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See page 26



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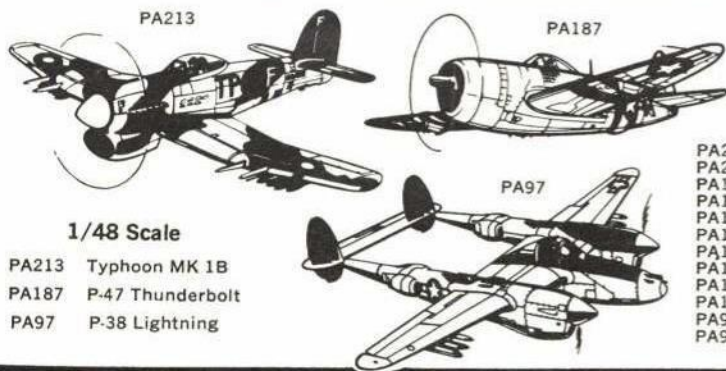


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VOLUME 69, NUMBER 5

NOVEMBER 1969

COVER PHOTO: Dave Platt's Douglas Dauntless WW II dive-bomber is the only model ever to be given perfect scale points at a National meet. An R/C job, it faithfully reproduces in-service wear-and-tear conditions. Color photo by Frank Pierce.

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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 DEPARTMENT

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

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.
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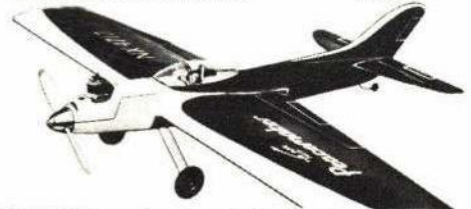


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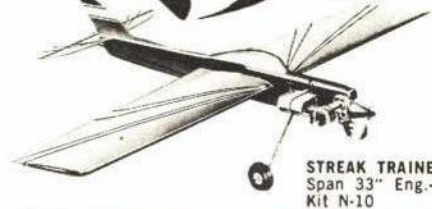
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STRAIGHT AND LEVEL



A silly little airplane is a smash-hit with the kids. But how do we keep 'em turned on?

FRIEND, what are you doing at 8:35 on Sunday morning, August 3? I'm meeting a deadline—but that's because of putting off until tomorrow what should have been done today. And, if you will pardon the editorial "I," I don't know how I can do justice to a very important subject. It has to do with this "beginner problem" which we've all beaten to death for the past ten years. But something is new and different this time. We do see much being done, but it is only a starter. What is different now is that this starter may have given us the key to something bigger and better than anyone ever dreamed of. But the mind dodges the problem of how best to tell it.

Staring out the window, I half-see a sign which says "Wig Shop." Dan Boone (surely not an old Indian-fighter from Kentucky) has a sign which says "Jeweler." Sandwich Shoppe, Transcaribbean Airways, and a bank "authorized by Congress on January 22, 1867," also are in view. So let's just tell it, like it is.

Well, first of all, it would be right handy if the AMA would stop changing the name of that Delta Dart thing, or Cub, or whatever the heck it is. To me, it is a Delta Dart, and it surely is mixed up in this "message." A Nationals ended just two weekends ago. And there was the most unique contest in modeling history recently held on the Mall in front of the nation's Capitol—the physical symbol which ties us all together. View for a moment the pictures on pages 16 through 19, in the October issue story "It Happened in D. C." Now think of 3200 kids at the Nationals—that holy of holies of the ultra-sophisticated designs and expert flyers—building and flying successfully, every darn one, their very first airplane.

There have been many of these "Delta Dart" affairs—and one can hardly call them contests, and maybe that has something to do with the phenomenal success of the demonstrations. They are demonstrations. SIG alone has made well over 100,000 of these special kits. He first viewed it as a helping hand and now he has a tiger by the tail. It is big, this whole thing.

Model airplane building and flying is a national hobby. But for years we've all felt something wrong at our competitive level. Why did we keep talking about Juniors otherwise? We can amuse ourselves with models, now that we have it made, and let it go at that. Why even think of anything else? But it bothers, and it hurts, if we can count ourselves out because the problem is just too vast, too vague, and maybe think it isn't even there. It's there all right. We've proved it by some of the things we did about it.

Frank Ehling conjured up a crazy little crate, fighting leaders like Dick Meyer from Pittsburgh, and even R/C clubs, helped bring it to the kids. A do-or-die guy like John Worth, who puts flesh and blood into making these things come together for the good of kids everywhere, probably never will be thanked. That's his job. The program is big enough now that we have trouble remembering those who make it go, bigger and bigger.

Well, there were all those Nats—from the days of tent

cities and rented busses to motels, barracks and, now trailer camps. Always changes. Rubber to gas, Free-Flight to Control-Line, Control-Line to Radio. And practically everything was kept, including Indoor models—but not those twin-pushers and CO-2 jobs. And all the time, the constant prophets of doom, and the talkathon crusaders with the panaceas, never really changed. Until the Navy threatened to lower the boom on what was becoming an old-man's picnic, and said where are the kids, we knew nothing but frustration in renewing the hobby, or sport, at a grass-roots and youth level. We may have the answer staring us in the face by luck, by dedication, by argument, through these years of bitter effort.

But all we really know now, is that North lies that way. We have the key. Kids will build, and fly airplanes—given exposure and help. This is fact. And only the first step. What is the next step?

We've gotten this far—rather we've been led by the nose—with a few individuals, a bit of industry interest, some magazine help. The Navy is a factor. And now we see something. There's a fuse and a match.

We need help, bigger more effective help. Financial backing on a grand scale. A plan or system for hanging onto more of those kids who enjoy this one-time demonstration—and then fade away to whatever they ordinarily do. Hanging around street corners maybe. Model airplanes bridge that stupidly named "Generation Gap." So do all sorts of things. We now have something big enough, important enough, healthy and socially significant enough, to be a shining sales package, to sell a coordinated, national program. What it takes is basic material, the tools, and the right way to put those tools to work. Using the tools properly won't be easy.

At the Nats, there were guys who, when asked to help the throng of kids who went all the way out to Willow Grove, to make their first airplane, who said, "I'm busy, don't bug me." For each of them there are 100 who would drop everything to help. You can help.

There are guys at higher levels who can push this to the top, if you'll do the spadework. Brilliant manufacturing minds, grand industry people, who know it can be done.

There's a flickering sign outside another window which flashes: "This is It?"

—The Publisher

THE 1969 NATIONALS STORY

THE BIG NATS, pages 14 through 17, gives the broad picture of what occurred at Willow Grove—a coverage tied in with the AMA's detailed account in their Model Aviation section.

Follow-up articles will be published in near future issues. Jerry Nelson will cover what happened in R/C; Chuck Broadhurst, the Free-Flight round-up; and Bill Boss will look into Control-Line. All are in-depth reports. Don't miss them!



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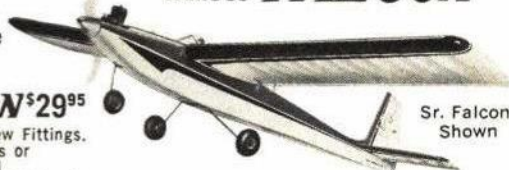
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Skylark 56 Shown

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Ott and Stahl plans

In the "You Said It" column in the Aug. '69 issue, Andrew Cottle of Brooklyn, N. Y. wrote inquiring about Ott and Stahl rubber scale plans. I would suggest that he and any one else who is interested in plans of models of yesterday write to The Father of the Old-Timer Movement: John Pond, 2162 — 43rd Ave., San Francisco, Calif. 94116.

One of John's hobbies is collecting plans and making copies available to modelers interested in building these older models. The last time I looked at John's plans collection, he had about 200 rubber flying-scale plans.

Martin H. Schindler, Vienna, Va.

Backyard Flyer his dish

In your June '69 issue I read about a fellow who was building an R/C plane. He said that he thought you should have more on single-channel jobs. He was 13. I'm 13 and I can't afford to buy the plane, let alone the engine and the R/C stuff.

I earn some money by doing odd jobs and stuff, but R/C is kind of steep! I like it more when you include something I can afford to make. For instance, the bit of info on rubber jobs. I made the Backyard Flyer and wish you would have more articles of that type.

Philip Feist, Cincinnati, Ohio

Thanks to Chuck

There have been several write-ups in the various model magazines, organizational, and club publications about the 2nd Annual West Coast Free-Flight Championships held in Taft, Calif. in March.

Charles Broadhurst, Exec. Dir. of the National Free-Flight Society, wrote many of the accounts which have been published. Chuck is also a member of the Capitol Condors, Inc., who in cooperation with the Oakland Cloud-dusters, co-sponsored the West Coast Championships. Chuck was very generous in expressing appreciation to the many organizations, manufacturers, and newspapers which gave us prizes, publicity, and provided refreshments at the contest. I have never seen such outstanding response to our needs.

But, there is something that Chuck didn't mention in any of the articles, and knowing Chuck, this is understandable. What he didn't mention were the many phone calls, letters, and the personal time and money he spent to promote this contest.

The publicity given us by the Fresno, Bakersfield, and Taft newspapers; the Grand Championship Trophy from the Taft District Chamber of Commerce; and the prizes from the many hobby manufacturers: these were there mainly through the efforts of Chuck Broadhurst, on behalf of free-flight modelers everywhere.

I am sure that all free-fighters will join

me in saying: "Thank you, Chuck, thanks very much."

A Free-Flight Modeler, Sacramento, Calif.

Chuck is a great guy and a dedicated old-timer who is putting zest into the national free-flight movement. His special report on free-flight at the Nationals will appear in our next issue. Publisher.

Dealer point of view

This letter is in response to a letter in the Aug. '69 issue by Phil Melanson. As a hobby dealer, I am irritated by a couple of Phil's statements. As for the super-regen receivers (Phil didn't say if it is tone or not), if we could get people to invest \$2 in an R/C book they would learn the limitations of this equipment. The super-regen receivers are limited, but not useless; use them in inexpensive expendable aircraft and operate in a rural area, or put them in a boat, run them on a farm pond and have a ball!

A lot of people will buy from mail-order ads without ever opening a book or talking to a reputable dealer. They seem to have the idea that the dealer is only trying to sell them something they don't need, and they don't think the dealer knows what he is talking about. This is especially true of beginners who are trying to make each dollar count.

As for the 4-H model building project, more power to Phil; but I have an opinion on youth organizations. Kids today have so many diversified activities that they are too busy to take a hobby seriously and do a decent job. If the parents for the past

25 years had been doing their duty as parents, we would have no need for all the youth organizations.

Now let's talk about the dealer that Phil so thoughtlessly kicked in the face. There isn't a dealer, distributor or manufacturer in this "good old USA" who is cutting a "fat hog" with model airplane supplies. Most dealers I know of put in 60 to 70 hours a week and don't come close to taking home the pay that a laborer takes home in 40 hours. If we don't earn enough money to purchase the essentials plus a few luxuries, we can't protest or go out on strike. We must close down our business and join the rest of our sick society which is demanding something for nothing.

As for the price of model building merchandise, let's "tell it like it is." The manufacturers have done a commendable job of keeping prices in line; a Fox 35 stunt engine is \$1 higher today than it was when first introduced, while a cup of coffee, or a new suit has doubled. I don't think you can show me a hobby manufacturer who has a union shop, yet they must buy their raw materials from unionized sources.

And just who do you intend to boycott? The manufacturer? He has the know-how and equipment to turn to other products. The distributor? He can turn to toys; besides, the dealer needs him. I can't imagine making up about 60 small orders a week to manufacturers. The dealer? He is operating on a shoestring now, you will just eliminate your local source of supply. "Cool it" Phil. Model airplane merchandise is one of the best values you can get for your dollar today.

I do have a gripe about retail selling of R/C. The public walks into a hobby shop and expects the dealer to have \$400 radio equipment on his shelf to show him. R/C equipment carries a small profit margin for the money invested by the dealer, and it will be obsolete in nine months. The customer still wants information (which he doesn't pay for) which might total an hour or more. He then either goes home and orders it from a manufacturer or forgets the whole idea because it is either too much money or the dealer didn't have the equipment to put in his hands and close the sale. Even when the dealer has the equipment, the man can get it cheaper from a friend who is a club member. Why should the dealer put his money in R/C equipment when he can put it in plastic kits at a higher mark-up and move them before they are stale?



Why can't R/C manufacturers let qualified dealers have an R/C set for a period of time on consignment? Even a small deposit would be all right. This method would expose more R/C equipment to more people and I'm sure more equipment would be sold and just maybe the model airplane business would lose the "toy plane" image.

Robert S. Pease, Bobby's Hobby Lobby
Westminster, Md.

Turbulent airflow

In the article on Aerodynamics in the May '69 issue, very little reference was made to the great difference in Reynolds number between full-scale aircraft and models. The article called for a very smooth finish and laminar flow for best results.

In your photo section on FAI competition models, two methods of increasing turbulence were shown, their purpose to increase lift and delay stall. J. S. Luck commented on this years ago.

As I understand it, at model speeds, an airfoil does not become efficient until the flow over it becomes turbulent. Laminar flow separates from the surface at lower angles of attack causing a loss of lift and early stall. Artificial turbulence tends to cause the flow to follow the surface better resulting in increased lift and stall at a higher angle of attack.

Sears R. McCarrison, Mattapan, Mass.

Many an old-hand has wondered why some beat-up crate with random patches and frayed edges sticking up in the breeze, flies so much better, and longer, than when it was new and sleek. And so many "dirty" looking crates glide like angels — while dream ships sink like bricks. One way to prove this turbulator thing, is to put a thread or thin string, doped in place, spanwise at an appropriate chord point — but only one wing! If a turn develops exhibiting more lift on the turbulated side, you are onto something!

Publisher.

Has personality

A bouquet of roses to you for your fine article on rubber-powered scale. Every word was true and such models do have a personality.

Model yachts are a parallel perspective. Here too, when such craft have been designed, painstakingly built, hopefully launched and set to a predetermined course, personalities are involved. The skill of the "sailor," the beauty in running, answering to the wind, all working together create a personality and each model has her own grace, beauty and life. Is such a sport dead? Must it fall victim to R/C? Never! True, R/C adds to the sport, but it becomes a mechanical rather than an inherent or educational skill.

Could be I'm an old-timer or a die-hard, but the enclosed photos are of some models I have designed and built and with which I had immeasurable hours of fun sailing, experimenting with running gear and describing "operations" to audiences of all ages.

I'm also an aircraft modeler, but I believe a "gone sailor." Hats off to the magazine. It's a fine publication and I'm always looking forward to next month.

Victor F. Miglierina, Baltimore, Md.

How about demonstrations?

Just read "You Said It" and "Straight and Level" about the problems of getting people interested in R/C, C/L and gliders.

May I suggest using groups already established. Have someone give a demonstration at Cub Scout meetings, Boy Scouts, YMCA's, grade schools, and junior high schools.

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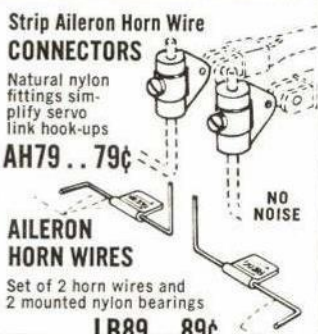
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YOU said it!

My roommate and I just started. Score so far: three gliders dead, one control-line wrecked several times, in order to learn how to fly. R/C is coming next month. We have learned and are still learning the hard way because the nearest club (not yet formed) is 170 miles away. But we feel that once we learn, we are going to try to pass our knowledge on to other beginners. Our own visiting will start as soon as we can put on a halfway decent program. Probably gliders, rubber, control-line and maybe R/C. But to keep their interest, we want to be good enough to help, not just demonstrate.

Richard Stephens, Missoula, Mont.

Police officer seeks help
 Please, if you can, send me the name of any radio-control clubs in my area. I am very interested in R/C, but am having difficulty meeting anyone who can help me. I think this is the major problem confronting beginners. Although I am 27 years old, I put myself in the same category as "junior." I am also a beginner in modeling, so I need help any way I can get it. I am a police officer, and my fellow officers have been ribbing me. I think this is a challenge to myself.

Charles F. Geffner, Brooklyn, N.Y.

AAM gave Charlie a construction. All those requiring such help should write the Academy of Model Aeronautics, 1239 Vermont Ave. N.W., Washington, D.C. 20005. It is their job to help. They do so. Ed.

Those finicky troublemakers
 Just what is a kid about 12 years old supposed to do with spare time? You get a hobby or something else to do. Well, you try model airplanes and everybody complains that engines make too much noise, that paint smells horrible, and they say "close that immediately."

These same people that complain about a kid's hobby, are the first to make you give it up. And nowadays when these people read a paper about kids getting together to smoke pot, they think: "What is going to become of the world? What's the matter with today's youth? Don't they have a hobby?"

These people are the real troublemakers. They are never happy unless they can complain. That is a good reason for today's youth not taking interest in model planes.

Another reason is it costs too darn much money. With prices going up, club membership is going down.

I fly 1/2A control-line, which I think is a lot of fun. Others think 1/2A airplanes are damned annoying. I get chased off fields all the time, so does the rest of my club. What's a 12-year-old supposed to do to keep out of trouble?

You have a great magazine—keep it that way.

Joseph Flannery, Bergenfield, N.J.

We appreciate
 You are to be congratulated on your excellent magazine. I have turned to it in many tight spots, and built a few models from your plans. I plan to build Down-
 Continued on page 72

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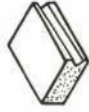
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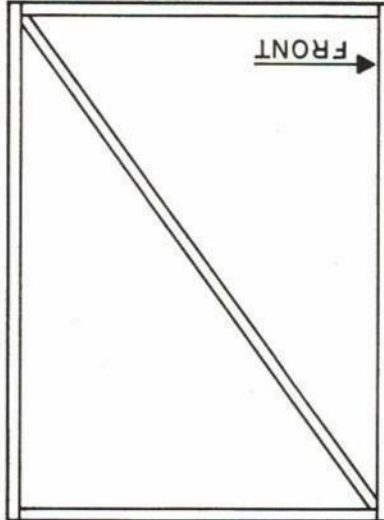
3/8" x 1/4" x 1/8" BALSA
BEARING BLOCK



SIDE VIEW

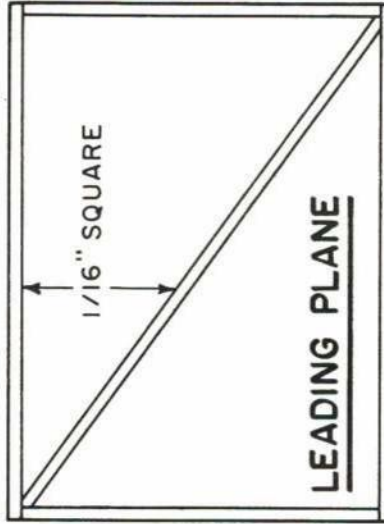


BOTTOM VIEW
SHOWING OFFSET
NOTCH FOR PROP
SHAFT BEARING TUBE
(SEE ALSO PROP
BEARING DETAIL
DRAWING)



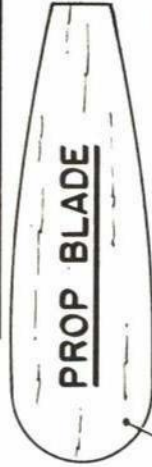
LEADING PLANE

1/16" SQUARE



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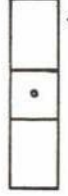
PROP BLADE

1/32" SHEET
(MAKE TWO)



TOP VIEW

LEFT
END
VIEW



RIGHT
END
VIEW



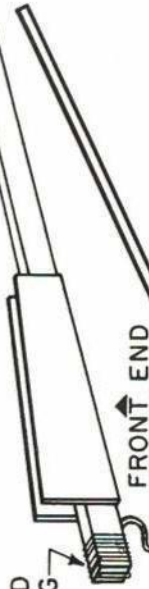
PROP HUB

REAR
VIEW



THREAD
BINDING

FRONT
END
DETAIL



LEADING PLANE MOUNT

1/32" SHEET
(MAKE TWO)

FUSELAGE

0.025-.045 DIAMETER
MUSIC WIRE HOOK

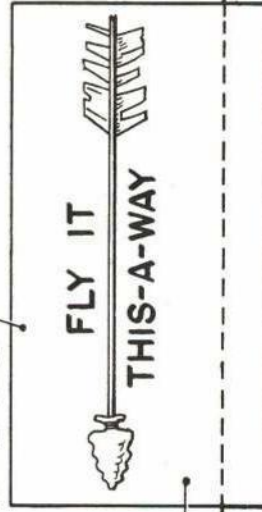
1/4" x 1/8"

FRONT VIEW OF FINISHED
LEADING PLANE, SHOWING
DIHEDRAL ANGLE

WING MOUNT

FLY IT THIS-A-WAY

1/32" SHEET
(MAKE TWO)



PROP SHAFT BEARING
(1/16" DIAMETER
ALUMINUM TUBE)

BEARING BLOCK

BEADS

BEND AFTER
PROP IS ON

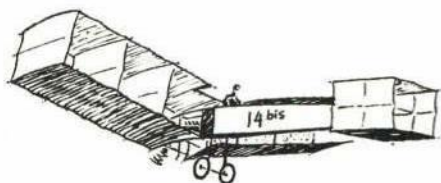
TUBE

0.025-.045 DIAMETER
MUSIC WIRE PROP SHAFT

Tail First

Many great planes have flown backwards. So does this little rubber job.

KENNETH AND WILLIAM HANNAN



1906 SANTOS-DUMONT

DON'T feel backward about building this "wrong-way" flyer, because some of aviation's most important pioneers started off in this direction. For example, many of the Wright Brothers' machines featured forward-mounted "tails," as did Santos Dumont's Bis 14 (one of the first heavier-than-aircraft to fly in Europe). Even the famous channel-crosser, Louis Bleriot, built at least three canards, as tail-first aircraft are called.

The North American Aviation XB-70 Valkyrie is one of the more recent examples of the type. Incidentally, the forward surface on a canard is usually referred to as a "leading plane," rather than a tail, which after all is supposed to be on the south end of any north-bound animal!

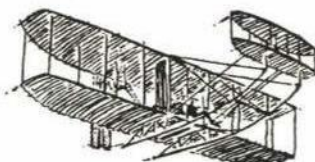
Much of the design effort and test-flying of our model was carried out by Tenderfoot Kenneth Hannan, who first became interested in canards while watching one being flown indoors by Walt Mooney, of San Diego, Calif.

Construction: First, take a good look at our plans and illustrations to be sure you understand how the various parts fit together. The model will perform best if it is light, so carefully select your balsa wood. Sight down each piece to be certain that

it is straight. Heft several pieces of wood, to tell which is the lightest.

Obtain a piece of Celotex, soft wood board, or even a flat sheet of corrugated cardboard, on which to build the wings and leading plane panels. We suggest you start with these parts so that they will have plenty of time to dry while you are working on other items. Since the plans are printed full size in the magazine, you can work directly over them. To protect the plans from glue, cover them with Saran-Wrap or waxed paper.

Wing: Select straight $\frac{1}{16}$ "-sq. balsa strips, and cut the two longest ones first. Pin



1908 WRIGHT

them in place over the plans so that they will be held flat while drying. Do not pierce the wood with the pins, but instead, put pins on each side at a slight angle, so that the wood will not be weakened.

Next, add the shorter pieces of $\frac{1}{16}$ " sq. strip which serve as ribs. Note that there are two of them glued together in the center of the wing. If you measure the length of the first rib accurately, you will be able to use it as a guide in cutting the remaining five pieces. Try to avoid getting too much glue on the joints; this looks messy,

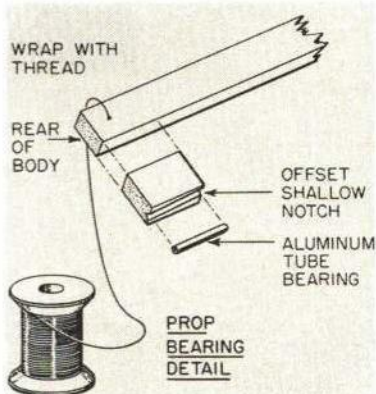
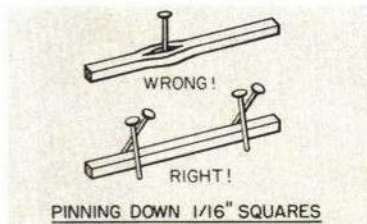


1911 BLERIOT

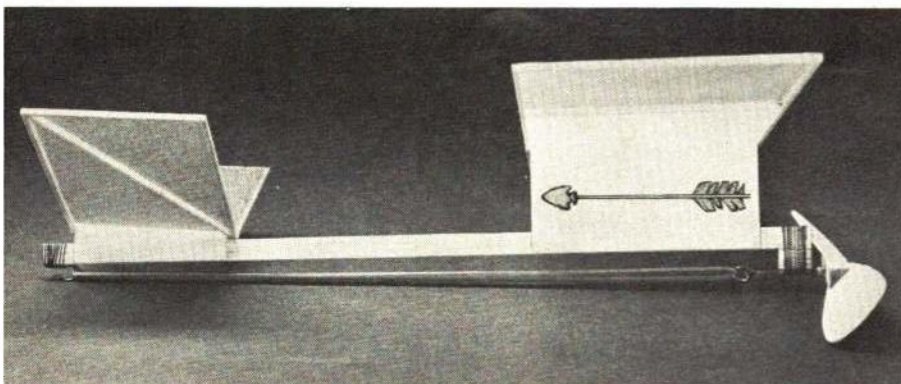
and adds unnecessary weight.

Leading plane: This is constructed in two parts, from $\frac{1}{16}$ " sq. balsa strips, which are pinned down to the plans in the same manner as the wing. Take your time to fit the diagonal sticks well, rather than trying to force them into place, or expecting the glue to fill in any cracks left by pieces that are too short. Patience here will pay off in

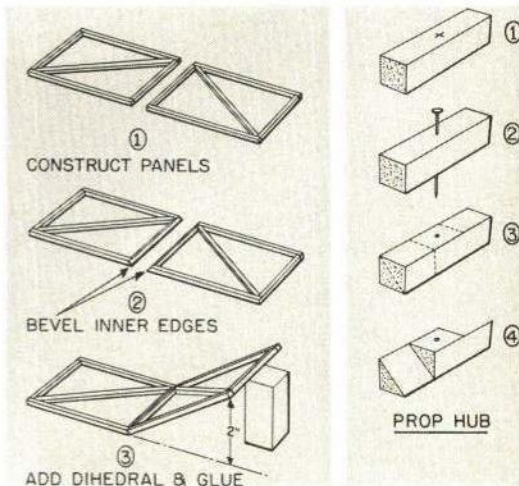
Continued on page 61



NORTH AMERICAN XB-70



Model has naturally correct balance point with balsa prop. If you substitute a plastic prop, add weight at nose to compensate. Tenderfoot arrow shows flight direction.

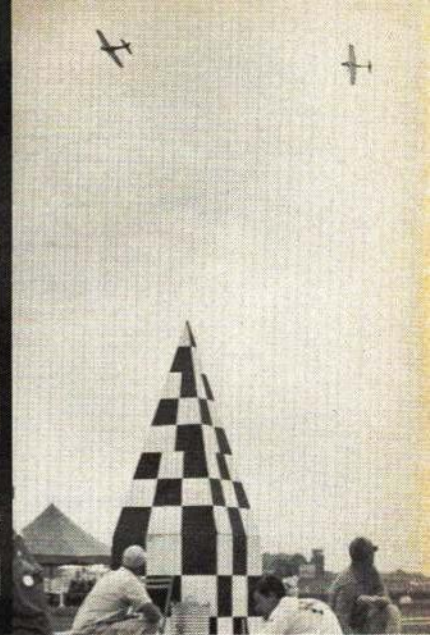




Phil Edwards photo
 "Welcome aboard," was the greeting contestants heard. These arrivals camped; others used Navy barracks, some stayed in motels.



Official U. S. Navy photo
 Navy men together with AMA'ers taught youngsters how to build and fly AMA Cub rubber models—most were new to modeling.



U. S. Navy
 R/C Pylon Racers look like big ones as they round pylon. Scale models (Form. I) and semi-scale models (Form. II) both raced.

THE BIG 'NATS'



Phil Edwards
 Mike Waldron, just 4'-5" height, celebrated his ninth birthday by placing 6th in Junior C/L Rat Racing. Lean needle valve setting slowed him down for first part of race. Dad, Ron, pitted.



