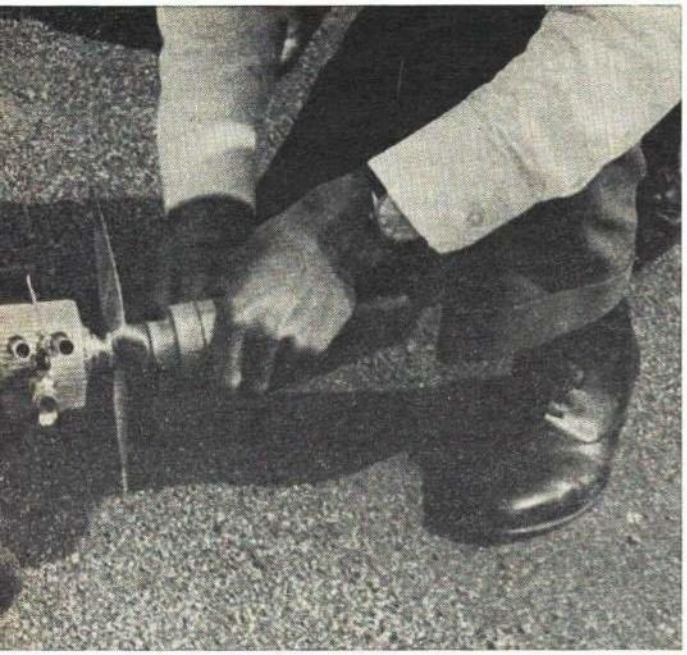


Have you been puzzled by fuel residue inside your fuselage when there are no holes or leaks at firewall? There's a leak — through throttle pushrod tubing!



Removable, neat hatch on Lanier Midget by Dieffenbach and son slides under plastic lips.



RADIO CONTROL WORLD

A ROUNDUP OF LATEST NEWS

CONDUCTED BY HOWARD MC ENTEE

Len Purdy's magnificent foam-and-plastic model for Lockheed-Georgia made to test hydrodynamic characteristics of seaplane conversion of Hercules C130 turboprop transport.

An editorial — *'There could well be some improvement in the quality of judging, and in the procedures used.'*

MOST stunt competition flyers, and most clubs that have run AMA stunt competitions, will agree that judging is one of the biggest and most worrisome problems. It has been a problem in contests all the way up to the Nats! The smaller clubs may have plenty of hands willing to tackle the numerous chores, but finding plenty of competent judges is another matter. Quite a few new proposals have been advanced lately in an effort to solve the dilemma; let's look at several of them. Before doing so, we should note that the progress being made toward developing a competent set of trained judges drawn from the ranks of active R/Cers is very heartening. Such judges have officiated at Recent Nationals R/C events with generally gratifying results. Eventually, we may develop an experienced "Judging Corps" here in the states, comparable to the group from which judges are picked to serve at the R/C World Championships.

Writing in newsletter of the Valley Flyers (San Fernando Valley area, Calif.), Robert Stockwell makes some interesting points. He notes that though sets of judges are rotated at many meets so that every contestant is scored only once by each judge, this can still lead to false results, if say, two sets of judges score consistently higher than all the other sets (as often happens). For our winners are determined upon the two best flights, and barring engine failure and such problems, the two best flights will probably be those scored by the consistently high judges. The solution: It might be worth trying some FAI scoring ideas — say we add up *all* flight scores, possibly dropping the lowest, to determine the winner.

As we noted earlier, some clubs simply can't find a full set of competent judges among their members. Stockwell has an idea to cover this problem too. Let the contest flyers themselves do the judging! Flyers could be lined up in each flight line in a fixed rotation; top man would be the first pilot to fly, next two in line would be in the ready boxes. Next five or so would be judges, any additional entrants would be listed as "waiting" below the judges in the lineup. As the top man finished his flight, he would go to the bottom of the list, the others on the list would all move up one place, etc.

Actually, Stockwell has worked it out so that the different modelers on two or even more flight lines shift places automatically so a fixed rotation takes place in each line and between lines. The idea, of course, is to make sure that all entrants are judged an equal number of times by all other entrants. With five judges in each line, it's suggested that the high and low scores of each flight be dropped, the other three scores totaled. After each complete flight round, the rotation could be randomly reordered, to further prevent repetitious judging of any one flyer by any one judge. No one would be judging more than five flights in any round, and every entrant should have ample time while waiting to fuel up or make necessary minor repairs and adjustments. It sounds worth a try. The Fresno Radio Modelers (Fresno, Calif.) report enthusiastically on the idea in their own newsletter, apparently hope to give it a tryout.

Len Purdy is another who feels there could well be ". . . some improvement in the quality of judging and in the procedures used. . . ." In the matter of judging, his suggestion is to use three judges on every flight, but only the scores of two judges would be figured for each flight. The idea is to compare the flight scores of the three judges, and retain the two scores which were the closest together. Thus, *either* an excessively high or excessively low score might be dropped. Judging *consistency* would be the criterion for scoring on every flight — and this seems to be what we have been looking for all along. Len further suggests that consultation between judges be eliminated. He suggests the three judges might sit in front of a single recorder, and after each maneuver, each judge would give his score to the recorder via finger signals, not verbally. Having been both a judge and a recorder, we feel this poor character will be awfully busy, but this is a detail that could be worked out.

Yes, there are worthwhile new ideas in judging coming out — it just remains to try them in competition, to find which best suit our needs.

— Howard McEntee

range, then osc. inductor core is adjusted to move the tuning band as desired on the dial. Our calibrated range is 50-54 MHz, and total tuning range is about 49.75-54.25 MHz. Osc core and trimmer tuning are very sharp, of course. RF core and trimmer are broad, but should be carefully adjusted to allow the two circuits to "track" as closely as possible over the entire range. It was found the tuning capacitor spreads the 50-51 MHz area much more than areas higher in the band. Unfortunate, but you can't win 'em all!

It should be quite possible to modify the Guardian 11 VHF range to cover the entire 27 MHz CB range, but this wasn't attempted. The same general procedures would be followed, but the four added capacitors would of course, be much different. Basically, you would need considerably larger capacitors in place of the 8 and 15 mmf units, and smaller ones in place of the 12 and 16 units.

Simple hatch cover. Neat and simple access cover for fuel tank compartment was seen on a Lanier Dart owned by Otto Dieffenbach Jr. (2 Streamside La., Timonium, Md. 21093). Idea came from his son — consists simply of cutting an opening ¼" smaller on all sides of the hatch indentation, then cementing ½" wide strips of the removed piece on sides and rear of the opening. Then cut a hatch cover from suitable material to slide snugly under these three lips. It stays in place well, is easily removed; you can quickly refuel the plane through this opening, handy feature on fully cowled engine.

Throttle rod cleaner: Fuel has a way of working its way rearward through throttle pushrod tubes and messing up whatever area is at the back end of the tube. We even heard one case where the fuel dribbled on top of — and into — an engine control servo, putting it out of business! There are probably several ways to stop this nuisance, but one that does work is shown here. It consists simply of a close-fitting felt wiper on the pushrod, housed in a metal protective cover. Felt is put inside a piece of thin aluminum tubing, and holds tubing centered on pushrod. A washer with close-fitting hole is held against front of tubing by a light spring (spring was originally closely coiled — was pulled out to length needed). The felt will soak up quite a bit of the oil; should be squeezed dry occasionally.

Vibration problem: We all have 'em, but Dale Root (6036 Telegraph Ave., Oakland, Calif. 94609) has a new one. Any motorized servo could be afflicted. The aileron servo of Dale's stunter (and the elevator servo of a pal's plane, both of which were powered by the high-revving Veco 61) would just go dead at full engine speed. All other controls operated normally.

Dale tried several replacement servos and different air loads on the ailerons, to no avail. Deciding the brushes of the servo motor were simply being shaken clear of the commutator by the vibration, the 11-7 propo was replaced with a 12-6. This slowed the engine a bit, and the servo worked perfectly. Apparently the smaller prop and higher RPM (an 11-8 was just as bad) produced a resonant vibration in the brushes. Now Dale uses double shock mounting — use the regular mounting grommets between servo case and a piece of ply; also attach ply to wing or fuselage with more grommets or servo-mount tape. This cured the problem in both planes, regardless of engine speed.

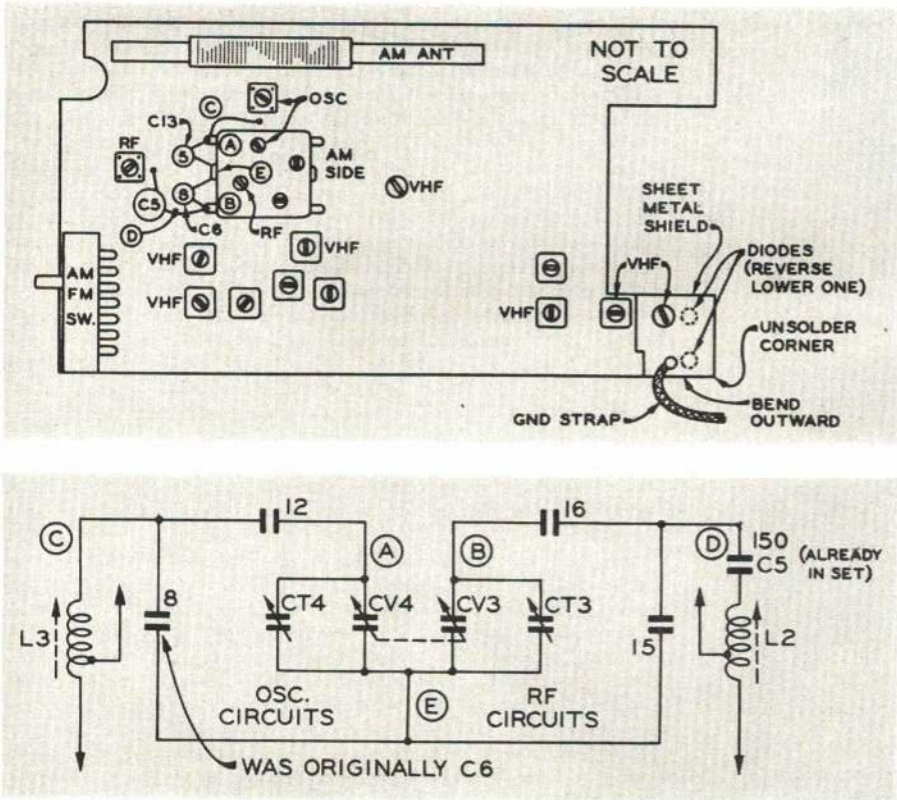
Water-going Hercules: Dubbed the C130 HOW (Hercules On Water), a concept developed by Lockheed engineers was felt to require scale model testing before they went further with the project. A $\frac{1}{16}$th sized scale model was built by Lanier Industries at a cost of $9000; proved that two areas of concern were really no problem. The engineers feared that water spray would kill the engines, and might envelop the tail surfaces.

Model has 8′ 3″ span, is built of laminated plastic over styrofoam core. It weighs 32 lbs., is powered by four Supertigre .40 R/C engines. All four throttles were operated together. Over 40 flights were made in a three-week test period, and the model performed beautifully. From a standstill on the water, the model would take off in 200′ (story in The Atlanta Constitution said that "ski-unporting" — a term not familiar to us, but which we presume means "getting on the step" — took place within 100′). Air speeds were estimated at 30-40 mph, and all flights were kept under 25′ altitude, since performance on and near the water surface was the main interest. Tests were conducted by Roy Lange, manager of Advanced Concepts Dept., Lockheed-Georgia Company. Model aviation comes through again!

Japanese Wankel engines! Prominent among exhibits at 4th Model Manufacturers Symposium (held in mid-October at Funabashi Airport, near Tokyo) were a couple of Wankel-style engines built by the OS concern. There was a single rotor unit of .29-cu.-in. displacement, and a double-rotor .60, both of which performed perfectly in their test planes. OS is apparently tied in with the German NSU-Wankel developers of this style engine. Also, we note "Graupner" insignia on the test planes; this German model concern is also licensed by Wankel (see p. 78, Dec. '68 issue A.A.M. for a recent Graupner-Wankel engine).

One problem with these engines for the model field has been starting; Graupner test pilots often use an electric starter, but the Jap engines were started by a hand pull-cord starter (manufactured by Graupner, we believe!). Pics and info sent to us by Lawrence W. Hoffman, who noted that the Wankel engines had quite a different sound in the air. The double-rotor engine should be exceptionally smooth in operation, and would have a very high-pitched exhaust note, due to the double power pulse each prop revolution. The two upper tubes on engine side are for exhaust, while carb is below them.

Lock that switch! In newsletter of the Dallas (Texas — where else?!) R/C Club is a note relating how a member had crashed his plane, due to knocking the power switch off, while flying. He had been letting a friend fly but friend got plane into awkward attitude; owner grabbed the transmitter, hit the switch —



Parts location and schematic for converting Lafayette Guardian II from 30-50 MHz to monitor our 50-54 MHz band. Modifications are few, tuning is sharp, and new slide-rule-type scale easily installed and calibrated. Also has the broadcast band.

Control-line Carrier flyer Bill Johnson has worked out a very reliable speed engine conversion to throttled operation. Uses slide valve in exhaust stack, variable pressure, no throttle barrel, and wide-open venturi.

totaled the plane! Another member of DRCC lost a plane when he knocked the switch off while trying to reset a trim lever with plane in flight. Many of us have locks to keep the switch off, but how many have same to keep it locked on? We heard of a glider pilot who launched his own plane on a high-start, turned transmitter off as he grabbed for control stick. Frantic action saved the plane, but these cases prove — it certainly can happen.

Grassroots

Toledo Northwest: Last call for the 4th R/C Conference sponsored by the Seattle RAMS, to be held at Tyee Motel (Olympia, Wash.) on Feb. 22, 23. Note this date has been changed from that announced at the 3rd Annual. No agenda has been received, but affair always has big display of models, many manufacturer exhibits, R/C movies, flying demo's if weather permits. Also scheduled are diving demonstrations and free lessons at the Tyee indoor pool by R/Cer Ray McClellan. Further info on affair: George Hickson (11809 18th S.W., Seattle, Wash. 98146).

DC/RC Symposium: This pioneer R/C conference will go into its 12th session on May 17, 18, sponsored as usual by the DC/RC, held at the usual spot — John Hopkins Applied Physics Labs, just west of Route 29, Howard Co., Md. As in 1968, the Saturday evening banquet will be held elsewhere (it has outgrown the APL facilities), possibly at the same golf club as in 1968. There will be a *short* entertainment after the banquet; short is emphasized since the club knows attending R/Cers want a chance to talk shop. It is hoped to have at least one paper on model engines. Those who feel they have material suitable for presentaton are urged to contact the Symposium Chairman, Dr. Walter Good (9802 Parkwood Dr., Bethesda, Md. 20014).

Competition

R/C World Champs: We have word that the 1969 R/C World Championships will probably be held July 23-28 near Bremen, Germany. Place is apparently settled, but the date may possibly be shifted a bit. Actual location of the meet is a town called Lemwerder, some ten miles north of Bremen on the Weser River. It is understood that flying will be at the field of a large aircraft plant. Housing for all concerned will be just across the river at Vegesack. It's unfortunate that the apparent date will very likely clash with our '69 Nationals date. A tough decision for quite a few R/Cers to make!

Suggested contest changes: In addition to the changes in judging methods that he has suggested, noted at the beginning of this Column, Len Purdy has some on procedures. In the first place, he feels that there should be two overall categories of Stunt competition, possibly called (for lack of better names) Basic Competition, and Championship Competition. The former would be what we have now, and could include the same split into three classes. While Len suggests we combine the two, thus having three different classes in both Basic and Championship, the six categories this requires might be too many, but this could be resolved in several ways.

For Championship flying, Len would make a Qualifying-Flyoff system mandatory (it has been used in quite a few meets, including the Nats, but is not mandatory at present). Following notes all apply to Championship competition. Qualifying flights could be limited, according to conditions (there must be at least three), but only two fly-off flights allowed. A reduced pattern and time might be used for Qualifying, if necessary. The three-judge system should be used in Qualifying, but for flyoff, at least six must judge each flight; highest and lowest scores would be dropped, total of the remaining four (or more) would be added to obtain actual flight score. Purdy feels Championship competition should be completed in one day, with Qualifying flights first, then top scorers selected in sufficient number to allow two flyoff rounds. There's food for thought in these ideas.

NRCSS formed: Stands for National R/C Glider Association, formed by a group of California R/C glider flyers in mid-August. Jerry Nelson (at whose flying field the meeting was held) was chosen tentative Chairman, Hans Weiss is temporary Sec./Treas., and Dale Willoughby will be Editor of the Zephyr (proposed voice of NRCSS). Members of the new group must be AMA members and have valid FCC licenses. It was proposed that there be a District Rules Coordinator and a District Representative for each of the 11 AMA districts. Yearly dues will be $5, which includes subscription to the Zephyr; dues cost for trade representatives and manufacturers in the R/C glider field may be set at $25.

It is hoped that rules for a 1969 National R/C Glider meet can be set up for both slope and thermal soaring. Tentative rules so far are for two glider categories: Up to 100" wingspan; Over 100" span, but not more than 16' span; maximum glider weight no greater than 15 lb. Further information may be had from Hans Weiss (1304 Wilshire Blvd., Santa Monica, Calif., 90401), who will also handle memberships.

Frozen glider guiders: As they did last year, a group of DC/RC glider enthusiasts converged on a mid-November weekend on the city of Cumberland, way up in the NW tip of Maryland. Why this far away spot? Cumberland boasts a very active full-scale glider club, and these flyers have discov-

Continued on page 81

Superb true-scale Gloster Gauntlet by Dennis Bryant is powered by geared McCoy 60 driving 16-in. prop. Flying weight of 10½ lb. needs all the power available. Radio is Sprengbrook Digital. Plane is silver, scale texture finish, fully rigged, has complete cockpit.

Unusual Japanese competition stunt plane by M. Kato seems to have everything — thick-section wing tip, functional vortex fences at tip, subrudder, and semi-scale appearance. Uses Enya and new MK-5 Digital control system. Flaps give lift and drag.

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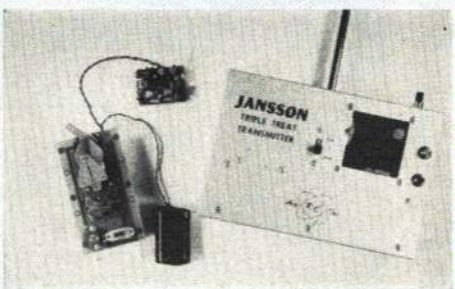

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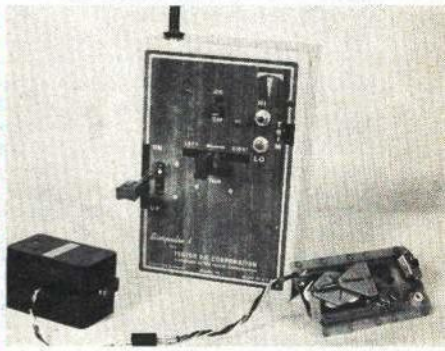

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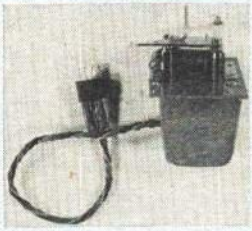

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This is the first superhet receiver to be produced by Ace R/C! And it is a first in many respects: Small—measures only 1⅝ x 1¼ x ⅝"; Light-weight is about .8 ounce; Relayless-but double-ended (DE) with 1 amp transistors in output for hookup direct to dual coil actuators; Low voltage—works reliably at maximum range on just 2.4 volts; Versatile—works with most any transmitter of from 400 to 1400 hz; Pulses—exceptionally fast.

Manufactured by Ace exclusively under license agreements with designers — several circuit breakthroughs found only in this unit.

Works with only minor change on Dickerson Skyhawk GG Conversion kit. Uses highest grade miniature components—completely assembled, tested and guaranteed.

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Ideal for Beginners and Sport Fliers

Get one of the Ace Commander R/O packages and you get the Commander DE Superhet Receiver, Commander Pulse Transmitter, Adams Actuator of the size you want, along with matching nickel cads, and completed wiring harness, AND you save up to $10.00 over buying singly.

We have the packages as matched sets in three basic offerings to suit your every R/C sporting need from the smallest to the larger sized aircraft. Ready for easy installation.