Phil Edwards
 The National Contest of today would not be possible without the assistance of the U. S. Navy in manpower and facilities. Shown is Dave Adamisin making C/L Stunt flight before Navy judges.



Phil Edwards

Big entry list, good weather and many flights combined to make long waiting line for timers in the Nordic Towline Glider event. Only the Open winner, a Canadian, made a perfect score.



Gerry Nelson photo

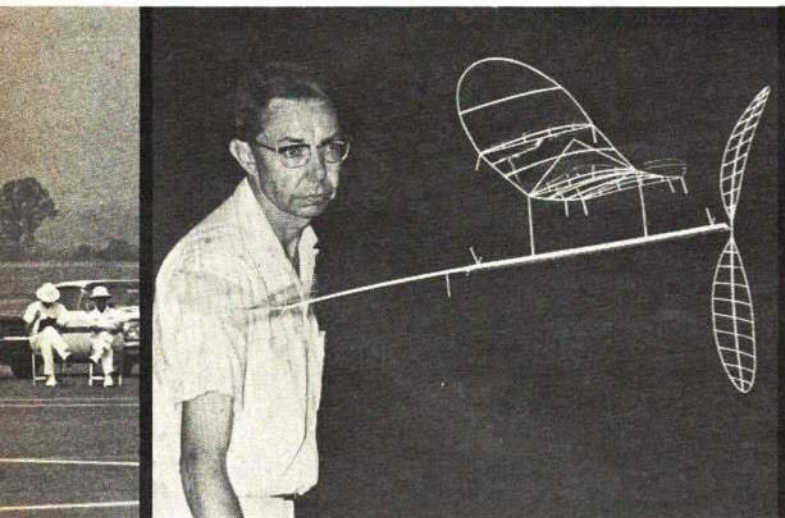
Larry Leonard, Canoga Pk., Calif., became R/C Champ by placing first in both Aerobatics and Form. I Pylon. Aerobatic model ready for takeoff is Kwik Fli III, Lee Veco 61.

AMA's 22nd year of U. S. Navy-hosted National Model Airplane Championships. Over 1500 modelers took part this year at Willow Grove Naval Air Station, Pennsylvania— and over 3000 more kids got started on their first airplane.

THE Academy of Model Aeronautics last July ran off an awesome double-feature model aviation event. One of the features was the usual world's biggest model meet — the 38th annual week-long competition for AMA member-modelers from all over the U.S.A., plus guests from several countries including Australia. This meet alone was one of the largest ever, with contestants from eight to 80 flying highly developed models of all types in over 30 official AMA events. Over 500 were berthed during the week in Navy bunks and many others camped in trailers on the station. All that was quite spectacular although nothing new to those who have enjoyed Navy-hosted Na-

tional Meets over the past two decades (first one: 1948).

This year, however, a second feature was added and run simultaneously during Nats week — a special four-day contest for first-time young modelers. On each day free Delta-Dart model airplane kits were given away by AMA and Navy officials. They also instructed classes on how to build the kits, then held a daily contest to introduce the youngsters to the thrills of competition flying. This four-day program attracted over 3,000 kids from the Philadelphia metropolitan and suburban areas. More Nats details on the following two pages and in the AMA News section (with listings of trophy winners and additional photos).



Phil Edwards

Concentration is intense as Hewitt Phillips, Hampton, Va., observes the flight of microfilm-covered Indoor Stick model. Event flown in Lakehurst blimp hangar, top time over 40 mins.



Phil Edwards

F/F Gas entrant Doug Adams, Grand Rapids, Mich., chose HL over ROG even though this allowed him three seconds less engine run. Three-minute flight max used this year was mostly well received.



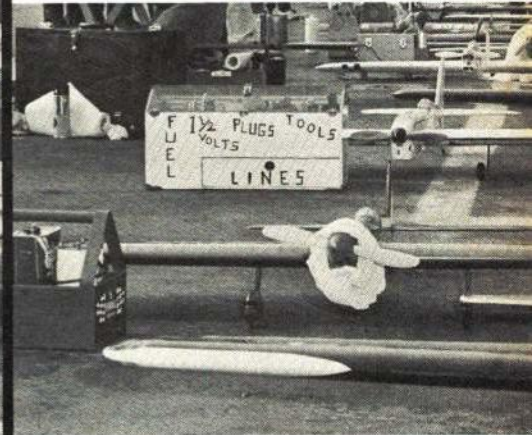
U. S. Navy
 Five-month-old Danny West, son of Mr. and Mrs. James West of Keego Harbor, Mich., had better keep watch on his pacifier—there might be a Combat flyer about wanting a new fuel tank!



Phil Edwards
 It is as interesting to watch the pilots as it is the models in C/L Combat when top flyers such as Peter Puchyr (L), Acton, Canada, and Richard McGarrigle, Trumansburg, N. Y., cut up the air.



U. S. Navy
 Spotter for R/C Pylon Racing is essential as pilot must keep constant model watch. Leonard Martin's dad, Henry, does spotting.



Phil Edwards
 Left: The contestant hangar is a center of Nats activity especially in evenings when models are readied for next day's events.

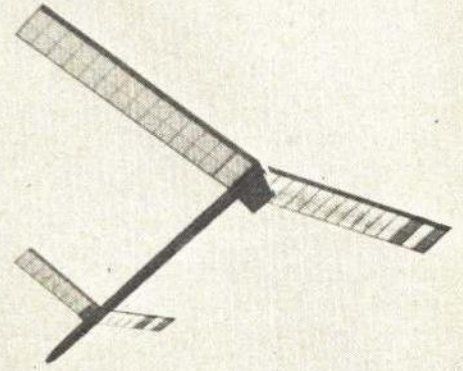


U. S. Navy

Few flyers could have survived the mostly hot week without the refreshments at each of the flying areas—a welcome relief.

Phil Edwards

Two days for Indoor flying allowed Indoor Scale to be added as an official event. Judges P. Kastory and D. Didelot at work.



Robert Meuser photo

Tail-first canard A-1 Towline Glider by Carl Taylor flew well but did not place in combined event with larger A-2 models.



U. S. Navy

John Breuer, Riverside, N. J., launches high-powered, light-weight C/L Combat model. Even at launch slight blur results from speed.



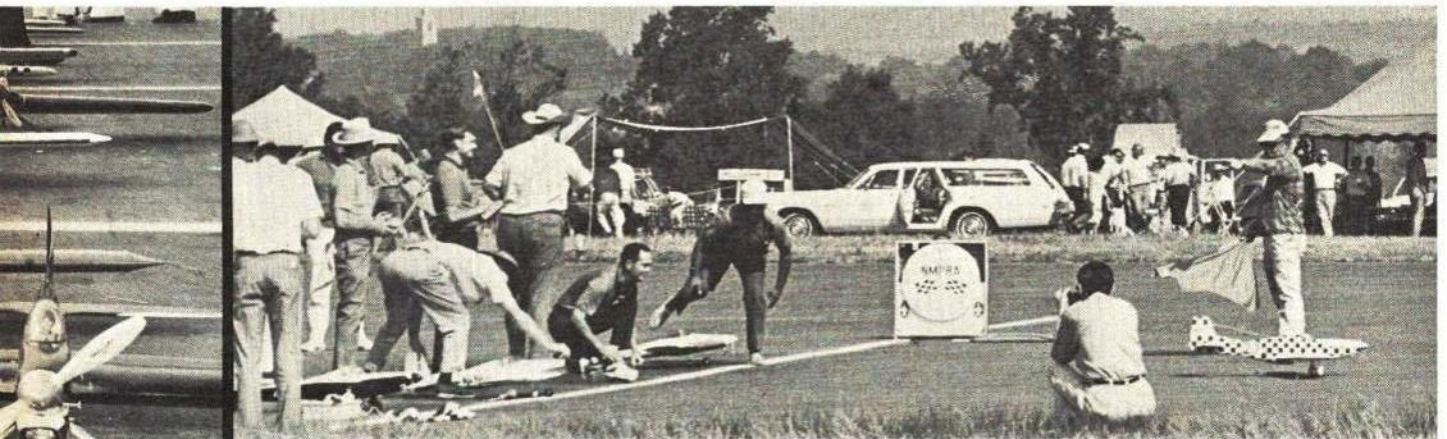
U. S. Navy

With FW 190 R/C Scale model this year, Dave Platt had high Fidelity and Craftsmanship scores. Realistic appearance was stressed.



U. S. Navy

Readying for a C/L Stunt flight to place him first among Juniors is Dennis Adamisin. Model has WW II Hawker Typhoon features.



U. S. Navy

C/L Stunt models lined up awaiting flights represent many outstanding examples of the art. Models not only were extremely flyable, but workmanship, detail and finish were outstanding.

Phil Edwards

Flagman Glen Spickler points to the second plane as the P-51 Formula II model of the Telford-Violett team streaks down the runway during R/C Pylon Racing Qualifying Heats early in week.



Scimitar

Distinctive-looking stunt ship designed for constant high-speed and positive tracking through maneuvers.

JOE FOSTER

SCIMITAR was designed with one basic thought. That was to try to solve a design deficiency that is prevalent in many of the small, high-speed stunt ships that are flown these days. This problem is the apparent difficulty high-speed airplanes have in tracking through the most basic maneuvers, such as loops, Immelmann turns, etc. We feel that this problem is created, at least in part, by small aerodynamic flaws that are exaggerated at high speeds.

How many ships have you seen that would track through three consecutive inside and outside loops without correction? I have flown only two. In the past we have always rationalized that some hidden warp was the culprit, even though we took great care to check the trueness of the flying surfaces and fuselage. A close examination of the flying characteristics of these crooked flying machines revealed that the heading was being lost at one spot in a loop. This was not the constant change of heading that would result from a warp. We concluded that some aerodynamic nonsense was taking place when the airplane reached a certain speed and attitude.

For example, I am sure you have seen many ships that wiggle in straight and level flight at a certain speed, or that wiggle when they are in a banked turn, or at certain headings relative to the wind. These are all exaggerated cases of the same aerodynamic flaw

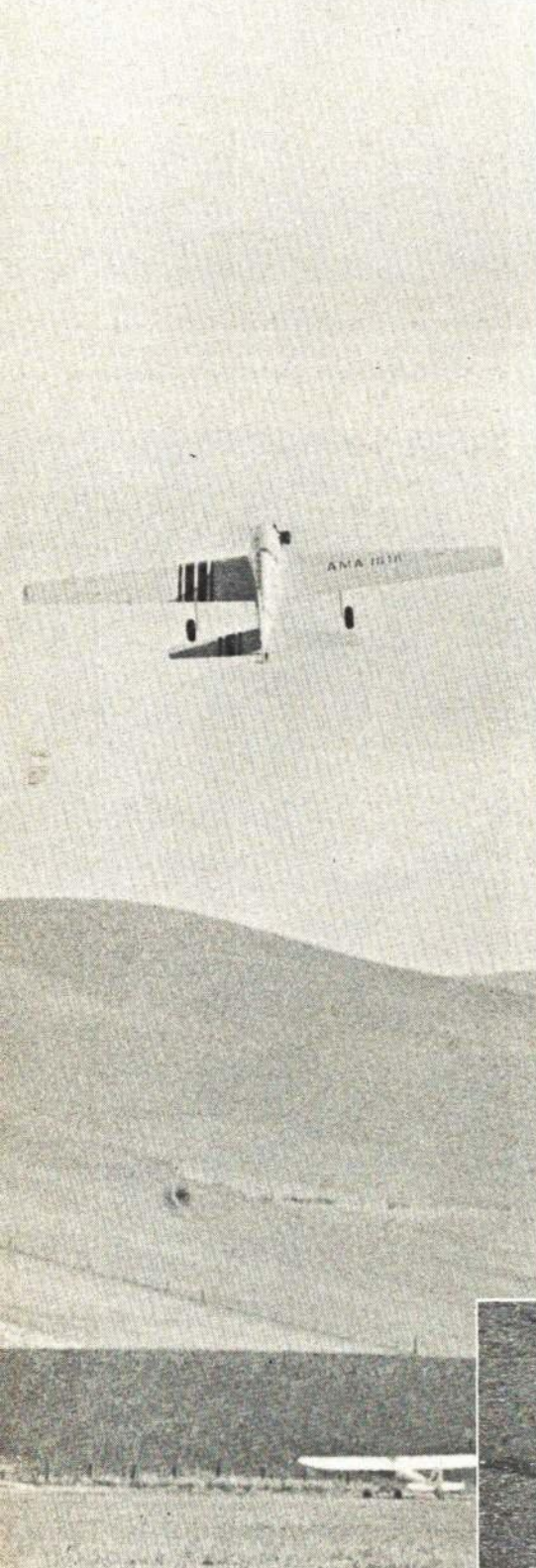
that will cause a seemingly unexplainable heading change at the top or bottom of a loop. It is our opinion that it is the uneven flow of air over the top of the fuselage, and its effect on the fin, that causes the wiggle and the resultant tracking problems.

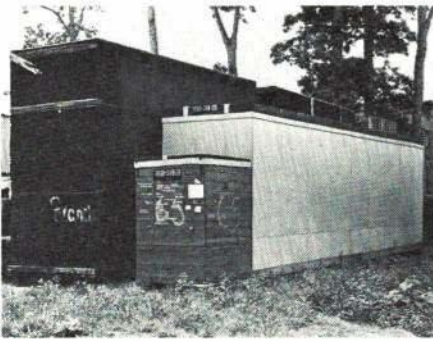
To resolve this deficiency we incorporated into the Scimitar design, three fairly obvious features. First, our wing leading edge is highly swept back. In our opinion, this improves the directional stability at all speeds. Second, we used a streamlined turtle-back fuselage design. This was done to smooth out the flow of air as it moves across the fin. Third, we kept the entire configuration as streamlined as possible, within practical limits.

Our first flights with Scimitar were very satisfying. We found that, not only had we accomplished our goal of correcting the wiggle and greatly improving the tracking problem, but we had derived two additional very desirable flight characteristics. The ship flies at a constant speed through the pattern maneuvers. This, along with its smoothness, gives it a very graceful appearance in the air, even though it is very fast. Additionally, Scimitar exhibits practically no visible dynamic overshoot about the roll axis. She does beautiful, constant-speed rolls with only a whisper of elevator correction, and stops rolling the instant you release the

Continued on page 56

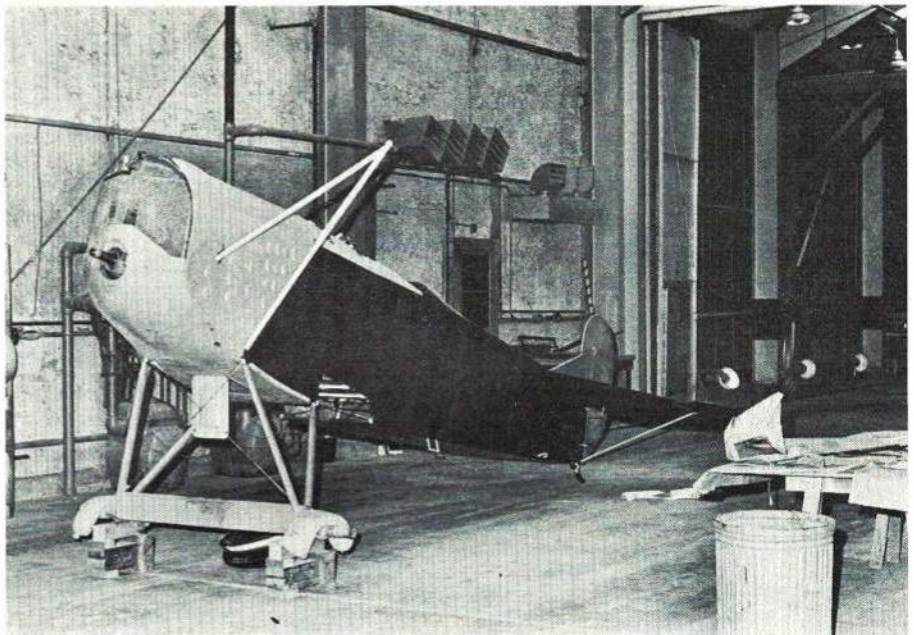
Unusual planform and Rivets-like appearance is result of engineering to correct flying problems of other stunters. Handles gusty weather like hot knife slicing butter.





Lack of hangar space makes necessary a temporary use of storage crates to protect some specimens from the elements. Large crate in this photo houses a disassembled Japanese bomber from WW II. The Museum hopes to erect additional hangar space but funding is slow-coming.

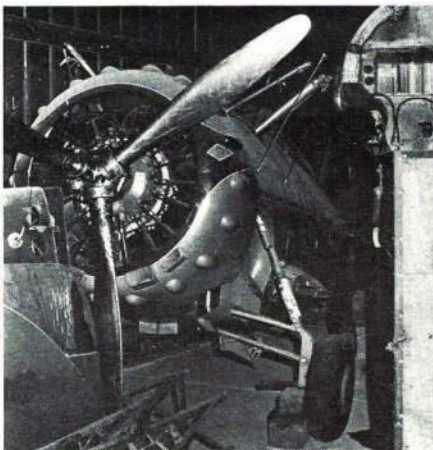
Fokker DVII, right, will be returned to factory-new condition. Yards of silk-screened fabric in the original lozenge camouflage were contracted for, rather than resort to authentic hand-painting. Museum frequently prefers a restoration to weathered operational condition.



All photos, Frank Pierce.



Above: Discouraging junk heap actually is collection of parts for two distinct aircraft, awaiting classification. The original parts are used whenever possible. Value to researchers is paramount. Motto is preserve rather than restore, restore rather than replace.



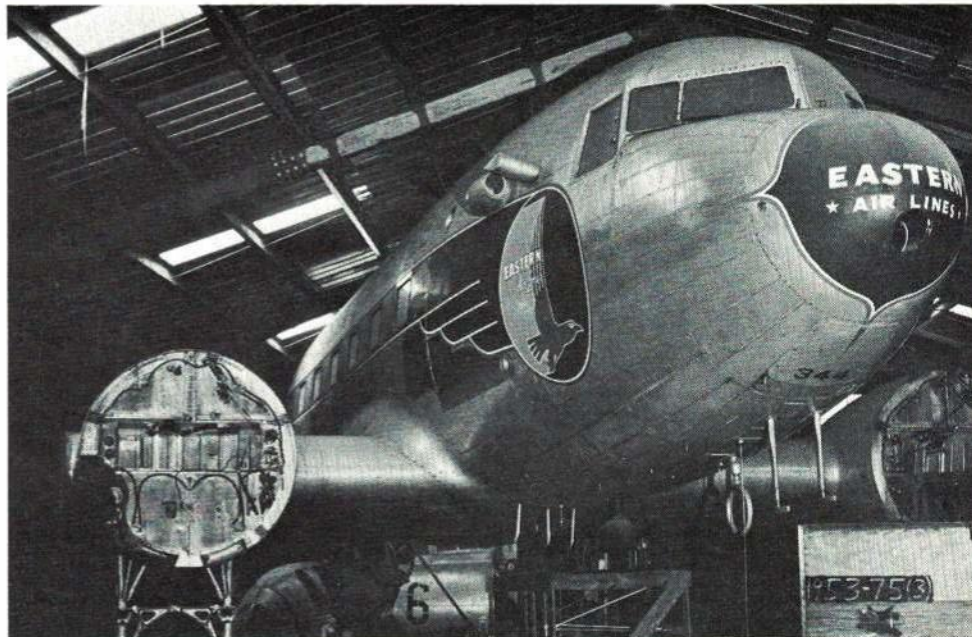
Al Williams' Gulfhawk II now looks like new, will shortly be loaned by Smithsonian for exhibit at Experimental Aircraft Association's Museum. Other museums who meet requirements will be similarly honored, in preference to keeping famous airplanes in dead-storage.

Right: First 1,000,000-miler, an aged DC-3 from Eastern Airlines, now stripped of wings and engines, was ordered completely refurbished by Eastern in 1953! Eventually, it should be a wonderful exhibit when new museum building finally becomes reality. Meanwhile, years pass.

WILL CONGRESS ACT IN TIME?

The SILVER HILL Story

With a handful of dedicated experts and a tiny budget the Smithsonian wages a desperate struggle to save many of aviation's treasured historic aircraft.





War trophy Japanese Kamakaze "Baka" is complete except for Jap copy of German Walther rocket engine. External lock on cockpit made ditching this flying bomb impossible. Flower pattern was frequently used badge by suicide pilots. Baka means stupid.



Sikorsky S43 (JRS-1) used by Navy was military follow-on to famous trans-Pacific airplanes in prewar period. Wings are missing. If funds were available Museum believes it could fabricate copies of original wings — if they cannot be found in the meantime.

FRANK AND NANCY PIERCE

FOR those who hold a deep-seated affection for the glory and excitement of aviation history, there is perhaps no place on earth quite like the National Air and Space Museum's Preservation and Restoration Facility in Silver Hill, Maryland. Few people know of its existence. There are enough sights and smells and memories of historic aircraft at Silver Hill to relive in one day the entire chronology of flight.

Housed in and around a group of metal hangars, the Smithsonian Institution has gathered a collection of some of the world's most important aircraft. The Silver Hill collection lies fenced off from the world, a sort of aircraft limbo until the final authorization for the new National Air and Space Museum building becomes a reality. When? Perhaps next year, the following year, maybe ten years. No one can say.

Don't mark Silver Hill on your itinerary for your trip to Washington. Surrounded by fencing, its gates are permanently closed to the public. No one enters unless he has specific permission from a senior Museum

official. Once in, a guard escort is assigned to you. Freedom of movement is as carefully controlled as it is on a U. S. nuclear-weapons station. These precautions are essential. The Smithsonian is the custodian of an aircraft collection of such size and significance that it cannot be evaluated in cash values.

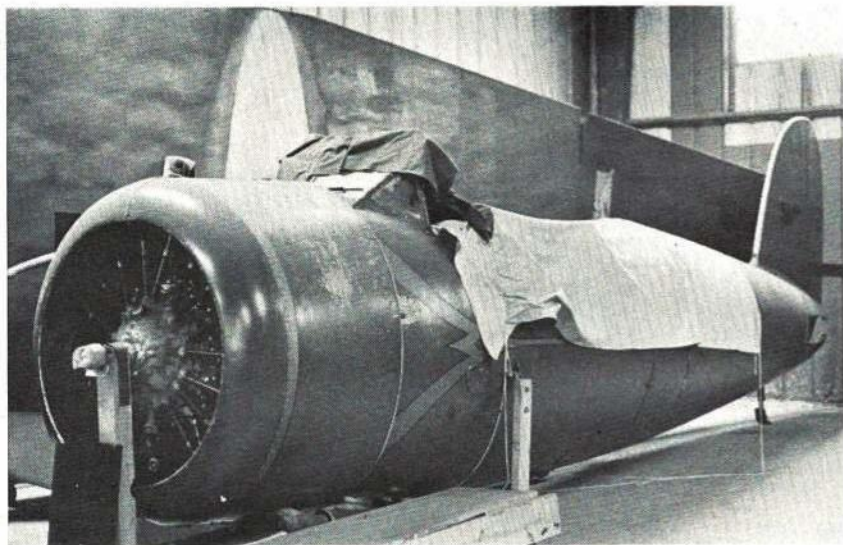
Through the dedication of a small staff and the stretching of a very small budget, the Silver Hill Facility has managed to preserve in a state of suspended animation nearly 200 aircraft, and find enough money left over to restore some items in the collection.

With few exceptions, most of the aircraft are preserved but not restored. "We are holding our own, at least for the time," one official told me. Their primary task is to keep time from taking further toll. Older, fabric-covered aircraft are stored partially disassembled in large dry hangar-like sheds. More recent and more rugged aircraft must be left outside, protected only by shards of plastic cocoons over more vital areas. As

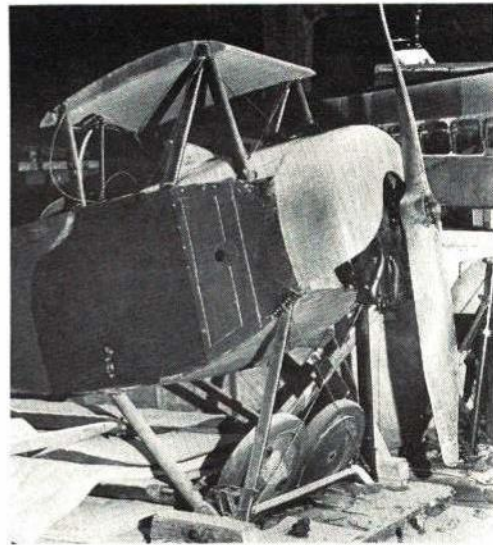
fast as funds and personnel become available, new hangars are constructed, or large packing crates are built to partially protect the aircraft from the weather.

Our escort opened the padlocked door of the largest hangar. Saturated by a ghostly green light filtering down from the few plastic skylights, stood a double row of aircraft, stripped of wings, and covered by the accumulated dust of years. The sensation was that of meeting an old friend after many, many years. I recognized them immediately, but could not help being struck by what the years had done. The fact that they were older didn't decrease the pleasure at all.

The clean, sleek beauty of a Northrop Gamma comes through, even with its wings removed. A familiar curve of a fuselage, the recognizable lines of cockpit and windscreen, a characteristic rudder which you have known since you were a boy. Though covered by a plastic sheet, how could anyone fail to recognize the massive, but somehow arrogant fuselage float of Grover Loen-



Amelia Earhart's "Red Bus" — nickname of her Vega — is oldest Lockheed aircraft in existence. Ship actually consists of parts from two airplanes due to crackups, and originally was on display by Franklin Institute. Museum also has Post's Winnie Mae.



Nieuport 15, once exhibited at now-vanished Roosevelt Field. Many companion items were lost because of lack of post-WW II storage space.

ing's famous amphibian of the twenties.

A SPAD XIII occupies one corner, sans tires and wings, but endowed with a magical grace and beauty which years can't take away. I remember this SPAD when, as a youngster, I used to visit the Museum during World War II, and World War I seemed even farther removed than it does today.

The SPAD was flown by a young AEF officer, when it was returned to the States to spearhead a Liberty Bond drive. When he saw the old SPAD on display, he caused consternation among the guards at the old aviation building, when he crossed the railing and climbed into the cockpit! Then he signed autographs, to the delight of visitors.

A German ME 262, stripped of its wings and jet engines like a dead gray shark, just as it had been shipped from Europe. Scratched, dirty, the black *Balkancruz* insignia peeling and flaking from its fuselage, it was one of WW II's secret weapons. The dirt on the cockpit floor, bits of trash and litter, left there by some unknown Luftwaffe pilot. When the Smithsonian restores this aircraft, something will be lost in the process — that bit of litter.

In another building, almost hidden behind a fully assembled Grumman F6F, was an aircraft which I had known personally. I hadn't expected to see it in the collection so the feeling of nostalgia and recognition was particularly strong. Suspended awkwardly atop its single center-mounted float was the fuselage of one of the N3N-3 "Yellow Peril" trainers from the NAF training squadron at the Naval Academy.

During the Korean War, I was stationed at the Air Facility across the Severn River from the Academy. Even then we took a certain pride in manning the last operational squadron of biplanes anywhere in the world (a dubious claim, but we believed it). Here was number 44 from the original group of 48, old, crippled, but a plane which I had fueled, hosed down, trundled from the hangar for morning flights, and waded waist-deep in the Severn to recover at the end of a day's flying.

I went from one hangar to another, taking photographs where there was room to focus. Nowhere was there really enough room, because space at Silver Hill is at a premium. Some aircraft were buried so deeply that photography was impossible. A DeHavilland Mosquito fuselage for example.

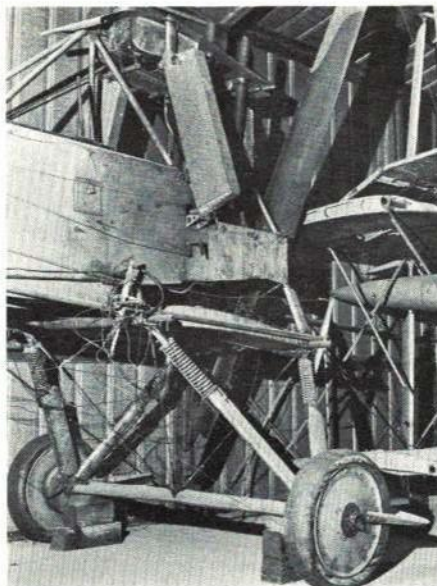
In spite of the crowding, there was order. Fuselages, wings, and component parts, were all marked with a catalogue number. But there is space around each aircraft. Nowhere did two aircraft touch in such a way that either would be damaged.

You must know where to look. Somewhere in Hangar 7 are the remains of an Albatros DV. I was curious to see how the plywood fuselage had withstood storage. But toward the rear of the hangar was Amelia Earhart's Lockheed Vega.

This was a premium aircraft! The quality of construction still shows through the dust — in the fit of the plywood skin and smoothness of the paint, the beautifully constructed fillets. Lockheed constructed the Vegas, Altairs and Sirius to the custom of each purchaser. The Earhart Vega still wears the Lockheed crest proudly on its vertical stabilizer.

Silver Hill also maintains aerospace hardware. Some of the Mercury and Gemini spacecraft are stored there in a hangar similar to those which house the aircraft collection. These are part of my own time, however. The burned and charred capsules sitting mutely on wooden pallets couldn't recapture the grandeur of the moment at Cape Canaveral. Space hardware is designed for an alien environment, not in-

Continued on page 50



French Voisin, one of group of aircraft received in 1919, is considered restorable. Needed is a 280-hp Renault engine with 12 cylinders. A Peugeot engine is a legitimate substitute but would require new hardware, which would detract from the desired authenticity, considered so important.



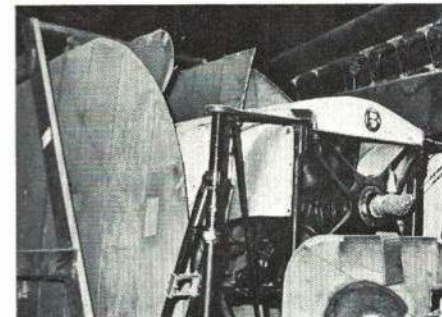
Caudron G4, acquired in 1919, was sent to the U. S. for an engine and structural evaluation in 1918. The missing LeRhône rotary engines were replaced from spare-parts stock. Interesting French plane was on exhibit for years, but removed to make room for another exhibit.



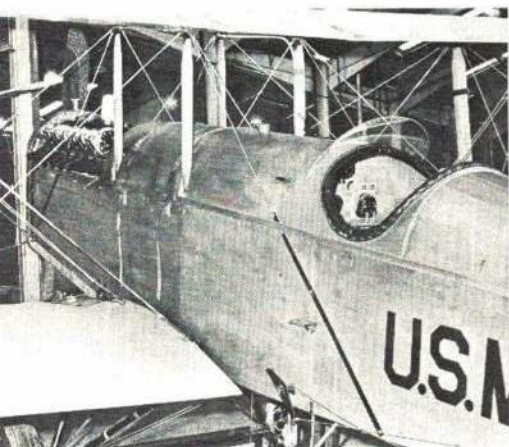
A prize from WW II is this Messerschmitt ME163 rocket-powered interceptor. It was extensively tested at Edwards AFB after the war. One of the most dangerous aircraft ever built, the Komet often exploded on a mild bounce-landing, or on over-running field, after touchy glide to earth.



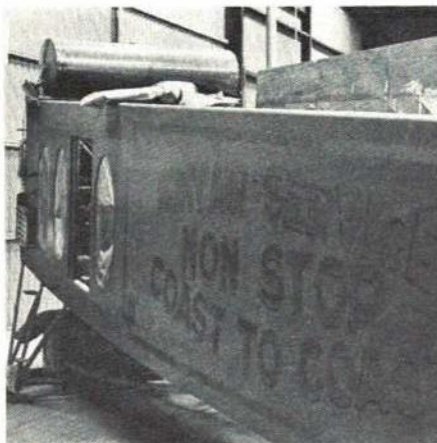
Curtiss F9C2 Sparrowhawk from dirigible Akron provided fighter escort. It was lowered on trapeze-like rack, which it engaged on return to mother-ship. This sample is the last survivor of small fleet. "Hook" extended above top wing, which gulled nicely into fuselage. A great modeling favorite.



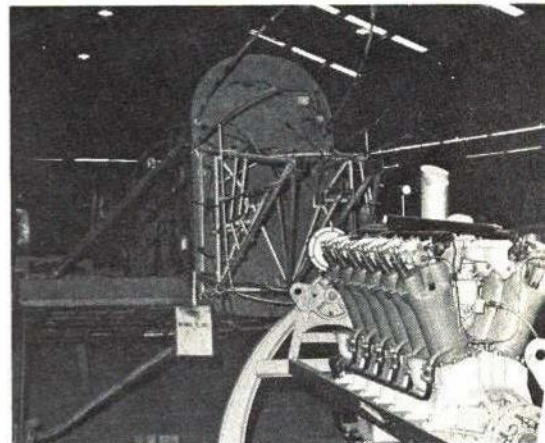
This Bleriot from Roosevelt Field collection was one of many built before WW II in both France and America. It is similar to English Channel-crossing Bleriot. Note the characteristic "B" on the top of cowling. Judging by this photo, ship is in fair shape.



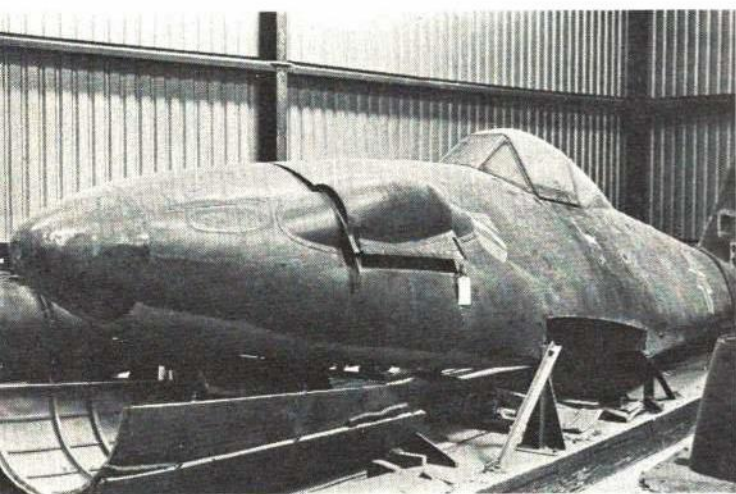
DeHavilland DH4 is one of the few reproductions at Silver Hill. It was constructed from parts of DH which crashed 1922 in the Rockies. Pilot helped find wreck 45 years later. Rebuilt plane flew Coast to Coast in 1968 to commemorate U. S. Airmail Service 50th Anniversary.



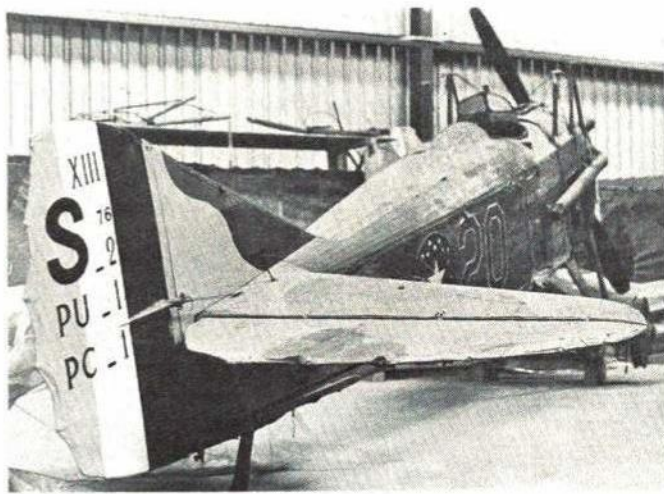
First aircraft to fly non-stop coast-to-coast (East to West at that!) was Fokker T2. It is now fully restored. Thanks to Fokker's design genius it still holds record for greatest weight per horsepower. Engine was wartime Liberty of 423 hp. On record flight groundspeed was 92 mph.



Now undergoing complete restoration is Douglas DT2 World Cruiser "Chicago," flagship of round-the-world flight in 1924. Liberty V12 engine will be sent to Iceland this year for 25 Independence Anniversary. Plane stopped there on flight. Restoration and display will follow.



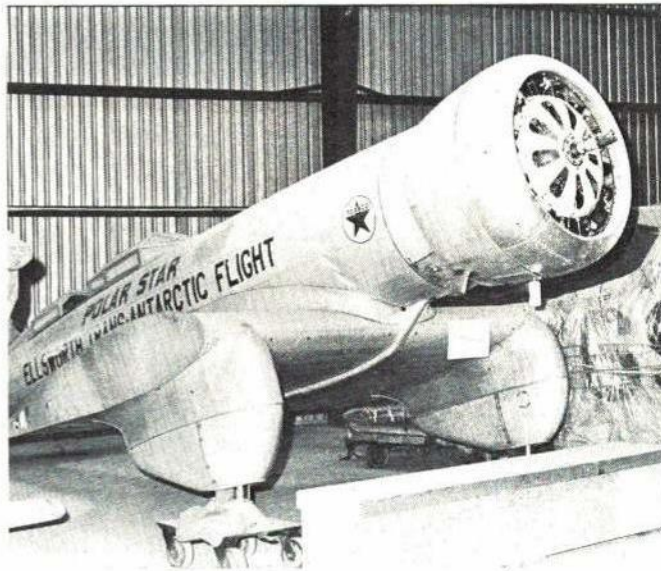
Messerschmitt ME262 twin-jet-powered recon served during last days of WW II with Jagdgeschwader 7. It was one of 11 captured at end of war. Serial number and name plate were removed by a souvenir hunter after plane was shipped to this country, making identification and history difficult to track down.



SPAD XIII scheduled for restoration to service condition, as it was at end of war, preserving bullet holes and scars. Ship was sent here for incentive in Liberty Bond drive. Original fabric will be backed by new technique. Museum was to acquire Rickenbacker's SPAD but aircraft was destroyed by fire while on exhibit in Illinois, a sad loss.



Gull-winged F4U Vought Corsair of Pacific Theater fame in WW II is typical of complete series of naval aircraft donated by Navy at war's end. Unfortunately, from Museum's viewpoint, log books were destroyed and individual histories lost. Nevertheless, these are historic aircraft meeting Museum criteria.



Lincoln Ellsworth's trans-Antarctic Northrop Gamma is in excellent shape. Ellsworth was reluctant to donate aircraft, thinking he would use it again. Museum agreed to store craft, even keeping battery charged. Plane will be preserved, not restored. Rough-landing wrinkle in fuselage will remain as was.

Ryan M-1 Mailplane

From this design the Spirit of St. Louis was developed. Rubber-powered model has details galore for the expert and clear instructions for the beginner.

VIC HARDEN

BEFORE 1926 few people had seen an airmail plane up close. But about that time the government began to award contracts to private firms to carry the mail. This was the real beginning of our present day airline companies.

Along with designs by Douglas, Boeing and others, was one built by the Ryan Airlines School of San Diego. The aircraft performed well even with lower horsepower and a heavier Hispano-Wright engine, in place of a Wright J4 engine originally specified. Known as the Ryan M-1, the plane later became the M-2. Some were built with the Hisso, some with the J4, for airline companies in the West.

Then Lindbergh picked Ryan to build his airplane. As history records he was successful in 1927 on a long and lonely trip, from New York to Paris. His Ryan number 29 was a descendant of the M-1 and M-2. The similarity was evident between the M-1 and the NYP Ryan used by Lindbergh.

Our rubber-powered model is the Hisso-powered version. It provides more nose length, giving a graceful and smooth appearance. A number of photographs exist of this version of the M-1 and M-2 as well as the J4 version. The *American Airman Magazine*,

Vol. 4, No. 7, of July 1961, shows two M-1/M-2 Hisso versions. *General Aviation News* Monday, March 24, 1969, carries a picture of the M-1 now on display in San Diego.

You can build a full-detail-scale type, or a scale-outline type. Both types require about the same effort and both will perform well. My model was a scale outline variety used to develop a larger diesel-engined job. The amount of detail will affect the final weight.

Start with the wing since it is the most difficult part. Using the patterns for the spars, front and rear, aileron and false spar and centerline splices, each cut from $\frac{1}{32}$ " straight-grain sheet, make two of each except the centerline splice pieces. The rib template is cut from light gauge aluminum or tin. Use the template to cut 30 upper rib caps from $\frac{1}{32}$ " straight-grain sheet. Each rib should be $\frac{3}{32}$ " wide. In addition, cut $\frac{1}{32} \times \frac{1}{8}$ " strips for the lower caps from the same material. The leading edge is $\frac{3}{32}$ " sq. and the trailing edge is $\frac{1}{16} \times \frac{1}{4}$ ".

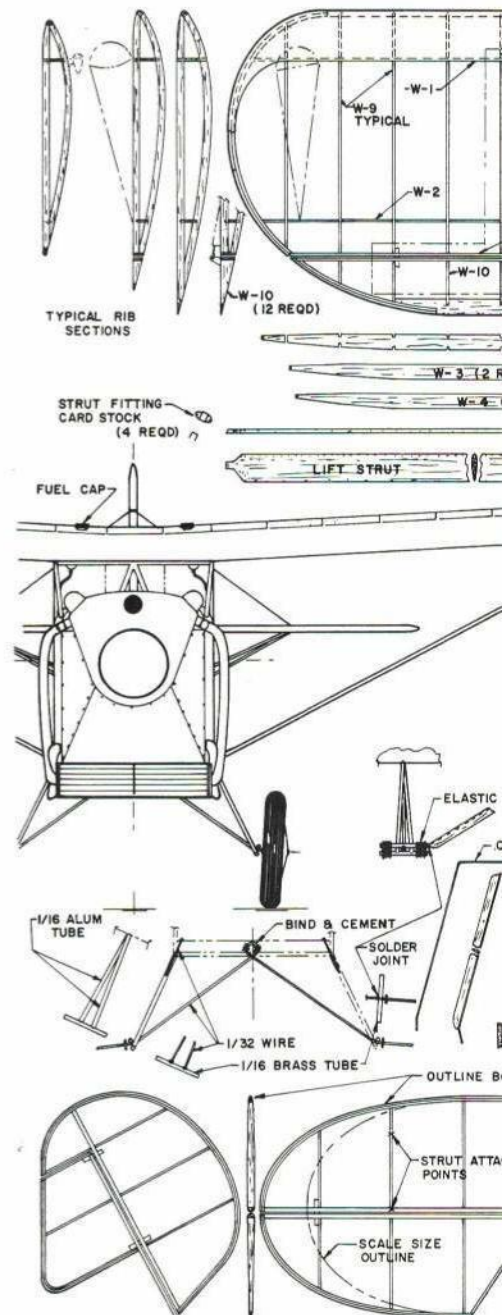
Trace the shape of the tip on a piece of cardboard about $\frac{1}{16}$ " thick. Cut out at the inside line and use it to bend the $\frac{1}{32} \times \frac{3}{32}$ " laminations to shape. Soak the wood in hot water a few minutes, then bend it around the cardboard form, holding the strips in place with pins pushed into any soft material used as a flat base. Use an oven at 125°

F. to speed up the drying time to a half hour.

Two sets are required. The wing structure can be set up over wax-paper-covered plans. Trim the forward ends of the lower rib caps to a 45-degree angle and assemble them in place with the spars, trailing edge pieces and leading edge strip. The upper rib caps are trimmed to match at the leading edge with a 45-degree angle cut, and to fair at the trailing edge on the lower rib cap. Build the wing, including the ailerons, as a single unit. Cut away the ailerons after



Model's structure features use of card stock, bond paper for wing leading edge, and built-up ribs. All curved outlines are laminated balsa strips. Flies great indoors or out.



the tips are completed. This assures alignment.

Now for the horizontal and vertical surfaces. Make up the cardboard forms (same as for the wing tips) and bend the $1/32 \times 1/16$ " laminations into place on the forms and dry as before. By now your wing tips should have dried and those laminations can be glued together holding them in place on the form to fix their shape. When the glue dries on the tips set them up in place with the leading and trailing edge pieces, blocking up in position. Glue all the contact positions with spars and other structure while still over the plans.

Cut out the rib and spar strip material for the tail surfaces from sheet stock; also the fuselage material can be cut to required sizes. The tail surfaces now can be laminated up on the form with glue and set aside to dry.

The wing halves can be taken up and checked for size and condition. If OK, set them up on a level surface with approximately a $3/4$ " block under each tip, adjusted so the center section of the spar stubs lay

flat and each tip is raised the same amount. Adjust so that the splice webs will fit between the ribs with the leading edge in a straight line tip to tip. Check everything for alignment and position and then glue the splice webs into place on the spar stubs.

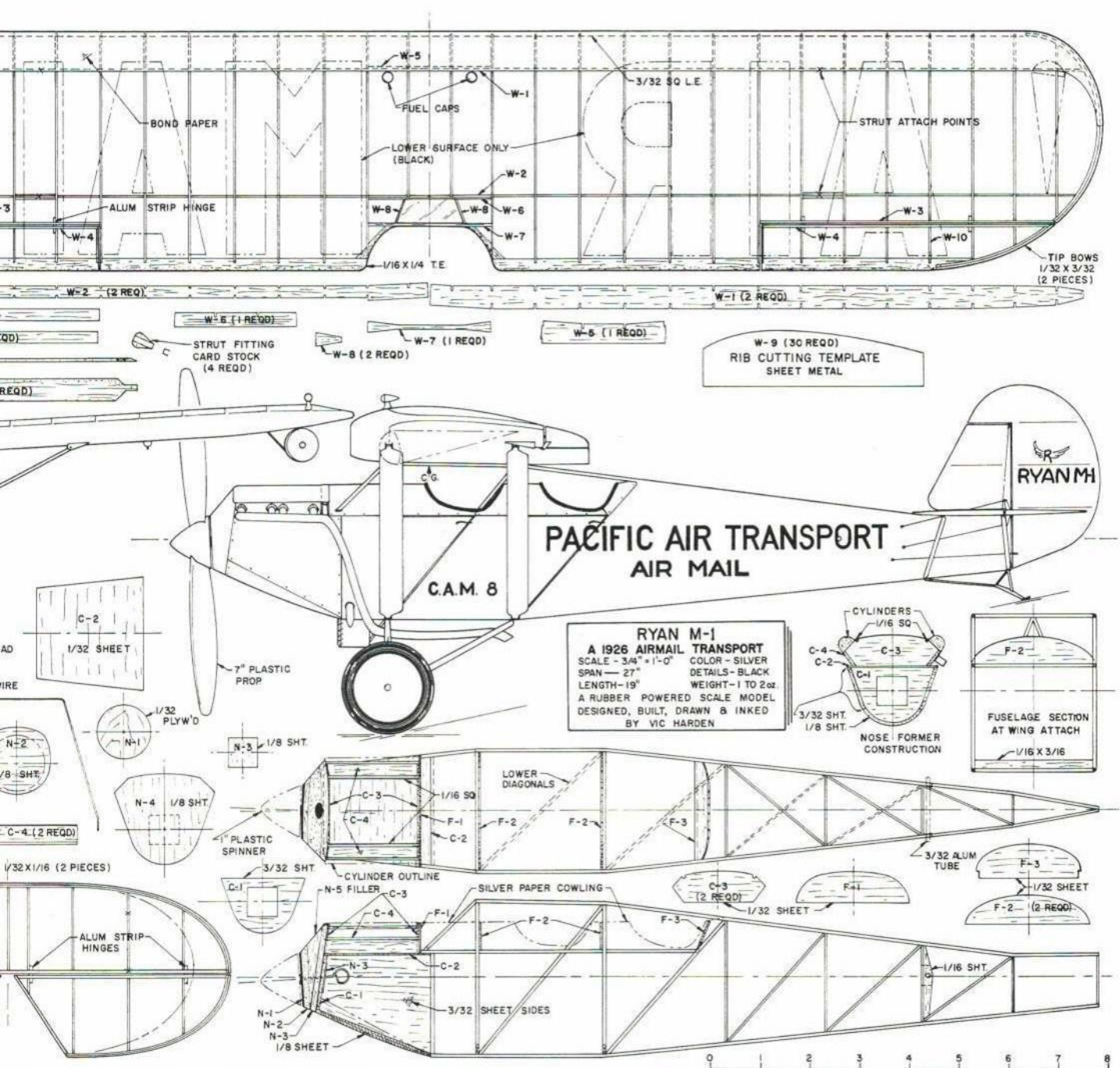
Now the tail surfaces, horizontal and vertical, can be assembled. Shim up the outline bow shapes so they center on the rib and spar depth. Cut the spars and glue into place over the plan. The rib material is trimmed to fit each location and glued in place. Set the assemblies aside to dry. The wing is now completed with the lower rib caps at the tip locations cut and glued in place. Install the center rib caps and two center-section trailing edge ribs with the false spar at center. Cut and fit the gussets and fairing blocks, gluing them in place as shown. Now the wing assembly can be sanded smooth, leading and trailing edges and tips faired and contoured to shape. Refer to the rib sections for contour. Install the filler blocks at rear spar for lift strut attachment point.

The wing covering starts by attaching light bondpaper from the leading edge back

to the front spar top and bottom. I use Titebond glue to attach the bondpaper; a very light film on the structure does just fine. The whole wing is covered complete, using your favorite method and tissue. Water-shrink and block down to prevent a warp. Also hold down for final drying of dope finish. The ailerons now are cut away, then re-installed, using thin-aluminum sheet strip for hinges glued in slots. Aluminum pop cans are a good source of the thin aluminum. The final finish color is silver or aluminum with black lettering on the underside of the wing as shown on the plan. (More on color methods later, but remember the degree of finishing is up to you.)

Take up the tail surfaces and fair in the ribs, spars and edges to the typical section shown on the plan. Sand the assemblies smooth, cover with your tissue and water-shrink. Hold the parts in position to prevent warping. Cut the control surfaces away, install the aluminum strip hinges if you choose, then set aside.

The fuselage is the usual box-frame-type
Continued on page 66





TENDERFOOT

NANCY PIERCE

The story behind a great competition.

May 15 will be remembered a long time. For on that day the exciting Tenderfoot Contest came to a close. All sorts of fascinating envelopes, letters, and even packages had been trickling in for weeks—faster, and faster, as the deadline bore down. Late arrivals resorted to air-mail special delivery and ever bigger red-printed exhortations to the Post Office to Rush—PLEASE!!!

The editors had started this thing. They'd asked for it. Now they'd found out! Do you guys, and gals, go for these Tenderfoot models? Do you really dig model airplanes? Is this your thing? Does the hobby have a growing future? So here we were, swamped, and frightened by a mass of wonderful pictures of fascinating models, each seemingly better than the one before it. Was there no end?

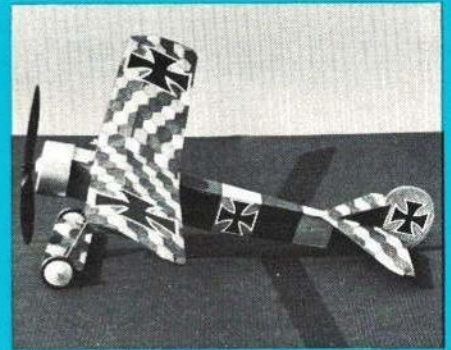
Somehow the job got done. The judges argued for their favorites. We sat up at night. And finally the scores were tallied. The winning selections emerged to cries of, "See, I told you so." Telegrams of congratulation went out. The cash prizes! Do you know: one chap bought a trumpet with his loot? Maybe we'll all get to hear him play some day! It was wacky. From beginning to end.

The April issue which announced the contest included Flying Funtique plans by Bill Hannan (with a thanks to K. Sykora), and instructions down to the last drop of glue. Suggestions for the finishing, left to the individual, evoked memories of great names in aviation history. A "Sopwith Plop," a "Clodrun Racer," a "Blearyeye," a "Curtiss Cabin," a "Fokker Kleindeker." Or the entrant could go way-out on his own. No holds barred. Planes would be piloted by the likes of, "Baron von Phinque," "Pierre Blearyeye," "Jimmy Doolot," or any hero-type the modeler imagined.

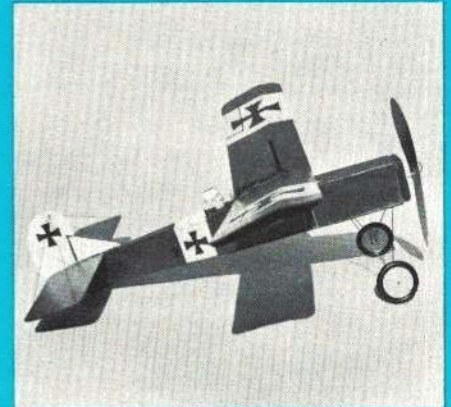
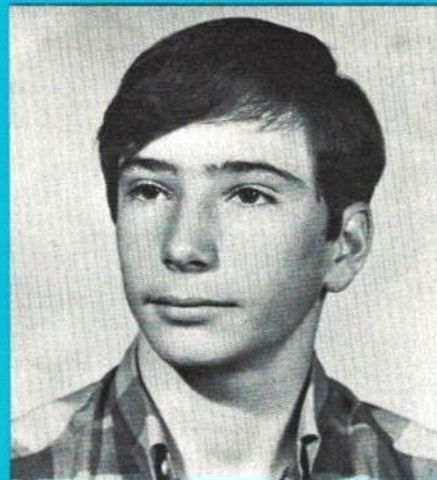
Rules required each entrant to build his, or her, own model, and furnish photos for judging. The basis for judging was: A) Does model conform to plans?; B) Appearance of surface finish; C) Amount of detail; D) Neatness of detailing; E) Originality and special effects—bracing wires, armament, machine guns, exhaust smoke, bullet holes, patches, insignia and wheel-pants for examples. Age classifications were ten years and younger, 11 through 13, and 14 through 16 years.

There were three first prizes: one \$50 award to the top winner in each age classification, plus Tenderfoot hats and T-shirts. Three runner-up prizes: \$10 plus Tenderfoot T-shirts in each age category. All winners would be awarded certificates of achievement and their story in AAM. Judges picked four Grand Winners (there was a tie in one age classification).

A young lady entrant named Jennifer landed a spot in the runner-up category. In the spirit of fun, some entrées used such names as, "Rumpled Tub," (Grand Winner model from David Barbosa), and "Maison Du Chien" (dog house) from runner-up, Kelly Pike. You can see by the photos that



Billy Edwards, age 8, created the most colorful model which he called a Fokker D-7 3/4ths.



Mike Meeks, age 13, put lots of careful sanding and painting into his work.

these young modelers are as much interested in craftsmanlike work and attention to detail as older hobbyists.

Questionnaires were sent to the Grand Winners. What were they like? What were their interests? You know! Four highly competitive winning types of hobbyists are not, of course, an accurate analysis of the general readership. But, it might be fun to discover how much you have in common with these winners, or how they differ from each other.

Here are the 17 questions and some of the answers from Billy—age 8, Neal and Mike—both 13, and David—16.

1) *How did he get started?* Billy's mother had been a teen-age modeler! His brother started with a hand-launched glider; Mike's and David's fathers included them in their own model work.

2) *What does he want to be as an adult?* Billy, Neal, and Mike all put down some

aspect of aviation as a first choice, while David will have music.

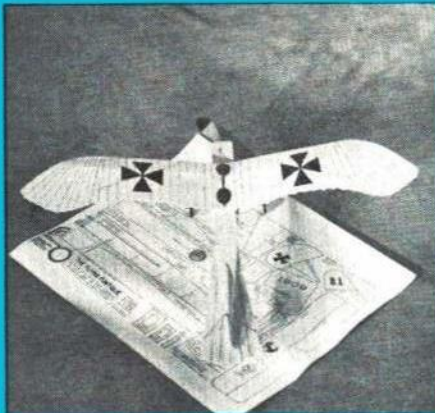
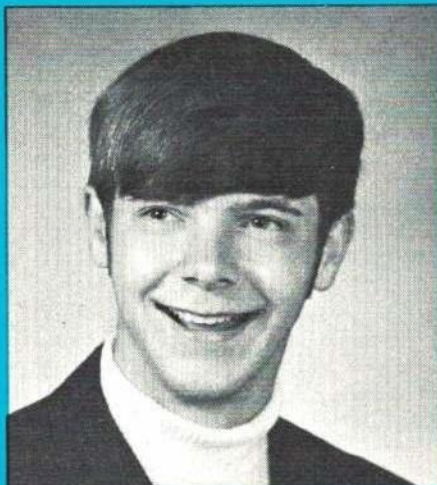
3) *What school does he attend?* All seem to attend public schools according to their age levels. (Like lots of other people.)