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No. 10G15—Commander R/O Baby pack.... $69.95
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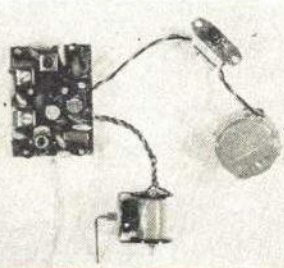

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LAHTI ANALOG SERVO ELECTRONICS—Complete kit of all electronics needed to make an excellent analog servo with highest resolution from S-3, S-4 or KPS10 mechanics. Use it with the AAM decoder for simple rudder only NON-FLAPPING control. No. 15G31—Lahti Analog electronics only kit, $11.95

AAM PULSE AMPLIFIER-FILTER provides the analog signal required from the Commander DE receiver for use with analog servo. This provides proportional with no flapping of the surface. Much more powerful and uses current only when servo is in motion so smaller batteries may be used. Kit contains PC board, transistors and components for filter. No. 15G24—AAM Analog Pulse Amplifier Filter $6.95

PREVAL SPRAYMAKER can be used for any dope or epoxy mixed to spray consistency. PREVAL combo contains 3 oz. power unit with nozzle, good for spraying up to 16 ounces of liquid, with 4 oz. container. No. 24L17—Sprayer combo $1.29; Extra 3 oz., power unit with nozzle, No. 24L18 98c; No. 24L19—Extra 4 oz. container with lid, 35c.

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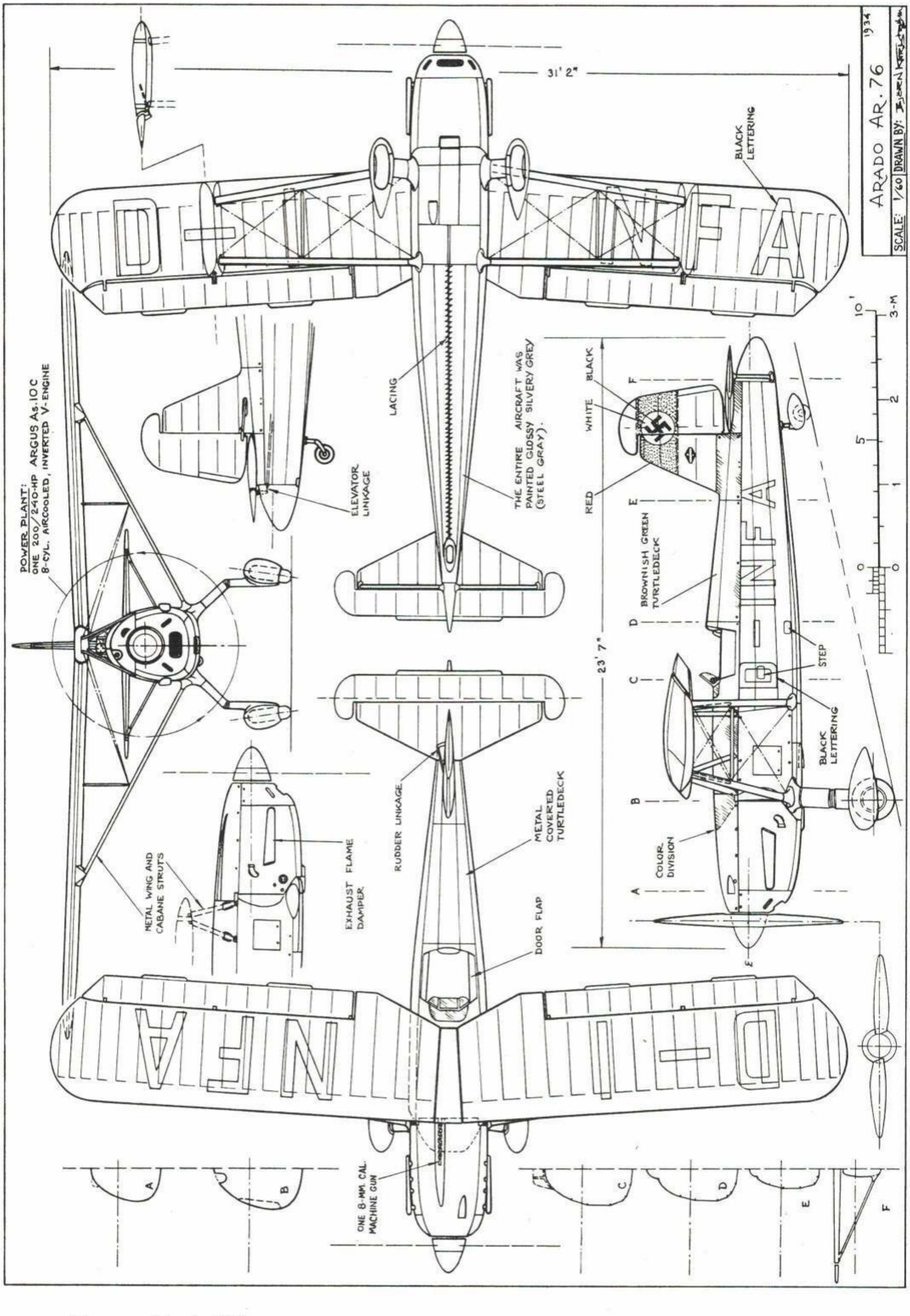
ARADO AR. 76
1934
SCALE: 1/60
DRAWN BY:
31' 2"
BLACK LETTERING
POWER PLANT:
ONE 200/240-HP ARGUS As.10C
8-CYL. AIRCOOLED, INVERTED V-ENGINE
LACING
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ELEVATOR LINKAGE
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RED
BROWNISH GREEN TURTLEDECK
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NEW PRODUCTS CHECK LIST

Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."

Sterling Models/Messerschmitt Me-109 R/C. Sterling's almost-ready-to-fly, profile Mustang (R/C) seems to have been a hit — first production run sold quickly and another run soon started. Now their second kit in this series will be the Me-109 seen above. Kit contents are similar; only change being that the German fighter's wing is covered in a high-gloss red plastic instead of the white. With WWII markings, you are practically guaranteed to have the flashiest model on the field. R/C dogfights are a near reality with rugged craft as these. Price to be announced soon. STERLING MODELS, Belfield Ave. & Wister St., Philadelphia, Pa. 19144.

AMT Corporation/Six New Plastic Kits. That's the number of new aircraft now available from AMT. And all are in 1/72nd scale. Topping the list is the MIG-21 with both Russian and Czech markings. The NATO code calls it the Fishbed. Cat. No. is A263, and price is $1.00.

Next is the German Junkers JU-88 A-4, backbone of the Luftwaffe. Fifteen thousand were produced and used as light bombers, day & night fighters, etc. Cat. No. A626, has a price of $1.00.

England's Wooden Wonder, the de Havilland Mosquito Mark IV mated powerful engines to the smallest practical airframe. It had no defensive armament but could outrun any foe. The U. S. used it for photo-recon. Cat. No. A631 at $1.00 retail.

McDonnell-Douglas' F-4 Phantom jet flys nearly 2.5 times the speed of sound with a crew of two and an 8-ton payload. Cat. No. of this fighter is A655, price $1.30.

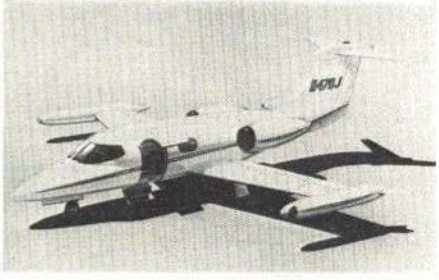
World's largest/heaviest, single-seat fighter is Republic's F-105D at 14-tons empty. It will carry 6-tons of bombs at subsonic speeds. With USAF and Vietnam decals, Cat. No. A656 costs $1.30.

Last is Japan's Rita Bomber. Known as the Renzan Strategic Bomber, it was a last-ditch attempt to develop a long-range, land-based attack bomber. Only four were completed. Even in 1/72nd scale this one has a span of nearly 18". Cat. No. is A680 and the price is $3.00. All of these kits feature detailed control surfaces, crew figures plus various armament, bombs and guns. Many have optional position landing gear, etc. Decal insignia are included too. AMT CORPORATION, 1650 10th St., Santa Monica, Calif. 90404.

Pettit Paint Co./Fire Orange Hobbypoxy. Does anyone doubt that Hobbypoxy's Pettit Paint Co. is a colorful concern? Well, right now Pettit is fluorescing (whoops — we mean glowing) over their new color, Fire Orange. It's high-visibility and fluorescent. Military aircraft use it. You use it, too, for trim and stripes and other decoration. Same price as the other colors: 1/4 pint at 90c and 1/2 pint at $1.40. Remember, though, to use a white undercoat for maximum visibility — then you'll effervesce. Info: Hobbypoxy, PETTIT PAINT CO., 507 Main St., Belleville, N. J. 07109.

Midwest Products Co./Das Little Stik R/C. Ugly for looks but nice for flying, that's this design by Larry Leonard and Bud Anders. It's a smaller version of the Ugly Stik by Phil Kraft. Construction is easy; only flat sheet stock is used. The 46" span model is a fine trainer when used with small multi systems or a sport flyer for the experienced. Kit includes Nylon hardware, formed gear, alum. engine mounts and Micro-Cut balsa. Use a .19-.23 in it. Kit price is $22.95. MIDWEST PRODUCTS CO., 400 S. Indiana St., Hobart, Ind. 46342.

Dumas Planes/Douglas DC-9 Jet. Here's a model of a jet that really flys. Unique and clever catapult glider design of the DC-9's in service with Hawaiian Airlines, it has a card tube fuselage to give roundness and take it out of the profile class. We suspect that is where the swishing sound comes from in flight. Parts are die-cut for the balsa wings, the tail and the 1/16" plywood nose. Ailerons and elevators are adjustable for trim, even though, this isn't an endurance model but a flyer for fun. Kit includes trim and markings plus the shock cord for launching. Price is $2.95; be a jet-getter. DUMAS PRODUCTS, INC., P. O. Box 6093, Tucson, Ariz. 85716.



Industro-Motive Corp./Gates LearJet in Plastic. IMC's first advanced scale model aircraft is the top-selling business jet, the Gates LearJet. They've included many unusual features — vinyl tires, chrome parts, opening doors and inspection panels, moveable control surfaces and a completely detailed interior. You must see the kit of parts. It's easy to understand why IMC does not recommend the kit for beginners. But experienced plastic modelers will rave. Price for the 1/72nd model is $2.00.

Here's another innovation from IMC. The 72nd Combat Group is their new series including the RF-4B Phantom II, F-100D Supersabre, F-105D Thunderchief and the A-1H Skyraider. And each kit contains extra, battle-damaged parts so you can individualize your own model. Build it factory-fresh or as a battle-scarred veteran. All are in 1/72nd scale and at a price of $1.00 each. Write: INDUSTRO-MOTIVE CORP., 1291 Rochester Rd., Troy, Mich. 48084.

Control that Engine

Inexpensive three-wire control-line system uses available parts.

G. B. TELFAIR

WHEN my son and I were introduced to control-line Navy Carrier flying, the sport immediately produced an interesting by-product. We found that controlled-engine flight with almost every type of control-line model is fun! This is particularly true for the Junior who may not yet feel ready for stunt, but who can get much satisfaction from taxiing, taking off, and landing with throttle control. For us, it has become so much fun, in fact, that practically every model we build has to have throttle control. Very early in our enthusiasm, however, we were faced with a basic problem. Commercially produced engine control bellcranks were not always available from the local hobby shops. When they were available, it seemed a shame to bury an expensive piece of mechanism in the innards of a trainer or Sunday-flyer model. So, I cast around for a bellcrank design that could be easily built, was inexpensive, and would be compatible with the three-line systems commonly in use for control-line engine control.

The result was the simple mechanism shown in Fig. 1, which can be assembled quickly from a couple of standard elevator-control bellcranks for about 50 cents. For the past three years, we have operated Guillow II and III trainers equipped with this type of crank with great success, both in practice and in contests. It would be ideal for profile Carrier models such as, Howard Mottin's Starjet or John Herndon's modified Skystreak (A.A.M., April, 1968).

The widespread enthusiasm for control-line Navy Carrier and the emerging interest in engine control for control-line stunt has pointed to the need for a simple, inexpensive engine-control bellcrank mechanism readily adaptable to trainers and a variety of engine throttles.

Fig. 1 shows such a throttle-control assembly for three-line operation that can be assembled from a couple of standard elevator-control bellcranks.

The upper crank in Fig. 1 is the elevator control, while the lower crank controls the engine. The elevator control is pivoted on one arm of the engine-control crank, which in turn is bolted to the bellcrank platform in the model. The centrifugal force on the model and control lines is carried by the engine-crank pivot bolt. Both cranks must move freely with no binding. The mechanism is operated from a J. Roberts-type handle.

In operation, pulling the engine-control-line (the third line) rotates the engine-control crank, actuating the engine throttle through the connecting pushrod. At the same time, the elevator crank is displaced half as much in the opposite direction. The control-handle mechanism follows this motion, keeping the lines evenly loaded. Properly rigged, this mechanism has no noticeable effect on the longitudinal trim of trainers and other slower models during throttle changes.

The heart of the mechanism is the engine-control crank, because its dimensions control the movement of the entire mechanism. The engine crank is made from a Perfect brand, 3" standard bellcrank (or equivalent) as shown in Fig. 2 sketch. Standard store-bought bellcranks are recommended because they come complete with pivot bushings and attaching hardware.

Notice, in Fig. 2, that the arm supporting the elevator crank is half the length of the arm to which the engine-control wire is attached. This relationship divides the centrifugal forces evenly among the three control wires. It also matches the movement of the mechanism to the relative movements in the J. Roberts handle.

The length of the throttle-actuating arm of the engine crank is equal to the length of the arm to which the engine-control wire is attached. Drill additional holes in the throttle-actuating arm to adjust the pushrod travel to the motion range of the specific engine throttle being used.

The elevator-control crank shown in Fig. 1 is a Perfect 2" standard bellcrank (or equivalent) used just as it comes from the package. Actually, any size elevator-control crank can be used, picked according to the elevator control sensitivity desired.

If you can tolerate a somewhat bulky assembly, the cranks can be assembled with the pivot bushings and other hardware just as they come from the package. Add a few washers under the elevator crank pivot bushing so that the elevator crank will clear the head of the screw attaching the engine crank to the model.

If space is at a premium, the height of the assembly can be reduced appreciably

Continued on page 58

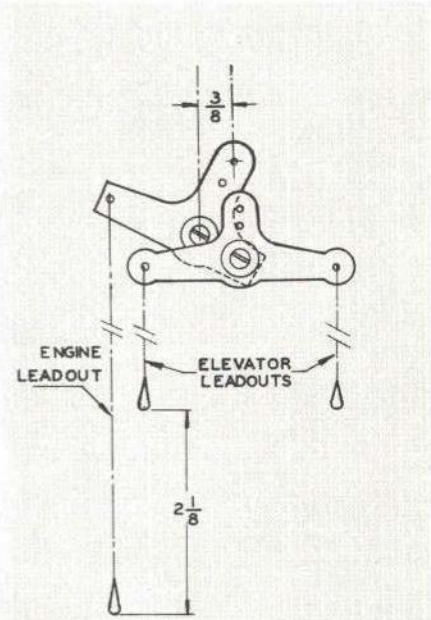


FIG. 3 — RIGGING DIMENSIONS

Complicated geometry of three-wire control unit maintains equal tension on each line. Both cranks should have no-slop bushings.

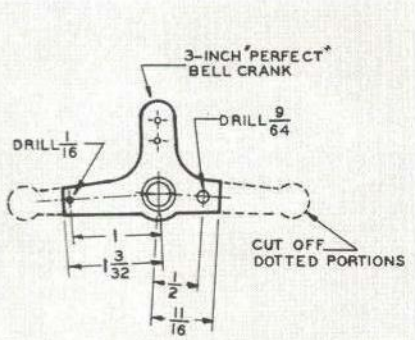
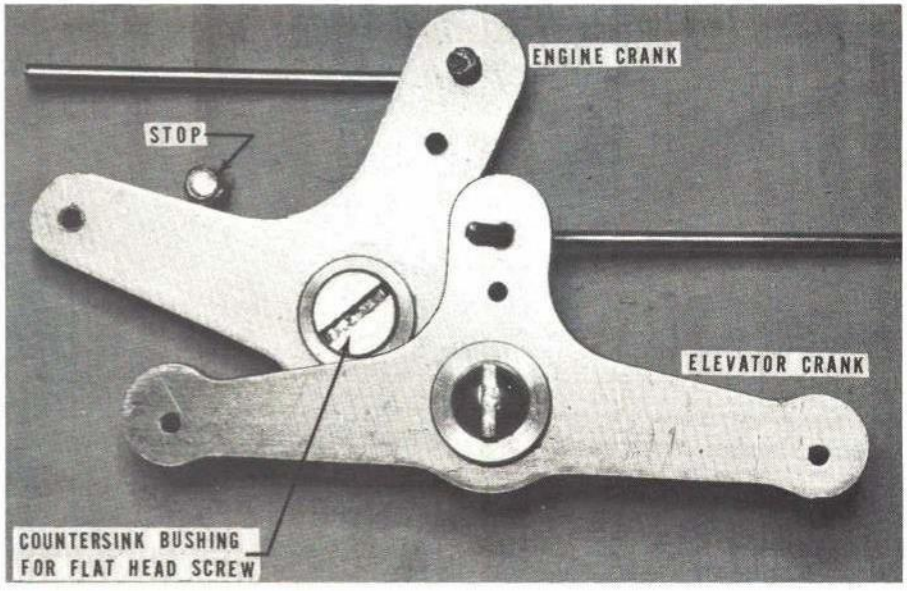
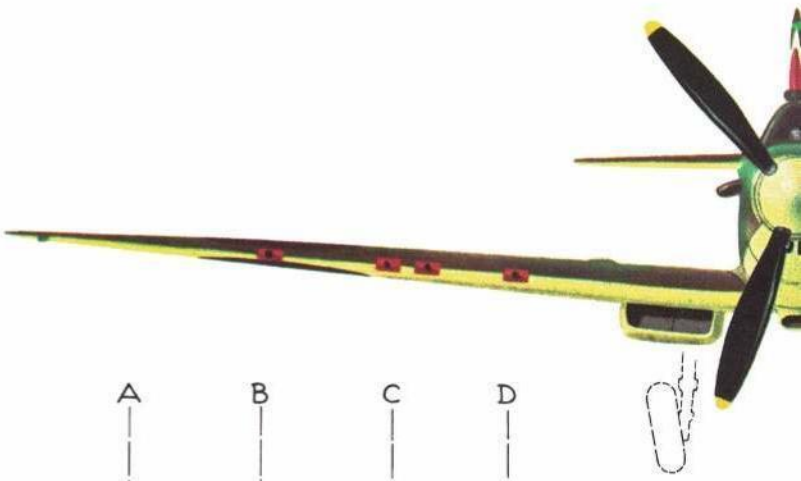


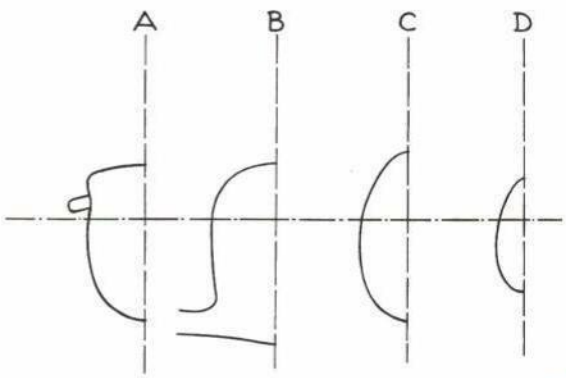
FIG. 2 — ENGINE CRANK

Engine crank is modified from standard elevator unit. The two holes to be drilled are not on a common line through center bolt.

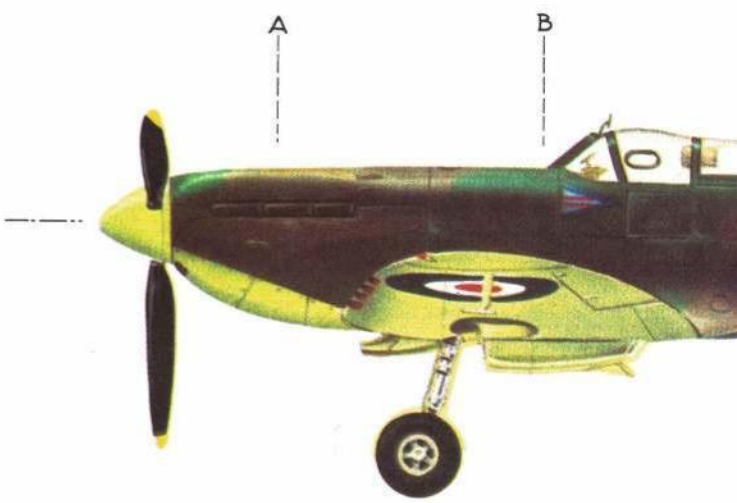


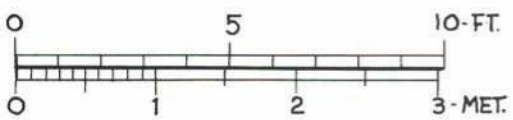
Assembled unit must operate freely in all combinations of positions. Engine crank stop limits both high- and low-speed positions.