4) *Other hobbies?* Seems as though you could be interested in anything and still be a good modeler. Billy builds "things" out of any bits of wood he can find, is serious about rocketry and astronomy—especially related to moon flights. Mike also builds model railroads. Name the sport and Neal likes it! David enjoys books and music.

5) *Does he have a pet or pets?* Billy sure does. He has a guinea pig and fish and would have a dog if it were allowed in the apartment. Mike has "one dog," David a Basset Hound. Neal tops them all with a dog, two cats, a collared lizard, and a guinea pig.

6) *What will he do with his prize money?* Billy spread his around. He started a bank

CONTEST RESULTS



David Barbosa, age 16, made imaginative bird-like job. He called it a "Rumpled Tub."



Neal Bahrman, age 13, made battle-damaged strut-braced fighter. Has guns above wing.

account, bought a few toys, tennis shoes, and wood to repair a model. Mike bought more models and accessories, while Neal purchased a jig-saw and saved the rest. David invested in his future by buying a new trumpet!

7) *Where does he build his models?* Billy's workshop is wherever he can put a big piece of beaver board. The Meeks' hobby room is now Mike's bedroom too. Neal and David both can use home workshops.

8) *How long did he take to build winning model?* Billy took nearly a week to build his Fokker. Mike and David needed only two and three days to produce prize winners. Neal took no chances and spent two weeks.

9) *Does he have a job, such as paper route, or chores?* You must note the ages of these boys. Billy helps out around the house, and does a lawn or two. Mike adds car washing

to his list of chores. Now we discover why Neal took two weeks to build his model! He's had a paper route for two years, does household chores, including tending the yard, and, of course, has all those pets to feed. David gave up a good job at the country club due to a family move (his father is a Captain with United Airlines).

10) *What does he like best about model aviation?* Billy's big thrill in modeling comes with the final test flight. Mike stresses the engineering stages, and puts most of his efforts in building and planning. Neal likes everything while David picks radio-control as his favorite feature.

11) *Does anyone else in the family build models?* We'll repeat that Billy's mother was a teen-age modeler. Mike and David have dads to work with them; David also has two younger brothers to tag along. Neal shares his hobby with a brother and sister-

in-law, a real air modeling family.

12) *What is his favorite feature in AAM?* They are individuals. Billy and Mike turn to the Tenderfoot features and plans. David read "Model World . . . on the international scene," and Neal would like to see more free-flight articles.

13) *Does he like to read?* Billy's tastes reflect his interests as do Mike's, while Neal and David expressed no particular preference.

14) *Does he like to be outdoors?* From the photos, you know these boys are outdoor types. Chasing model airplanes, for one thing!

15) *How many brothers and sisters?* If it means anything, all these boys have one sister. (There you go—Ed.) Maybe that's enough! But Neal and David also have two brothers apiece.

16) *Does he prefer to build from plans or kits?* These, remember, are winning modelers, so their preferences should be significant. Eight-year-old Billy builds from both; kits outnumbering plans at this point. The other boys, who are older, use plans. Neal—the one who enjoys everything in model aviation—uses judgment in the selection of materials, especially the wood.

17) *Does he like to enter model contests?* Billy finds contests a real challenge. After winning in this one you can bet he will have many years of such challenge ahead. This is Mike's first one, but there's nothing like winning to give a man a taste for winning again. David said that this Tenderfoot contest was the first designer contest he had ever entered, but that he and his father had entered free-flight, control-line, and radio-control contests in the Denver area.

Some of you Senior Class AMA members may recall your own beginnings! Boys like these could benefit from your expert help in solving technical problems in advanced modeling. You could spend more of your local AMA time introducing new techniques to young people who might be discouraged with modeling because they find no satisfaction in one form, or were not able to master it.

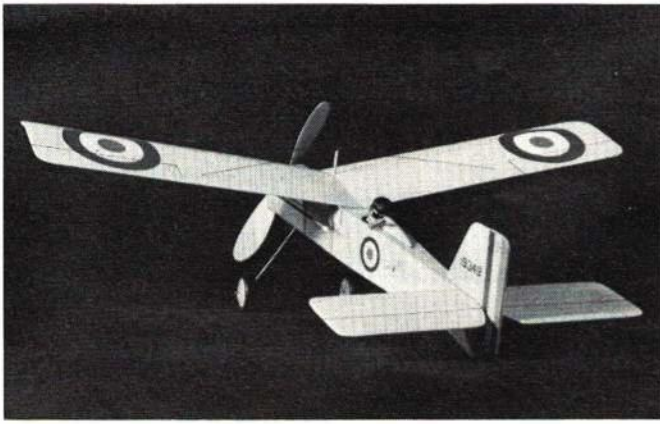
Some kids working strictly on their own, do not understand the limitations of kits, but have no one to introduce them to balsa and glue.

Except for the happy fact that Billy's mother was a teen-age modeler, he might never have had the opportunity to realize his special talents. His widowed mother appreciates the guidance in model building a neighbor has given Billy.

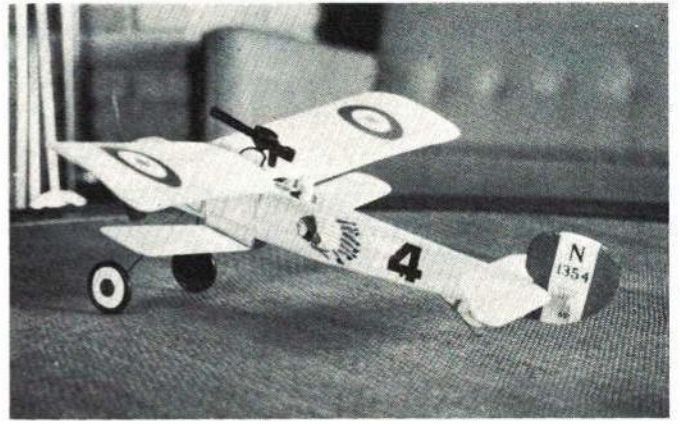
So do we know who a Tenderfoot is? He is any alert, bright-eyed boy (or girl!) with the ability to do good work—finishing a graceful model, watching it climb easily into the air, and glide to a soft landing without a dent inflicted on its delicate frame.

Congrats to all of you who tried. You surely made the judges sweat. There was not a bad model in the bunch.

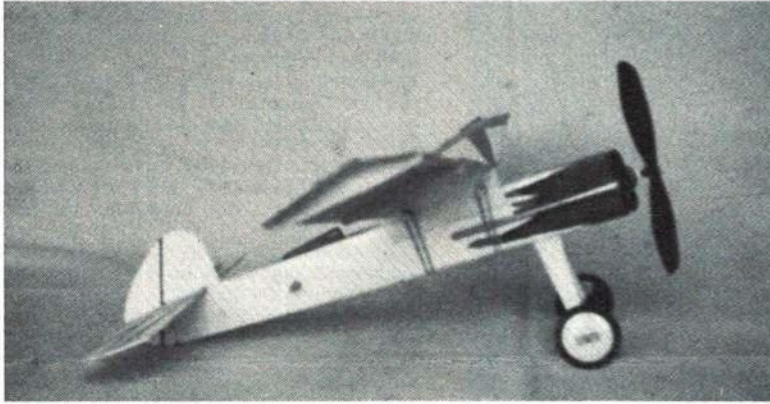
This Tenderfoot thing—we all loved it. And we're all smarter for it!



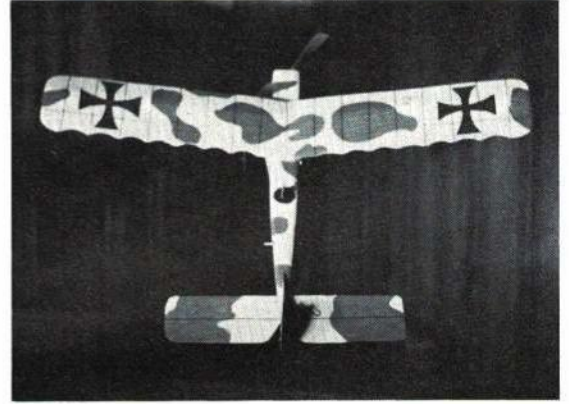
Mike Stewart has 3-D pilot, exhaust, and head rest. Nice work.



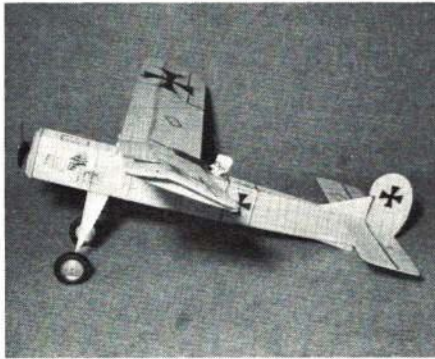
Spencer Steckroth, age 10, entered only biplane. Nifty, too.



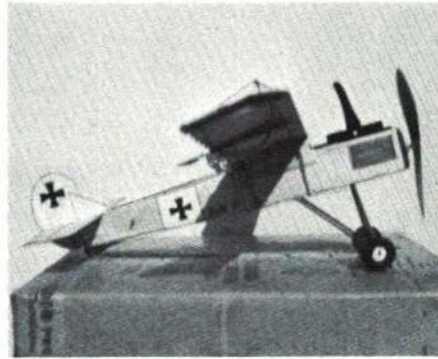
Mike Pierschalla's Dooalot Racer is colorful. Sports racing Number 7.



Nine-year-old Steven Carter camouflaged his Funtique.



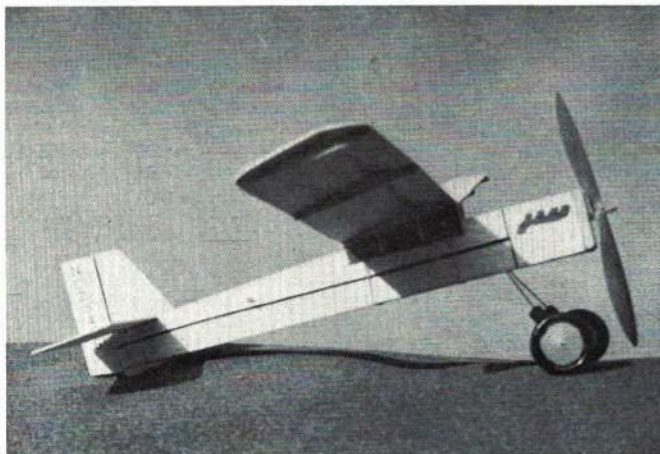
Jumpin Dooalot flies Tre Twilligear's plane.



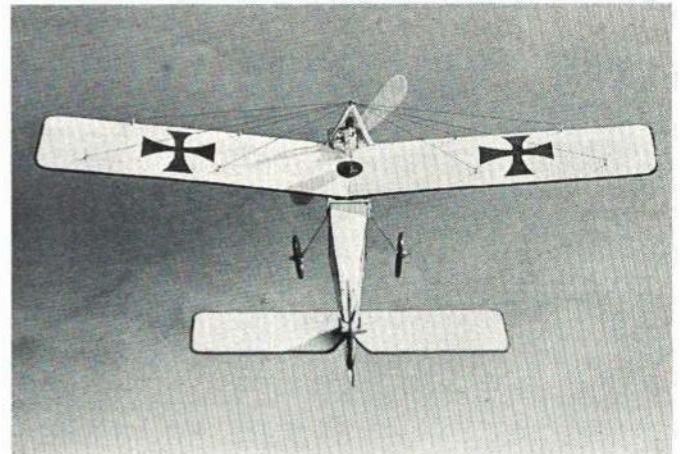
James Bale used unique exhaust stack.



Wheel-pants, racy colors on Fred Zink's flyer.



Jennifer Everett entered passenger-type plane.



David Lewis has flying wires and cables on Model 1915 Pfalz-EV.

Authentic "Warpaint" for Ordnance

FRANK PIERCE

SCALE modelers who go to extreme lengths to duplicate all markings and details on modern U. S. military aircraft are often handicapped by lack of accurate information on the color and markings of current externally carried bombs and rockets.

The following is a summary of body colors and code markings as currently authorized by military regulations:

High-explosive bombs: Olive-drab body and fin, light yellow 2" band approximately

1/3 back from nose. Yellow lettering. New low-drag bombs (streamlined tear-drop shape) have dark red or dark green nose fairings. If no fairing is present, nose fuze may be either aluminum or brass color.

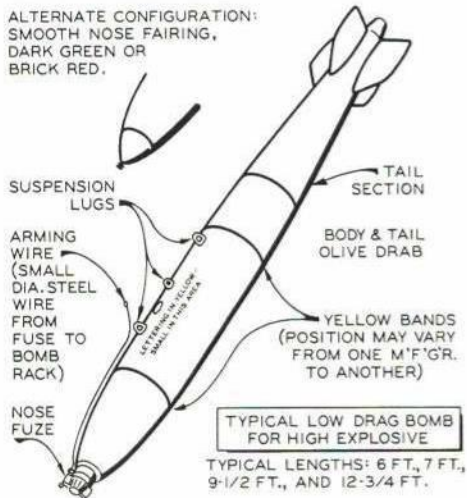
Chemical bombs: All gray body with 2" red or green band, 1/3 back from nose. Matching lettering. Chemical bombs are shaped like conventional bombs.

Fire bombs: No fins, olive-drab body, light red band 1/3 back from nose.

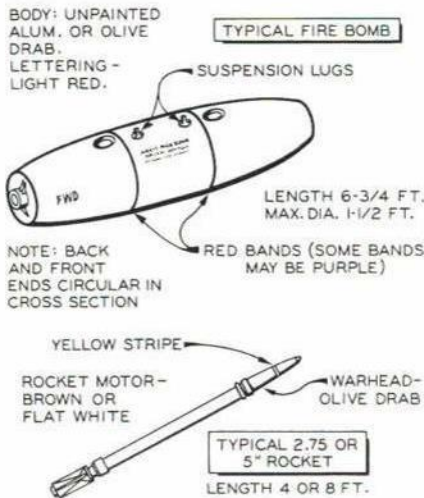
Rockets: Motors, if exposed, dark brown, forward airframe olive drab with yellow band to indicate high explosive. White also authorized for motor.

Many publicity photographs show aircraft armed with white, bright orange, or blue bombs. These indicate training or dummy rounds and would not be installed on a combat-ready aircraft. Scale kit manufacturers have frequently used these publicity photos as the basis for their color and marking data.

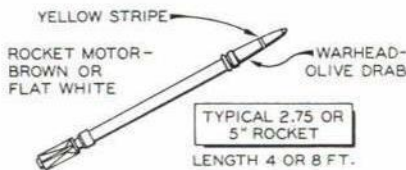
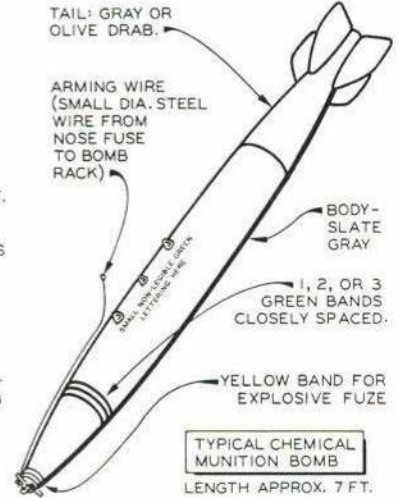
ALTERNATE CONFIGURATION:
SMOOTH NOSE FAIRING,
DARK GREEN OR
BRICK RED.



BODY: UNPAINTED
ALUM. OR OLIVE
DRAB.
LETTERING -
LIGHT RED.



TAIL: GRAY OR
OLIVE DRAB.



McDonnell-Douglas A4 loaded with low-drag general-purpose high-explosive bombs. If this were a color photo, the basic olive-drab color of the bombs would be evident, as would be the yellow identifying bands which signify the high-explosive loading. Dark-green nose fairing indicates specific type of internal weapon fuzing. Controlled coloring tells pilots and ground crews at a glance the exact characteristics of each piece of ordnance—which can be dropped simultaneously or individually.



1969 R/C WORLD CHAMPIONSHIPS

Fine competition pilots from many countries are becoming so expert, this contest was decided in the last exciting round.

HOWARD McENTEE

FOR a World Champs, at least five countries must be represented. This one had 25, with 67 pilots in Stunt.

Overall Director (like our CD) was Bertold Peterson. The German Aero Club was the sponsor. These bi-yearly affairs are held under the auspices of the CIAM, the modeling division of the FAI. AMA is the U. S. representative of the CIAM.

Under the direction of Dr. Helmut Ziegler of Switzerland, the Scale event was run as a World Championship concurrently for the first time on an unofficial basis.

The airfield was ten miles north of Bremen. One large hangar housed planes, provided processing, transmitter impound, Scale judging, etc.

Two flight circles about quarter-mile apart were on a wide runway—the first time a meet of this size had been held in Europe with more than one flight circle.

Each circle had a tent for officials, a small computer to help scoring—which later proved less accurate than hand tabulation—a flight dispatcher, etc. At each circle was a large electric clock, visible to judges, officials and flyers on the runway, marked for both starting time (three minutes to get a

plane into the air) and for maximum total flight time. A loud buzzer signaled the beginning and end of these periods.

On the first day of official flying, scale models flew all afternoon, following a morning practice session for Stunt teams. Each team had 45 minutes practice time allowed at this site. Bull-horns were handed to each team manager as one of his team members went out to fly. This allowed the manager—or the flyer's mechanic—to call out to the judges each maneuver, and its beginning and end. Thereafter, compact, portable transmitters, and receivers with loud speakers, allowed officials and spectators to know just what maneuvers were coming next.

Each stunt flyer was allowed four flights, the lowest dropped before totaling. Five judges on each circle remained at that circle for the entire meet. Contestants were shifted back and forth after each round. High and low scores from each group of five judges were dropped, and the remaining scores were totaled to obtain the score for each individual flight.

Maximum possible score for a flight is 2000 points. The highest score by any flyer was 1444 by first-place winner Giezendanner on his third flight.

Many fine competition flyers are developing around the world—and it's going to

take plenty of hard work and a very good team-selection system if the U.S. hopes to get back the first place trophies. Our Phil Kraft took second in Stunt and the U. S. second in Team.

In Individual and Team, top places were fought over until late Sunday afternoon. A check of the scores by rounds of the top flyers shows this shifting around. Even if all four rounds were counted, the top five winners would have still been the top five, and in the same order. With three rounds counted, they were: 1) Giezendanner, Switzerland, 4156 points; 2) Kraft, U. S., 3965; 3) Wester, W. Germany, 3937; 4) Marrot, France, 3921; 5) Schoenfeldt, W. Germany, 3937.

At the end of Round 1, the order was Schoenfeldt, Giezendanner, Matt (Lichtenstein), Brand (So. Africa), Marrot. After two rounds we had: Marrot, Schoenfeldt, Wester, Kraft, Brand. With three rounds completed: Schoenfeldt, Marrot, Kraft, Giezendanner, and Wester. At the end of four rounds, counting all four: Giezendanner, Kraft, Wester, Marrot, Schoenfeldt. U. S. team member Jim Kirkland was ninth, with 3551 points; and Jim Whitley, 10th, with 3437 points. Team Manager Ron Chidgey did a creditable job.

Since FAI judges favor large sweeping

Continued on page 53



First-place winner, Bruno Giezendanner, Switzerland, flew retract landing gear equipped design with Digi Fli radio and new style Webra 61.



Flying same Quick Fli at past Internats, Phil Kraft, here with Mrs. Kraft, placed second. His own radio of course, Enya 60.

Josef Wester of Germany using Graupner Varioprop radio and ST 60, placed third. In large FAI maneuvers, strip ailerons are favored in Europe.



Phil Kraft with Jim Kirkland. Jim flew Lanier plastic version of his Citron design.



German Nats winner Heinz Elsaesser placed 6th at Internats. Used Robbe Digital, ST 60G.



Foster of Great Britain with model called Equalizer, used Spreng-Brook radio, Merco 61.



Like winner, W. Schonfeld uses retract gear on "Prestige." Radio is Simprop, S. T. engine.



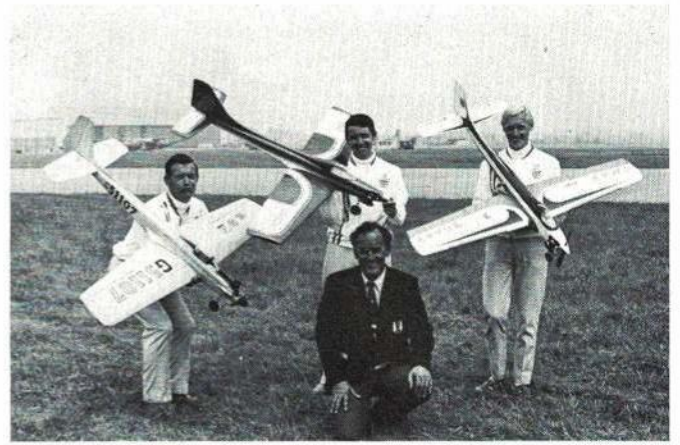
Belgian flyer, Haegemann, and compatriot flew "Zimeken" design with Radio-Pilote and



Sekirnjak, of Austria, used his country's Dirigent radio in "Flipper II." Rossi engine.



Marrot of France (Number 2) placed 4th. Model is Styz. Radio-Pilote.



British team and Manager. Their models have very long tails.



South African team used Logictrol (U. S.) radios and S. T. motors.



Hangar full of all kinds of planes. Here are the Italian models.



Italian flyer Pagni used S. T. engine (of course) and Logictrol.



W. Kaeseberg kept rain away when flying record speed model.



Flip Flop 16

BILL BLANCHARD

-DATA-

FINISH: 2 COATS SANDING SEALER OR 3 COATS NITRATE DOPE SANDED SMOOTH WITH #600 SANDPAPER
 WEIGHT: APPROX. 3/4 OZ.
 FLIGHT ADJUSTMENTS: BALANCE AT & LEFT RUDDER & STAB INCIDENCE ARE USED TO OBTAIN RT. LAUNCH & CT. GLIDE.

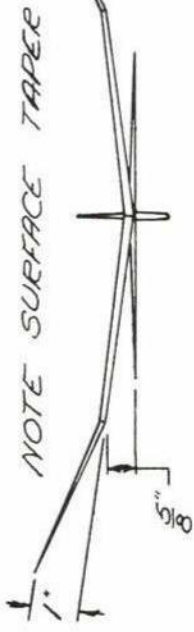
LEFT HALF OF WING & STAB SHOWN

WING T.E.: 3/16" X 3" LIGHT SHEET Balsa

WING L.E.: 3/16" X 1 1/2" HARD

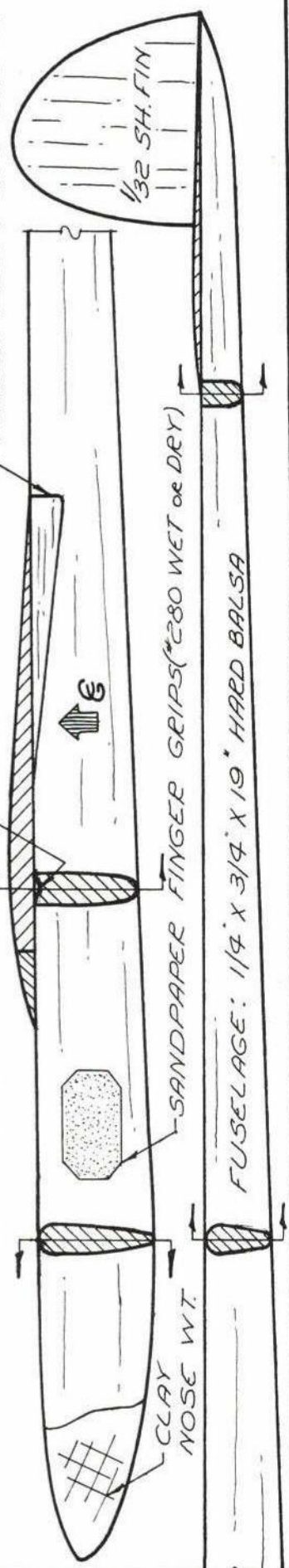
STAB L.E.

STAB: 1/16" LIGHT SHEET Balsa



NOTE SURFACE TAPER

FRONT VIEW SCALE: 1/4



FUSELAGE: 1/4 X 3/4 X 19" HARD Balsa

The Most Exciting News in RC!

PULSE PROPORTIONAL COMES OF AGE --

Ace R/C has achieved the ultimate in single channel pulse proportional guidance systems in our new Commander series.

The backbone of the systems is a transmitter design by Don Dickerson to meet the requirements of all forms of pulse proportional radio control. Prime design objectives were high RF output, coupled with reliability, and expandability. These goals have been met.

Has extra high RF output, and the exact same RF section is used in all three versions. This output is equal to, and in a number of cases exceeds, the high priced types.

For each of the three transmitter versions (rudder only, galloping ghost, dual ghost) the pulser is different. Because the requirements of each type of flying is different, it was felt desirable to design a pulser to fit each particular need, and not attempt to adapt with a simple "hi-lo" switch or other shortcuts.

Exhaustive tests in the field by a number of R/C flyers have proven this concept to be valid. For each of the three versions of the transmitter offered, the pulser is designed to perform its specific function only!

R/O requires a pulse width ratio of 95-5, with a pulse rate of approximately 6 pulses per second. To this may be added high pulse at the user's option for the inclusion of motor con-

troi at a later date.

For Galloping Ghost a linear change in the Pulse Rate PERIOD is required—as opposed to a linear change in Pulse Rate FREQUENCY.

For Fast Rate pulse systems with dual actuators perfect linearity of the pulse width and pulse rate functions is required. An additional feature is the throttle arrangement for use with "go-around" actuators that permits retention and full control of the pulse rate function during throttle command, when used with decoders with special provisions. Beside the obvious advantage of retaining elevator control during throttle command, this arrangement permits the use of stops on the elevator actuator to prevent go-around. This permits a wider pulse rate change for more elevator power to hold the model in outside loops, etc.

The transmitter is housed in a two-tone vinyl case, and is especially temperature compensated, and has voltage regulated circuitry, not found in other equipment in this price range. The Rand stick assembly is used in all modes.

Airborne units for the series incorporate the time-proven Commander DE Superhet receiver which is backed by three years of production and design and successful operation in the field. This receiver is coupled with the proven

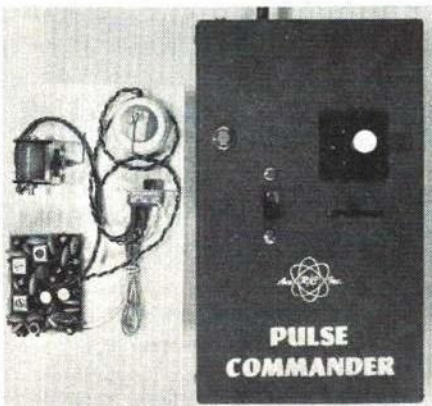
Adams actuators or Rand devices, to provide the most dependable combination of components.

The Commander Pulse series is offered in three basic versions: Rudder Only, Galloping Ghost, and High Rate Dual Actuator. This is a concept that has been much talked about, but has never before been achieved. It offers complete expandability between systems. It is a logical approach meant for the beginner and the sport flyer.

If you purchase the RO Commander, you can go to GG or Fast Rate. Once you gain confidence and experience, and want to move up the ladder, you may return your RO unit to the factory for conversion, and move up to Galloping Ghost or Fast Rate at a minimum expense. The same basic transmitter PC board is used with a minimum of changes; the same basic receiver is also used, with a change in actuator devices, and batteries.

For more on the expandability features with prices, watch our next ads. Also, watch for details in our new 1970 catalog.

The entire Commander series features ready-to-fly custom-wired and guaranteed equipment, including airborne batteries. See below for full description of each of the versions.



**PULSE
COMMANDER**

COMMANDER R/O PULSE PACKS Ideal for Beginners and Sport Flyers

Rudder-Only has been proven to offer the most fun and satisfying experience per dollar invested of any of the R/C systems available today. Now, with the new Commander R/O Pack you are assured of the fact that you can start with simple rudder only, and at a later date upgrade your equipment to Galloping Ghost or Fast Rate Decoded systems.