Wing Commander's Pennant carried on fuselage below the windscreen.

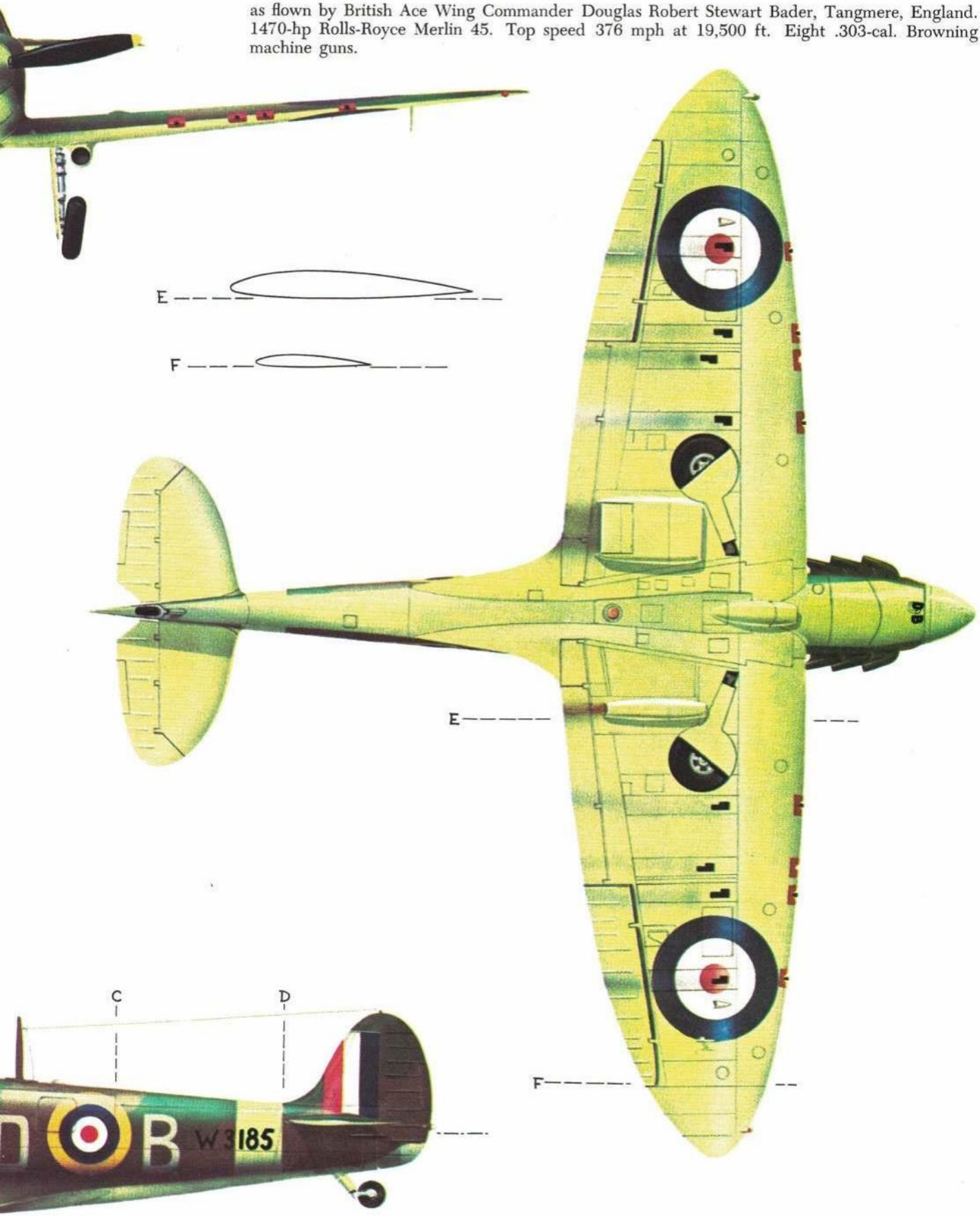




American Aircraft Modeler album of all-time favorites:

1941 SUPERMARINE SPITFIRE Va

as flown by British Ace Wing Commander Douglas Robert Stewart Bader, Tangmere, England. 1470-hp Rolls-Royce Merlin 45. Top speed 376 mph at 19,500 ft. Eight .303-cal. Browning machine guns.



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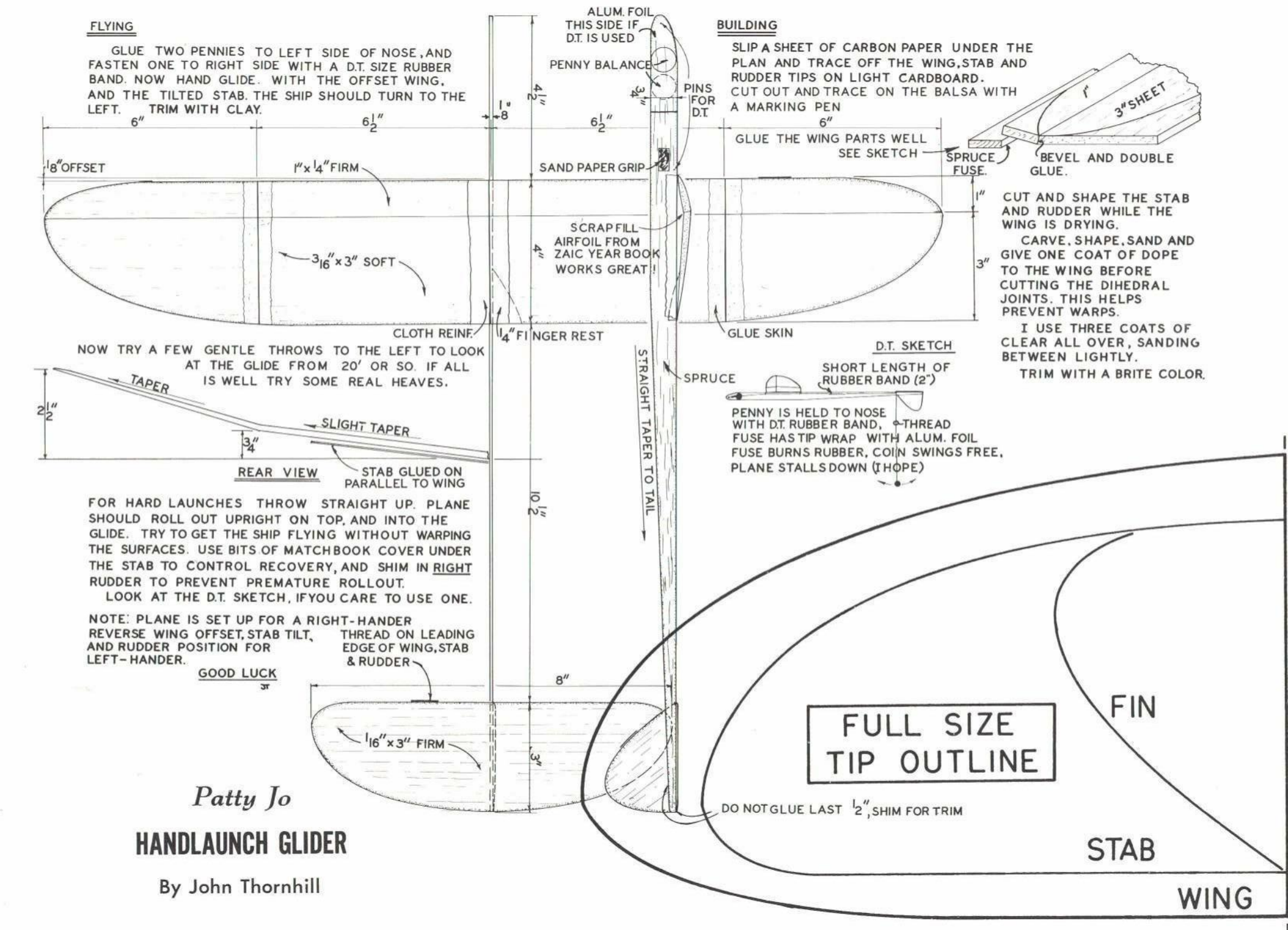


Patty Jo

HANDLAUNCH GLIDER

By John Thornhill

EIGHTEENTH IN A SERIES

GETTING STARTED IN R/C

More on terminology: What is Multi? Proportional? Digital? Pulse? What might you start with?

HOWARD MC ENTEE

CONTINUING the discussion started last month, you'll recall we started out to answer the query of a reader who was confused by R/C system terminology — but we got sidetracked to some extent (and even backtracked) to try and show how system terminology started, and why outmoded terminology is still in wide use.

Our reader wanted to know what is meant by "multi," which we covered last month. He asked next about "proportional," "multi proportional," and "digital proportional." We went rather deeply into proportional way back in Part 2 of this series, but briefly, it's a system allowing an infinite number of positions for a control surface (or throttle or anything else we wish to move) in the remote model. Usually a stick, knob or lever is moved on the transmitter, and the control follows in exact step. Earlier and less precise systems didn't allow this infinite range of control — they often could produce only full movement or none at all. In some, that full movement had to be accepted in sequence — you couldn't just signal for a right turn and immediately get it!

Now let's digress again for a moment. You'll hear the term "pulse proportional" — just what is that? Generally it's any system in which the plane control surfaces can be seen to wiggle or flutter; they are doing so in step with the pulses being sent from the transmitter. Such systems preferably are set up so that the plane cannot wobble in step with the control surface wiggles; this simply requires keeping the pulse rate above a certain minimum. Pulse proportional generally is simple, relatively low in cost, but can produce fine flying results. And by raising the pulse rate a bit and utilizing the proper servos, that surface wiggle is virtually eliminated — but the system is still basically pulse proportional!

Back to our confused reader, "multi proportional" is a system that allows proportional control of *more* than one surface in a model. We specify "surface," but today engine throttle is considered quite an important control too; thus a system which allows proportional control of rudder and throttle could be considered to be multi proportional. So could a system that provides proportional control of rudder, elevator, throttle, ailerons, flaps and engine mixture! Again, "multi" is an outmoded term which should be dropped, but doubtless never will be!

Our friend wanted to know what "digital proportional" is. It simply is the presently accepted, best scheme for obtaining a number of proportional controls from a given system. "Digital" denotes a modest similarity to the operating methods of digital computor circuitry; the latter work mostly with either full current flow or none at all. There is no in-between variation. Our digital proportional systems also use much on-off circuitry.

Earlier proportional (or "propo" — one gets tired of writing that long word so often and propo is a widely accepted shortening of the term today) systems operated on the so-called "analog" principle. While digital signifies only two circuit states — full-on and full-off — analog describes a gradual variation in circuit state, which is actually how we move our control sticks, and how we want our servos to move. Digital systems start with the analog movement of the control stick by the flyer, change this to digital action in the transmitter and send it over the air this way, then translate it back to analog action at the servo (sounds very complex but for many reasons we won't go into here, it's considered the best way to do the job at present). Pulse propo systems operate on analog principles; however, serious flyers who wish to move many controls on their models proportionally find that digital apparatus does a better job — and it's about all you can get for such control systems.

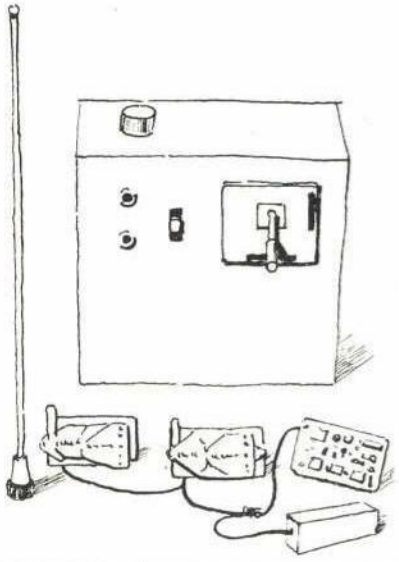
Now just because a system is digital, this doesn't signify that it must necessarily handle two or more servos in a model. Actually, we have on the hobby market today digital systems designed to drive any number of servos from one up to eight. More could easily be handled if there were a need. Needless to say, the single-control digital system is rather low in cost — but more than the simpler pulse propo single-control systems. It offers more, though; the servo is the same as those used in multi digital propo systems and has just as much power and the same precision of action.

When you purchase a multi digital propo outfit, again, you don't have to use all those servos — you can start with just one in your model, add more as needed and as your skill progresses. The receiver of present such systems is about the same size and weight as that for a single-control pulse propo rig; the battery pack supplied with the multi outfit will be larger and heavier than you really need for one or two controls — but if your plane will carry it, this is no problem.

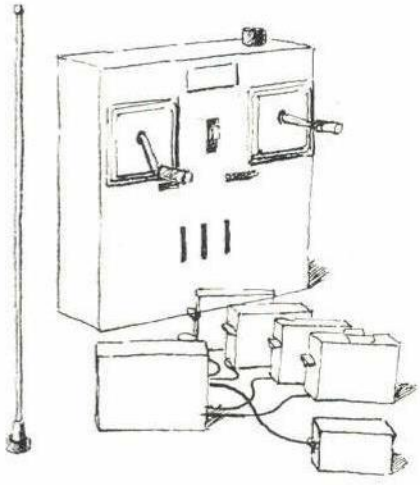
We personally feel that a newcomer to R/C is best off buying a pulse propo system to start with, preferably one of the latest type that allows easy change of pulse rate. Such transmitters and receivers are highly versatile, in that they allow you to start out with a low cost rudder servo or actuator for flying a small plane. Perhaps the plane can also carry the necessary additions in equipment to control the throttle (this might add only an ounce or two of weight). As you grow more adept — and ambitious — you could graduate to Galloping Ghost, then on to use of separate servos for all plane functions.

There are those who feel the newcomer should purchase a full multi digital propo rig right at the beginning; if the modeler knows he will stick with R/C for a considerable time, this larger investment is doubtless justified. You can purchase — say — a five-control digital transmitter and receiver, but only the number of servos you wish to use in your first plane (or as many as you can afford). You can always buy more servos, possibly a larger battery pack, later on when you go to a larger and more complex plane. This way, of course, you will not have wasted money on a simpler rig, which will be of little use to you after you have graduated to a hot multi control model.

We hope our discussion and the several digressions into R/C history, nomenclature and so on will help clear up some of the doubts over terms used in R/C today.



Typical single-channel dual-servo system. Can also be used as single-servo Galloping Ghost. Includes: transmitter, receiver, servos, and battery pack. Dry battery in transmitter but charger needed for airborne nickel-cadmium batteries.



Typical multi digital proportional system. Includes: transmitter, receiver, four servos, battery packs and charger (usually in transmitter case). Basic systems offer four functions with up to eight functions available on the more deluxe sets.

MARCH 1969

MODEL AVIATION

Official magazine

A.M.A. NEWS

Academy of Model Aeronautics • 1239 Vermont Avenue N.W., Washington, DC 20005

Wash. ANG Academy of Aerospace Science & Modeling

One of the most wonderful aerospace education and modeling centers ever conceived is proposed to be constructed at Camp Murray, Tacoma, Wash. While certain approvals still need to be had, it appears that this venture, estimated to cost somewhat over a million dollars, is well on its way to fruition.

The concept provides facilities for operating radio-controlled model airplanes, model rockets, model boats and seaplanes, control line models, model cars, model railroads, and slot cars. The model railroads and slot cars would be run within the proposed 11,770 sq. ft. Academy building, while outdoor sites for other interests would be developed at Camp Murray.

For RC aircraft, the proposed area is 1,000′ x 800′, featuring 400′ x 100′ paved runway with adjacent parking ramp and taxiway. This same area, plus tracking stations, would be used for model rockets.

Model boats and seaplanes would operate along a beach at an existing lake. Allotted space would provide necessary water area for hydroplane competitions, seaplane operation, and cruising with electric and gas-powered scale model boats.

Eight control line circles would be provided according to initial planning, together with adjacent covered pit areas. It is envisioned that three of the circles would be grass of 180-ft. diameter, two paved 180-ft., and three paved 100-ft.

Plans for the model car area call for two paved 70-ft. circles. Here, too, there would be a covered work bench and pit area.

"The idea of a Washington State Academy for Aerospace Science and Modeling was conceived as a logical answer to the absolute need for educational facilities and programs in this field for young people," is the beginning sentence in the ANG's description of the proposed facility. "Not only does the knowledge explosion demand a greater exposure for youngsters to space age technology, but far greater numbers of our youth must be attracted and motivated to this career field if we hope to maintain our leadership as a nation. A center designed to provide both an educational foundation of scientific theory along with the practical application of modeling represents the finest possible approach to learning."

A draft of the purposes of the proposed Washington State Academy of Science and Modeling includes the following:

1. To encourage youngsters to participate in wholesome and constructive activities.
2. To promote development of modeling as a recognized sport and as a worthwhile recreational activity.
3. To introduce today's youngsters to modeling activities as a challenge in problem solving and the attainment of knowledge.
4. To provide a scientific and vocational environment for extracurricular research and experimentation.
5. To provide a facility, second to none, for state, regional, national and international model meets and contests.
6. Provide a place for scientific workshops, seminars and conferences.
7. To motivate youngsters and create new horizons of interest and enthusiasm for learning and scientific or vocational achievement.
8. To establish rapport among youngsters, educators, modelers, civic groups, and people in business, industry and government.
9. To give stimuli and confidence providing constructive direction, experiences, and new ideas.
10. To foster race, religious and ethnic equality, harmony and understanding.

In a statement about the proposal, Major General Howard S. McGee (The Adjutant General, Washington Air National Guard) said:

"The assets of the National Guard, including the skill and knowledge of its members, have long been dedicated to the training and development of American youth. The Aerospace Science and Modeling program . . . offers a unique opportunity to utilize a portion of our facilities to encourage the development of a broader segment of our youth; preparing them for the future, motivated by the high ideals of duty and responsible citizenship and better able to contribute to the growth of this nation. I view this as an appropriate application of our efforts and use of our facilities.

"The Washington National Guard, by providing space at Camp Murray, can become the catalyst to launch an outstanding civic and educational program complementing existing public education and recreation programs. The value of this concept and enthusiastic support from both private and public agencies is clearly demonstrated by . . . comments from individuals vitally interested in the project."

AMA leaders and the HQ staff have assisted in the Washington state project. Cliff Weirick and Phil Kraft attended meetings and a special workshop program to promote the project, along with local leaders Ralph Brooke, Neil Udell and others. AMA's Dist. XI Vice President Bob Stalick and other district officers also have contributed support. State project officers visited AMA HQ last September to obtain documentation of aeromodeling's contribution to education. HQ has assisted further by obtaining endorsement of the project by the National Aeronautic Association and the National Aerospace Education Council.

AMA leaders participated with the Washington State Air National Guard in a workshop which studied the various aspects of the proposed Washington State Academy for Aerospace Science and Modeling at Camp Murray, Tacoma. The facility envisions flying areas for CL, RC, and rockets.

1969 Program to Pick Indoor Team for 1970

Who's eligible to be on the team? Any AMA member who will be at least 14 years old by the time of the World Championships in 1970.

1. **Entry requirements:**

a. A contestant who wishes to qualify at a regular sanctioned AMA indoor contest must preregister via AMA Headquarters by remitting a qualification fee ($3 for Open members, $1 for Jrs. or Srs.), in return for which he will receive a program entry form. The contestant must then fill out the form, obtain the meet CD's signature, to certify that the information is correct, then mail the form back to Headquarters. Note: the qualification fee mailing must be postmarked no later than midnite of the day before the contest of qualification.

b. A contestant who wishes to qualify via local qualification trials will pay a qualification fee (same as in 1. a., preceding) to the Contest Director at the first trials. Upon receipt by Headquarters of the contest report from the trials CD, with fees, those contestants who did not qualify will be forwarded a program entry form, as per a.

c. Those who qualify by either a. or b. will receive a notice of qualification, certifying eligibility for the quarter-finals.

d. Those with a program entry form from Headquarters may attempt to qualify at either local qualification trials or regular sanctioned AMA indoor contests, without payment of further qualification fees.

e. Contest Directors of qualification, quarter and semi-finals meets may fly in those meets provided that two contestants or other officials time the CD's flights. The CD of the Finals meet, however, may not fly in that meet.