The R/O Packs feature the Dickerson transmitter described above with the Rand single axis stick, and the Commander DE 2.4 volt superhet receiver. Has an Adams actuator of the size of your choice, depending upon your aircraft, with nickel cadmium batteries wired with an on and off switch. AND each pack will save you \$10.00 if you bought the individual items separately.

The R/O Baby is for .010 to .020 jobs, has two 225 MA nickel cadmiums, and the regular Baby Adams actuator. The airborne weight is 2.5 oz.

The R/O Standard uses the LV single Adams actuator for more power for .049 to .07 size. Uses larger capacity nickel cads. Airborne weight is 4.5 oz.

The R/O Stomper used the LV Twin Adams actuator for up to .15 or can be boosted for use with .19. Airborne weight is 4.9 oz. (Charging equipment extra)

No. 10G15—Commander R/O Baby \$69.95

No. 10G16—Commander R/O Standard 71.95

No. 10G17—Commander R/O Stomper 74.95

All 27 MHZ, except 27.255. Specify.

WATCH THIS SPACE NEXT MONTH—
MORE SIMPLE PROPO COMMANDERS ARE ON THE WAY!

NEW HANDBOOK-CATALOG For the Fun Flyer and Tinkerer

ACE RADIO CONTROL • BOX 301 • HIGGINSVILLE, MO. 64037

Our 1969 Handbook-Catalog is bigger and better than ever. More items for the do-it-yourself, the tinkerer, the fun flyer and for the BEGINNER; more products from most R/C manufacturers as well as many Ace R/C exclusives. HANDBOOK section has been acclaimed as the "Bible for R/C" — a "MUST!" by R/C editors. Price is just \$1.00 POSTPAID in USA. This is completely refundable on your first order! And that order also puts you on our mailing list for our R/C DATA Service—acclaimed the world over! You can't lose—send your buck on a round trip today. It could be the best dollar you ever spent.

Important: For overseas delivery on catalog or Binder please add 50¢ for additional postage.

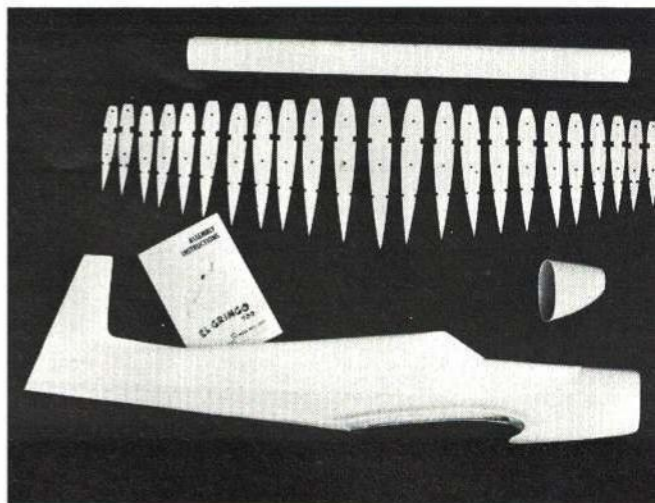
NAME _____
ADDRESS _____
CITY _____ STATE _____ ZIP _____

QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

Guaranteed delivery anywhere. Orders over \$5.00 sent prepaid. Orders under \$5.00 please add 50¢ for postage and packing.

My BankAmericard

Stinger Mfg. Corp. Two new R/C semi-kits. El Gringo, for 49 to 71 engines at \$46.95 and El Gringo Too, 4/5 scale for 35 to 45 at \$34.95. Both feature fully molded fiberglass fuselage with two-tone Aero-Gloss colors molded in. Pre-cut competition-grade balsa wing ribs, full-size plans for wing, and core kits for both planes. Write **Stinger Mfg. Corp.**, 2331 West Holly St., Phoenix, Ariz. 85009.



NEW PRODUCTS CHECK LIST

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



Harco Company/Fury Mark II R/C. New high performance R/C aircraft for accomplished flyers. Styrofoam wings, pre-cut and sanded parts, necessary hardware plus many extras. Easy, fast construction. Fury II gives high performance in Pylon, performs new AMA maneuvers. Write **Harco**, 290 Thompson Ave., Oceanside, N. Y. 11572.



Tatone Products/Exhaust Off. Simple, effective way to prevent stains by carrying exhaust clear of trailing edge. Consists of extremely light, flexible plastic tubing, attached easily to most mufflers with hardware provided. 12" long. Exhaust Off comes in 5/16, 3/8, and 1/2" diameters. Price \$1.35. **Tatone Products**, 4719 Mission St., San Francisco, Calif. 94112.



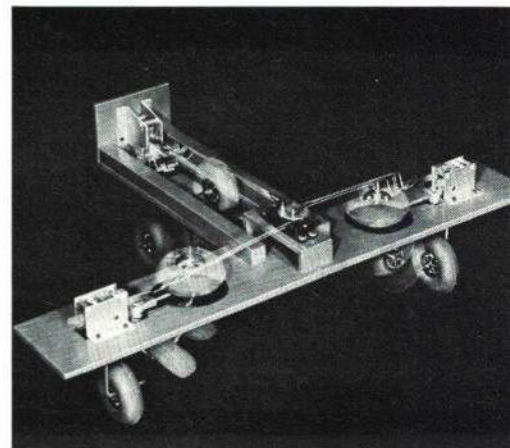
AMT/Westland Lysander. 1/72-scale kit of RAF reconnaissance craft of WW II, has more than adequate detail. Plastic canopy, external bomb racks, dull-finish RAF or Free-French insignia, movable propeller. Construction, moderate to difficult. Price under \$1. Write **AMT Corp.**, 1225 E. Maple Rd., Troy, Mich. 48084.



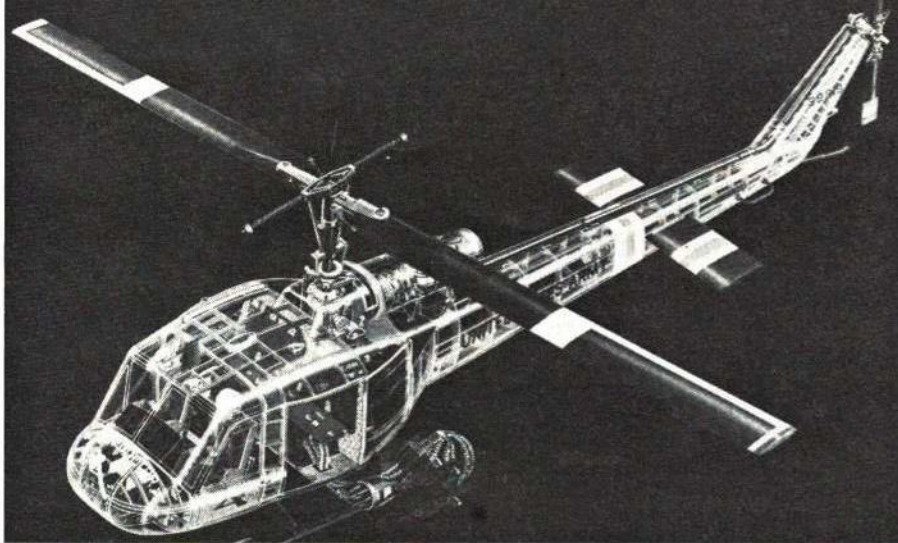
Scientific Models/Cutty Sark. Beautifully carved wooden hull, precision-cast metal work, brass chain, cloth sails, characterize Scientific's lovely model of famous Clipper ship. Price including wood display stand, \$9.95. Also, detailed replica of 1910 Maxwell auto, accurate in all respects. \$12.95. Write **Scientific Models Inc.**, 113 Monroe St., Newark, N. J. 07105.



EK Products/XL-3 R/C. Ideal for beginners and for mini-sized planes, XL-3 is lightweight and low-cost approach to proportional control. Includes single-stick transmitter, 3 Mini-Mite servos, 500 ma/hr Nicad battery, receiver, switching harness. Price appr. \$250. Write **EK Products Inc.**, 3233 W. Euless Blvd., Hurst, Tex. 76053.



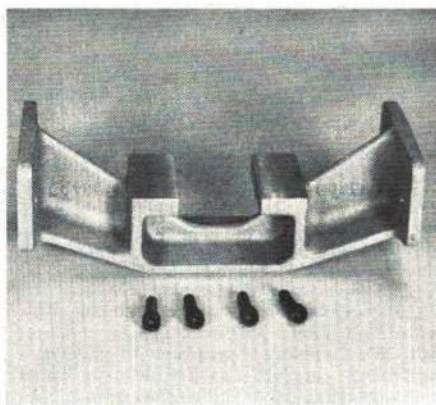
Technisales/Retract-Gear System. Scale, pylon and pattern flyers want reliable retractable landing gear systems. This German unit is powered by an aux. channel rotary-output servo. Self-locking movement, counter-balancing spring. Prices \$35.95 pair main gear, \$23.95 nose gear. **Technisales**, P. O. Box 2233, Alhambra, Calif. 91803.



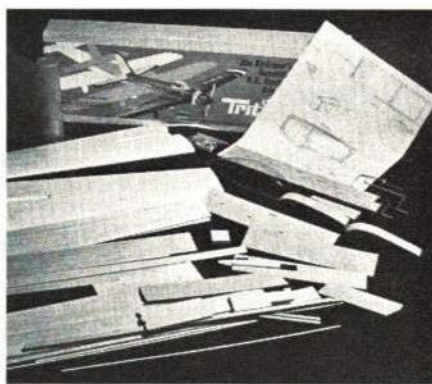
Monogram/Bell UH-1B. Monogram introduces $\frac{1}{24}$ scale Huey in fully transparent plastic skin to show off interior construction of prototype. Main, tail rotors powered

by hidden electric motor. Kit includes 184 parts in authentic colors, plus decals. Retail under \$11. Write **Monogram Models, Inc.**, Morton Grove, Ill. 60053.

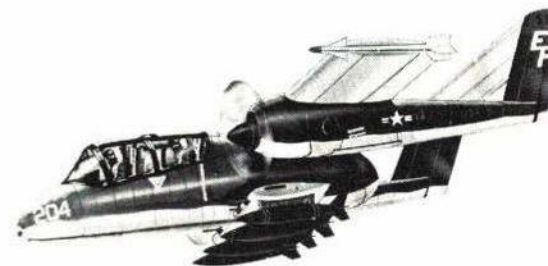
Nelson Model Products/Receiver Sleever. Easy-to-mount foam-rubber sleeve provides protection from vibration and shock, for sensitive receivers; battery packs with minimum weight. Cost 89c. Write **Nelson Model Products, Inc.**, Box 2027, Dublin, Calif. 94566.



Octura Models/New motor mount. For motors between 60 to 80 in ski boats, hydroplanes, etc. Octura "6-60" can be used in hulls having minimum 6" spacing between engine bearers. High-strength aluminum. Price \$6.50. Write **Octura Models**, Box 536, Park Ridge, Ill. 60068.



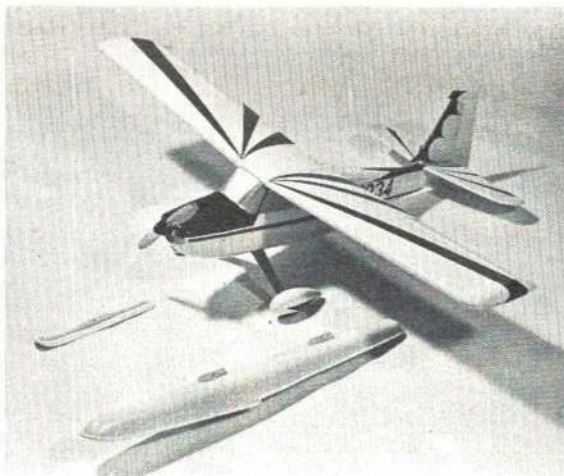
Dumas Products Inc./Triton. New concept in R/C high-performance aircraft with Jim Kirkland's 62" wingspan Triton. Designed for 45 to 60 power, features fiberglass engine cowling, balsa construction fuselage, molded foam-core wings. Detailed, easy-to-follow plans. Costs \$49.95. Write **Dumas Products, Inc.**, PO Box 6093, Tucson, Ariz. 85716.



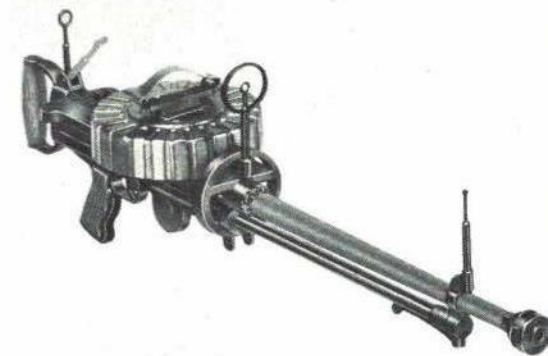
Hawk Model/OV-10Z. $\frac{1}{48}$ -scale North American OV-10A, ground-support replacement for A1, presented with authentic Marine Air markings in Viet Nam. Features finely detailed propellers, landing gear, weapon stores. Cost appr. \$1.30. Write **Hawk Model Co.**, 4600 N. Olcott Ave., Chicago, Ill. 60656.



Hawk Model/Corporal Missile Kit. U.S. Army tactical missile model $\frac{1}{4}$ " scale, complete with ground-support equipment accessories. Unique phosphorescent finish glows in dark, illuminates launch site. Cost \$1.30. Write **Hawk Model Co.**, 4600 N. Olcott Ave., Chicago, Ill. 60656.



Angel Mini-Flite/Citabria. Eye-appealing scale model of new fully aerobatic Citabria (Airbatic spelled backwards). Foam construction with unique plastic covering, contains parts for either skis, floats or wheels. Price \$29.95. Write **Angel Mini-Flite**, 340 Broad St., P. O. Box 437, Fitchburg, Mass. 01420.



Williams Bros./Lewis Machine Gun. Detailed scale model of Lewis scarf-mount machine gun, standard for Allied multiplace WW I aircraft. Kit easy to assemble, 2" scale now available; $1\frac{1}{2}$ " and 1" scales to come. 2" scale, price \$1.25. Write **Williams Bros.**, 6719 Salt Lake, Bell, Calif. 90201.

MiG 21d

NATO calls it Fishbed, but this deadly Soviet jet is one of the world's finest fighters. Model uses high-revving, light-weight, 40 engine.

ROLAND H. BALTES

FULL SIZE PLANS
AVAILABLE — SEE PAGE 60

HOW many control-line flying models of jet aircraft have you seen lately? Very few, if any. The jet age has been with us for some time but the modeling of jet airplanes has not kept pace. The reasons for this are varied and interesting.

Probably the biggest contributor is the lack of a suitable jet engine. The pulse-jet-type engine — around for so many years — has enough power, but also has serious limitations. The ducted-fan propulsion system once enjoyed popularity in free-flight; however, it has been applied only to control-line by a very small group of dedicated modelers. Not until somebody markets commercially the necessary fans will this become common.

So what we are left with is the glow-plug engine and propeller combination. Egads,

you say, a propeller on a jet? But this is really nothing new. Look at many of the current control-line stunt designs and the jet influence is quite noticeable. The same holds true in radio control where the building and flying of jet-type models have been on the increase. Besides, it even was prototype practice in the early jet days to test airframes using piston engines with props.

Obviously, I'm trying to justify the use of the prop on my MiG-21, the chances that the real MiG ever used one are almost nil. But how many real planes have you seen that used a rubber band for a motor, or were flown at the end of some wires?

We selected the MiG-21 not only just because we liked it, but also because it had several features which were very desirable, such as: a fair amount of wing area, a nose radome that could be disguised with a spinner, and a simple fuselage. We also had a good set of 3-views and pictures. The real MiG-21 is in service with many of the Communist countries and apparently available to any country that has money to buy one.

The model we decided on goes under the

NATO codename "Fishbed D" and can be distinguished from the earlier "C" models by the larger hump behind the canopy and the nose probe on top of the fuselage. The model is built to a scale of 1" equals 1', which is a good-size model. Ours weighed 4 lbs.

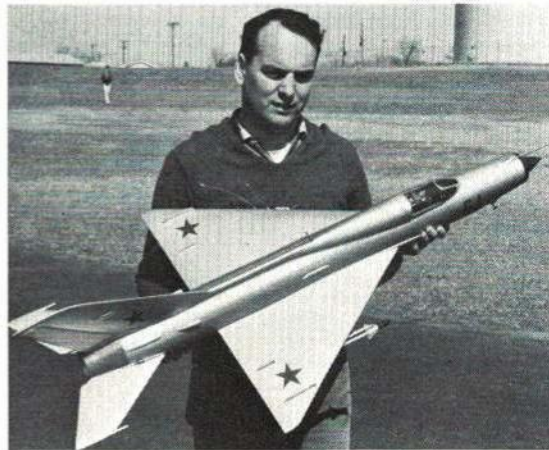
This brings up a little problem which can be easily overcome if you plan ahead. The model most likely will be nose-heavy when built. We therefore used plywood quite liberally in the rear. No sense building a flimsy model, then having to add lead weight. Common sense should be used in building the front end strong but light. The lightest but most powerful engine available should be used. We show a K&B 40 on the plans but other 40's, like the ST G21/40, would work.

By now you may be wondering about the flying characteristics of the model. We were somewhat dubious ourselves, however the first flight — which lasted less than a lap — did demonstrate excellent ground handling qualities. After a little more weight was added to the tail the subsequent flights were very realistic, which means that it does take

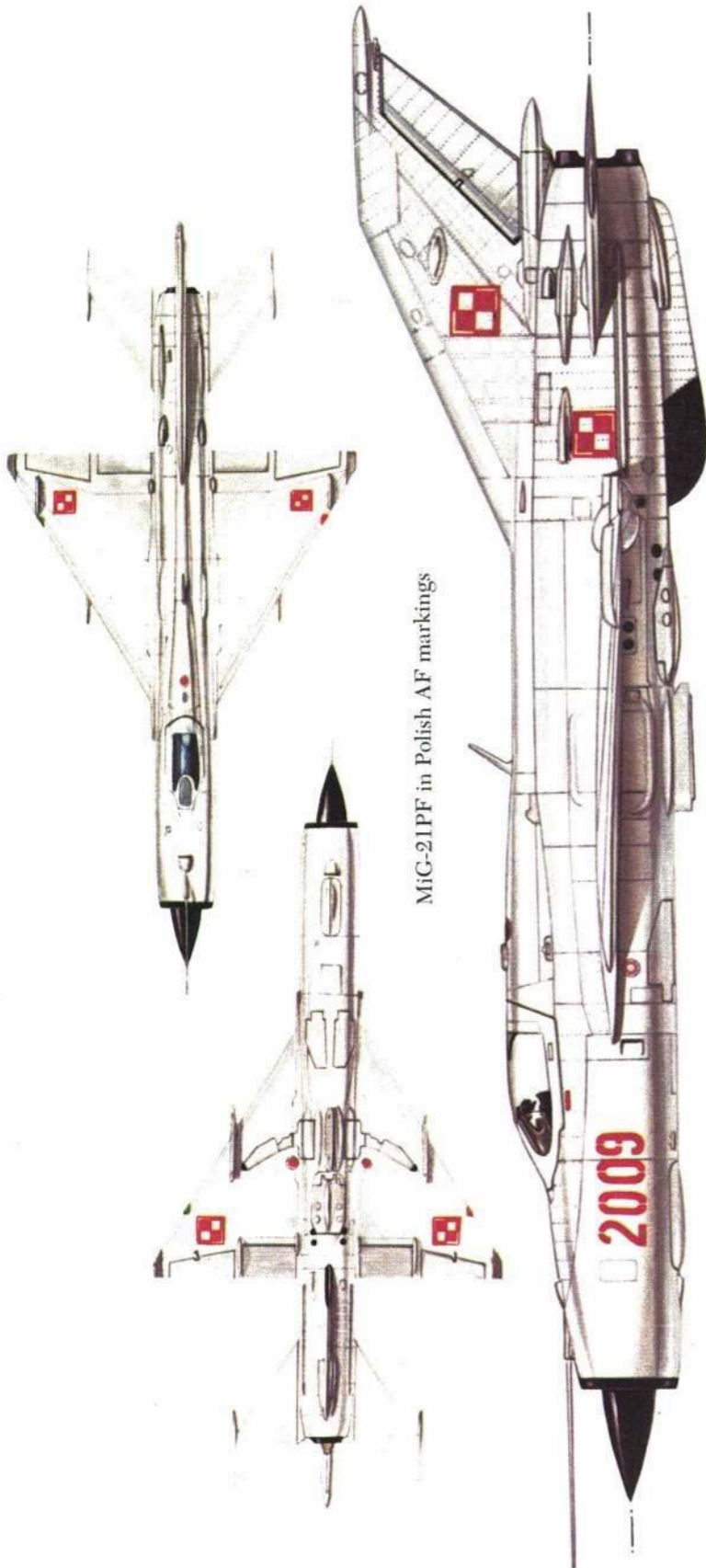
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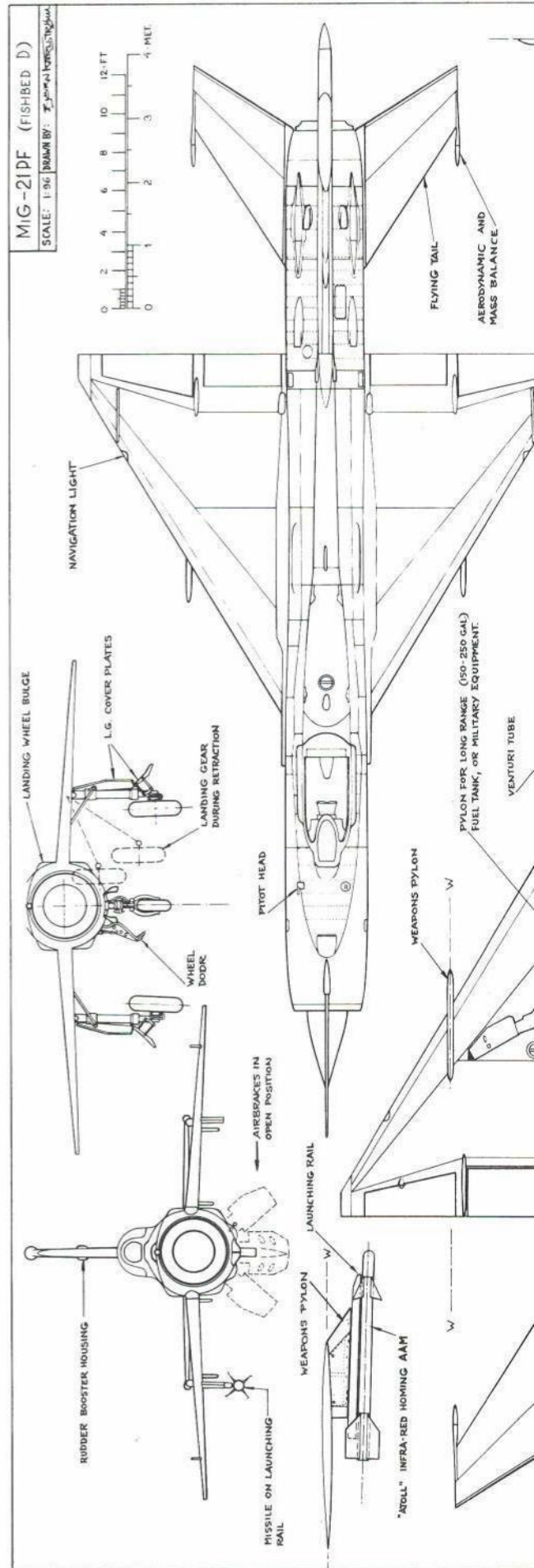
In constructing your version of the MiG, the Karlstrom centerspread drawings on the following pages will provide the scale details for a championship job. Fast and stable, the MiG also will gain high flight points.

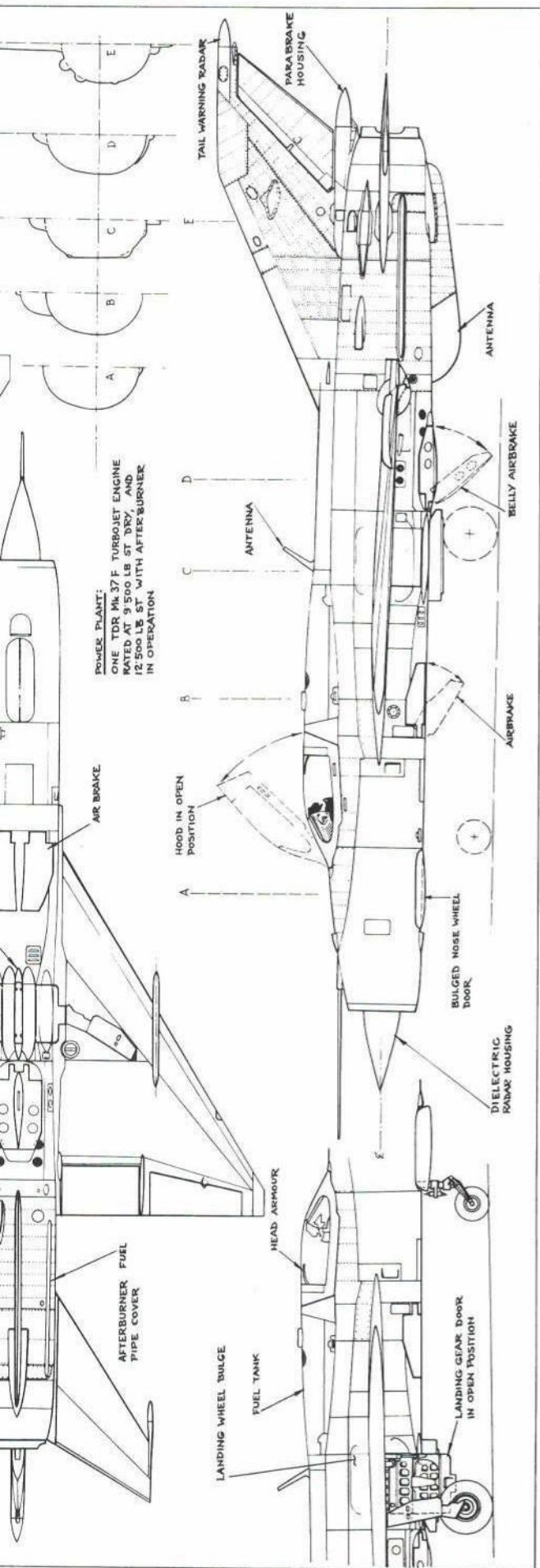


Model could have been designed for Dynajet, but it is noisy, requires heavy insulation, can't be throttled. You won't see the propeller in flight anyway!