2. **Local Qualification Trials:**

a. An unlimited number of local Qualification Trials may be held in the U. S., between January 1 and April 30, 1969. Each Trials shall be sanctioned through normal channels as for AMA contests and have a minimum of four entrants who hold a current AMA membership card with FAI stamp. Each contestant may enter any or all the local Qualification Trials in his Zone. FAI Rules shall apply at each Trials, except that "rounds" need not be flown. Any ceiling height may be used for each Trials. All flyers who score 60% of the top time at each Trials shall qualify for entry in the Quarter Finals.

b. A contestant at a regular sanctioned AMA indoor contest, held between Jan. 1 and April 30, 1969, may qualify by scoring at least 60% of the winning time for that contest. Same AMA membership and FAI stamp requirements. Model flown in the contest must qualify for FAI Indoor.

3. **Quarter Final Trials:**

Quarter Final Trials may be held in any ceiling height, and must be completed by May 31, 1969. FAI rules shall apply, except that rounds need not be flown. All qualifiers from local Qualification Trials may enter any Quarter Finals anywhere, but only one. Top 80% qualify. Entry fees: Junior and Senior — $1, Open — $3.

4. **Semi-Final Trials:**

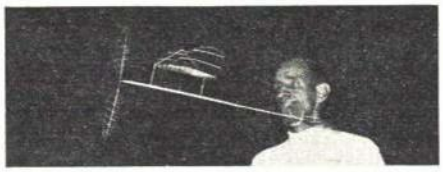
Zone Semi-Finals will be scheduled one per zone only. Entry fee — $5 per entrant and must be completed by June 30, 1969. Any ceiling height may be used, and full FAI rules will apply, including the use of rounds. Qualifiers from Quarter Finals in any zone may enter any Semi-Final in any zone but only one Semi-Final. The top three (3) from each zone shall qualify for entry in the Finals; if less than 5 enter any Semi-Final, the top 50% will qualify for the Finals.

5. **Team Selection Finals:**

The Finals shall be flown sometime during the summer of 1969, with FAI rules to be strictly observed, at a central U. S. location. Entry fee $5 per entrant, and the top 3 fliers shall represent the U.S.A. at the 1970 World Indoor Championships.

For more information:

Program administrator is Clarence Mather, 3880 Echochee Ave., San Diego, Calif. 92117. Area coordinators are: Bob Champine (East), 360 Abingdon Circle, Hampton, Va. 23369; Dick Ganslen (South-Central), 1204 Windsor, Denton, Tex. 76201; Jim Richmond (North-Central), 131 Pamela Dr., Bensenville, Ill. 60106.



Clarence Mather, indoor team program administrator. Shot from 1968 World Championship.

The AMA Headquarters staff, responsible for servicing over 25,000 members and 459 clubs in 1968. L to R: Helen Costello, chartered club secretary; Carl Wheeley, Publications Director; Gretchen Cantrell, membership clerk-typist; Lisa Katel, membership/film library clerk-typist; Jocelyn Cardinale, FAI/Contest/Records secretary; Giselle Jackson, accountant; Frank Ehling, Technical Director; Pamela Walker, membership clerk; Lucille Ward, Office Manager; Lesley McGill, Mail/Supplies secretary; John Worth, Executive Director; Dorothy Severson, addressing clerk-typist; Jim Stoneback, National Meet secretary. About two-thirds of those shown are full-time employees — most do at least two basic jobs and share several responsibilites.

1969 NATIONALS TENTATIVELY SET FOR JULY 14-20 AT WILLOW GROVE, PA. (NEAR PHILADELPHIA). PLAN TO BE THERE.

C.I.A.M. Meeting Results

The 1968 meeting of the Committee for International Aero Modeling (CIAM) of the Federation Aeronautique Internationale (FAI) was held at Paris, France, on November 23. Twenty-two countries attended. Representing the U. S. were Maynard Hill, Walt Good, Leroy Weber, Steve Wooley, Harry Stine and John Worth. The major decisions made at the meeting follow.

Radio Control

The 1969 World Championship is to be in West Germany at Lemwerder, July 23-27. Simultaneously with the Aerobatic WC, at the same site, will be the 1st International RC Scale Contest, sharing air time and frequencies on a coordinated basis. Some of the WC details:

a. Two circles for Aerobatics, plus one for Scale.

b. Four rounds will be flown.

c. Only four frequencies will be allowed for Aerobatics. Each team must use three (one each per team member) from this selection: 27.045, 27.095, 27.145 and 27.195 MHz.

d. Two frequencies are allowed for Scale; either may be used: 26.995 and 27.255 MHz.

e. Entry fees: $40 for team members, $60 for supporters.

A new rule adopted requires the use of an "effective silencer" for all models entered in FAI RC competitions (all the meets on the FAI calendar). The proposed requirement of silencers in other categories (FF and CL) was tabled, pending study by the subcommittees.

Free Flight

The 1969 World Championship is planned for Austria at Wiener Neustadt, August 12-17.

New for '69, three models may be flown in FF events. The various parts of the three models may be interchanged provided the resultant complete model conforms to the rules.

Coupe D'Hiver rules have been accepted by the CIAM on a provisional basis. However, no R.O.G. is required, and the number of flights has been changed from three to five.

Control Line

Only two-line systems are allowed for FAI Speed (mono-line no longer permitted) starting in 1969. Minimum diameter of each line is increased to .3 mm (.0118 in.).

For Team Racing WCs, a 100-lap semi-final race is added.

General

The two Jim Walker trophies, donated by the '66 U. S. CL team, were officially accepted by the CIAM. They are awarded on a perpetual basis to the team and individual CL Stunt World Champions.

The first Model Rocketry World Championship is scheduled for 1970 in Yugoslavia. Events will be for Scale and Altitude.

New CIAM officers:
President: S. Pimenoff — Finland
V. Pres.: R. Cerny — Czechoslovakia
Tech. Sec.: R. Moulton — England
Secretary: J. Ganier — France

Profile Carrier Tips

Ed. note: Control line Carrier is fun both to fly and watch. If you're not familiar with Carrier Flying, here's how it is.

Models fly from a simulated aircraft carrier deck curved to fit the flight circle, either on the ground or elevated a few inches above — with all but the deck area considered to be water! Idea is for such a model to take off from the carrier deck and fly at high speed for a half mile (as if on a simulated strike mission). Then it is slowed down by the pilot to be clocked for a half mile at minimum speed (simulating approach for a carrier deck landing). Finally, the model is landed on the simulated deck — either with or without the engine running — utilizing an arresting hook and lines stretched across the deck just as with full-size U. S. Navy planes.

It's exciting! That's why competitions for Navy Carrier scale models have been conducted for many years. Now, a new class has been introduced which makes practical the use of simple sport models with just the addition of an arresting hook. Maybe there's something here for you — if so, read on.

Profile Carrier events have been held in various areas throughout the country without the benefit of official rules. Now these models have their own official event with a special set of rules. This should have particular appeal to the younger flyers and the average "Sunday flyer" as far less sophistication than for Navy Carrier I and II "scale classes" is required. You don't need to have a super-detailed scale plane with racing engine and exotic fuel system to compete in Profile. In fact the rules prohibit these specialized systems.

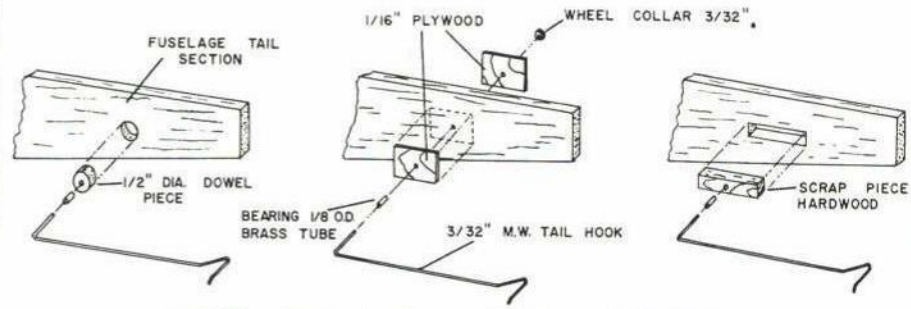
Basically the rules call for a semi-realistic type of plane with a profile fuselage, 300 sq. in. minimum wing area, and a 35 RC plain bearing engine. No cowls or pressure fuel systems are allowed. Paint the plane in your favorite Navy colors, and you are in business. Three .015" diameter lines are required for flying.

These rules are the first attempt at providing rules for Profile Carrier, and undoubtedly will not please everyone. But they are a good beginning. The primary idea was to set up rules that would allow anyone to go down to the local hobby shop to get the items needed for the event, rather than encourage special "expert-only" equipment. The second reason for the event was to have a "slowed down" version of Carrier rather than the 100-plus mph birds presently flying. Therefore, certain restrictions were necessary to achieve this, while at the same time providing a general rules structure.

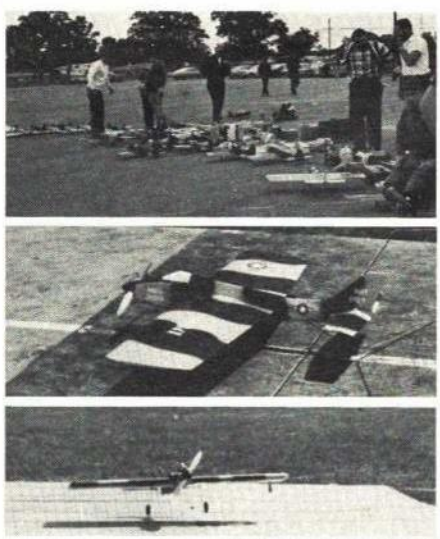
The 300 sq. in. minimum wing area requirement is important. This one point caused many hours of careful consideration before the final decision was made. This was a case of providing enough size so that the plane would fly well at low speed; it also works against encouraging "speed" models. The biggest problem with this rule is that the very popular Sterling Skyshark, a kit designated as a Profile Carrier plane, is prohibited if built according to the instructions. The wing on this plane comes out around 220 sq. in. if built stock. The main reason that the rules were not reduced to this small size was because this would then discourage use of a greater number of kits with larger wings. To name a few: Goldberg's Buster, Shoestring, Cosmic Wind; Sterling's Ringmaster, F-51 Mustang, Yak-9; Top Flite's Flite Streak; plus many more. This was a case of fitting the rules to the greater number of available kits, plus the fact that the larger wing size will help to reduce speeds. An added advantage is that with a 300 sq. in. wing, it is not necessary to use flaps for added lift on low speed. This makes for simpler construction and uncomplicated control linkages. It is possible to get a sustained speed below 20 mph with a 300 sq. in. wing.

The requirement for a 35 RC plain bearing engine is another case of providing for the use of readily available equipment. The use of custom throttles, fuel regulators, and pressure fuel systems for maximum performance has become a specialized art in Navy Carrier Class I and Class II. Banning pressure systems and requiring factory production throttles makes Profile Carrier a slower and less sophisticated event. The reason for *three* .015" diameter lines is the same; these are available at most hobby shops already made up to the correct lengths. Two-line systems have been tried many times, and most have been unsuccessful. As long as everyone is competing with three lines as a base, there is no need to provide a loophole for the two-line "Mickey Mouse" systems. The primary way to win in Navy Carrier is to have good reliable equipment and to know how to use it consistently — not find a loophole in the rules to achieve a "technical breakthrough."

The foregoing was based on information provided by Howard C. Mottin, Chairman, Control Line Section, 1968 AMA Contest Board.



THREE METHODS FOR INSTALLING ARRESTING HOOK IN A PROFILE FUSELAGE



Photos by Howard Mottin

Michigan Carrier meet and typical Profile Carrier plane. Note adaptation of sport model.

1970-71 Team Selection Planning Underway

Selection of U. S. teams for the various FAI World Championships (eight of them, altogether) is a continuing effort even though the WC takes place only every other year. This is because some of the team qualification programs are spread over a two-year period, and it also allows time for the volunteer committees to reexamine previous programs with a view to improving them if possible.

Details for the free flight and control line programs were almost complete at press time. If finalized in time, details will be announced in AMA News Extra in this issue.

Radio Control. Tom Rankin (10317 Crestmoor Dr., Silver Spring, Md. 20901) has been appointed by the AMA president as administrator of the program to select the 1971 RC team. Joining Rankin on the committee are Betty Stream, committee secretary (3723 Snowden Ave., Long Beach, Calif. 90808), Dave Burt (3048 Central St., Evanston, Ill. 60201), Alex Chisolm (615 E. Belmont Ave., Fresno, Calif. 93701), Dr. Bob Lien (1430 Tulane, New Orleans, La. 70112), Randy McGee (2401 Huntleigh Ct., Oklahoma City, Okla. 73120), Bill Kempton (9207 East 118th, Puyallup, Wash. 98371), Cliff Piper (Highland Rd., Atkinson, N. H. 03811), Nate Rambo (1158 Baywood Ave., Camarillo, Calif. 93010).

Modelers are urged to contact the nearest RC committee member and offer suggestions for program improvements.

Free Flight. Dave Linstrum (12411 Leigh Lane, Maryland Heights, Mo. 63042) has named a panel of ten modelers to assist in developing and carrying out a program to select U. S. team members for the 1971 FF World Championship. They are Ed Dolby (112 West Mission Lane, Phoenix, Ariz. 85021), Mike Des Jardins, acting chairman (718 Seventeenth St., Denver, Colo. 80202). Bill Hartill (7513 Sausalito Ave., Canoga Park, Calif. 91304), Hugh Langevin (4854 Aldrich Ave. South, Minneapolis, Minn. 55409), George Lewis, Jr. (29536 Bonnie Dr., Warren, Mich. 48093), Floyd Miller (1313 Brookridge Dr., Columbus, O. 43221), Robert Sifleet (6720 Fox Meadow Rd., Baltimore, Md. 21207), Pete Sotich (3851 W. 62nd Pl., Chicago, Ill. 60629), Robert Stalick (2807 South Oak, Albany, Ore. 97321), and George Xenakis (223 Viceroy, Houston, Tex. 77034).

Indoor. Clarence Mather, San Diego, Calif., is team selection program committee chmn. Next WC is planned for 1970. See separate program details.

Control Line. Steve Wooley (821 4th St., Marietta, Ohio 45750) is program administrator for picking the 1970 U. S. CL World Championship teams. Three events are involved: speed, stunt and team racing.

AMA-HIAA-Navy Regional Program Report

The 1968 AMA-HIAA-Navy regional program introduced about 1,000 youngsters to model aviation and provided expense-paid trips for eighteen winners to the National Model Airplane Championships. Despite being initiated on a crash basis the program was highly successful and is being succeeded by an expanded program for 1969.

The programs are a combined effort of the Academy of Model Aeronautics, the Hobby Industry Association of America, and the United States Navy. They feature meets with special events, tailored to youngsters with little or no previous model airplane competition experience.

Participation requirements are minimized. Regular AMA membership is not required of contestants. In some events it is not even necessary to build a model — plastic ready-to-fly control-liners, for example, may be used. The objective of the programs is to expose youngsters to model aviation and competition.

It is also intended that adults get involved with helping youngsters. This is difficult to do at conventional AMA meets which are basically adult-oriented; so much so that the oldsters are too busy doing things for themselves. The 1968 meets were outstandingly successful in this regard — many adults found out that helping young contestants was fun.

Eleven meets were held in 1968, and twice as many are anticipated for 1969. Since the '68 meets were successful, practically all of last year's sites and Contest Directors are expected to be available again in 1969:

San Francisco, Calif., Karl Gies, CD
Phila., Pa., Tom Keer, CD
Dallas*, Texas, Bill Lank, CD
Meridian*, Miss., Al Wright, CD
S. Weymouth*, Mass., Dave Cook, CD
Fentress*, Va., A. K. Anderson, CD
Twin Cities, Minn., Jeff Welliver, CD
Los Angeles, Calif., V. Cunnyngham Jr., CD
Pensacola*, Fla., Russ Verbael, CD
Miami, Fla., Jerry Wagner, CD
Seattle*, Wash., Don Zipoy, CD

Originally, it was planned to have all meets at naval air stations. But there were problems of schedule conflicts, site suitability, and awkward location. However, Navy cooperation in shifting some meets to civilian sites solved the problems and did not greatly compromise the goals — the promotion of Navy interest in model aviation and the Nationals.

Six of the meets (shown by asterisk in the list) were held on naval air stations. In the other areas meets were generally held closer to downtown. It was found that many of the non-Navy sites, because they were closer to the cities, were able to attract larger participation — transportation was much less of a problem. Yet Navy connection with the program was maintained by having naval personnel on the contest scene, sharing in the award presentations and the publicity. The same principle is being applied to the 1969 program so that more non-Navy sites may be utilized, although it is also hoped that additional naval stations may be included.

The hobby industry participation provides two key ingredients, prizes and promotion. Seventeen member manufacturers of the HIAA provided $6,000 in merchandise awards for 1968. They also contributed direct financial support which enabled about 40 youngsters from the National Meet to spend a day at sea on an aircraft carrier cruise. This included flying from the Nats to Pensacola, Florida, then back.

The HIAA office in New York City also provided promotional help in distributing publicity kits to hobby dealers and distributors, and by issuing press releases. The AMA and HIAA offices worked very closely together in coordinating the effort, particularly in producing the publicity kit materials. The same teamwork will operate in the '69 program.

AMA's HQ staff designed the '68 program and promoted the operation of meets by AMA Contest Directors and Chartered Clubs. Meets were sanctioned without charge. Special instructions were provided to Contest Directors along with frequent bulletins to interchange information from CD's.

Local AMA people in each meet area agreed to sponsor at least one winner to the National Meet. Several areas actually sent more than one — the Philadelphia group, led by Tom Kerr of the Delaware Valley Federation of Model Airplane Clubs, sent eight youngsters to the Nationals! Acceptance of this travel obligation at the local level is the key to the program's success — the most successful local efforts obtained the help of dealers, civic or business groups to absorb the transportation cost.

The special events used in the meets included four free flight and four control line events. Each meet had to hold at least five events so that a mixture of free flight and control line was assured. This was intentional in order to ensure attraction of both interests. This event planning worked so well it is being repeated for 1969 with only minor changes. The events were described in the July '68 issue of American Aircraft Modeler and will be covered again in the official 1969 program announcement to come in a future issue.

The free flight events are designed for small field use; even a shopping center can be a suitable site for hand-launched glider or AMA Cub models. The same two free flight events may be flown indoors. In some cases it is possible to use only one or two control line circles plus a gymnasium or auditorium-type building, so that comparatively small facilities can be utilized. A hangar and the ramp in front, for example, is suitable; as is some combination of school gym and playground.

One important lesson was learned in the 1968 program. This was that such special Junior meets need not be held as part of larger conventional meets. It was easier and better in practically all cases for the special meet to be run on its own. This was the best assurance that enough officials would be provided so that newcomers could be given full attention. It also assured that more dads were available to help since they weren't busy with other events.

The 1969 program is currently in final development. It is expected to be an expanded version of the 1968 program. Since the program is no longer restricted to using only naval air stations, the potential for more meets is greatly increased. It is expected that more commercial sponsorship of meets is likely, using such community centers as shopping centers or ballfields.

While 1969 program details are to be announced shortly, AMA is interested in hearing right now from those who might be interested in hosting a meet in their area. The following basics apply: if the host sponsors a winner to the National Meet (to be held in the Philadelphia area in '69), the HIAA will supply the contest prizes, (expected to include a cruise on an aircraft carrier) and meet promotional material, the AMA will supply all competition details (rules, free sanctions, special entry), the Navy will assist by publicity and making sites available. AMA Contest Directors and clubs in local areas will direct and assist meet operation.

New for '69 will be a closer tie to the National Meet. In 1968 those who won trips could only enter conventional events at the Nationals. In 1969 the special events are expected to be part of the Nats contest. And instead of being lost in the overall Nats activity, the regional winners are to receive special publicity and identification — with events to be held in prime time

Photos by Don Orr and Bill Conkling

Pictured are three young contestants who were entered in the AMA-HIAA-Navy Regional Meet at Fentress, Va. The free-flight portion was directed by the Brainbusters Model Club. The kids got in a lot of flying — some with AMA Cubs (or Racers) built on the field.

and location.