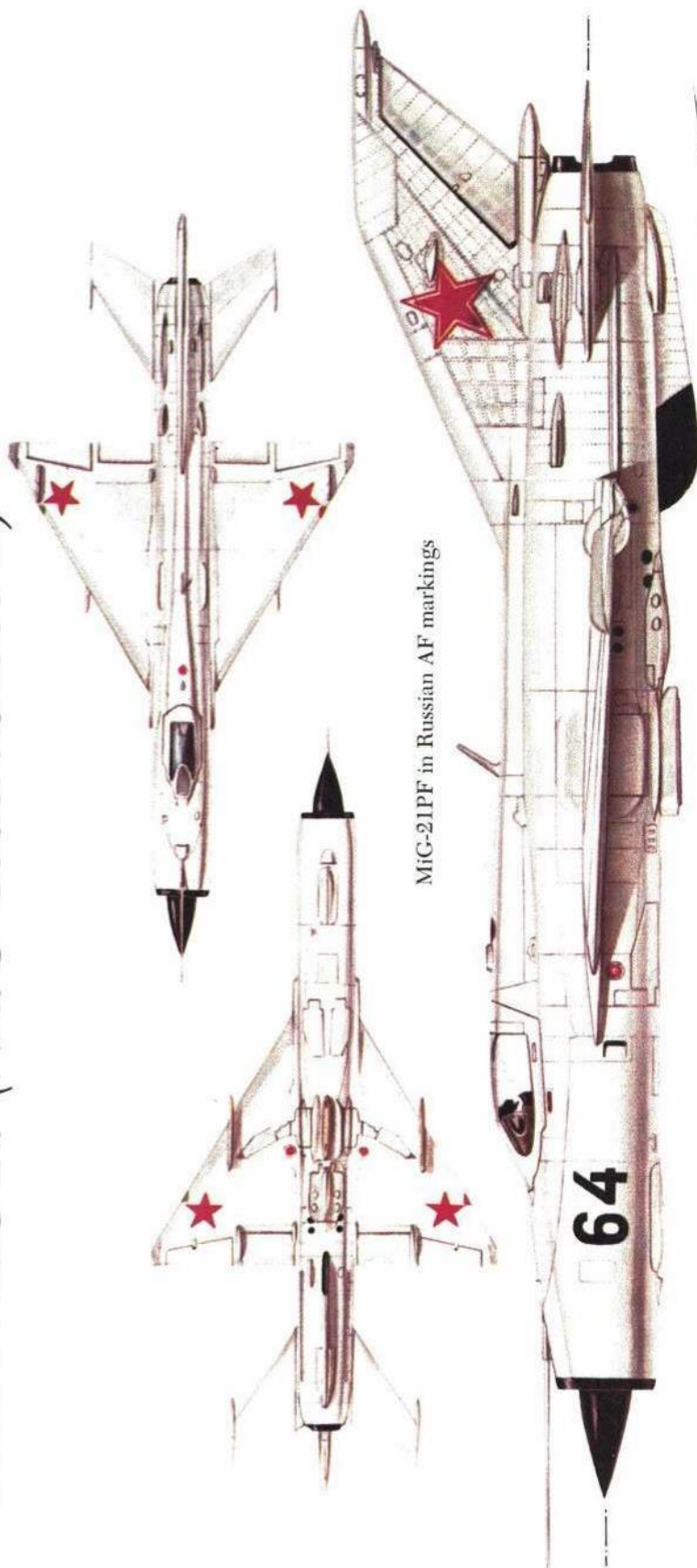


MiG-21PF in Polish AF markings



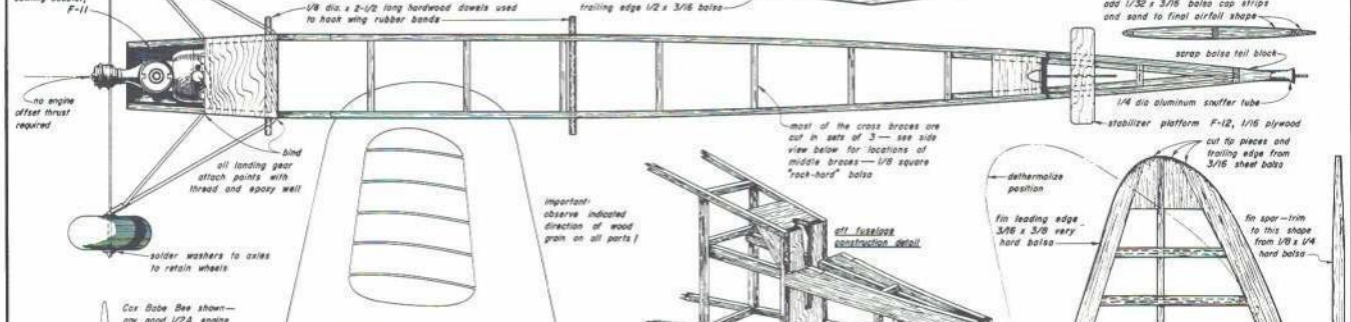
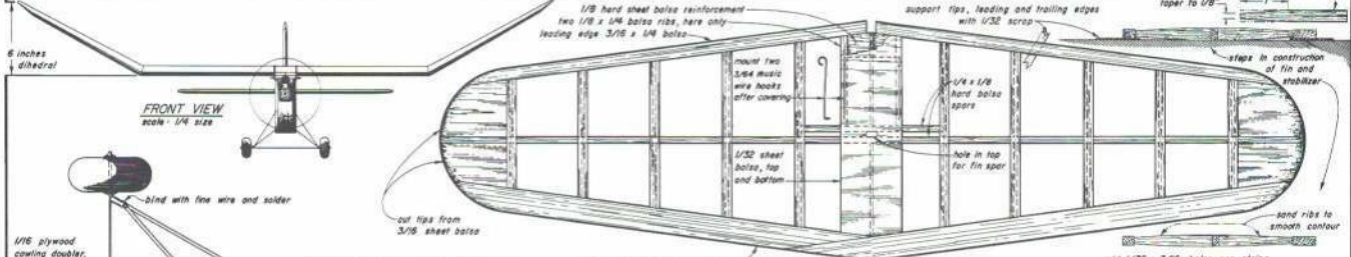
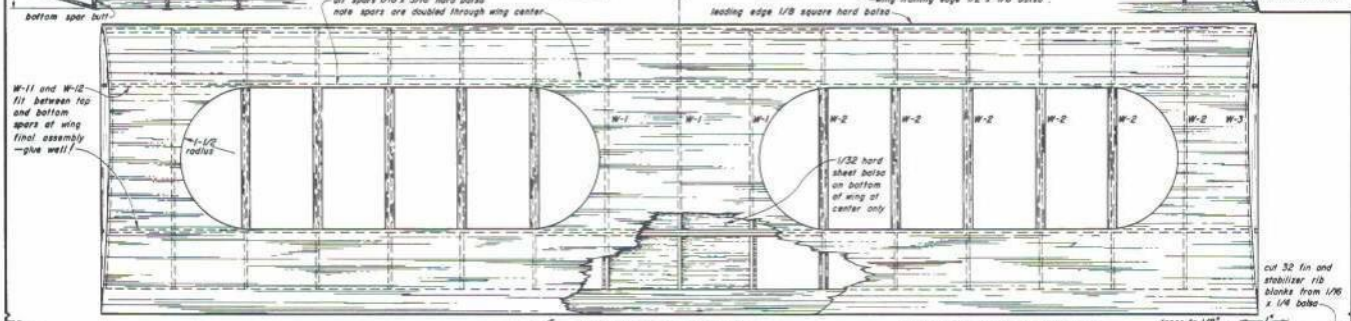
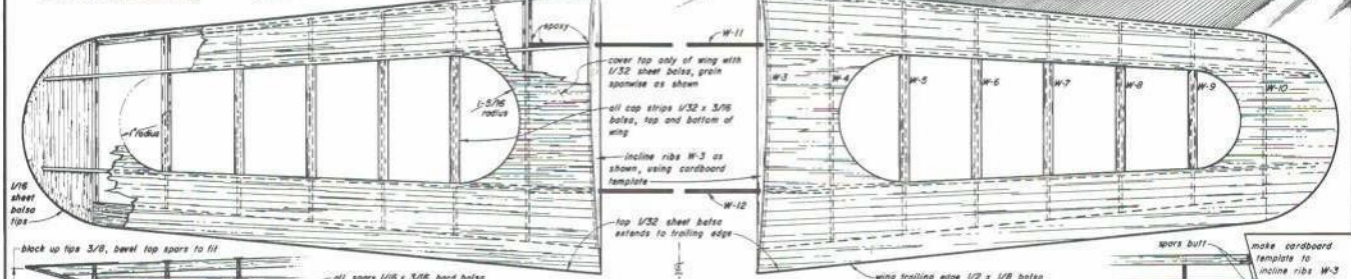
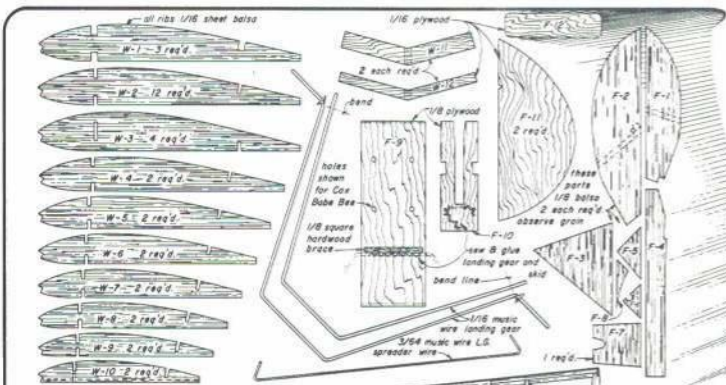
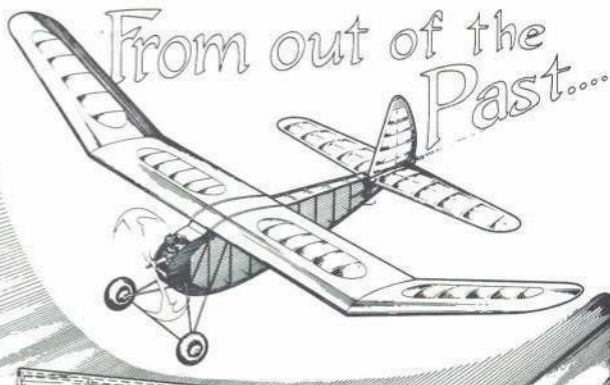


RUSSIAN MiG-21F (NATO Code: Fishbed-D)



A cleaned-up MiG-21 fitted with all-weather radar, increased fuel capacity. Two Atoll infra-red homing AAMs. In service with many countries. Drawing depicts Polish Air Force plane. Said to do Mach 2.2, range 400 miles.

From out of the Past...



Frank Ehling's 1937 Contest Gas Model

for 1/2 size Antique "Old Timer" flying

from the pages of 1937 Air Trails, a vintage design in modern form drawn for American Aircraft Modeler by David W. Jones, May, 1969

HALF-SIZE VERSION OF A GREAT OLD-TIMER



'Contest Gas Model'

"A proven design that has been a consistent winner at many meets," said this magazine over 30 years ago.

FRANK EHLING

(Publisher's Note: In 1937 editors weren't much for dressing up titles and it is a shame we don't have a great name, say like Starduster, for this great ship which won so many meets for Frank Ehling. So we say it like it was: "Contest Gas Model." This article probably makes Frank the first designer in history to have the same craft published twice — but 32 years apart. And by a coincidence your present publisher was then the editor of this same magazine — and couldn't think of a decent name apparently. Anyway, these things flew like birds. Build it, enjoy it — but by gosh don't let it fly away. It wants to. The following text is taken from the inscriptions on the Egyptian pyramids of prewar days.)

A gas model must be fundamentally sound in design and construction to withstand the wear and tear of flying. The fact that this model is recommended by Frank Ehling, its designer and builder, is proof that it fulfills this foremost requirement. His many years of experience with gas models has taught him what features to incorporate in a successful design.

Other than simplicity and durability of construction, Ehling makes the following recommendations for gas models: The wheels of the model should be placed forward of the propeller, to prevent damage in the event of bad landings resulting from poor adjustment or from hitting an obstacle and diving to the ground.

A moderate-thick wing section should be used. It produces a slower flight under power and a better glide than excessively thin or thick airfoils. The ignition system should be carried in the bottom of the fuselage for a low center of gravity position and it should slide backward or forward on track inside the bottom of the fuselage for easy balancing. The model should be finished with clear dope to give a transparent wing, with color dope used for the outline or scallops on the wing. This color combination will keep the model in sight the longest possible time.

Flying: The model weighs 3½ lbs. The wing area is about 7 sq. ft., making the ship rather lightly loaded. Test flying should be easier under these conditions. The model will suffer less from bad landings than a heavier model. Balance the model at the mid-point of the wing chord. The stabilizer has zero-incidence setting. The wing has

Continued on page 56



Smithsonian Institution.

Half-size version of old-time model is now on display at Smithsonian Institution, in Washington, D. C. Here, Director of the Air and Space Museum, Dr. Louis Casey, poses with Frank Ehling's replica in front of 1903 Wright plane. Museum would like some real antique model engines — have any? Wonder what Wilbur, up there, thinks of all this?

GETTING STARTED IN R/C

How Servos Function

HOWARD McENTEE

WHILE servos are a simple matter to the R/C expert, they can be a source of mystery to the novice. Let's dig into the matter. Generally, the term "servo" indicates a control mover which is powered by an electric motor. "Actuators" refer to proportional surface movers based upon permanent magnets (no motor as such). What are generally referred to as "single-channel servos" are motor-driven control movers that operate in a sequence manner. They have also been termed "motor-driven escapements." Depending upon the number of pulses they receive, they will move a rudder, for example, to right, left, or neutral. Most also have a third position that can trigger a second and similar (but not necessarily exactly the same) servo to operate an engine throttle, or possibly an elevator. These servos have a motor with a gear train to reduce output disc speed and boost torque, and a set of electrical cam contacts.

When the modeler sends one pulse, the motor rotates, drives the gear train and output disc, and also moves the cam; at the proper interval, an open spot (no contact) is

reached on the cam, and the servo stops there. It draws no power as long as you hold the turn position (nor does it in neutral). When you release the transmitter button, the receiver relay returns to its "normally open" position, and another circuit is closed on the servo cams which drives the output disc until it reaches neutral. Since the spinning electric motor has lots of inertia, it would always run past any desired stop position after current to the motor was cut. So ingenious circuitry applies a brief instant of reverse polarity voltage to the motor (this tends to try to drive it backward). This "electrical braking" brings the motor to a precise stop, just where you want it.

We mentioned a relay on the receiver to control the servo, but transistor circuitry will also do the job, and is widely used today.

Getting into simple proportional systems, the simplest servo is the spring-centered style. The transmitter of such a system includes a pulser (also called an "encoder") that sends a continuous string of pulses—generally on half the time, and off the other half, to produce neutral, or a centered rudder. Sophisticated receivers and systems utilize electronic decoders (which are also known as pulse length detectors), but in the simplest systems the servo itself is the decoder. It detects the changes in pulse length (obtained at the transmitter by varying po-

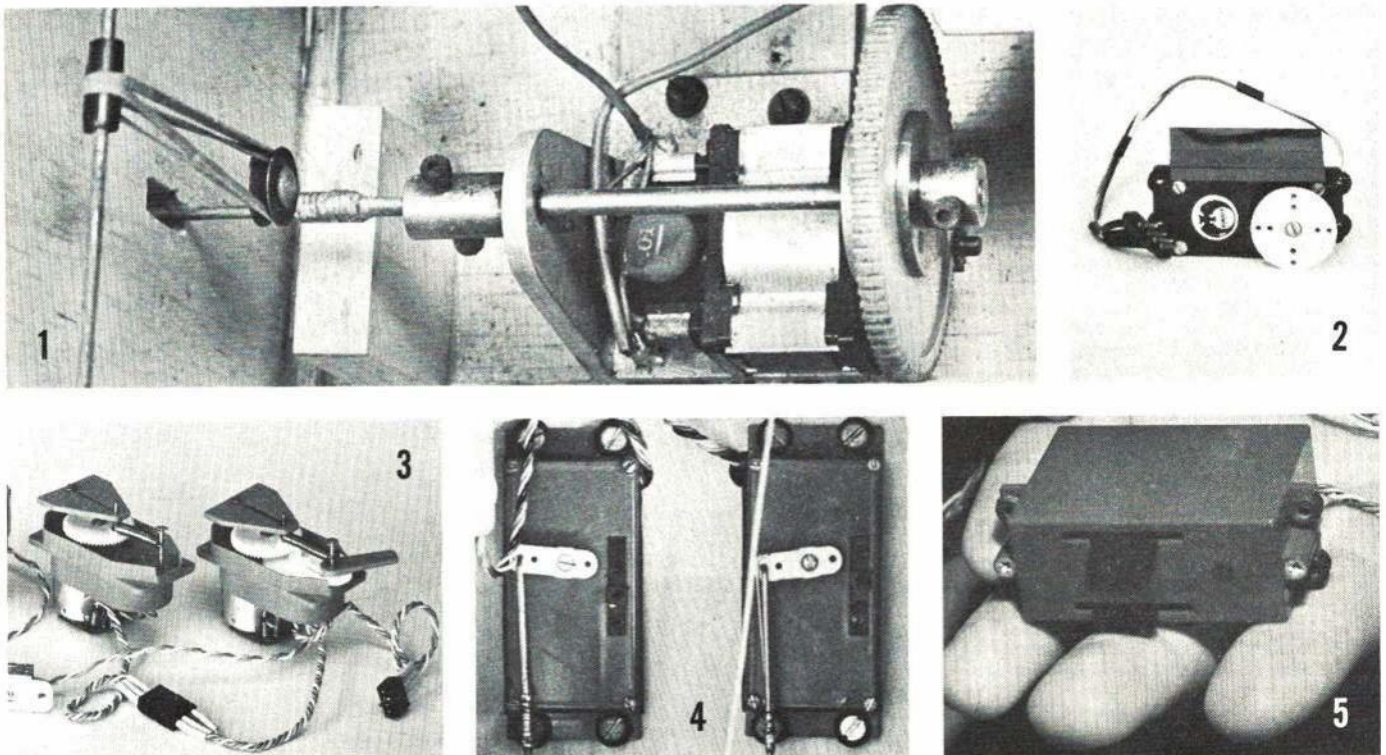
sition of the control lever or knob) and moves the rudder accordingly. It stops when the voltage it is receiving, and its particular spring tension balance out with the average pulse length coming from the transmitter.

The motor is fed alternate pulses of voltage from the two sets of batteries; positive on a given motor terminal might drive the armature clockwise, while negative on the same terminal would produce counterclockwise rotation. At neutral, therefore, the armature just wiggles back and forth, making perhaps several revolutions each direction. Speed reduction gearing is always used with such servos today, and if the reduction is great enough, the rudder will just have a slight back and forth wiggle in neutral.

Such servos always have a centering spring. This need not be very strong. In fact, it shouldn't be, for excess spring tension simply absorbs servo output power that would better be used to move the rudder. Tension should be enough to drive the servo toward (but not necessarily exactly to) neutral, if the servo is deflected to its limits with power off. In flight, air pressure on the deflected rudder tends to drive it back to neutral (and also increases the load on the servo, of course).

Spring-centered proportional servos are relatively inefficient; they draw power from

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1. Old-time homemade pulse servo and installation with rubber band centering. 2. Modern feedback miniature servo is fully enclosed, may have disc-rotary output, turning 45 degrees each way from neutral. 3. Modern commercial pulse servo—compare with homemade unit above. Note centering spring, rotary output from

triangular disc on top. One servo for elevator (left) and one for rudder AND throttle. 4. Two-servo installation of older, larger servos with elevator and rudder operated from rotary arm output. Linear push-pull output not used. 5. Another modern miniature feedback servo with two reciprocal push-pull outputs.

NOVEMBER 1969

MODEL AVIATION

Official magazine

A.M.A. NEWS



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

INTERESTED IN JOINING A.M.A.? Over 25,000 did in 1968. Membership details may be had by requesting FREE BROCHURE from above address.

1969 National Model Airplane Championships

BIG. That was the 1969 Nationals. It was so big that questions were heard about whether this one was the biggest ever. Complete historical statistics were not available at press time, but some comparisons are possible from recent records: the 1966 Nats at Chicago was the biggest in the last five years, and the 1969 meet was about the same in number of contestants registered — but a record number of AMA members (over 400) registered as mechanics, running the total registrants to a new high, over 1,500!

The 1969 meet, held at Willow Grove Naval Air Station, near Philadelphia, was bigger than the last National Contest at the same location in 1965 by about 300. The 1969 meet was also bigger than last year's Nats at Olathe, Kansas. A tremendous late entry surge at Olathe resulted in a total registration of almost 1,100. This year there were more than that many advance entries by mail, and about one hundred and twenty contestant entries were added at the meet, besides several hundred mechanics.

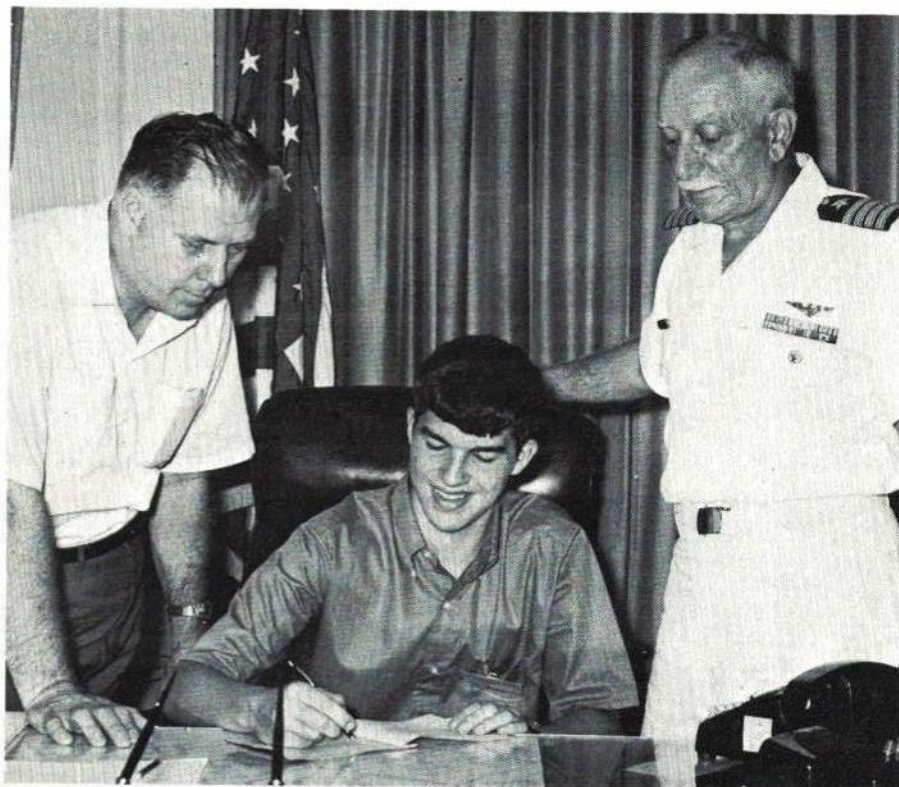
There were more events than ever at the 1969 meet — 38 separate events, most divided into the three AMA age classes. There were 17 Control Line events, 12 Outdoor Free Flight, 5 Indoor Free Flight and 4 Radio Control. RC Pattern had a staggering 144 entries compared with 100 in 1968. RC Pylon Racing, which had been predicted to have as many entries as Pattern, ended up with considerably less — just over 80 — reflecting the fact that the event is not yet as popular in the east as it is in the west, although the new Formula II event drew a respectable 31 entries. RC Scale took a big jump — 45 entries!

Free Flight had some awesome event entries: 355 in 1/2A Gas, 283 in A Gas, 319 in HL Glider, and over 200 in Nordic Glider! Control Line activity was generally up from last year, including an incredible 135 in Combat. Profile Carrier, a brand new event this year, drew 50 entries. Encouraging to FAI control-liners, who have been worried about declining activity, were increases in entries for FAI Speed and FAI Team Racing. The latter event had 30 entries this year as compared with only 5 in 1968, and FAI Speed this year had 35 entries.

Indoor buffs this year had more activity than ever before. Besides two days of Nats flying instead of the usual one, there was a third day of FAI team selection flying. In the Indoor Team Finals on Sunday, July 13, the top placers (who comprise the U. S. team for the 1970 Indoor World Championship) were Jim Richmond, Bensenville, Ill.; Pete Andrews, Scranton, Pa.; and Clarence Mather, San Diego, Calif.

Indoor Scale was flown for the first time as a Nats event, and there were 62 entries — more than the traditional Stick, Paper

Continued on page 48



U. S. Navy photo

"As a former model airplane builder and contestant at the Nats, we applaud your endeavors and wish you God speed," concluded the telegram to Astronaut Neil Armstrong and the crew of Apollo 11 which was sent at the time of blast-off for the historic flight and Moon walk. Glenn Godden, 15, the Junior AMA-HIAA-NAVY Regional Meet winner from Seattle, Wash., signed the message on behalf of all Nats entrants. John Worth, AMA executive director, and Captain Nicholas Brango, Commanding Officer of Willow Grove Naval Air Station, witnessed the event.



A Model Air Show featuring CL, RC, and FF climaxed week-long competitions. Al Signorino and "Snoopy's Dog House" are in the foreground.



Grand National Champion Trophy was awarded to Buck Servaites by Admiral Bernard Streaan and Miss Model Aviation for 1969, Chris Gorman.

NATIONAL CHAMPIONS

Grand Champion

Buck Servaites, Dayton, Ohio

Junior

Mark Kerr, Philadelphia, Pennsylvania

Senior

Gary Myers, Miami, Florida

Open

Buck Servaites, Dayton, Ohio

Radio Control

Larry Leonard, Canoga Park, California

AMA Club Team

Golden Eagles, Broomall, Pa. (Gerald Comp, Donald Hockaday, James Kutkuhn, John Paserky and Donald Reed.)

Nats Team

U. S. Air Force Team (Bert Dugan, Larry Miller, George Brown III, Philip Bayley and Charles Stiles.)

PERPETUAL TROPHIES & SPECIAL AWARDS

Tulsa Glue Dobbers (High time regardless of age, Nordic A-2 Glider): Peter J. Allnutt, Toronto, Ont., Canada.

Mulvihill (High time regardless of age, Unlimited Rubber): Michael Bailey, Smyrna, Georgia.

Tulsa Glue Dobbers (High time regardless of age, Outdoor H. L. Glider): Philip Klintonworth, Troy, Mich.

Hoffman Memorial (High time regardless of age, A FF Gas): Gerald Comp, Secane, Pa.

Testor's (Best model finish, regardless of age): Andrew Sheber, Livonia, Mich.

Jim Walker (Winner of Junior-Senior-Open flyoff, CL Stunt): Robert Lampione, Astoria, N. Y.

Stout Indoor (High time regardless of age, Indoor Cabin): James Richmond, Bensenville, Ill.

Stout Commercial (High time regardless of age, Indoor Stick): Ronald Plotzke, Mt. Clemens, Mich.

Art Chester (Best scale model, RC Pylon Form. I): Sam Fly, Dallas, Texas.

Sterling Models (Best Flying Scale model of any category irrespective of flight points): Linton Keith, Santa Clara, Calif.

1968 NATS SPONSORS

Approximately 500 awards were provided through the contributions of the following:

Ace R/C, Inc.; Adel Division, DeLaval Turbine; Ambroid Company, Inc.; American Aircraft Modeler; Andrews Aircraft Model Co., Inc.; Aristo-Craft Distinctive Miniatures; Burgess Battery Company; Carl Goldberg Models, Inc.; Citizen-Ship Radio Corporation; Comet Model Hobby Craft Corporation; Competition Models, Inc.; Cox Manufacturing Co., Inc.

D. N. Mallory Distributor; Dee Bee Engineering; DuBro Products, Inc.; Dumas Products; Estes Industries, Inc.; Flying Models Magazine; Grish Brothers; Hobby Industry Assn. of Delaware Valley; International Balsa Corporation; Jasco; K and B Manufacturing; Kraft Systems, Inc.

Lanier Industries, Inc.; Micro-Avionics, Inc.; Midwest Products Co.; Model Rectifier Corporation; Orbit Electronics, Inc.; Pactra Chemical Co., Inc.; Paul K. Guillow, Inc.; Pettit-Hobbyoxy; Progress Manufacturing Co.; Rand Manufacturing; R/C Modeler Magazine; Rotary Pen Corp.; Russell, Marsh and Kennedy, Inc.

Scientific Models, Inc.; Sig Manufacturing Co., Inc.; Sterling Models; Sullivan Products; Tatone Products; The Testor Corporation; Top Flite Models, Inc.; Western Model Distributors; Williams Brothers; World Engines, Inc.; World Wide Radio Control.

NATS ENTRIES

	Jr.	Sr.	Open	Total
Number of Entrants	242	131	701	1074
Number of Mechanics				428

Entries by Event

Control Line	Jr.	Sr.	Open	Total
Rat Race	20	17	50	87
B Proto Speed	12	9	33	54
1/2A Profile Proto	40	(Jr. Only)		
1/2A Proto Speed	20	14	38	72
FAI Speed	7	4	24	35
1/2A A Speed	27	14	32	73
A Speed	16	9	35	60
B Speed	14	10	43	67
C Speed	11	6	31	48
Jet Speed	6	5	16	27
Stunt	21	21	54	96
Combat	33	27	75	135
FAI Team Race	1	7	22	30
Scale	10	12	30	52
Carrier I	10	15	44	69
Carrier II	5	13	39	57
Profile Carrier	18	10	22	50
Indoor				
Scale	14	10	38	62
H. L. Glider	41	30	79	150
Paper Stick	14	11	35	60
Cabin	10	6	18	34
Stick	8	6	41	55
Free Flight				
1/2A Gas	103	41	211	355
A Gas	65	35	183	283
B Gas	17	25	132	174
C Gas	12	25	128	165
FAI Power	10	10	70	90
Wakefield Rubber	7	3	55	65
Unlimited Rubber	27	8	82	117
Nordic Glider	52	26	133	211
H. L. Glider	107	48	164	319
Rocket Power	19	15	68	102
Scale	10	10	42	62
Helicopter	—	—	13	13
Radio Control				
Pattern	12	13	119	144
Scale	3	2	40	45
Pylon I	6	5	40	51
Pylon II	2	2	27	31

HQ Note: These figures represent a last-minute tally as well as corrections to an earlier listing in the *AMA Competition Newsletter*.