Perhaps the most significant aspect of the AMA-HIAA-Navy program is the joining of forces in a common effort. The 1968 program proved that there were great mutual benefits to be gained. The 1969 program is intended to increase the participation of each group for greater effectiveness. Watch for announcement of 1969 program details in these pages.

Fun with Juniors

The following report by John Pond, AMA's 1968 district vice-president from California, gives a picture of the enthusiasm and excitement which was typical of the 1968 regional meet program.

Tired of trying for that elusive umteenth "max flight"? Has your black box been giving you fits lately? If you are looking for new enjoyment in model aviation, put your latest creation aside and give a Junior some of your time.

If you have never had 50 kids tagging after asking for help, then you haven't lived. Most modelers are allergic to the idea of spending their time with Juniors, but the results are more than rewarding. The enthusiasm of kids is absolutely infectious. Before you know it, you are getting a bigger kick out of the Junior activity than the young ones.

The 1968 Northern California AMA-HIAA-Navy Regional Contest held on June 11 at Milpitas was no exception. When you see a die-hard like Joe Bilgri sit in a chair for better than three hours and do nothing but encourage and time kids, you know there is something to this Junior program.

Perhaps the happiest guy on the field was Karl Gies, the Contest Director. For six months prior to the HIAA Elims, Mr. Gies, as an industrial arts teacher, had been running classes in the hows and whys of model construction. Naturally, when the opportunity came to stage a local Jr./Sr. elimination contest, Karl was in an excelent position to handle the meet.

With this particular elimination, there was a considerable amount of anxiety. The Northern California area was not scheduled to have an elim., and when asked to stage a local meet, time was of the essence. One of the big problems was to stage the contest before the school semester ended. This entailed moving the date up even shorter.

However, with some prodigious efforts in publicity, the S.F. Bay area was flooded with notices. Then the tough breaks set in. Presidential aspirant Robert Kennedy was assassinated. All publicity promised by radio, TV and newspapers completely evaporated as the entire news media was concerned with the assassination.

On the humorous side of things, the writer discovered the announcement of the contest in the want ads of the S.F. Chronicle! An announcement of the contest on radio was made at 12 o'clock at night. Some time for those early-to-bed type of kids!

Regardless, the word did get out to the majority of kids highly interested in competing. Notices sent to various hobby shops helped as did all the notices posted in all school bulletin boards. In short, a concerted effort was made to offset the lack of the news publicity.

Perhaps one of the trickiest gimmicks employed by the Contest Director to attract kids was the promise to teach kids on the spot to build and fly models. Karl had arranged for several of his teaching colleagues to man the classrooms on Saturday for those kids desiring to build a model. The promise in the publicity was made to the kids that all they had to do was to bring 25 cents for an AMA Racer kit. The rest the teachers would handle.

Despite all the handicaps, the months of efforts paid off. Kids who didn't know a wing rib from the motor stick were winding and flying models with all the assurance of the experts.

Ever see a kid's expression when his Racer does over a minute outdoors? You will find yourself pitching in to try to get two minutes for the boy.

This particular elimination contest featured a "double-header"; i.e., outdoor flying in the morning and indoor flying in the afternoon. This was done to take advantage of that fabulous early morning California air that makes FF so popular. The indoor portion was staged in the afternoon as the wind arrives like clockwork at 11 a.m.

One other advantage in holding both types of events is the equalizing of chance. If you didn't have a good indoor flyer, you might get lucky in the outdoor events and vice versa. In addition, this made the determination of the overall winners much simpler, as the big winner of one or two events had to demonstrate versatility in more events.

One thing for sure, if you helped run this contest, you had a tremendous feeling of having contributed to the welfare of at least one boy's future. Not enough credit can be given to Contest Director Karl Gies and his school associates, and acknowledgement is made to the 900 Club whose members were of invaluable help.

The Bruce Hannah family, from Sacramento, arrived in force at the Northern Calif. AMA-HIAA-Navy Regional. Little Chris Young, right, was indefatiguable — never quit trying. Meet director Karl Gies.

"Father" of the Gas Model Engine Visited

Reprinted, with minor changes, from The Lake Erie Gas Model Club Newsletter, *Parma, Ohio, Richard Woodward, editor.*

Earlier this month, this editor had an opportunity to visit the man who has become known as the "father of the gas model airplane engine." Operating in a small but complete workshop located next to his home in State College, Pa., Bill Brown is still active in the model airplane hobby.

As a junior in high school, Bill produced his first operating miniature gas engine, a .29 cu. in. displacement ignition mill. In his early work with model airplane engines, Bill was encouraged and assisted by his shop teacher, Mr. Victor R. Fritz. A two-week article giving a full description of this engine appeared in the Philadelphia newspaper, *The Evening Bulletin*, in the May 30th and June 6, 1931, editions.

One of the earliest applications of the new miniature engine was to power a small surfboard. With the surfboard submerged from view, Bill really managed to confuse the lifeguard at the local swimming hole as he scooted about the lake with no apparent effort and a tremendous swimming speed!

The .60 cu. in. displacement "Brown Junior" engine, which is so well known to engine collectors, first entered into production in 1933, and was produced by the Junior Motors Corporation. Regretfully, the controlling people in the Junior Motors Corp. had little interest in developing other engine designs for future markets. With this obstacle, Bill was forced to continue engine experimentation on his own resources.

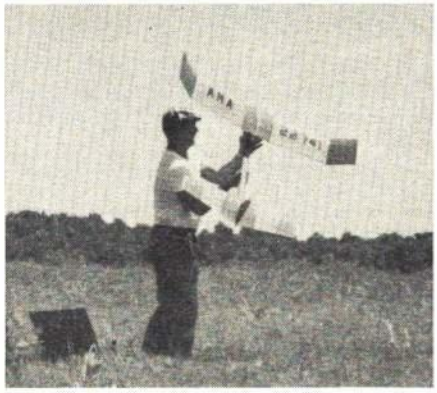
This further work on engines paid off, with the appearance of the Lykens Brown .12 engine in 1938. Bill considers the Lykens Brown to be the first "really successful" model engine. At the time of the Lykens Brown engine there were several other engines on the market; however, the Brown's running ability was far superior. The Lykens Brown was short-lived, for with the coming of the Second World War, Bill dropped the engine business in 1939. More recently, Bill Brown was the man behind the Campus CO_2 piston engine.

Presently Bill Brown has yet another "Brown Junior" engine in the works, with emphasis on the junior! This newest engine is a .005 cu. in. version of his earlier CO_2 engine. Everything is small about this engine. It has a special tank which is charged from a standard CO_2 cartridge with a charge gun. Weighing less than ½ oz., engine and tank combined, it is capable of running for about 30 seconds. A rocket engine using the same tank and charge unit, but with an exhaust nozzle instead of the piston engine, has also been developed. This latter combination is reported to give a 5-sec. run with the small tank. The small piston engine should be ideal for powering some of the small scale models, such as the rubber-powered biplane kits. The engine is designed to power a model weighing up to 2½ ounces.

A unique feature of these engines is the ablity to connect several tanks to one engine, or even combinations of several tanks and several engines. Using a central control valve for the tanks, it would be possible to make a multi-engined model with all engines running at equal power and all engines quitting at the same time.

It is expected that these new Brown CO_2 engines will be produced for sale, but time of availability and price is not known.

Bob Gutai (L), Bethlehem, Pa., won A and BC gas events at Maxecuters' Croom meet. Bob Sifleet (R), Baltimore, Md., waits out good air for HL glider. Meet used special small field rules.
Photos by John Sites



Small Field FF Rules Used

Reported by Ernest Violett

A change of flight rules to seven-second engine run and two-minute maximum flight was successfully used by the D. C. Maxecuters AMA Chartered Club in its July 21 meet at Croom, Md. Although this was unorthodox and was with little local area precedent, the club felt there was ample justification for the change because of small field conditions. Limitations on other events were also employed — 2-min. max for towline and 2½-min. max for rubber and HL glider.

The Maxecuters had originally planned its Class AAA-AMA-sanctioned meet for an excellent free flight site at Dickerson, Md., but the field owner subsequently withdrew permission for its use. Rather than abandon the meet, which had already been granted AMA sanction and was listed in the contest calendar, the club set out to find a new field. After weeks of fruitless inquiries and site inspections, permission was obtained to use the Croom site, public land controlled by the Maryland-National Capital Park and Planning Commission. At that time, it was recognized that the field was not ideal, approximately 2,500 by 4,700 feet with densely wooded perimeters, but it was the *only* contest site available in the area.

Trial flights by club members were not reassuring, particularly when using ten-sec. runs and three-min. maxes under windy conditions. Pre-contest appraisals and brainstorming sessions brought about the decision to reduce engine runs and flight times. Chief among the motivating factors was the desire to reduce or eliminate lost models — and hopefully improve contestant satisfaction. By noon of contest day the wisdom of this decision was confirmed! There were no lost aircraft; the contestants accepted the restrictions and praised their use.

Model performance, regarding the number of ships maxing out, was about the same as usual when a ten-sec. run and three-min. max is used. The only exception was FAI-class power models; these heavy models did not reach maximum climb rate on the seven-sec. run, and thus fared badly against lighter AMA-rule models.

Flyoffs were inevitable, just as with contests using full engine runs. However, to extend the flight time for successive flyoffs was inviting lost models, contrary to the initial concept. Therefore, it was decided to retain the two-minute max and to reduce the engine run from seven seconds to six, five, etc., in order to produce a winner. It works!

Featured prominently at the contest was a special event for youngsters under age 12. For this event, youngsters constructed AMA Cubs on the site, and then flew them for duration (total of four flights). The kits were furnished free, and all construction tools (white glue, pins and building boards) were provided. This event so thrilled the youngsters that plans are sure for a repeat at future contests.

Once Over

Soars with RC Pylon Racer

The Tulsa (Okla.) Glue Dobbers *News Letter* reports that Meyer Gutman removed the engine and landing gear from his delta-wing Hustler, converting it to a sailplane, and succeeded in putting in a 45-minute slope-soaring flight! This was, according to Wes Duncan, "to the disbelief of all the purists." He adds, "I'm sure this proves something, and I'm trying very hard to figure out what."

Plastic R-t-F Clinic

With an estimate at hand that only 5% of the ½A plastic ready-to-fly models sold are flown, the Cholla Choppers MAC has helped to improve the situation in the Tucson (Ariz.) area. By means of posters in all stores selling these models, youngsters who received them as Christmas presents were urged to attend a clinic last December 29. Club members taught the youngsters how to start, care for, and fly their models. No doubt they signed up many new members, too.

MMM Gets Good Publicity

The Magnificent Mountain Men club is to be complimented for working with *The Denver Post* (Colo.) in promoting the MMM-sponsored Rocky Mountain 3rd Annual FF Championships last September. The Oct. 1 *Post*, sent to us by Bill and Annie Gieskieng, has a full page of photos devoted to the meet—good credits to MMM, NFFS, and AMA.

Spins and Loops

The Long Island (N. Y.) Drone Society gave recognition at its October 20 club contest for the RC flyers who did the most spins after one minute's climb, the most loops in one minute, and the worst crash. Tops for spins was Joe D'Amico, followed by Bob VanWymersh, Bill Fuori, Angelo Lanci and Len Hauff. Loopers finished in the order of Bill Grant, Ray Jacabelli, Tom Biaco, Vince Veltry and Al Holmes. Dick Saggese was the unlucky one to get the worst crash award. Oscar Weingart, editor of the Lidsletter, is reported to be moving to San Francisco. Bill Fuori is slated to take over his post.

Flying Site Recommendations

The Cholla Choppers MAC is assisting AMA by preparing recommendations on flying sites for control line models which could be reproduced and used as part of a kit in promotion of flying sites. The club became aware of the need when AMA HQ put it in touch with a local agency interested in flying site information. By means of its *Hangar Talk* newsletter, Ed Hagerlin, editor, the Cholla Choppers recommend that clubs throughout the nation prepare their recommendations (for all types of flying activities — RC, FF, CL, etc.) and send them to AMA HQ. In this way HQ could provide flying site recommendations which would take into account a variety of existing conditions.

Oregon Club Reduces Dues

Due to the decrease in the AMA charter fee for clubs, the Willamette Modelers Club has also reduced its annual dues. The AMA charter fee for those 21 or over was reduced from $1.50 to $1.00, eliminated completely for Juniors and Seniors. The WMC reduced its annual dues to $6 for Open, $4 for Sr., and $2 for Jr. — a saving of 50c for Open and Jr., and $2.50 for Sr. WMC members.

Dutch-built AMA Cubs

Photo by A. L. Aarts

Some of the AMA Cub models have gotten as far as The Netherlands — not in flight but in kit form. A. L. Aarts writes that he has given the kits to several boys who have never had a piece of balsa in their fingers. "They all built the model without problems in 1½ to 2 hours, and the flying is very good." Aarts indicates that he favors adding nose ballast to make the models glide better.

Fast-Slow Pylon Race

An unusual fast-slow RC pylon race was a part of the Radio Control Club of Rochester's (N. Y.) final club contest on October 6. In this event two laps were flown wide open, then two laps as slow as possible. The winner, Gene White, was the contestant with the widest time spread between the fast and slow laps. He literally floated his Kraft-equipped Taurus around the slow-flight portion. Ed Keck was second, Larry Downing third.

Rat Race Too Fast?

Richard Ellis, reporting on the Golden West Championships last October at Garden Grove, Calif., says that it was the best contest that the Orange County Thunderbugs has sponsored. But, he says, Rat Racing is getting too fast. For instance, due to crashes none of the teams finished the 140-lap race. Ellis promotes .15 cu. in. engines for the event, saying it would be more fun and less hazardous.

Old-Timer TLG and Rubber

There has been a surge of activity for old-time "gassies," usually pre-WW II

Continued on page 52

AMA News Extra .....

1969-70 FAI FREE FLIGHT PROGRAM TO SELECT 1971 USA WORLD CHAMPIONSHIP TEAM

Three-man teams for Wakefield rubber, FAI power and A-2 towline glider will be chosen to compete in the 1971 World Championships. (Model and flight specifications for these classes are in the AMA rule book.) The program begins with qualifying, which may be done at meets throughout the country this year from March 29 thru August 3, progresses to regional Semi-Finals to be held over the 1969 Labor Day weekend, and culminates with a single Team Finals to be held Labor Day 1970.

QUALIFYING REQUIREMENTS

1. Entry: Open to any AMA member who has a valid FAI stamp. (FAI stamp available from AMA HQ with membership for $1 extra; $1.25 extra if purchased later.)

2. Entry fee: $4.00 per event for Senior and Open AMA members--no charge for Junior members. Entrant is provided with a Qualification Performance Affidavit which entitles him to enter asmany qualifying meets as he wishes until August 3, 1969, or until he qualifies for the S/F's. The entry fee is payable as follows:

a. In advance, by sending entry fee to AMA HQ. (Juniors send in request for free entry with stamped, addressed, return envelope.)

b. At an AMA sanctioned Q/T, by paying the $4 fee plus a $1 late fee--total of $5 (no late fee for Juniors). Fee must be paid before flying.

3. Qualifying meets: Fly in either regularly scheduled AMA sanctioned FF meets with scheduled FAI events by paying entry fee according to 2.a, or in AMA sanctioned Qualifying Trials by paying entry fee according to either 2.a or 2.b.

4. Performance needed to advance to Semi-Final. The only requirement is a seven-flight total of 14 minutes or better, with model specifications and timing in accordance with FAI rules for these events. The use of "rounds" is not required for qualifying. When the flyer has succeeded in qualifying, the Contest Director certifies to the achievement by means of the Qualification Performance Affidavit.

SEMI-FINALS

Those qualified as above may enter one of the regional Semi-Finals Aug. 30-Sept. 1, 1969. There are expected to be 5 to 7 of these throughout the country. Entry fee for the S/F's, payable at the site, is $5 per event for Senior and Open, $2 for Junior. Rounds will be flown; other details and method of advancement to Team Finals will be announced in early August, 1969.

TEAM FINALS

A single, country-wide T/F will be held in 1970 at a site to be selected. T/F entry fee is $12 per event, for all ages, payable at the site. The top three modelers in each event will be U.S. team members for the 1971 World Championships (tentatively scheduled for Sweden). T/F site will be announced in Fall of 1969.

FOR ADDITIONAL INFORMATION, contact Dave Linstrum, Program Administrator, 12411 Leigh Lane, Maryland Heights, Missouri 63042.

By special arrangement with the publisher this page is produced at the very last minute, just before the magazine is printed, to bring you the latest news concerning current Academy of Model Aeronautics events of national significance.

Once Over

Continued from page 50

spark ignition types. Now the Southern California Antique Model Plane Society has tried pre-1943-design events for outdoor rubber and towline glider at its November 17 contest. Rubber models were required to use the propeller shown on the original plan; TL gliders could use an auto-rudder if it was used originally.

Whitehead Memorial Meet?

Dick Meyer, chairman of AMA's Junior Committee, has proposed to the Greater Pittsburgh Aero Radio Control Society that it sponsor a memorial model meet in honor of Gustave Whitehead. Those who read the November *American Aircraft Modeler* will recall the growing wealth of data that Whitehead may have flown before the Wrights. Some of his experiments were conducted in Pittsburgh's Schenly Park where Meyer would like to stage the memorial meet.

NFFS Experiments with PUFF

The National Free Flight Society has come up with an experimental event called PUFF (penetration up-wind free flight). The event is for rubber models, duration, 2-minute max. What makes it PUFF is that the entire flight and landing of the model must occur up-wind of the launch line.

SAM Award to Pond

John Pond (San Francisco, Calif.) was presented with a commemorative trophy and honorary lifetime membership in the Society of Antique Modelers in a ceremony during the Second Old Timer Championships at Denver last July. This was for "his years of unselfish and untiring efforts in bringing great waves of old time flyers out of the woodwork," according to *Shoc Talk*, published by the Sky Hoppers of Orange County (Calif.).

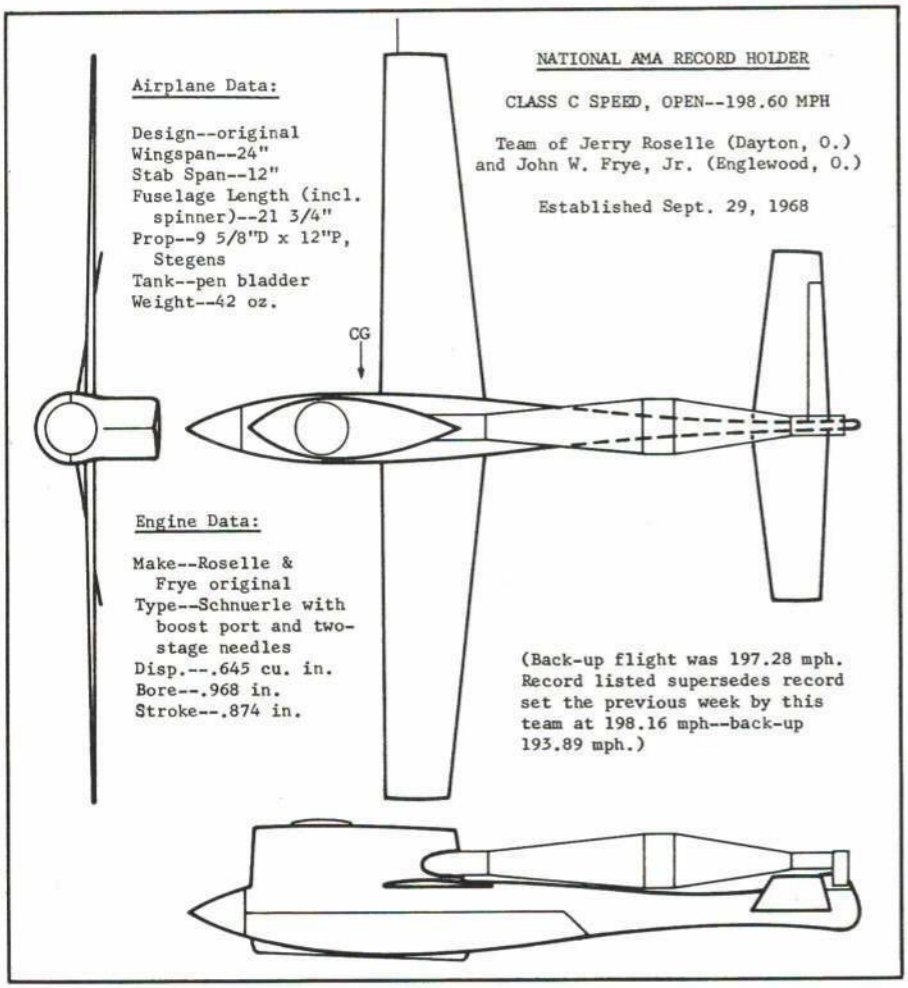
Northwest RC Conference

February 22-23 is when the Fourth Annual Northwest RC Conference will be put on by the RAMS and SMYC at Olympia, Wash., Tyee Motel. The conference features an exhibition of RC planes and boats (with judging for best finish and best of show), manufacturers' displays, RC home movies, raffle of Kraft equipment, banquet (Walt Schroder, guest speaker), dancing, and even a fashion show for the ladies. For more information contact the conference chairman, Ronald Champoux, 6306 47th Ave., S.W., Seattle, Wash. 98116.