Phil Edwards photo

Trailer park was an ideal housing solution for a number of modeling families at NAS Willow Grove — not available at all Nats. In background is Hangar 80 which housed AMA HQ, scale model judging, Navy Displays, Delta Dart building and contests, and entry processing for which those below (who arrived ahead of time) are waiting.

Phil Edwards photo



CONTROL LINE

1/2A SPEED

Junior	mph
1. Brian Pardue	98.32
2. Ross Legg	91.24
3. Elizabeth Nixon	90.87
4. Michael Taibi	89.96
5. Charles Schubert	89.96

Senior	mph
1. Bruce Van Hoozen	98.86
2. Henry Nixon, Jr.	97.47
3. Gerald Myres	96.22
4. George Brown	94.40
5. Aan Nixon	92.75

Open	mph
1. Charles Legg	109.71
2. Warren Kurth	107.10
3. Anaston Bussell	102.23
4. James Mitchell, Jr.	95.71
5. Harry Grogan	92.75

A SPEED	mph
1. Danny Bartley	140.37
2. Robert Myres	139.50
3. Harold Nash, Jr.	139.07
4. Brian Pardue	127.27
5. Elizabeth Nixon	125.58

Senior	mph
1. George Brown	136.33
2. Gerald Myres	131.55
3. Alan Nixon	129.47
4. Mary Brown	124.97
5. Bruce Van Hoozen	122.26

Open	mph
1. Baltus/Beatty	154.60
2. Vassallo/Telford	150.84
3. Anaston Bussell	146.55
4. G. Draycott Hooke	145.60
5. Aldrich/MacKenzie/Satterwhite	141.37
Alfred McCarthy	141.37

B SPEED	mph
1. Danny Bartley	154.40
2. Harold Nash, Jr.	149.84
3. Charles Schubert	146.76
4. Gary McGraw	144.66
5. Brian Webster	134.51

Junior	km/hr
1. Brian Pardue	164.05
2. John Gerber	150.04
3. Mark Kerr	137.43

Senior

1. J. E. Albritton	162.13
2. George Brown	151.86
3. Gerald Myres	151.48
4. Mary Brown	142.15
5. Alan Nixon	138.54

Open

1. Frye/Roselle	167.40
2. Charles Fitzpatrick	164.35
3. Aldrich/McKenzie/Satterwhite	164.35
4. David Elias	160.10
5. Bernie Stadtem	159.79

C SPEED

Junior	mph
1. Danny Bartley	177.97
2. Gary McGraw	166.60
3. Harold Nash, Jr.	162.10
4. Michael Hainen	150.44
5. John Gerber	136.31

Senior

1. Robert Mohr	177.97
2. Gary Myers	157.01

Open

1. Frye/Roselle	193.68
2. Thomas Roman	179.93
3. Bartley/Garner	178.50
4. Arpino/Garzon	178.15
5. Alfred McCarthy	177.97

JET SPEED

Junior-Senior	mph
1. Danny Bartley	157.28
2. George Brown	154.18
3. Gary McGraw	151.45

Open

1. Harry Latshaw	167.37
2. Mike Olson	166.14
3. Glen Payne	164.02
4. Charles Serie	163.57
5. Harold Nash	160.65

FAI SPEED

Junior	km/hr
1. Brian Pardue	164.05
2. John Gerber	150.04
3. Mark Kerr	137.43

Senior

1. George Brown	190.84
2. Bruce Van Hoozen	162.13

Open	
1. Laird Jackson	189.53
2. Glenn Lee	187.46
3. Schauer/Jones	185.43
4. Philip Beyly	173.29
5. Bert Dugan	170.34

1/2 A PROTO SPEED

Junior - Profile	
1. Danny Bartley	80.33
2. Harold Nash, Jr.	76.99
3. Walter Gifford	73.44
4. Richard Jackson, Jr.	71.01
5. Michael Hainen	70.56
Bruce Pallet	70.56

Junior	
1. Ross Legg	83.49
2. Michael Taibi	80.61
3. Elizabeth Nixon	76.37
4. Gary McGraw	73.20
5. Steven Valerius	70.01

Senior	
1. Tom Hartvigsen	84.08
2. Mary Brown	77.26
3. George Brown	75.35
4. Bruce Van Hoozen	75.22
5. Henry Nixon, Jr.	75.19

Open	
1. Anaston/Bussell	92.13
2. Warren Kurth	89.50
3. Charles J. Legg	86.84
4. Harry Grogan	75.92
5. Buck Servaites	75.00

B PROTO SPEED

Junior	
	mph
1. Danny Bartley	140.02
2. Brian Webster	106.72
3. Michael Hainen	106.40
4. Mark Kinder	89.83
5. Larry Green	64.67

Senior	
1. George Brown	120.76
2. Bruce Van Hoozen	114.10
3. Mary Brown	111.20

Open	
1. Aldrich/McKenzie/Satterwhite	141.88
2. Bartley/Garner	140.90
3. Robert Heminway	137.35
4. David Elias	136.52
5. Dye/Kasmar	132.40

AEROBATICS (STUNT)

Junior	
	Points
1. Dennis Adamisin	459
2. Michael Thompson	446
3. Robert Feinstein	433
4. Wayne Colgan	381
5. Craig Bankemper	361

Senior	
1. Mike Stott	471
2. Robert Howard	464
3. Dawn Cosmillo	462
4. David Adamisin	447
5. Ed Wallace	444

Open	
1. Robert Lamplone	598
2. William Rabe, Jr.	594
3. Gerald Phelps	587
4. Walter Kostecky	580
5. Jim Silhavy	580

COMBAT

Junior	
1. James Hayes	
2. Richard Sherman	
3. Craig Bankemper	
4. Tommy Autrey	
5. Matsuzaka Masanori	

Senior	
1. Frank Imbriaco	
2. Jim Ehlen	
3. David Chambers	
4. Donald Cline	
5. James Morway	

Open	
1. Will Rogers	
2. Peter Puchyr	
3. Richard McGarrigle	
4. Edwin Gifford	
5. Karl Schilling	

FAI TEAM RACE

Jr.-Sr.-Op.	Time
1. Kelly/Parent	10:12.0
2. Albritton/Marvin	12:47.2
3. Myers/Hubschmidt	12:47.3
4. Staat/Dolgnr	
5. James Van Sant	

RAT RACE

Junior	Time
1. Craig Bankemper	6:05.8
2. Robert Wright	6:10.5
3. Chuck Bankemper	6:13.5



U. S. Navy photo

Avro Lancaster of Linton Keith attracted many photographers. The CL Flying Scale winner, it also was judged best scale model of all categories to capture the 1969 Sterling Models Award.



Phil Edwards photo

Navy Carrier models are judged by factors full-size Navy planes must excel in — high speed, slow speed and carrier landing. Edwin Peterson, Jr., pull-tests.



Phil Edwards photo

Glenn Lee, Batavia, Ill., gets ready Super Tigre G21-powered B Speed model. 1968 National Champion.

John Smith, with megaphone and binoculars, takes a minute to discuss a matter with Pete Peters. Smith was CL Speed events director, Peters CL category director. Binoculars used to help observe possible whipping infractions.

1. Michael Hainen	6:19.0
5. Robert Myres	10:04.6

Senior	
1. Jerry Haupt	5:51.7
2. Ed Wallace	5:57.2
3. Warren Olds	6:14.2
4. Tim Zimmer	6:18.4
5. Jeffrey Tacconi	10:39.4

Open	
1. J. C. Ballard	5:40.0
2. Richard McIntyre	5:42.0
3. James Mitchell, Jr.	5:45.4
4. Arthur Chambers, Jr.	5:49.2
5. James Hainen	5:55.0

3. Dan Domina	361.86
4. Steve Coffman	360.60
5. Robert Hulick	317.21

NAVY CARRIER II

Junior	Points
1. John Gerber	479.10
2. Dale Johnson	79.97

Senior	
1. Edwin Gross, Jr.	507.77
2. Albert Stanczyk	497.50
3. James Romano	478.88
4. Joseph Dzialo	353.38
5. Robert Tweed	206.39

Open	
1. E. R. Willmann	587.43
2. Charles Banks	580.04
3. Bill Johnson	553.13
4. Edwin Peterson, Jr.	538.54
5. Marion Sawicki	533.03

FLYING SCALE

Junior	Points
1. Elliott Dickson	425½
2. Billy O'Connor	231
3. Dave Urbanek	194
4. James Sloneski	185½

Senior	
1. James Romano	458½
2. John Bowe	306½
3. Mike Stott	290
4. Bob Wrase	259½
5. Robert Morse	177½

Open	
1. Linton Keith	543
2. William Harney	513
3. Andrew Sheber	492
4. Florian Piorkowski	466
5. Eddie Tepper	455



U. S. Navy photo

Practice flights by Dennis Adamisin, Taylor, Mich., before start of Junior CL Stunt event, paid big dividends as he won first place. Older brother, David, took fourth in Sr.



U. S. Navy photo

Huge crowd at RC area gathered daily. Golf cart has portable loudspeaker which was manned by Bob Lutker. He toured all activities and described events to uninitiated.



U. S. Navy photo

Hale Wallace inspects Bell P-63A Kingcobra that placed him second in RC Scale. The twelve-pound model has operable flaps and dropable tanks.



U. S. Navy photo



U. S. Navy photo

Left: Curtiss JN4-D Jenny of Walt Moucha has graceful flight characteristics, placed 3rd in RC Scale. Model weighed 12¼ pounds, powered by OS Max 80, controlled by Micro-Avionics. Lower photo shows landing approach being watched intently by flight judge Rudy Black. Above: RC Scale Achievement Award winner Dr. Norman Evans with DeHavilland DH-2. Young observer is his son.

RADIO CONTROL

PATTERN FIRST STAGE

Junior	Points
1. Whit Stockwell	156½
2. James Hiller	130½
3. Otto Dieffenbach	127½
4. Bryan Sattler	120
5. William Hiller	119½
Senior	Points
1. Bob Smith	165½
2. Michael Mueller	158½
3. W. Schroder, Jr.	142
4. Ken Duncan	141½
5. Tom Street*	138½

*Expert, others Novice

Open, Novice

1. George Kane	147
2. Bob VanWymbersch	147
3. Tom Taylor	143½
4. George Buso	140
5. Vernon Smith	137½

PATTERN 2ND STAGE

1. Larry Leonard	214¼
2. James Whitley	213¼
3. Tony Bonetti	212
4. Jim Edwards	211¼
5. Ron Chidgey	208¼
6. Don Coleman	196
7. Paul Ennis	195½
8. Don Lowe	193
9. Norm Page	189
10. Ed Izzo	188¼
11. James Martin	179
12. Ed Keck	178¼
13. Bob Smith*	178¼
14. Neal Kilby	166¼
15. Gerald Nelson	136½

*Senior, others Op Exp.

PATTERN FINALS

1. Larry Leonard	319½
2. Jim Whitley	308½
3. Ron Chidgey	298½
4. Tony Bonetti	290
5. Jim Edwards	279½

PYLON FORMULA I

Jr.-Sr.-Op.	Points
1. Larry Leonard	35
2. Samuel Fly	29
3. Whit Stockwell	29
4. Harold deBolt	28
5. Edward Izzo	27
Best Junior	Points
Whit Stockwell	29
Best Senior	Points
Bob Smith	17

PYLON FORMULA II

Jr.-Sr.-Op.	Points
1. Harold deBolt	27
2. Richard Allen	27
3. Donald Lowe	25
4. Robert Noll	25
5. Richard Barron	25
Best Junior	Points
Bryan Sattler	8
Best Senior	Points
Leonard Martin	24

FAI FLYING SCALE

Jr.-Sr.-Op.	Points
1. Maxey Hester	1050.1
2. Hale Wallace	1031.9
3. Walt Moucha	1020.2
4. Bud Atkinson	905.5
5. Dave Platt	850.0
Scale Achievement Award	Points
Norm. Evans (DeHavilland DH-2)	



Phil Edwards photo

Larry Leonard gets some pointers from Cliff Weirick, a former RC winner. Leonard went on to win Pattern as well as Formula I Pylon Racing.

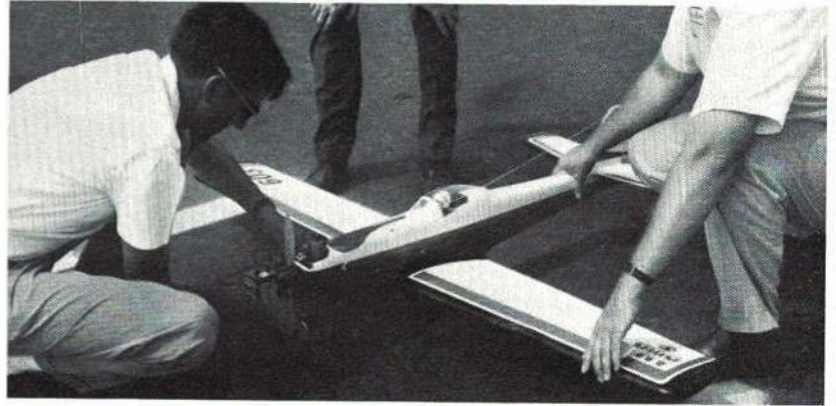


In preparation for First Stage Pattern Qualifying flight, George Buso fires up his Webra 61-powered Quick Fli III. Hal Conklin holds.



Phil Edwards photo

Stafford Minnow was a popular Form. I racer. With his, Bob Smith was 3rd in Qualifying, 11th in Finals.



Could you believe this Lanier Citron survived a mid-air collision the day before? It did — escaped with slightly squashed wing leading edge. Paul Byrum is the airplane owner.

INDOOR

CABIN

Junior	Time
1. Ronald Ganser	15:37.2
2. Michael Kuehne	8:22.9
3. Barry Pallet	4:12.0
4. Bruce Pallet	3:56.8
5. William Schlarb	3:55.5

Senior

1. Dan Domina	9:43.0
2. Jan Servaites	9:28.0
3. Terry Kuehne	7:08.0
4. Dale Hacker	6:50.8
5. Susan Weisenbach	5:11.0

Open

1. James Richmond	22:43.2
2. Buck Servaites	22:42.6
3. Al Rohrbaugh	21:07.5
4. Ronald Ganser	15:05.0
5. Warren Williams	14:10.0

STICK

Junior	Time
1. Ronald Ganser	22:55.6
2. Michael Kuehne	12:03.2
3. Wm. Schlarb, Jr.	7:56.0
4. Michael Parykaza	6:12.2

Senior

1. Dale Hacker	16:15.1
2. Dan Domina	14:51.8
3. Jan Servaites	13:54.4
4. Terry Kuehne	9:54.0
5. Susan Weisenbach	9:09.5

Open

1. Ronald Plotzke	42:53.0
2. Joe Bilgri	38:21.4
3. John Triolo	37:56.6
4. James Richmond	37:00.5
5. Pete Andrews	35:09.2

PAPER STICK

Junior	Time
1. Ronald Ganser	10:20.1
2. Michael Kuehne	8:58.2
3. Brian Webster	8:47.0
4. James Haught	7:39.5
5. Bruce Pallet	7:39.4

Senior

1. Dan Domina	14:49.4
2. Jan Servaites	14:00.0
3. Susan Weisenbach	13:54.5
4. Terry Kuehne	10:12.9
5. Francis Donnelly	9:55.0

Open

1. James Richmond	26:56.0
2. Edward Stoll	21:17.3
3. Al Rohrbaugh	20:54.1
4. Charles Sotich	18:15.0
5. Daniel Belleff	18:08.7

H.I. GLIDER

Junior

	Seconds
1. Mark Kerr	105.0
2. David Belleff	99.0
3. Donald Ganser	97.5
4. Warren Carter	95.2
5. David Pfeifer	90.8

Senior

1. Michael Thompson	123.6
2. Jan Servaites	122.1
3. Gary Myers	112.9
4. George Brown III	111.7
5. Kenneth Fitch, Jr.	108.8

Open

1. Rudy Kluber	152.2
2. Buck Servaites	135.1
3. Donald Reed	134.1
4. Larry Miller	131.0
5. Ronald Higgs	127.5

FLYING SCALE

Junior

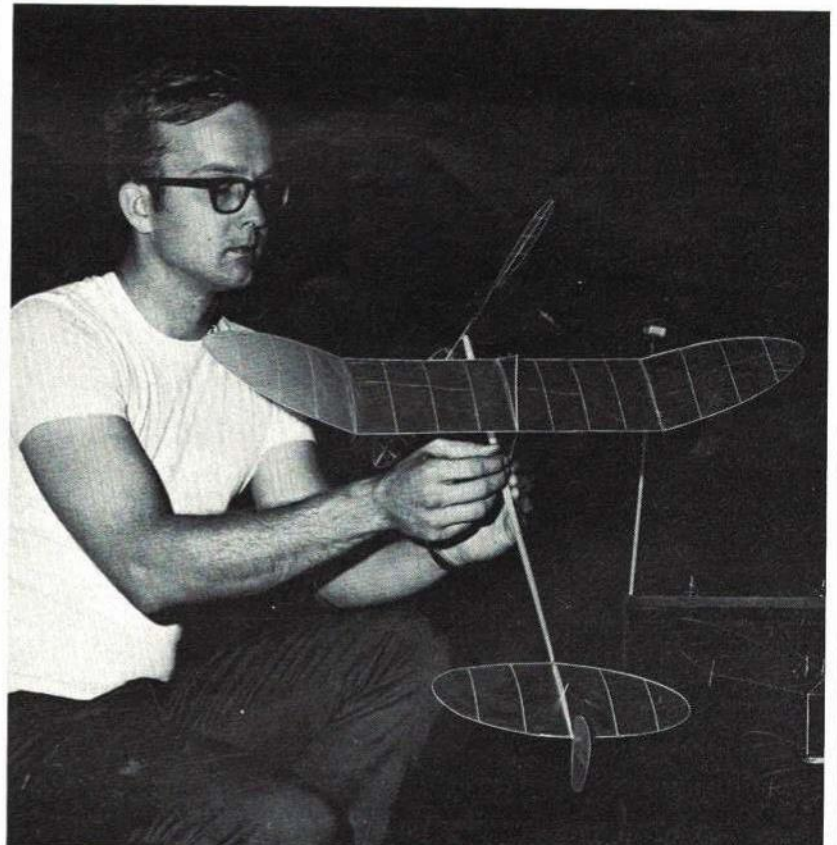
	Points
1. Brian Webster	119.7
2. Michael Kuehne	114.6
3. Justin Mills	85.7
4. Bruce Pallet	75.9
5. Barry Pallet	68.5

Senior

1. Terry Kuehne	122.5
2. Michael Thompson	101.8
3. Denny Dock	67.5
4. Jay Krush	61.1

Open

1. Walter Eggert, Jr.	146.0
2. James Richmond	139.1
3. David Stott	136.2
4. Andrew MacIsaac	129.2
5. Donald Garofalow	128.0



U. S. Navy photo

Grand National Champ Buck Servaites' strongest Championship events were Indoor (Paper Stick model shown) and Outdoor FF, but he also earned points in 1/2A Speed and 1/2A Proto.



Dick Colonna sets dethermalizer fuse in his A-2 Towline model as Edward Ham engages line — placed 2nd.



B FF model by Alan Vollmer looks like a low wing, but down angle of surfaces should give high-thrust pylon forces.



U. S. Navy photo

This was the first Nats for Ron Evans, shown with A-2 Towline Glider. A Canadian won this event in the Open age class.



George "Professor" Perryman enjoys the shade for a minute while flying Wakefield. Still uses polyhedral stab "trademark."



Robert Meuser photo

Mark Kerr, Junior National Champion, almost loses balance as Fox 29X Starduster blasts away from vertical takeoff.

2. Gary Heeb	12:00
3. Brian Webster	8:31
4. Ronald Ganser	7:50
5. Eric Hatschek	6:48

Senior

1. Donald MacKenzie	24:00
2. Jan Servaites	8:05
3. Joseph Boyle III	6:28
4. Jeffrey Biggs	5:57
5. Terry Kuehne	3:49

Open

1. Robert Plone	17:52
2. Nicholas Pitas	17:31
3. George Poorman	17:15
4. Daniel McDonald	14:50
5. Peter Allnutt	14:46

HELICOPTER

Jr.-Sr.-Op.	Points
--------------------	---------------

1. Glenn Lee	163.25
2. D. Lee Taylor	162.1
3. Richard Wetzel	123.85
4. Paul Kastory	87.3
5. Seymour Hertzson	7.0

ROCKET POWER

Junior	Time
---------------	-------------

1. Robert Lyons	3:35
2. Gary Plone	2:51
3. James Mills	2:04
4. David Cleveland	1:20
5. Robert Sylvia	1:03

Senior

1. Denny Dock	5:39
2. Michael Thompson	4:51
3. Terry Kuehne	3:24
4. J. V. Boyle III	3:05
5. Jan Servaites	1:11

Open

1. Harry Murphy, Jr.	7:52
2. Charles Sotich	7:32
3. Edward Ham	6:42
4. Robert Edelstein	6:31
5. Robert Plone	6:17
Ronald Higgs	6:17

NORDIC GLIDER

A-1 Junior	Seconds
-------------------	----------------

1. Eric Hatschek	808
2. Glen Winkel	694
3. Daniel Tobie	609
4. John Petchler	586
5. Steven Valerius	514

A-2 Junior

1. Mark Kerr	671
2. Michael Kuehne	600
3. Michael Taibi	577
4. James Haught	573
5. Brian Webster	567

A-1/A-2 Senior

1. Benjamin Schultz	751
2. Joseph Dzialo	704
3. Donald MacKenzie	700
4. Gary Myers	532
5. Paul Tobie	518

A-1/A-2 Open

1. Peter Allnutt	900
2. Richard Colonna	853
3. Donald Reed	841
4. James Gremel	811
5. Leonard Stress	775

H.L. GLIDER

Junior	Time
---------------	-------------

1. Gary Plone	5:06
2. Jeffrey Nix	4:50
3. Grady Turner	4:45
4. John Nix III	4:13
5. Ronald Ganser	3:59

Senior

1. Kenneth Fitch, Jr.	4:55
2. Jeffrey Biggs	4:54
3. George Pharr	4:23
4. Michael Thompson	4:13
5. Lewis Cleveland	4:09

Open

1. Philip Klintworth	7:47
2. James Gremel	6:37
3. Larry Miller	6:28
4. Albert Bennett	5:50
5. John Nix	5:32

FLYING SCALE

Junior-Senior	Points
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1. Brian Webster	394
2. Terry Kuehne	382.5
3. Lee Brown	332
4. Stephen Kastory	287.5
5. Dean Haywood	286

Open

1. Frederick Stark	515
2. David Stott	497
3. Bruno Markiewicz	481
4. Richard Wetzel	473
5. John Stott	460.5
Ted Dock	460.5

B GAS

Junior	Time
---------------	-------------

1. Michael Taibi	18:00
2. Grady Turner, Jr.	8:44
3. Mark Kerr	8:29
4. W. L. Schlarb, Jr.	8:11
5. Brian Webster	8:04

Senior

1. Gary Myers	13:27
2. Mark Heckendorf	8:44
3. Neal Pickel	8:25
4. Susan Weisenbach	8:13
5. R. Mike Hallum	7:58

Open

1. John Pfeifer	24:00
2. Robert Gutai	19:10
3. Ronald Higg	17:17
4. James Robinson	17:08
5. Larry Miller	16:35

C GAS

Junior	Time
---------------	-------------

1. Mark Kerr	15:00
2. Brian Webster	8:38
3. Grady Turner	8:00
4. William Burgess, Jr.	7:33
5. William Schlarb, Jr.	7:19

Senior

1. Gary Myers	8:16
2. Mark Heckendorf	7:57
3. Michael Ettel	7:50
4. Neal Pickel	7:40
5. Joseph Dzialo	7:34

Open

1. George Versaw	20:49
2. James Scarborough	19:34
3. Gerald Comp	17:17
4. James Coffin	17:02
5. John Paserksy	16:55

**FREE FLIGHT—
Outdoor**

1/2 A GAS

Junior	Time
---------------	-------------

1. Mark Kerr	19:19
2. John Nix III	10:47
3. William Kauter, Jr.	10:33
4. R. Michael Felter	8:52
5. Kevin Hayes	8:39

Senior

1. R. Mike Hallum	11:06
2. David Poydock	10:37
3. Michael Ettel	9:00
4. Gary Myers	8:36
5. Jeffrey Biggs	8:32

Open

1. Harry Grogan	19:34
2. Andrew George	15:48
3. Benton Cleveland	12:51
4. John Paserksy	12:00
Howard Hill	12:00

A GAS

Junior	Time
---------------	-------------

1. John Petchler	13:15
2. W. L. Burgess, Jr.	12:00
3. Mark Kerr	11:42
4. Bruce Pallet	9:00
5. Michael Taibi	8:57

Senior

1. Neal Pickel	17:56
2. R. Mike Hallum	10:35
3. J. V. Boyle III	8:20
4. Kevin Graunke	8:18
5. David Poydock	8:14

Open

1. Gerald Comp	19:13
2. Rudy Klumber	16:57
3. Ronald Higgs	16:56
4. Don Sim	15:00
5. James Scarborough	14:19

FAI POWER

Junior	Seconds
---------------	----------------

1. Mark Kerr	779
2. W. L. Burgess, Jr.	765
3. Steven Valerius	691
4. Glen Winkel	680
5. Fred Biggs	592

Senior

1. Denny Dock	803
2. Lewis Cleveland	731
3. J. V. Boyle III	629
4. Jeffrey Biggs	551

Open

1. Robert Siffert	1028
2. Joe Bilgri	888
3. Benton Cleveland	871
4. Allan Vollmer	870
5. Charles Broadhurst	870

WAKEFIELD RUBBER

Junior	Seconds
---------------	----------------

1. Gary Heeb	830
2. Michael Bailey	576
3. John Petchler	168
4. Fred Biggs	167

Senior

1. Jan Servaites	637
2. J. V. Boyle III	466
3. Jeffrey Biggs	453

Open

1. Donald Reed	855
2. Buck Servaites	853
3. Joe Bilgri	845
4. Henry Struck	797
5. Charles Sotich	770

UNLIMITED RUBBER

Junior	Time
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1. Michael Bailey	33:00
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AMA News Extra

1969 FREE FLIGHT WORLD CHAMPIONSHIPS - AUSTRIA - AUGUST 12 - 17

Nordic: 1st - Russia; 2nd - Czechoslovakia; 3rd - Italy; 6th - U. S. A.

1.	Drew, E.	Gt. Brit.	180	180	180	180	180	180	180	1260
2.	Pataki, G.	Hungary	180	180	180	180	180	180	177	1257
3.	Prochazka, O.	Czech.	180	180	180	175	176	180	180	1251
4.	Czerny, P.	Poland	180	180	180	180	165	180	180	1245
5.	Grigorasch, A.	Russia	180	180	180	180	168	180	173	1241
29.	<u>Taylor, Jim</u>	U. S. A.	103	180	180	180	130	180	180	1133
31.	<u>Xenakis, George</u>	U. S. A.	180	180	180	180	127	132	153	1132
34.	<u>Klintworth, Phil</u>	U. S. A.	180	180	60	180	180	176	167	1123

Wakefield: 1st - Russia; 2nd - E. Germany; 3rd - U. S. A.

1.	Oschatz, A.	E. Germany	180	180	180	180	180	180	180	1260
2.	Martin, H.	Austria	180	180	180	171	180	180	180	1251
3.	Silberg, I.	Russia	180	170	180	180	180	180	180	1250
4.	Loffler, J.	E. Germany	180	180	161	180	180	180	180	1241
5.	<u>Gard, John</u>	U. S. A.	180	180	160	171	180	180	180	1231
10.	<u>Parmenter, Frank</u>	U. S. A.	180	180	180	180	180	127	180	1207
17.	<u>Xenakis, George</u>	U. S. A.	180	180	180	96	180	180	180	1176

Power: 1st - Italy; 2nd - Hungary; 3rd - U. S. A.