Record Roundup

The following new national AMA records have been established since the previous listing.

Outdoor Free Flight	
Wakefield Op. J. Lenderman	20:39.0
Unlim. Rubber Op. R. White	22:07.0
Indoor, AMA Ceiling Cat. I	
B. Stick Jr. R. Dunham II	9:44.0
B. Cabin Jr. R. Dunham II	5:26.0
FAI Stick Jr. R. Dunham II	9:15.6
Indoor, AMA Ceiling Cat. II	
B. Stick Jr. R. Dunham II	15:58.2
Indoor, FAI Ceiling Cat. II	
FAI Stick JSO Stan Chilton	19:16.8



Newest Life member Points Way to Others

AMA has had only four "Life" members until now. The obvious reason is that among those who are inclined to support the organization beyond the basic membership dues, there are not many who are able to commit in a lump sum the $1,000 that a Life membership requries.

But recent Executive Council action in response to a proposal by AMA's legal counsel, now makes it easier to make a Life membership contribution. It is now possible to spread the $1,000 donation over a two year period, in three payments: a down payment, another payment a year later and a third payment two years after the first. This eases the financial strain at any one time and also provides tax benefits in three consecutive tax years.

The Executive Council voted 11-0 in favor of the proposal and it is now in being. To apply, you need only to send a check for at least one third of the $1,000 Life membership fee. Showing his faith in this proposal, our counsel accompanied it with his down payment. So we welcome him with enthusiasm as AMA's fifth Life member and hope that through his action other Life memberships may result.

Originally—about four years ago—AMA's counsel was retained to look after AMA's radio frequency problems. He has secured for us a frequency allocation from the FCC. He also helped in establishing AMA as a tax-free non-profit organization; and is now initiating a project to aid AMA clubs and individual members in the obtaining of flying sites.

The latter project is of vital interest to our future because without sites our activity cannot endure. AMA needs legal assistance in cases of threatened site loss due to noise or annoyance type complaints, in the establishment of legal guidelines to insure that site operation has a maximum protection of the law, and in the promotion of the use of government property for model flying purposes.

We, of course, share our counsel's oft-repeated views that the Academy of Model Aeronautics does an exceptional job—which needs greater appreciation and support—in directing the energies of young people into productive and challenging channels; and that AMA uses its dues income well for maximum membership benefit. It is our hope, therefore, that through the new Life membership plan others may contribute more substantially to our organization.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Feb. 16 — Lincoln Park, N. J. (AA) 9th Annual Snowbird Challenge Meet for CL. Site: Club Field, Two Bridges Rd. A. Cangialosi CD, 131 Horseneck Rd., Fairfield, N. J. 07006. Sponsor: **Garden State Circle Burners.**

Mar. 22-23 — Ft. Worth, Tex. (AA) Ft. Worth Thunderbirds RC Club Meet. Site: West Shore, Benbrook Lake. R. Lutker, 3105 Cockrell Ave., Ft. Worth, Tex. 76109.

May 3-4 — Dallas, Texas (AA) 4th Annual Dallas RC Club Contest. Site: North Lake City Park. C. Summers CD, 7132 Shook Ave., Dallas, Tex. 75214. Sponsor: **Dallas RC Club.**

May 25 — New Castle, Pa. Open RC Fun Fly. Site: PORKS Field. Z. Allerton CD, 124 Richelieu Ave., New Castle, Pa. 16101. Sponsor: **P.O.R.K.S.**

June 7-8 — Nashville, Tenn. (AAA) Mid-South RC Championships. Site: Edwin Warner Park. R. Reuther CD, 216 Vaughns Gap Rd., Nashville, Tenn. 37205. Sponsor: **Middle Tennessee RC Society.**

June 14-15 — Ft. Worth, Tex. (AA) Ft. Worth Thunderbirds RC Club Meet. Site: West Shore, Benbrook Lake. R. Lutker CD, 3105 Cockrell Ave., Ft. Worth, Tex. 76109.

June 21-22 — Denver, Colo. (AA) 11th Annual Mile Hi RC Meet. Site: Lowry AFB. W. Kessler CD, 4765 E. Eliff, Denver, Colo. 80222. Sponsor: **Mile Hi RC Club.**

Sunburst

Continued from page 27

1.375″ edge) should not be sanded except to flatten knife marks. Use epoxy to secure these fins to the body tube. Be sure to mount fin before you paint the body tube, otherwise the force of the takeoff will pull the fins off.

As shown in the drawing, the fins are mounted at 90-degree intervals around the body. A good way to do this is to take a compass and draw a circle slightly larger than the size of the O.D. of the body tube and draw two lines perpendicular to each other through the center of the circle, set the tube on the circle and mark it where the lines extend beyond the circle. Use an ordinary machinist's square or carpenter's tri-square to make a 1⅜″ mark up the side of the tube for fin placement. After fins are secured to the body tube, it should sit about 24 hours to allow the epoxy to set completely.

While the fins are drying, construct your parachute. Use a 19″ square of light-weight nylon or silk. Cut into an 18¼″ diameter circle. Then prevail on mother, sister, or wife to sew a .25″ seam around the edge. Divide the outer circumference into eight segments and mark with chalk or soap. Now cut four 30″ pieces of nylon cord (we use the twisted type about .0625″ in diameter) or heavy show makers linen thread. Sew one end of the cord to the parachute, then sew the other end to the point opposite on the chute. Don't be afraid to use a little thread to sew on securely.

Now, hang the parachute line loops over your finger so that the chute hangs free and the lines are of even length. Make a loop in the end of the lines and push about one inch of the shock cord end (the one without the snap swivel) through the loop and pull the loop tight. If you wish additional security, you can sew the free end of the shock cord back to the shock cord just below the loop.

The launch lugs are simply two .5″ long pieces of ordinary small size drinking straws. Epoxy one lug flush with the bottom of the body and midway between two fins, now epoxy the other one about .75″ from the top of the tube, making sure that it is directly in line with the lower one. These lugs serve as a guide for the rocket to ride on up the launch rod.

Prepare the nose cone by sanding, coating with sanding sealer, resanding, put on one more coat of sealer, and then re-sanding. Screw the screw eye into the center of the rear end of the nose cone, remove the screw eye, squirt some glue into the hole it made, and then screw the eye back into the hole. Hook the snap of the snap swivel into the screw eye and the rocket is completely assembled.

At this point, before painting, many modelers wish to test fire their rockets. (It is OK to paint first, if you wish.) To prepare for launching, put a wad of fireproof tissue or fiberglass into the nose end of the rocket and push down so that room is left for the chute (about 1″ of wadding is all that is needed). Fold the chute into a packet that will go into the tube, put the chute lines down the tube, followed by the chute. Then insert the nose cone.

Insert the motor by putting masking, freezer, or scotch tape around the engine about 1″ from the top and about 1″ above the nozzle. Enough tape should be used to insure a tight friction fit. This is necessary to keep the engine from ejecting when the recovery system ejection charge fires. In competition launchings, if the engine ejects the flight is not counted.

There are several good commercial igniters on the market. The FSI F18-8 engine

model rocketeer

NATIONAL ASSOCIATION OF ROCKETRY

1239 Vermont Avenue NW, Washington, DC 20005

NAR

USAF ACADEMY TO HOST NARAM-11

Unless unforseen complications occur, the U. S. Air Force Academy, Colorado Springs, Colo., will be the site of NARAM-11 (National Association of Rocketry Aeromodeling Meet), eleventh national model rocket competition. NAR President Al Beetch announced in November by letter to Association officials, trustees, and other interested persons, that the USAF Academy confirmed the request sent in by NAR Trustee Dr. William B. Rich (who is also USAF Reserve Officer).

Honorary Trustee William S. Roe, of 1225 N. Weber, Colorado Springs, Colo. 80903, has enthusiastically accepted the post of NARAM-11 Contest Director. Our latest report on progress for the Aug. 11-15, '69 competition indicated that meetings with Capt. Harry Kepner of the Academy Department of Astronautics were underway December-February. In attendance were NAR's Bill Roe, Larry Loos, Mel Severe (Metro Denver Rocket Assn.), plus representatives from Estes Industries and Flight Systems, and 1st Lt. John Wilson, Commander of Civil Air Patrol's Colorado Springs Composite Sq.

The Academy, in an ideal location for the Nats, will benefit from fact that exactly ten years earlier, NARAM-1 was held at Denver's Hogback Rocket Range, July 16-19, 1959, with NAR's G. Harry Stine, as Contest Director. More important, NARAM-4 was hosted by the Academy in Aug. '62. More details forthcoming.

NAR BY-LAWS ACCEPTED

Senior members attending NARAM-10 at NASA's Wallops Island Station last August approved the new NAR By-laws. A major change in the By-laws extended voting privileges to Leader members in all NAR affairs which include such items as By-laws revisions and election of both Trustees and Leader Administrative Council (LAC) members.

Meanwhile, Pascack Valley Section's Jim Barrowman has received high praise for his efforts before, during and after NARAM-10. As the 10th Nats Contest Director, Jim handled every detail of the project, with able assistance from his home section and other local NAR sections on the East coast. He was commended especially for his excellent launch system which completed all firings on time except for one day when second flights were flown.

A very active NAR Senior member, Jim as a trustee also serves as an advisor to the LAC and its members (for 68-69): Robert

Continued on page 54

Estes Cameroc/Delta is presented by G. Harry Stine, right, a trustee of NAR, to Eino Latvala, Chairman of American Institute of Aeronautics and Astronautics.

comes with an igniter. If it fails, use a piece of 32 gauge nichrome wire about 2.5" long and about a 2" piece of Jetex. Wrap three or four turns of the nichrome wire around the Jetex so that an equal amount sticks out on both sides. Thrust up into the engine so that about .5" of each of the nichrome leads hangs below the engine. Use a piece of fireproof wadding or Kleenex to make a plug to hold this igniter in place in the engine.

This article is too short to go into the construction of a launching device. A good one can be obtained from any of the rocket supply companies. Now that you are loaded and ready to launch, place the rocket on the launch pad, be sure that it is pointed straight up, return 25' to your launch switch, if the wind is gusty wait for a lull, then count down at least 5 seconds and press the switch. If you have followed instructions you should get a successful flight.

When you have recovered your bird, finish by painting. Your color scheme should be one of high visibility. All balsa and plywood surfaces should be gone over several times with sanding sealer and sanded as smoothly as possible. Do not sand the body tube. Decals with designs, numbers, and letters can be obtained from the supply houses. Decals add much to the appearance. After the desired colors are brushed or sprayed on, and any decals are in place, go over the entire rocket with a coat of clear lacquer and then wax to give a smooth finish. The smoother the rocket, the less drag; the less drag the greater the altitude.

The Sunburst is actually a design evolved in competition within the Apollo Rocket Society of Village Meadows School, a section of the NAR. The competition here between the advanced members is hot and heavy. In the last several shoots, ancestors of the Sunburst have proven themselves real high flyers. In the second language of our southwest — *Buena Suerte*!

Model Rocketeer

Continued from page 53

Mullane, John Belkewitch, Jr., J. Talley Guill, Joseph V. Persio, Patrick Staken, Elaine Sadkowski (secretary), and Jay Apt (chairman).

TWO CONVENTIONS PLANNED FOR SPRING

NAR members should plan to attend at least one of the two conventions set for this spring. The first will be the fourth annual Pittsburgh Spring Convention, March 14, 15 and 16, to be hosted by the Steel City Section, 1824 Wharton St., Pittsburgh, 15203 (write for details, include stamped envelope).

Second gathering of NAR members this

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Att: Mr. Sid Axelrod

Gentlemen:

Every month we read your Ads which cite the "EXPERTS" testimonials on the fabulous SUPER MONOKOTE, and let us tell you, they are as dry as dust. "I like SUPER MONOKOTE cause it tastes so good" etc., etc., etc.

So, we thought we'd let you know how some of the novices feel about it.

BILL WINANS

Remember back in December of 1967 before SUPER MONOKOTE was on the market we wrote you for a sample for Mr. Bill Winans. He was to use this on the Top Flite UNDER DAWG. Well, you sent 10 feet, which was more than sufficient to do the UNDER DAWG and several other items besides. Mr. Winans covered a T-Tail Glider of his own design, and flew this up at Jimmie Stewart's ranch and lost it, complete with it's new ORBIT radio. Bill and Jimmie flew over the area and couldn't find it. They rode horseback through the area, still no glider could be found, so sad but true, the little T-Tail was lost.

Just three weeks ago, telephone repairmen went into the area and found the T-Tail and returned it to Bill Winans. Now this had sat out there in the elements for over nine months, and except for a couple of places where racoons had chewed on the wing, this little T-Tail was still intact. Would you believe also, the SUPER MONOKOTE had kept the water and dampness out of the radio compartment, and the ORBIT still worked. Now, can the champs top that!

JOHN MARCUS AND HARVEY KREITENBERG

John and Harvey are a couple of High School kids, and both fly radio control. They go out to the Basin in a Ford Ranchero. One Sunday, planes in the back of the truck just driving away, Harvey's dog "CHAMP" decided he wanted to go along too. The dog took a running leap into the back of the truck smack bang onto a SUPER MONOKOTE wing.....and would you believe he just left a paw imprint! Now, this is no poodle. CHAMP is a 65# boxer dog. John and Harvey swear by SUPER MONOKOTE, and the tight-wads have found you can use it over and over again. Some of theirs has seen service on three different planes.

So.....it's real easy for us to see which covering is the choice of the Novices.....it's SUPER MONOKOTE all the way. Makes our job real easy to sell it too.

Maddy

MADDY WEISS (Mrs. Hans Weiss)

spring is the M.I.T. Section's third annual National Model Rocketry Convention, the weekend of April 4, 1969, at the Massachusetts Institute of Technology. Age and sex is no barrier to attending; all NAR members are invited.

Host for the event is M.I.T. Model Rocket Society, at M.I.T. Branch, P. O. Box 110, Cambridge, Mass. 02139, which reported total weekend cost is approximately $20, including hotel accommodations, bedding, launch site transportation, and literature.

Early information received indicated the program includes: guest speakers, two banquets, technical report presentations, model launchings, manufacturers displays, discussion groups, demonstrations, NASA films, and extensive use of analog and digital computers by teletype and closed-circuit television.

CAMROC MODEL PRESENTED TO AIAA

On Tuesday, Oct. 22, 1968, the Chairman of NAR's Liaison Committee, Mr. G. Harry Stine, briefed the Education Committee of the American Institute of Aeronautics and Astronautics at their 5th annual meeting in Philadelphia. On behalf of the NAR, Mr. Stine presented the Committee (for AIAA Hdqs.) an Estes Astron Delta/Camroc model together with Electro-Launch II unit. The model will be on permanent display in the Board Room of AIAA Hdq. in New York. It was specially built and donated for this purpose by Vern Estes, President of Estes Industries, Inc., Colo.

Mr. Stine noted later that most of the AIAA committee members had no concept of model astronautics and were extremely interested in learning more about it. Those that were aware of NAR and its endeavors, expressed favorable comments about NAR and spoke highly of its program in the U. S.

Though the committee present was im-

Continued on page 63

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Revell

Control That Engine

Continued from page 42A

by countersinking the flanged side of the engine-crank pivot bushing to accept a flat-head, 6-32 machine screw, and using only the fiber washer under the elevator crank bushing. The pivot bushing for the elevator crank can also be countersunk and a flat-head screw substituted for the round-head screw that comes with that crank.

In either case, the elevator-crank machine screw should be cut off flush with the face of its nut after assembly, so that it will clear the mounting platform. If a lock-washer is not used under this nut, the nut should be staked to the screw (using a center punch or a cold chisel) to keep it from vibrating loose. If necessary, cut a shallow groove in the mounting platform to clear this nut.

To rig the assembled control unit, fasten it to a scrap of wood in the throttle-open position as shown in Fig. 3. A No. 6 screw through the engine crank pivot bushing and brads through the pushrod holes in the bellcranks will hold the unit in alignment. Then attach the leadouts in the usual manner, making the throttle-control leadout 2⅛" longer than the elevator control leadouts, to match the dimensions of the control-handle connections.

Once the control unit is installed in the model and connected to the throttle, it's a good idea to install stops to limit the motion of the engine-control crank and assure positive full-throttle and idle positioning. The stop shown in Fig. 1 is a short length of No. 6 threaded rod screwed into a ⅛" diameter hole in the bellcrank platform. This single stop is so placed that it will limit motion in both directions.

Of course, if the engine has built-in stops at the idle and full-throttle positions, there

is no need for stops at the engine-control crank. The engine stops cannot be overloaded because, with this control unit, none of the flying loads are transmitted to the throttle.

An advantage of this type of engine-control unit lies in its versatility. The unit that we have described closes the throttle by forward motion of the engine-control crank. To use it with throttles requiring aft movement to close, simply invert the engine-control crank and reassemble the unit with the elevator crank forward and the engine control wire aft. You will need to adjust the lengths of the elevator and engine pushrods accordingly.

To operate arresting-hook, landing-flap, or other auxiliary mechanisms, use the extra holes in the actuating arm of the engine-control crank or drill additional holes where needed. You can also use standard bellcranks of other sizes to make up units to suit a particular model, engine, or throttle, limited only by your ingenuity.

So Sonny Soloed

Continued from page 23

We would be able to keep her from going gray in the kitchen wondering where in the world we are, and waiting hours for that phone call that told her we were back at the base, a factor worth a lot of money. She would always yield to the boy when a nice day came along and it was possible to splash down to some warm beach where she could sun herself, saying it was far more beneficial for him to get time.

Well, he has the time now, and it's her turn now, because not only is she behind in touring time, but if I get a chance to get off, sonny may not always want to go with me now, preferring to go alone. So that

leaves the seat for Liz. The poor underplaced Piper!

It's got to go for a Tri-pacer! How plain that is. From now on the boy is going to need more instruments, and the Cub just ain't got 'em. Just basics. He will need more panel, more speed, more range, more power, more of everything, and we might as well throw in more people. Like me and Liz.

Yes, you can see it all now, the poor Piper-less pop pacing about the base, talking to the usual Joes that hang around parked airplanes, passing the poop back and forth. Hangar flying it's called, and I just ain't used to that sort of thing. I was always up and off, and that's about to switch-off. I'm the guy it's going to hurt, and you can bet your bucks I'm going to do something about it, should it get too painful. Too bad, because the Cub is so much fun.

I have had stories printed about how much fun we have in the Cub and go where Cessnas fear to tread and all that, and it's all true. It's been great, and genuine fun. Sure the ground crawled by at 85 indicated, and I had to land for fuel at marinas well short of a 185-mile range. But what a ball when we got there. Check my cockpit cuties story. Check my other writings on how we shut off the engine, and glide all over the mountains around Lake George. And catch thermals when we could. How we would throw open that big window and door, and let the sky rush in on warm sunny days. And float along just above stall with first a girl, then a boy, then a woman, then a man passenger to share the joy of sitting up on this balcony in the sky. You can't have such shenanigans in a Tri-pacer, can you?

Luckily, I won't feel so grounded as I do here in Jersey, when we get up to the lake for the summer school months, because there the plane is 200 feet away, and either of us can undo it and take off. Bub can fly all he wants while I'm either at my board working or out in the boat with the wife and friends. It will be a pleasure to get buzzed by the boy, as long as this old boy is busy.

At 17 he will get his private ticket, then he will begin to take up friends, then I will have another tale to tell and a new wail of woe. He certainly won't want to take Dad for any old rides; he's been up before. Son will need all those friends who he has flown over before, now in the plane with him, and they are endless at a lake. Same at home. Endless. My poor Piper!

But two airplanes are out, and we'll just have to settle for one, a bigger one. And all because my little boy finally reached 16, and soloed. I could rave on, but we'll conclude by noting that the daylight was waning when the FBO returned and slipped Bub the 25 questions on the pre-solo written. I was shooting landings with an eye on the "op" shack for the boy, not wanting to keep the plane from him, and suddenly out he trots with the instructor.

I splashed up to the dock, and turned the warmed-up Cub over to them, and they were off against the clock, to beat a pending snow forecast. Twice around dual and Liz drives up from her school-teaching job, just in time to see the instructor lock his seat belt on an empty front seat, and junior, her

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little baby boy, all alone in the back seat, with a live engine!

Soon the live engine snarled, and the boy taxied out into mid-stream, and the wife's expression looked like he was already heading for the moon. Me and the instructor fell to comforting her, and the chill wind sure cooled the scene as junior was off in a flourish, same as he'd done a thousand times before. Only alone. Since it was a solo hop with instructor looking, he later confided that he wanted to hold the deck till speed built up, then haul it right on up like a P-40 to 300 feet and level, but tut-tut, son. I'm glad he smoothed it.

Landing was flawless. Another takeoff and go-round, and the light was too poor for my Leica to get much. His second circuit was it. He landed north of the bridge out of our sight, and it was 15 seconds before we could see him under the Rt. 46 bridge, and the wife breathed out with "Ah, there's my little man," as he fast-taxied on down to the dock.

Well, it was hand-shakes all around, and a kid with a red face the size of a basketball, and had it not been so chilly a November day, more folks would have been on hand to congratulate him. Anyway, it was time to taxi to the ramp for the winch-up on dry land and a dolly, so we agreed to let Bub do the honors, and cranked him up again. No sooner than in mid-stream, he plowed right across the biggest piece of submerged driftwood to ever float down the Hackensack River and stuck fast on it. He switched off the mags, and flipped the doors open to see what happened. He was adrift, no boats, no help. He tried dislodging the bulk with the paddle, but the float step had mounted the top, and he was fast. So he started the engine again, and with our shouts of advice, which he couldn't hear, he tried to gun it up over the slippery mass, but became stuck faster.

Luckily, the bulk budged as he gunned, so he kept gunning till it neared our dock, and we could grab one end, and the tide carried him and the Cub right broadside to the dock. There we proceeded to lift the Cub bodily off its perch. It had gone over a spike head and lodged just behind the step for a permanent hold, which nobody could have undone alone. He was lucky to be near the base. It was his first fix, and he handled it fine. So the old pro here climbed in to take it to the ramp, but don't you know that at the last minute I hauled the water rudder up too quick, and the tail wind immediately threw the tail askew, and I hit the ramp at a crazy angle. Why, I never did that before.

Model Rocketeer

Continued from page 53

pressed by the educational material made available by Mr. Stine through courtesy of model rocket manufacturers, the chairman requested all data, catalogs, information, etc. be sent to him as soon as possible, for use. Send your best material on model rocketry to: E. K. Latvala, Aerospace Environmental Facility, ARO, Inc., Arnold AFS, Tenn. 37389.

Arrangements for the briefing-presentation were made with James Harford, AIAA's Executive Director, and David Kaufmann, AIAA Education Director.

It was just prior to NARAM-9 that the announcement was made concerning AIAA's endorsement of model rocketry for use by its members and university sections. Their endorsement changed a ten-year position against the use of chemical exothermic engines by non-professionals. AIAA's new position paved the way for college and university students, affiliated with the organization, to carry out model rocket experiments as an official program.

NAR SENIOR WINS SPORTSMANSHIP AWARD

An NAR senior member who discovered he received an important award by mistake at NARAM-10 and quickly and cheerfully returned it to officials, has been selected for Pascack Valley Section's first sportsmanship award. PVS officers, in announcing the award to John Belkewitch Sr., felt he truly represented the "spirit of good sportsmanship which we hope is present in all members of Pascack Valley."

A double honor for John, for he also was presented a service award by the George C. Marshall Space Flight Center, NASA, at NARAM-10, for his work as NARAM Chief Range Safety Officer at NARAM's 8, 9 & 10. The service award was a large scale model of the Saturn V moon launch vehicle.

An NAR Trustee and vice president of his section, John has been a rocketeer for more than six years. (Credit — PVS Impulse.)

WAMARVA HOLDS REGION MEET

NAR Sections of the Washington, Maryland and Virginia area held their MARS III (or Mid-Atlantic Regional Shoot) Oct. 19-20, 1968, with 65 contestants participating.

The section named MARS took the majority of prizes, walking off with five of six trophies. At first, on Saturday, Hurricane Gladys almost cancelled out launching as members barely managed to get off the parachute duration event. Five other events were successfully flown Sunday.

Dick and Peggy Sipes won the senior division with 180 points; Howard Kuhn was second with 126. In the Leader division, Mark Mercer, of NARHAMS Section, was first with 162 points; second was Jim Stev-

enson with 153. First place in the junior division was captured by Tom Stevenson who garnered 135 points against fellow section competitor and nearest rival, Craig Kuhn, 108.

Other sections there were: Annapolis Association of Rocketry, Rock Creek, Star Spangled Banner, and United Flying Organization. (Credit — The Banner, SSB Section.)

JOIN IN . . . BLAST OFF WITH US!

There are thousands of model rocketeers in the U. S. who are launching models on their own, primarily to "see 'em go." However, when you join in the activities of an NAR Section, you have a much better opportunity to appreciate the fun and excitement of model rocketry. You come in contact with those who have your interests, compare models, learn new concepts of construction and flying, and you can compete in exciting regional and national m. .ts.

If you are not a member of a section, locate other model rocketeers in your a.ea to form a NAR chartered .ection. Details are always available b; writing to NAR, 1239 Vermont Ave., N. W., Wash. D. C., 20005 for a Guide-Application form.

Add to section calendar of events — 1969: (Correct entry on: March 14-16, Pittsburgh Spring Convention; June 14-15, WAMARVA I, Ft. Meade.

El Cochino

Continued from page 20

the point where lateral instability would begin. With the incidence down to this minimum, the ship really bores, and conversely, increasing the incidence will slow the ship, and, up to a point, it will become quite docile.

Once the incidence is adjusted so the ship is flying as you like it, the CG can be gently adjusted aft to get the stalled spin entry and snap rolls.

Construction is about as easy as a built-up ship can be with only three bulkheads, two side assemblies and top and bottom sheeting in the fuselage. We build the sides using Core Grip contact cement to attach the $\frac{1}{32}$ doublers fore and aft, then the engine mounts and #1 and 2 bulkheads are subassembled with the engine bolted in place. One side is then placed on a flat surface; the bulkhead, engine mount assembly is glued and clamped to this side; the opposite side is then glued and clamped to the bulkhead-engine mount assembly, voila, a basic fuselage with an engine that fits its mounts.

The fuselage is completed by adding the top $\frac{3}{8}$ inch soft sheeting and the bottom $\frac{3}{32}$ inch medium sheeting. With the engine and spinner in place, add the rough nose-shaping blocks and position the ply spinner plate with approximately $\frac{1}{16}$ to $\frac{1}{8}$ running clearance for the spinner. Pull the engine and rough contour the nose and fuselage to the shapes shown on the plans. Finish the contours with fine sandpaper and you are ready for paint.

The plans show a built-up wing which should pose no problems. It builds quickly on a jig and has proved to be a sturdy, dependable structure. We would emphatically recommend, though, that you use a foam wing (and stab) with $\frac{1}{16}$ contest grade sheet covering. We know that it isn't really "building" as such, but if you want an almost foolproof wing, foam is the surest way to get one. We have found that our foam wings, in general, weigh no more than our wood wings and are generally a darn sight straighter. Our units have always come from FOAMCRAFT, but we have included templates so you can hack your own or have your favorite supplier

cut one! Makes a good club project too!

In covering a foam wing, we use Contest-grade 1/16 sheet in 4-inch widths and butt-glue five sheets together on a flat board, sanding one side thoroughly smooth after the joints have set. This gives us a panel large enough to cover each wing panel with one sheet and a single operation.

A note about glue. There are hundreds of adhesives on the market today, some good and some bad. Our method is to use white glue or Titebond on all internal structural joints and a sandable cement, such as PACTRA B, on all external joints that require finish sanding.

The aileron control hookup shown provides almost no down aileron and lots of up. We've done this to stop the ship from jumping up when full aileron is applied. At the speed it flies, you've got to get it around pretty quick or you'll be in the next county and that "down" just knocks you all over. With this differential, she'll roll "on the wire."

We've talked about the nice pattern flying that Cochino can do. We haven't mentioned what an excellent trainer it is with six inches added to the span. The wing loading drops to 20 to 21 oz. per square feet and it becomes a gentle flyer, not forgiving, but an easy ship to train on with an instructor beside you.

As you get more proficient with your flying and want to liven things up a bit, go down to Sears and get a patented Cochino wing adjuster, more generally referred to as a hacksaw, and "have at it," trimming the wing span in increments until you feel comfortable flying with the span as shown.

Sometime ago, we read Harold deBolt's discussion of wing fillets and their effect on flying characteristics. Our latest Cochino incorporated rather generous fillets from the high point of the wing aft, and we concur wholeheartedly with Harold's conclusions that the vertical fin and rudder operate far more effectively in the less turbulent airstream provided by the fillets, and we do recommend you try them.

In closing, we know you will enjoy flying this ship, whether you are an almost beginning flyer or an experienced contest addict, it won't let you down!

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Down-Draft Dodger

Continued from page 32

grit paper to bevel the joints to the proper angle. Use white glue here also in two coats. An initial heavy coat on both pieces is allowed to soak into the wood for 10 to 15 minutes and then a thin coat is applied when joining them. Be sure to wipe away all excess as it is very difficult to sand smooth when dry.

The rudder and stab should be cut from light quarter-sawn 1/16 sheet. Do not shape a lifting airfoil into the stab but taper it symmetrically.

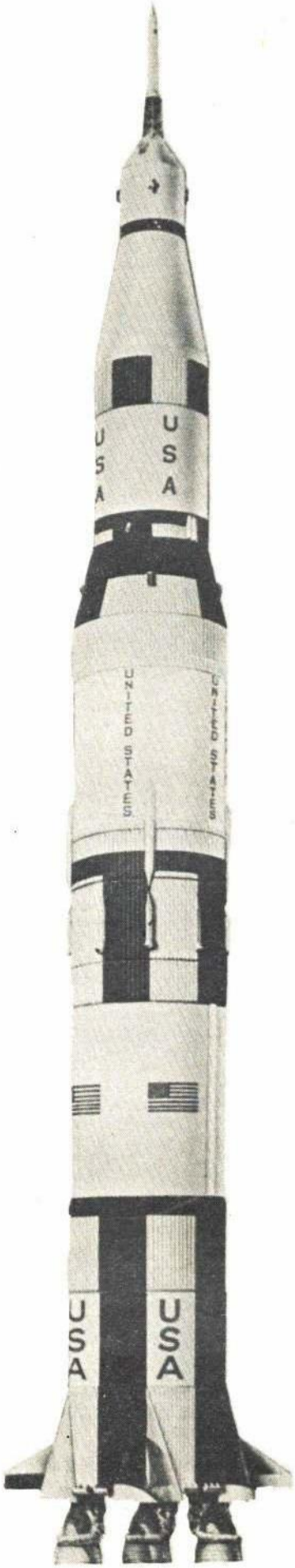
Fuselage and assembly: Select the straightest 1/8 x 3/4 spruce available and cut to the indicated shape. Do not taper the thickness toward the tail but simply round the edges. The 1/16 plywood nose doubler is cut out to receive a piece of 1/16 sheet lead approximately 1/2 x 1/2 and the 1/4 O.D. aluminum snuffer tube. It is necessary to epoxy a piece of .005" aluminum sheet to the outside of the falling weight to prevent the lead from "sucking out" the fuse through heat absorption. Attach the lead to a 5" length of .008" control-line cable and attach this to a double length of elastic thread fastened to the tail of the fuselage. Sandwich the .015" piano wire release spring between the fuselage and doubler as shown, and epoxy the whole assembly together. Using a dethermalizer on an HL glider seems like a lot of trouble — it is. But if you spend time and care putting a high gloss finish on a glider, it is well worth the effort. Use a doubled small size rubber band to hold the falling weight and fuse in place. The torsion spring assures consistent releases. When the weight falls, it throws the model drastically out of trim and it will come out of the strongest lift. It descends like a buzzard with a belly-ache, but it is very effective in preventing all too frequent flyaways.

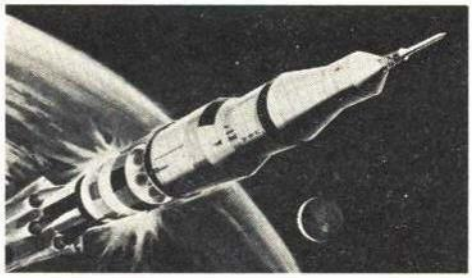
Attach the wing to the fuselage with epoxy glue, the same for the 1/16 plywood finger rest. White glue will suffice for attaching the tail surfaces.

Finish: The necessity for a smooth finish on an HL wing is probably the most important but least appreciated factor in achieving high performance. The initial launch speed of an HL is significantly higher than any other kind of free-flight model and surface roughness wastes precious energy. Care should be taken to make all surfaces "clean" but the wing should receive special attention, since it is responsible for the greatest amount of total drag. I have used a high gloss lacquer finish on the last five gliders I have built, and the difference in launch altitude is significant.

After final sanding with 600-grit paper, give the wing one coat of a lacquer-talcum powder mixture cut 40% with thinner. Sand smooth and apply superfine Jap tissue. It is easier to fill than bare wood and provides some much needed color with little weight penalty. Brush on four or five thin coats of clean lacquer and sand with 600 paper after every other coat. Build up the final gloss with lacquer from an aerosol spray can while wet sanding between coats. Ten to 15 spray coats should be sufficient to fill the paper and smooth out the dull spots. Final gloss is obtained by polishing with the *back* of the sandpaper and then polishing with rubbing compound. After flight trimming, give the wing a light coat of automotive paste wax for final slickness. Three to four light coats of lacquer should be sufficient for the rest of the glider.

Flying: Properly trimming an HL involves more than just a mighty heave and a smooth rollout. For consistent contest performance, the model must be able to





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All stages separate to simulate actual launch and flight sequence. Photos show (1) Second stage ignition. (2) Third stage ignition. Third stage takes Apollo spacecraft into earth orbit. (3) Earth parking orbit and subsequent re-ignition of third stage engine to send vehicle out of earth orbit and into lunar escape trajectory. (4) Apollo spacecraft pulls away from the third stage and continues on to the moon.

ride turbulent thermal air without spiraling out. When a model enters a thermal, the relative wind strikes it at a lower angle thus increasing the angle of attack of the wing. After a slight stall, the model assumes a different longitudinal angle consistent with this new wind vector, which means a light nose down angle in relation to the ground. Since HL gliders usually fly with little or no angular difference between the wing and stab, this nose down altitude causes an increase in glide speed. In addition, a really strong rising column of air generates a swirling vortex of wind which increases the circular velocity of a model. If the only adjustment is rudder tab, then these increases in airspeed can cause a spiral dive, often disastrous.

In developing a method of thermal trimming, I have borrowed shamelessly from Larry Conover. First, use rudder trim for a left circle about 80 feet in diameter. Then bend down the trailing edge of the left main wing panel: $\frac{1}{32}$" down about ¼" from the edge for one half the length of the panel. This slight wash-in on the inboard wing will keep the left wing from dropping when a thermal speeds things up. This wing adjustment will also affect the launch trim by causing a right-rolling moment and a slight looping tendency. Counteract the latter by bending in a slight amount of down trim into the left side of the stabilizer: $\frac{1}{32}$ down trim about $\frac{3}{16}$ from the edge for one half of the stab segment. These adjustments are approximate and will of course vary with individual gliders.

All three flight adjustments — left rudder, left wing wash-in, down left elevator — create a right-rolling tendency at launch speed which offsets the left yawing moment of the left rudder trim. Consistent rollouts are easy to achieve with this setup by launching with the wing rotated clockwise at about 30 degrees from the horizontal.

As for the inclination of the launch, logic would suggest a completely vertical throw. But it is very difficult to throw anything straight up. In addition, it is possible to impart extra energy to the glider with a few quick steps as you are winding your arm to throw. Unless you are an extremely agile individual who can jump 6 feet straight up while throwing like a baseball pitcher vertically, your glider will get higher if you concentrate your momentum in a horizontal direction.

The actual inclination and rollout behavior will depend upon wind strength. In near calm, a 60-degree launch angle with a 180-degree turn into the glide seems to get the best altitude. For windy weather, vary the launch angle and tilt so as to keep the glider faced into the wind for the

majority of the climb. By taking advantage of this wall of resistance you can pick up extra feet of altitude as wind speed increases. Best recovery under these conditions seems to be a tight half loop at the top with a right roll turning 270 degrees into the glide.

Every article on HL flying I ever read included some discussion about the necessity of physical fitness for successful contest flying. Pushups, tennis-ball throwing, and isometrics are helpful but such emphasis on brute strength is a little depressing to those of us with parking meter physiques. Fortunately, though, control seems a lot more important than bulging biceps for consistent success. And control comes from frequent flying.

The Emanon

Continued from page 24

A sanding block made from a piece of ½" thick pine of at least 3 x 11 with a piece of 80 grit aluminum oxide sandpaper contact cemented to one side and a piece of 120 grit to the other makes a good tool for final shaping and smoothing. Leave the center-section of the wing unshaped for easier alignment. Note that when the wing is glued in place on the crutch, there should be a very slight amount of positive incidence of no more than 1/64. Do not omit the ½ oz. of wingtip weight. This design does not incorporate any other features to counteract torque, so put the lead-out where it belongs.

The stabilizer and elevator are made from one piece of medium-hard 3/16 thick balsa. It is planed and sanded to a symmetrical airfoil that tapers to 3/32 thickness at the tips. It is then sawed halfway through with a razor saw and cracked to form the ½" dihedral angle under each tip. Glue with epoxy glue. The elevator is hinged with approximately 1" long pieces of 1/16 I.D. (inside diameter) brass tubing that has been roughened with sandpaper so that the epoxy glue will get a better grip. The 3/64 diameter music wire control horn is heated cherry-red and formed around a 1/16 diameter piece of music wire with a pair of vise-grip pliers while still hot. Glue to it the elevator with epoxy reinforced with patches of fiberglass cloth.

The fuselage crutch is made from one piece of lightweight straight-grained basswood. This can be cut by hand with a coping saw or by using a jigsaw. Keep the sides about 1/16 to 3/32 thick aft of the center of gravity or you will have a tail-heavy plane that will be almost uncontrollable.

The Harter's Proto pan is cut off as shown on the plans to make a half-pan arrangement. Mount the motor with four ¾" long

4-40 Allen bolts. The thrust-line is straight ahead. No in- or out-thrust is used. Out-thrust makes the model yaw outward, increases line pull and cuts down airspeed somewhat. In-thrust makes the model yaw inward, decreases line pull and increases airspeed slightly. In-thrust, however, makes the takeoff very critical with the model wanting to torque-roll towards the pilot.

Remember, in order to make that record run, you first have to get into the air. Torque-roll a Proto once and the only trophy you'll receive is for the most spectacular crash.

Note, four pan hold-down bolts are used rather than the conventional two. This feature really ties the pan and crutch together into a solid unit. The more solid the engine mount, the more engine revs.

The rear of the fuselage is completed with a hollowed medium-soft balsa block that, along with the crutch, follows the contour of the original pan. This, in addition to the top block, makes the whole rear of the fuselage into a light rigid hollow tube. The ⅛ balsa former seals off the rear of the fuselage so that raw fuel cannot get into it in case of a bladder breakage. This forms a structure similar to an eggshell in that it is very thin-walled, tight and rigid.

The hole for the cylinder can be quickly cut with a 1¼ diameter hole saw. Following a recent trend, no cooling passages were used on this model. It is an accepted theory that the hotter you can run any internal combustion engine, without overheating of course, the more power it will produce. A model with cooling passages also tends to cool the cylinder unevenly with the front being cool and the rear running hotter. Besides, its a heck of a lot easier to build an airplane without cooling vents.

The landing gear consists of a 1/16 diam-

eter music wire skid epoxied into the basswood crutch in the tail, the main gear is swept-forward sheet-aluminum gear bolted to the pan. The pan is prepared to receive the gear by filing or milling a flat on the bottom and drilling and tapping two 6-32 holes. The gear is formed from .090" (3/32") thick 2024 or 7075 spring-tempered aluminum alloy.

Make sure that generous radii are left at all of the bends or this material will crack. The axles for the 1½ diameter K&B or Don's wheels are special little lathe-turned steel buttons that are held to the gear by 6-32 flat head machine screws. Use a drop of Locktite on all of the screws when assembling the gear to insure that vibration will not loosen it.

A good finish with a minimum amount of liquid, and as a result weight, is the aim of the finishing procedure. The importance of adequately prepared surfaces cannot be overemphasized. You cannot put a good finish over a sloppily built or poorly sanded model.

The outside of the nose and the whole inside of the model is finished with two layers of fiberglass resin. A layer of lightweight cloth, which should be about the same weight as silk, is applied along with the second coat of resin. Be careful, as fiberglassing can be very easily overdone. So watch the amount of resin you apply! Remember that the resin does not harden by the evaporation of solvents, as say dope does, losing much of its original weight in the process. Rather, it hardens by chemical reaction with the hardener. So the amount that you apply is the amount that hardens. By the same token, do not omit this step as the fiberglass adds much-needed strength and fuel-proofing in this critical area. Without it, any lightly built Proto will come apart at the seams on the first

shaft run or the high-nitro-content speed fuel will literally dissolve the front end.

The whole model is then finished with a couple of coats of dope, one coat of Hobbypoxy Stuff and two coats of Hobbypoxy orange sprayed on. The dope and Stuff should be liberally sanded with 220 aluminum oxide sandpaper wrapped around your sanding block. The first coat of the Hobbypoxy orange is sanded with 320 wet or dry silicone carbide sandpaper. Orange was selected because it is bright and makes the model easy to time and it seems to have one of the highest pigment contents of any of the Hobbypoxy colors. So two coats are all that have ever been necessary to completely cover. A small aerosol-type spray gun, as sold by Ambroid, the Ambroid Jetpak, the Binks, or the Wren, is all that is necessary to spray a small model.

There is a TV jingle for cigarettes that tells us "It's what's up front that counts." This is true of any speed airplane.

The Emanon has been able to handle all the power of any racing 29's produced in the past few years. The model just goes that much faster with each new engine.

After some contact with pre-production versions of the then new Supertigre's 29 rear rotor and some interesting discussions with Craig Asher of World Engines, it looked as if the design had too many possibilities to pass up. This was the engine that was used to set the first and all subsequent records. It has been steadily improved and is ideally suited to this plane.

The record-setting engine itself is mechanically quite free and all burrs have been removed with a fine oilstone and polished with crocus cloth. Be especially particular about burrs on the working surfaces of the shaft, the top and bottom edges of the piston and the cylinder ports. Supertigre's current ABC, Aluminum-Brass-Chrome, piston and Cylinder seems to have solved the galling problem that was prevelent with the cast iron piston, steel liners previously used.

No matter what the design of the engine or what kind of super blasts you use for fuel, if there are any binds or roughness, it will never go. The ultimate speed that the engine will attain is, of course, determined by its design features. Without a perfect mechanical setup, however, the world's most advanced design is still worthless.

A Barden precision class 7 bearing with .0009" to .0011" internal clearance was substituted for the stock German Main bearing; this is probably not strictly necessary.

For good break-in on a prop that will not put too much of a load on the engine, an 8-5 was used on the original. It will produce the same satin-smooth wear pattern on your piston and liner that the record engine has. Start the break-in on mild fuel and a rich setting and, on successive run, gradually lean the engine out on progressively hotter fuels until the engine will give a fully peaked lean run on the hottest fuel that you intend to use without any signs of overheating.

The tank used can be the conventional pen-bladder Bladders made out of heavy-walled surgical tubing of approximately ⅛ I.D. and 3/16 O.D. are more resistant to breakage. This tubing can be obtained at most scientific or medical supply houses. The bladders are made by cutting off 4" of the tubing, folding ½" of the back end over and binding it with soft copper wire. A ¾ piece of ⅛ O.D. brass tubing is inserted into the front end and bound with the same copper wire.

A 40-cc horse syringe is available at Sears and is used for filling these bladders. Ask to see their farm catalog. Sixty cc of fuel provides enough time for starting, setting the needle valve and flying some 20 laps.

Falcon

Continued from page 28

of the tailplane.

The markings on the S.E. 5/5a's were in accordance with the regulations of the period. The first deliveries had the cockade on the upper wings painted midway between the tips and outer sections, occupying nearly all the available chord. Later deliveries had the more conventional "tip cockades." All of the S.E. 5's had the fuselage cockade of unusually small diameter. The system of individual identification within the squadrons varied considerably and it is not possible to generalize on them. In the 74th Squadron, for example, "A" flight carried letters on the nose beneath the exhaust manifold; "B" flight had numerals in the same location; "C" flight had letters between the cockades and squadron markings. The letters or numerals were usually repeated above the starboard wing in white, and beneath the lower port wing they were repeated but painted black.

The cockades on the S.E. 5/5a's were 59″ overall in diameter, clearing the leading and trailing edges of the wing by only ½″ — the full chord being 60″. The narrow encircling white ring was ¾″ wide. The blue, white, and red sections of the cockade were of equal width, i.e., with the blue and white areas being equal to the diameter of the 1½″ side central red spot.

On the sides of the fuselage, all the foregoing dimensions were roughly halved. It must be understood that exact locations and diameters varied widely on different aircraft, but the same proportions between the outer white ring and the inner rings were always maintained.

Color scheme: Camouflaged aircraft; during 1916, wartime khaki-green camouflage dope became standardized and by the end of the year was applied to all surfaces. The shades of camouflage varied considerably, ranging from dark olive green to a light khaki color, with many of the intervening shades being used as well. The wings and tailplane were sometimes of a lighter shade than the fuselage. The undersurfaces of the wing, tailplane, and sometimes the fuselage were clear-doped and consequently were a pale cream shade.

Specifications: Wingspan: 26 ft. 7.4 in.; length: 20 ft. 11 in.; height: 9 ft. 6 in. Armament: One fixed 0.303 in. Vickers machine-gun with 400 rounds, Contantinseco C.C. synchronizing gear, Aldis and ring-and-bead sights. One 0.303 in. Lewis machine-gun on Foster mounting with four 97-round drums and Norman sight. Four 25-lb. bombs could be carried in racks under fuselage. Powerplant: (A number of different manufacturers supplied engines) 150/200-hp Hispano-Suiza (various series); 200-hp Wolsely W.4a Viper; 200-hp Wolsely W.4b Adder I, II, and III; 200-hp Sunbeam Arab I and II. Speed: 105 mph at 15,000 ft. (S.E. 5) 123 mph at 14,000 ft. (S.E. 5a) — ceiling about 23,000 ft.

Manufacturers of scale model kits for the S.E. 5a as follows: Revell 1/72nd — a very excellent kit; Aurora ¼″; Lindberg (used for model in article) ¼″, kit No. 53269. Check the kit you have selected for missing or broken parts — wash parts in warm detergent suds, rinse in clear water, then allow all to dry thoroughly.

To construct, first fill the gun trough in the right body half (Part #5) with Duratite or auto spot putty. Allow to dry, sand smooth. Cement instruction panel and seat (#22, 24), rudder bar (#25), control stick (#26). Assemble right and left body halves together (#4, #5). Cement landing gear assembly. Be sure landing gear is equidistant. Cement stabilizer in place. Before landing gear cement hardens, line up un-

dercarriage with bottom of stabilizer. File or sand off heavy lacing on sides of fuselage. Glue radiator (#13) in place. Cement bottom engine cowl (#15) in place. Cement together following parts: left and right crankcase halves, left and right cylinder blocks, left and right exhaust pipes. When cement is completely dry, fill any cracks with Duratite or auto putty.

Putty areas around stabilizer and landing gear. If you are not using the display stand in kit, fill in body "buttonhole" at this time. After putty is dry and sanded smooth, spray assembled parts with primer (at least two coats), sanding after coats and checking for seams which may have opened up.

While primer is drying on above parts, spray top and bottom of upper wing (#1) and repeat process on right and left lower wing panel (#2, 3). Prime coat wheels; all parts to make tail skid dolly; wheel chocks; mechanic and pilot; two machine guns (30 caliber — #28), body machine gun (#29); top engine cowl (#14); four interplane struts (#32) and four cabane struts (#31, 31a).

After primer coat is dry and sanded smooth you can apply the first coat of beige, cream or light tan color to undersurfaces of wings, fuselage, stabilizer. At least two coats will be required, depending upon your coverage of primer and also because a lighter shade sprayed over a darker shade usually requires more covering coats. The shade of beige used on the model was obtained by adding a few drops of dark brown to cream.

After paint is dry, mask off and spray top of lower wing and top of upper wing, stabilizer and fuselage with the shade of olive drab you have mixed, or a commercial premix. For olive drab on model, a small amount of light gray was added to the olive drab paint as it gives an "aged" look.

Squadron markings and flight letters were cut from a sheet of "Sig" white decal paper. Wiring is optional — but if installed it can be done as follows: drill holes at correct entry points as shown on kit drawing and box cover. Use fine piano wire which can be purchased in almost any hobby shop, cut to length and insert in drilled holes, applying small amount of clear lacquer at hole to bond.

After engine assembly primer coat is dry, spray entire assembly metallic black. Radiator, shutters, metallic black — rest of radiator olive drab. Propeller is mahogany-color, streaked with very thin wavy lines in black to simulate wood-grain. A good way to do this is to paint the black wavy lines on top of the mahogany color and then spray a very light coat of mahogany overall. This softens the harsh black lines to a very realistic grained wood tone. Struts are painted a wood color; Pactra manufactures an excellent wood tan shade for this.

As to decals, you may have to buy extra decals as the ones in the kit are not exactly correct colors — to wit: the yellow outer ring should be white (see above under the history of the aircraft). A simple way to correct this is to cut out four white circles which are the same size as the entire cockade, including the yellow rim. Using a pair of sharp cuticle scissors, cut yellow rim away from the decal. Soak the white decal-circles which you have made, locate and position them on your model, then soak the remainder of the kit decal and position on the white decal, making sure that edges are equidistant on all sides.

Source material and decals: You will find that the Profile Publications are perhaps the most accurate and useful of the aviation brochures offered to the modelbuilder/collector/historian. "Profile" Number 1 was used for this model. The "Profiles" are available from John W. Caler, Department

AM, 7506 Clybourn, Sun Valley, California 91352. In addition, this firm carries many other related items: books, plans, etc. for the modeler. The white decal paper and additional decals are available from "Sig" Manufacturing Company, 401(M) South Front Street, Montezuma, Iowa. Dept. AAM.

Versapro SS-1

Continued from page 31

draw the shaft from the pot body. The rubber O-ring is discarded and the plastic stop is carefully removed with a razor saw. Drill out a 2-56 nut to slip over the shaft in place of the discarded O-ring. Be absolutely certain to remove all residue; then reassemble.

The servo is now ready for mechanical assembly. For the first option, remove the spring, all gears, plates, etc. from the servo. Remove the large idler gear pin and drill the pin support post and the "bathtub" ¼" to permit the pot to be installed. Drill the idler gear to 3/32", mount the potentiometer with no washer or nut on the bottom of the servo case and lock in place with a single nut on the top side with the center terminal toward the servo motor (for either option). Press the drilled gear in place. Reassemble the remaining gears and rudder plate, leaving off the spring, throttle actuation assembly, and elevator plate. Connections to the pot terminals are brown to wiper and clockwise from there, orange and green in that order. Amplifier is attached to bottom of motor by soldering printed-circuit lands directly to motor terminals and ground terminal. At final assembly, amplifier and motor are also epoxied securely together.

Second option is go-around positionable throttle. No modification is made to the servo mechanism except for removal of the

spring. Purchase an extra idler gear and drill it to $\frac{3}{32}$". Mount the servo and potentiometer on to the servo mounting plate as shown in Fig. E. The servo mount plate shown may be mounted with servo mount tape or, if mounting space is tight, use four wood screws through neoprene tubing shock mounts. An alternative mounting plate is shown in the photographs, which permits the normal rubber grommet mounting. Merely extend the board by ¼" at each end and drill ¼" instead of ⅛" for mounting at ¼" from the end. Be sure that the new gear meshes with the small idler pinion as it is pressed onto the pot shaft. Mount the amplifier and attach pot leads.

The servo damping resistor R1 must be selected for the particular application. When used with the filter presented here, 15,000 ohms is approximately correct. When placed in pulse systems using two or more servos, R1 must be decreased to 10,000 ohms or less. Operation in commercial systems such as the ACL orbit, etc., will permit R1 to be increased to as much as 30,000 ohms. There is a trade-off; the larger R1 is, the better resolution becomes but the servo must not be permitted to oscillate. The proper procedure is to install a 10K trimmer potentiometer on the bottom of the PC board in place of R1. With the system operating, adjust the pot for proper damping, then measure its resistance after first removing it from the circuit. Then install the nearest size fixed resistor permanently as R1, or if a good quality small trim pot is used, it may be installed permanently on the component side of the board at the position shown for R1. There is room and holes for such a pot, but be very careful to avoid shorting other components.

After the servo is operating to your satisfaction, apply a thin coat of epoxy to the amplifier board around the circle which

February, 1969 • Model of the Month • Sikorsky CH-54A Skycrane

contacts the motor. Solder the motor and ground terminals with short lengths of component lead wire for extra strength. Additionally, if the servo is to be used in a high-vibration environment, Silastic glue between the components and the servo motor will give adequate protection.

The switcher/filter: The schematic for the pulse amplifier and filter is shown in Fig. F, and the layout of components is shown on Fig. D. Fig. C has the full size PC layout. An excellent relayless galloping ghost driver is obtained by deleting the filter components identified in these figures and simply using the output between point X and battery C. T. to drive a GG servo. The more inquisitive will immediately see that the filter portion of the circuit thus identified may be used alone to filter the output from pulse systems such as SIMPRO 3, etc., to provide an analog signal for any feedback servo.

Both the relayless driver and filter configuration can be driven by any relayless servo (or remove the relay from relay receivers and drive with the output). The points indicated as ± 2.4 V and battery C. T. are also tie points for the receiver, servo, and supply leads. Route the leads as shown in the pictures and attach plugs of your choice. If your receiver is fussy about operation on 4.8 volts, insert any good silicon diode in the negative lead to the receiver as shown on the schematic and component layout diagram. The diode drops the voltage by ½ V giving your receiver 4.3 V average.

Operation: If the first servo configuration option is chosen, use the analog servo as any other analog servo. The second servo arrangement in conjunction with the filter is used for feedback rudder control. Application of full signal on or off gives the normal go-around control of throttle. The servo will instantly seek its previous position when normal pulsing resumes, or cycle to provide low motor and neutral rudder if signal is lost. The first configuration is not designed for go-around throttle, but will go around to provide a cycling neutral.

Performance:

Servo throw — ± ¼" as limited by Rand Servo mechanics.

Transit time — approximately ¾-second end-to-end.

Resolution — limited to approximately ± 1/32" of output travel by the Rand Servo gearing backlash, but this has been found quite satisfactory for all operations.

Filter — accepts rates as low as 8-12 pulses/second with recovery times consistent with ¾-second servo transit. There is no upper limit on pulse rate.

Battery requirements — four 225 mah cells are sufficient for approximately two hours

of continuous duty.

Weight — total airborne weight with a 225 mah battery pack and the average receiver is under 6 ozs.; this is quite good considering that power is quite adequate to handle almost any size rudder-only aircraft and, of course, boats.

Acknowledgement: The encouragement and suggestions of Ed Sweeney during the development and flight-tests of the equipment discussed here and in the preface is gratefully acknowledged. Ed is an excellent test-pilot and an inveterate tinkerer with many ideas useful to all R/C flyers from single-channel to full house.

Radio Control World

Continued from page 37

ered the existence of a tremendous air wave between local mountain ranges (one pilot recently rode this wave to over 19,000'!). The big glider flyers have been most cooperative with the model flyers, and furthermore, there is a local group (Cumberland R/C Club) to join in the fun. The weatherman had predicted just the right wind and other conditions for the wave to be in existence (unfortunately, good wave action is only evident in cold weather) and some 15 glider flyers were on hand for the Saturday flying.

The DC/RC had obtained a record trial sanction, and several members had rigged up devices to aid in flying gliders up to, and perhaps beyond the limits of naked-eye flying. But though cold, Saturday showed almost a dead calm! Many short flights were made however, and the Cumberland RCC had arranged for a most enjoyable evening at a local restaurant. By Sunday morning, weather reports were ominous — two bad winter storms headed

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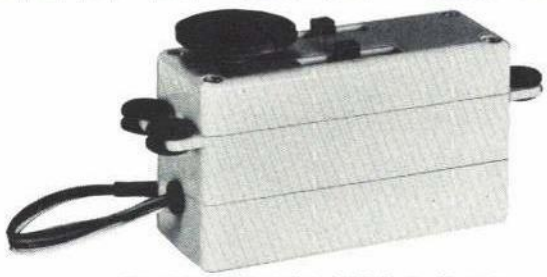
for the area — most of the flyers fled homeward. A few diehards stayed — and enjoyed wonderful flying all day! Wind was good, it was much warmer than on Saturday, the storms never made it. Some of the gliders were gotten up above 3500', but apparently the big wave wasn't working. **Toledo East:** More and more R/C gatherings are known as "little Toledos!" A new one in New York area is sponsored on March 16, 1969, by Westchester Radio Aero Modelers. Place is Country Center where Rt. 119, Central Ave. and Bronx River Pkwy. meet in White Plains. Ample room to exhibit models; prizes given in categories — WWI, post-WWI, Stunt & Sport, Best Finish and Best of Show. There will be booths by manufacturers and a Swap Shop. Hours are 10 a.m. to 8 p.m. Info from WRAMS Pres. Alan Siegel, 5 Carthage La., Scarsdale, N. Y. 10583.

New in R/C

Staveley's unique analog: With digital propo supreme in the multi field today (and getting down to even single-control systems), it is surprising to see a large manufacturer enter the full-house propo field with an analog outfit! The English firm of Staveley Industries Ltd. (an established maker of complex machine tools) has done just this — but there are many differences from the multi analog systems we've had here. Basically, the Staveley transmitter sends out an R. F. signal pulsed off at a variable rate, ranging from 400-800 Hz (600 Hz is neutral) to provide the aileron control channel. The pulse length is varied over a 3 to 1, 1 to 3 ratio to handle the elevator. Concern claims this "wide deviation" of both aileron and elevator pulses allows servo action every bit comparable to that from the best digital systems. Yet because the system doesn't tie each servo, in effect, to a single pulse in every frame (the rate and length detectors in the receiver operate on a wide summation of pulses, and one or more random pulses of interference have no effect whatever) it affords the known analog system resistance to most interference. Separate oscillators in the transmitter are varied over a 2 to 1 frequency range with 60 Hz center frequency for the rudder and throttle channels, these signals being superimposed upon the A and E channels. Resolution of R and MC servos is said to be almost as good as for A and E, and stability is identical.

A few other features are notable, too. The transmitter is designed to eliminate "splatter" (quite severe with some digital transmitters). Charger for transmitter and plane batteries is in the transmitter, but the deluxe outfit has a charger that automatically drops charge rate to trickle, when both batteries are "full." The chargers all incorporate a powerline transformer, a worthwhile safety feature, and will operate from either 115 or 240V. Transmitters have .8W *output*, may be had with several different control stick assemblies, including the latest Kraft. Complete airborne weight of four-control system with 800 maH nickel-cad pack is 13¾ oz.; this weight is with the lightest servos. Concern offers either Kraft KPS-10 or Controlaire S-3 servos (both fitted with Staveley amplifiers). Systems will soon be available to handle from one to three servos, in addition to the present four. Cost in England for latter in deluxe version appears to be about $372 (we believe this includes the heavy English purchase tax on hobby goods). Concern expects to offer their line through U.S. distributors eventually. In the meantime, queries may be sent to Staveley Research & Engineering Center (Clapham, Bedford, England). Reports we've had from several English sources state this new system "feels just like digital" in the air.

yes, there is a difference



in the Classic KPS-9 Servo.

Combining the 11 Transistor Classic Precision Amplifier and the KPS-9 Servo Mechanics results in the best digital servo available for the competition or sport flyer. Fly this combination of amplifier and servo mechanics and you will be convinced there is a difference. The Classic 9 servo provides the speed necessary for the new '69 pattern maneuvers such as Reverse Spin, Cobra Roll, and Loop with Rolls. Classic servos can be used in any combination, see other choices.

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Classic Single Stick—Design of the single stick 4 channel and 6 ch system is complete. Factory built sets and Kits will be available Feb. 1. The Classic SS4 and SS6 utilize the new Kraft three axis stick with built in rudder and motor trim.

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