1.	Baumann, F.	W. Germany	180	180	180	180	180	180	180	1260
			(+ 240 + 300 + 240)							
2.	Rieke, K. H.	W. Germany	180	180	180	180	180	180	180	1260
			(+ 240 + 300 + 186)							
3.	<u>Spence, Henry</u>	U. S. A.	180	180	180	180	180	180	180	1260
			(+ 240 + 287)							
4.	Friis, H.	Sweden	180	180	180	180	180	180	180	1260
			(+ 240 + 222)							
5.	Spring, P.	Switzerland	180	180	180	180	180	180	180	1260
			(+ 240 + 202)							
6.	Koster, T.	Denmark	180	180	180	180	180	180	180	1260
			(+ 240 + 150)							
7.	Fiegl, B.	Italy	180	180	180	180	180	180	180	1260
			(+ 240 + 004)							
8.	Krycer, B.	Czech.	180	180	180	180	180	180	180	1260
			(+ 233)							
9.	Fuller, G.	Gt. Brit.	180	180	180	180	180	180	180	1260
			(+ 209)							
10.	Savini, S.	Italy	180	180	180	180	180	180	180	1260
			(+ 207)							
11.	Monks, R.	Gt. Brit.	180	180	180	180	180	180	180	1260
			(+ 204)							
24.	<u>Sifleet, Bob</u>	U. S. A.	156	158	180	180	180	180	180	1214
25.	<u>Norton, Sandy</u>	U. S. A.	180	180	160	179	177	145	180	1201

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.

Continued from page 41

Stick and Cabin events, each of which had less. HL Glider was flown the same day as Scale and had 150 entries, almost half of which were Juniors and Seniors.

But all of these figures were put to shame by the most fantastic Nats activity ever. The "Delta Dart" event registered over three-thousand entries! In four days of building and flying, each day averaged more flights than all of last year's Delta Dart activity at Olathe. The most important thing about all this is that most entrants were new modelers.

That's what the Delta Dart program is all about — "turning on" kids so that a new generation of model flyers may be created. Hopefully, too, a new generation of aviation-minded youngsters may develop into naval aviators eventually — that's what the Navy would like to see. The smashing success of this year's follow-up to last year's initiation of the AMA Delta Dart program has assured a continuation of Navy-hosted National Meets. The 1970 Nats is already set for the Chicago area, and an even bigger Delta Dart program is being talked about.

Navy-AMA teamwork this year was outstanding. AMA officials almost unanimously reported exceptional cooperation and coordination by Navy personnel. It is traditional for AMA to present a plaque of appreciation to the station's Commanding Officer, but this year, for the first time, the C. O. reciprocated by presenting a plaque to AMA.

The occasion was a surprise presentation during the Sunday Air Show which closed the meet. It was the most spectacular model air show ever presented, including gas and rubber-powered free flight demonstrations; all types of control line flying; and RC soaring, scale, aerobatics and even helicopter flying. A sensational finale will never be repeated: a live broadcast on the public address system of the first landing on the moon by Apollo 11.

It was a Nats blessed by unusual weather breaks. Predictions all during the meet were for thunderstorms. But other than a night downpour and another light rain early on the last day, the bad weather was all around the Nats but seldom on the air station itself. Model flying continued with very little interruption, although the threat of a complete washout was ever present.

Good model retrieving procedures and reduced maximum flight times prevented many lost model problems. In general the

progressively reduced engine runs for gas events worked well. The consensus seemed to be that a five-second engine run was sufficient to solve flyoff problems. But one spectacular exception captured everyone's imagination: a 1½-second engine run (out of a three-second possible) produced a three-minute max flight!

U. S. teams to the RC World Championships left immediately after competing in the Nats. Maxey Hester headed for Germany after winning the Nats RC Scale event with his back-up model. He saved his No. 1 model for Europe (with which he placed fourth in the International Contest, leading the U. S. Team which placed second to Great Britain).

In the Nats RC events a number of outstanding youngsters stole the show from the "pro's." The top qualifier in RC Pylon Racing Form. I, for example, was 16-year-old Whit Stockwell — Larry Leonard, still in his twenties, took first place in both Pattern and Form. I Pylon; he became the RC Champion the first time this title was recognized at the Nationals.

It took a hundred officials to run the 1969 meet — about one for each ten contestants. Their efforts were rewarded by many favorable comments concerning the quality of officiating. This is not to say that everyone was happy with official decisions — every Nats involves protests and disqualifications. But charges of favoritism for "name" flyers were easily refuted as there were too many counter-examples. One of the U. S. RC Team members, for example, who is also an AMA elected official, found himself on the wrong end of a decision which cost him many flight points.

This recalled the 1968 situation in which the AMA president was disqualified for having a model only two square inches short of the required minimum. In general the officials were tough, not always polite or friendly, but exceptionally impartial. As volunteers whose Nats efforts involve long hours of extreme pressure and tension, their performances were amazingly professional.

Taking a look at the total activity, with more events than ever plus an overwhelming Delta Dart contest, this Nats had more going on than any before it — more officials, more contestants, more mechanics. It was a whopper — more than ever, the world's biggest model meet.

AMA Elections for 1970-71

Within the next month each AMA member should receive his ballot for election of certain AMA officers to serve the 1970-1971 term. The expiring terms to be filled are for the offices of national secretary-treasurer and regional vice presidents for AMA Districts I, III, V, VII, IX and XI.

When the Nominating Committee met during the 1969 National Contest it operated for the first time by the procedures promulgated by the Executive Council earlier in the year. Among other things, these procedures (detailed in the AMA News section of the June 1969 AAM) call for the names of possible candidates to be submitted in writing prior to the beginning of the Nominating Committee meeting.

Unfortunately it seems that membership interest in the election is minimal as only one nomination per officer position was received by the published deadline of 8 pm on Wednesday, July 16, except for District III. Therefore, most candidates will run unopposed except for possible write-in votes (for which space will be provided on the ballot). The 1969 election slate is as follows:

Secretary-Treasurer — Earl Witt, Chambersburg, Pa.; **Dist. I Vice President** — Cliff Piper, Pittsfield, Mass.; **Dist. III V.P.** — Laird Jackson, St. Davids, Pa., and Ronald Morgan, Scotland, Pa.; **Dist. V V.P.** — Jim Perdue, Tullahoma, Tenn.; **Dist. VII V.P.** — Jack Josaitis, Dearborn, Mich.; **Dist. IX V.P.** — Stan Chilton, Wichita, Kans.; **Dist. XI V.P.** — Robert Stalick, Albany, Ore.

Represented in the Nominating Committee meeting were AMA Districts I, II, III, IV, VI, VII, VIII and IX.

New District II V. P

During the 1969 Nats Art Schroeder, District II (New York & New Jersey) AMA Vice President, announced his resignation to be effective at the conclusion of the contest. Schroeder indicated his inability to continue representing his area and also do other chores he has recently taken on.

The Executive Council regrettably accepted the resignation but was pleased with Schroeder's recommendation of William Boss to fill the unexpired term; the Council officially installed Boss in office.

Boss is president of the New York Association of Model Airplane Clubs and was runner-up in the 1968 AMA election for District II V.P. His address is 145-24 223rd St., Laurelton, N. Y. 11413.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Oct. 4-5 — Houston, Tex. Houston RC Club Fly for Fun. Site: Mabray Field. J. Locke CD. 9111 Terrydale Dr., Houston, Tex. 77037. Sponsor: Houston RC Club.

Oct. 5 — St. Charles, Ill. (A) Flying Fools - FVMAA CL Meet. Site: Model Port. T. Watson CD. 523 Blaine St., Batavia, Ill. Sponsor: Flying Fools of St. Charles, Ill.

Oct. 5 — Van Nuys, Calif. (AA) Flightmasters 20th Annual FF, CL, RC Scale Contest. Site: Sepulveda Basin. J. Bailey CD. 11161 Mansel Ave., Inglewood, Calif. Sponsor: Flightmaster Club.

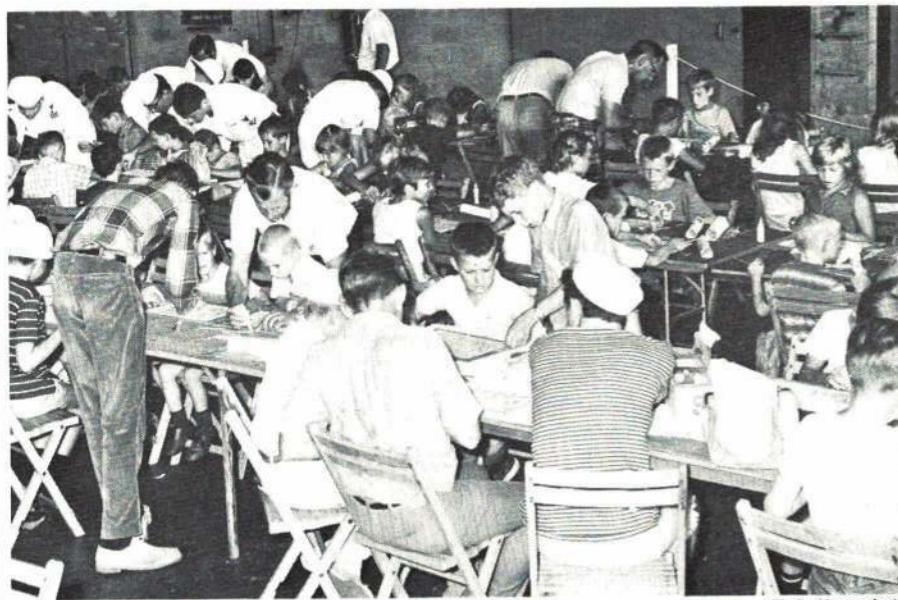
Oct. 5 — Lincoln Park, N. J. (AA) 11th Annual Model CL Air Show. Site: GSCB Club Field. J. Miske, Jr. CD. 415 Clifton Blvd., Clifton, N. J. Sponsor: Garden State Circle Burners, Inc.

Oct. 5 — Norfolk, Va. (AA) CL Contest. Site: Industrial Park. R. Swindell CD. 702 Mimosa Rd., Portsmouth, Va. 23701. Sponsor: Norfolk Aeromodeler.

Oct. 5 — Phoenix, Ariz. (AA) 3rd Annual CL Invitational. Site: Pending. N. Lemak CD. 3810 W. Golden Lane, Phoenix, Ariz. 85021. Sponsor: Air-Zona Model Airplane Club.

Oct. 5 — Pittstown, N. J. (AA) 1969 Eastern States RC Championships. Site: Sky-Manor Airport. L. Shulman CD. 42 Blake Ave., Cranford, N. J. 07016. Sponsor: Central Jersey RC Club.

Continued on page 71



U. S. Navy photo

The Nats "Delta Dart" event outdrew all the others — over 3,000 entries! Philadelphia area youngsters came on four days to first build AMA Cub rubber models and then fly them in competition. Bob Lopshire, AMA Junior Committee chairman, organized building and flying sessions.

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Silver Hill Story

Continued from page 22

tended to conquer an ocean of air.

A space capsule is a coldly calculated thing. It is pure function, down to the last ablated inch of blackened heat shield. None of the intuitive curve, the graceful sweep, conceived mostly by inspiration and a deep-rooted feel for the air. In short, none of the sheer majestic beauty of the Northrop Gamma, or the light and delicate grace of the Nieuport Scout which still come through in spite of a half-century of decay. The capsules speak more of what is yet to be.

Time is truly of the essence. As years pass, in spite of the efforts of the people at the Air Museum, all of this will gradually diminish. Fabric rots, metal corrodes, records are lost, last survivors disappear and the type is extinct. The aircraft which could be preserved this year will require complete restoration next year, and ten years hence will require extensive re-fabrication of many parts. Then it is, to some extent, a copy and its worth to aviation research is reduced by that much.

Congressional action could prevent this. Funding for the construction of the new National Air and Space Museum building in Washington would provide a long-needed center for aviation research and a show-place worthy of this magnificent collection. But Congress must appropriate the funds. The Silver Hill collection should be given back to the people.

MiG 21D

Continued from page 38

full power and a pretty long takeoff run before the model gets into the air. Our concern that the model would yaw outward on take-off or during flight did not materialize. The MiG is very stable and flies with a slight nose-up attitude.

Construction: For those that don't like cutting out wing ribs, this model is for you since there are very few. The fuselage has to be built first since it is the backbone. Start by cutting out all formers and wing ribs from material as shown on the plans. Then cut out the rear wing spar from 1/8" plywood and glue to Former 9. Bend the nose and main landing gear from 1/8" wire and install on Formers 3 and 8 using J-bolts. Apply epoxy glue to nuts since the gear takes a beating and has to be mounted securely to the formers and spar.

Shape the motor mounts as shown on plans and glue to Formers 2, 3, and 4, making sure these formers are lined up properly. Keep glue out of the slots for the plywood doublers, which will be added later. The horizontal stabilizer-elevator assembly—which we will refer to as the stabilizer—has to be made next, since it will be installed as a unit. Cut out the two hinge mounts from 3/32" plywood, drill the holes for the control horn and then cut out the pivot slots. Bend a large Top-Flite horn as shown in the top view of the plan and then install the plywood hinge mounts to the horn. Refer to the sketch on the plans for details.

The stabilizers are laminated with a 1/8" plywood core and 3/16" balsa sheet. Cut out the cores and also the 3/16" hardwood dowel support. The slots in the cores for the dowel support and the hinge must be cut out accurately. The tricky part is gluing this assembly together. To keep it properly lined up, clamp the trailing edges of the stabilizer cores to the work bench, making sure the spacing is proper.

Slip the support dowel through the slots in the hinge mounts, then glue the ends of the dowel and the ends of the horn into the slots of the stabilizer cores. The use of an epoxy glue is strongly recommended. Add the top and bottom balsa sheets and the tip dowels.

Continued to page 52



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Sig's semi-scale D.H. CHIPMUNK won Senior C/L Stunt at the 1969 National Model Championships!

One of America's most popular C/L stunt kits is Sig's 54" span CHIPMUNK (designed by Jim Van Loo) and we're pleased to be able to report that Mike Stott took first place with this model in Senior C/L Stunt at the '69 Nats, with 471 points. Mike's entry was built from a standard Sig kit, which features detailed full-size plans, one-piece molded engine cowling, molded butyrate canopy, molded wheel pants, formed landing gear, top-quality Sig die-cut balsa and plywood. For all .29-.40 engines, this is one stunt ship that looks as good as it flies. Kit only \$12.95

The photo at the right shows Mike Stott with another of his fine Nats entries — this one a Hansa Jet of 60" span, powered by a Superfire 46, which took 3rd place in the Senior Scale event. Incidentally, Mike has just joined the Design and Development team at the ever-expanding Sig Mfg. Co., Montezuma, Iowa.



SIG 'AAA' BALSAs - NEW PRICE LIST

SHEETS		STRIPS		BLOCKS	
36" LENGTHS	48" LENGTHS	36" LENGTHS	48" LENGTHS	1" SQ.	2" SQ.
1/32 x 22c	1/16 x 10c	1/16 x 1/8 3c	1/16 x 3/16 5c	1" x 1 12c	2" x 2 18c
1/16 x 20c	1/8 x 18c	1/8 x 1/4 6c	1/8 x 3/8 7c	1" x 2 16c	2" x 4 32c
1/8 x 21c	1/4 x 20c	1/4 x 1/2 12c	1/4 x 3/4 15c	1" x 3 16c	2" x 6 32c
1/4 x 22c	3/8 x 21c	3/8 x 1/2 12c	3/8 x 5/8 16c	1" x 4 16c	2" x 8 32c
1/2 x 23c	1/2 x 22c	1/2 x 3/4 12c	1/2 x 1 15c	1" x 5 16c	2" x 10 32c
3/4 x 24c	3/4 x 23c	3/4 x 1 12c	3/4 x 1 1/4 15c	1" x 6 16c	2" x 12 32c
1 1/2 x 25c	1 1/2 x 24c	1 1/2 x 1 1/4 12c	1 1/2 x 1 3/4 15c	1" x 8 16c	2" x 16 32c
2 x 26c	2 x 25c	2 x 1 1/2 12c	2 x 2 15c	1" x 10 16c	2" x 20 32c
3 x 27c	3 x 26c	3 x 1 3/4 12c	3 x 2 1/4 15c	1" x 12 16c	2" x 24 32c
4 x 28c	4 x 27c	4 x 2 1/4 12c	4 x 3 15c	1" x 14 16c	2" x 28 32c
6 x 29c	6 x 28c	6 x 3 1/4 12c	6 x 4 15c	1" x 16 16c	2" x 32 32c
8 x 30c	8 x 29c	8 x 4 1/4 12c	8 x 5 15c	1" x 18 16c	2" x 36 32c
10 x 31c	10 x 30c	10 x 5 1/4 12c	10 x 6 15c	1" x 20 16c	2" x 40 32c
12 x 32c	12 x 31c	12 x 6 1/4 12c	12 x 8 15c	1" x 22 16c	2" x 44 32c
14 x 33c	14 x 32c	14 x 7 1/4 12c	14 x 10 15c	1" x 24 16c	2" x 48 32c
16 x 34c	16 x 33c	16 x 8 1/4 12c	16 x 12 15c	1" x 26 16c	2" x 52 32c
18 x 35c	18 x 34c	18 x 9 1/4 12c	18 x 14 15c	1" x 28 16c	2" x 56 32c
20 x 36c	20 x 35c	20 x 10 1/4 12c	20 x 16 15c	1" x 30 16c	2" x 60 32c
22 x 37c	22 x 36c	22 x 11 1/4 12c	22 x 18 15c	1" x 32 16c	2" x 64 32c
24 x 38c	24 x 37c	24 x 12 1/4 12c	24 x 20 15c	1" x 34 16c	2" x 68 32c
26 x 39c	26 x 38c	26 x 13 1/4 12c	26 x 22 15c	1" x 36 16c	2" x 72 32c
28 x 40c	28 x 39c	28 x 14 1/4 12c	28 x 24 15c	1" x 38 16c	2" x 76 32c
30 x 41c	30 x 40c	30 x 15 1/4 12c	30 x 26 15c	1" x 40 16c	2" x 80 32c
32 x 42c	32 x 41c	32 x 16 1/4 12c	32 x 28 15c	1" x 42 16c	2" x 84 32c
34 x 43c	34 x 42c	34 x 17 1/4 12c	34 x 30 15c	1" x 44 16c	2" x 88 32c
36 x 44c	36 x 43c	36 x 18 1/4 12c	36 x 32 15c	1" x 46 16c	2" x 92 32c
38 x 45c	38 x 44c	38 x 19 1/4 12c	38 x 34 15c	1" x 48 16c	2" x 96 32c
40 x 46c	40 x 45c	40 x 20 1/4 12c	40 x 36 15c	1" x 50 16c	2" x 100 32c
42 x 47c	42 x 46c	42 x 21 1/4 12c	42 x 38 15c	1" x 52 16c	2" x 104 32c
44 x 48c	44 x 47c	44 x 22 1/4 12c	44 x 40 15c	1" x 54 16c	2" x 108 32c
46 x 49c	46 x 48c	46 x 23 1/4 12c	46 x 42 15c	1" x 56 16c	2" x 112 32c
48 x 50c	48 x 49c	48 x 24 1/4 12c	48 x 44 15c	1" x 58 16c	2" x 116 32c
50 x 51c	50 x 50c	50 x 25 1/4 12c	50 x 46 15c	1" x 60 16c	2" x 120 32c

NEW BALSAs ADDITIONS

SHEETS - 36" LENGTHS		STRIPS		BLOCKS	
36" LENGTHS	48" LENGTHS	36" LENGTHS	48" LENGTHS	1" SQ.	2" SQ.
1/64 x 36 30c	1/32 x 36 50c	1/32 x 1/8 6c	1/32 x 3/16 5c	1" x 1 12c	2" x 2 18c
1/32 x 36 32c	1/16 x 36 76c	1" x 2 12c	1" x 3 16c	1" x 2 16c	2" x 4 32c
1/16 x 36 36c	1/8 x 36 82c	1" x 3 16c	1" x 4 16c	1" x 3 16c	2" x 6 32c
1/8 x 36 42c	1/4 x 36 102c	1" x 4 16c	1" x 5 16c	1" x 4 16c	2" x 8 32c
1/4 x 36 52c	3/8 x 36 122c	1" x 5 16c	1" x 6 16c	1" x 5 16c	2" x 10 32c
3/8 x 36 62c	1/2 x 36 142c	1" x 6 16c	1" x 8 16c	1" x 6 16c	2" x 12 32c
1/2 x 36 72c	3/4 x 36 162c	1" x 8 16c	1" x 10 16c	1" x 8 16c	2" x 16 32c
3/4 x 36 82c	1 1/4 x 36 182c	1" x 10 16c	1" x 12 16c	1" x 10 16c	2" x 20 32c
1 1/4 x 36 92c	1 1/2 x 36 202c	1" x 12 16c	1" x 14 16c	1" x 12 16c	2" x 24 32c
1 1/2 x 36 102c	2 x 36 222c	1" x 14 16c	1" x 16 16c	1" x 14 16c	2" x 28 32c
2 x 36 112c	2 1/2 x 36 242c	1" x 16 16c	1" x 18 16c	1" x 16 16c	2" x 32 32c
3 x 36 122c	3 x 36 262c	1" x 18 16c	1" x 20 16c	1" x 18 16c	2" x 36 32c
4 x 36 132c	4 x 36 282c	1" x 20 16c	1" x 22 16c	1" x 20 16c	2" x 40 32c
6 x 36 142c	6 x 36 302c	1" x 22 16c	1" x 24 16c	1" x 22 16c	2" x 44 32c
8 x 36 152c	8 x 36 322c	1" x 24 16c	1" x 26 16c	1" x 24 16c	2" x 48 32c
10 x 36 162c	10 x 36 342c	1" x 26 16c	1" x 28 16c	1" x 26 16c	2" x 52 32c
12 x 36 172c	12 x 36 362c	1" x 28 16c	1" x 30 16c	1" x 28 16c	2" x 56 32c
14 x 36 182c	14 x 36 382c	1" x 30 16c	1" x 32 16c	1" x 30 16c	2" x 60 32c
16 x 36 192c	16 x 36 402c	1" x 32 16c	1" x 34 16c	1" x 32 16c	2" x 64 32c
18 x 36 202c	18 x 36 422c	1" x 34 16c	1" x 36 16c	1" x 34 16c	2" x 68 32c
20 x 36 212c	20 x 36 442c	1" x 36 16c	1" x 38 16c	1" x 36 16c	2" x 72 32c
22 x 36 222c	22 x 36 462c	1" x 38 16c	1" x 40 16c	1" x 38 16c	2" x 76 32c
24 x 36 232c	24 x 36 482c	1" x 40 16c	1" x 42 16c	1" x 40 16c	2" x 80 32c
26 x 36 242c	26 x 36 502c	1" x 42 16c	1" x 44 16c	1" x 42 16c	2" x 84 32c
28 x 36 252c	28 x 36 522c	1" x 44 16c	1" x 46 16c	1" x 44 16c	2" x 88 32c
30 x 36 262c	30 x 36 542c	1" x 46 16c	1" x 48 16c	1" x 46 16c	2" x 92 32c
32 x 36 272c	32 x 36 562c	1" x 48 16c	1" x 50 16c	1" x 48 16c	2" x 96 32c
34 x 36 282c	34 x 36 582c	1" x 50 16c	1" x 52 16c	1" x 50 16c	2" x 100 32c
36 x 36 292c	36 x 36 602c	1" x 52 16c	1" x 54 16c	1" x 52 16c	2" x 104 32c

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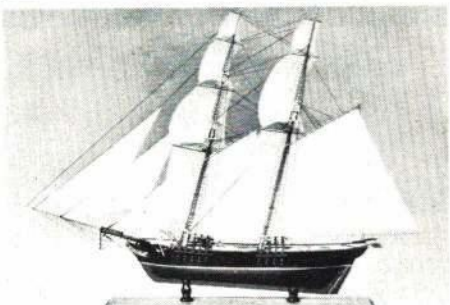
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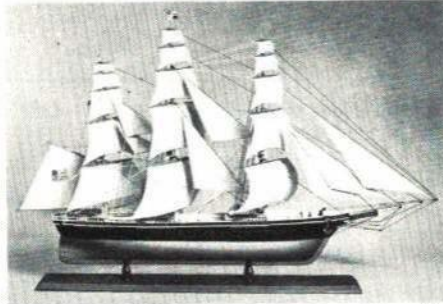
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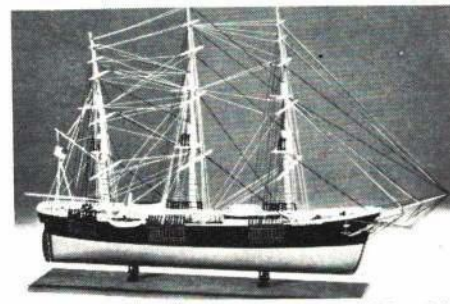
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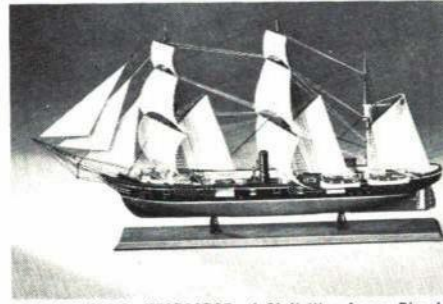
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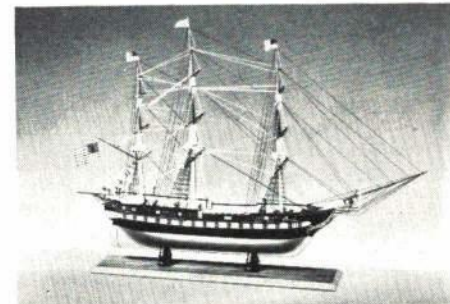
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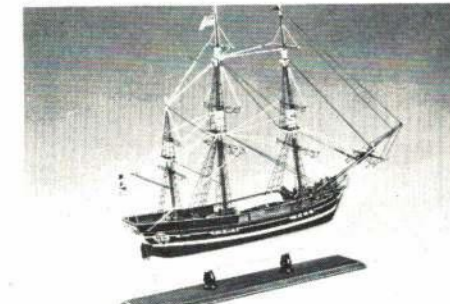
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then sand the stabilator to an airfoil shape. Finally slip the stabilator hinge mounts into Formers 12 and 13. Line them up accurately, then glue again with epoxy.

Now we can return to the front of the fuselage. Slide the 1/16" plywood motor mount doublers into Formers 5 and 6; then slide this assembly into Formers 2, 3, and 4, which were previously glued to the motor mounts. Again, all the formers added will have to be lined up properly, then glue all joints. Now you can also add Former 1. After this has dried, cut out the lower keel from 1/8" hard balsa. Mark position of the Formers, then glue to Formers 4, 5, and 6. Now you can install Formers 7 through 11, and the stabilator assembly.

Cut out and install the top keel. The bellcrank platform now can be put in. For a bellcrank we used the Roberts unit sold by Sturdi-Built, which is used for engine throttle control. Most well-equipped hobby shops should have them.

At this point the fuselage may be pretty shaky, so install wing ribs W1, W2, and W3. Also install a strip of 1/8 x 3/8" balsa along both sides of the fuselage. Now is the time to drill the holes for the engine bolts, install a tank, and make the necessary holes in the formers for the fuel lines. Since we did not want to spoil the appearance of our model by having the tank-fill and vent lines stick out of the fuselage, we installed them to be accessible through the nose-wheel well, which is open.

Now is the time to install the throttle pushrod. This requires making appropriate holes in formers. If you can get hold of a Veco extension shaft, it will allow moving the engine further back to ease the CG problem.

Finish up the wings by installing the leading and trailing edges and adding wing ribs W4. Flank the wings using 3/32" balsa sheet. The vertical stabilizer is made next. Pin the leading and trailing edges to the plan, then glue in ribs R1 through R3 and plank with 1/16" sheet balsa on both sides. Add the tip block, then sand to shape.

The rudder is made from 1/2" sheet balsa. Install vertical stabilizer so that slot in rib R1 slips over Former 11 and glue well. Install elevator pushrod, using heavy music wire (at least 3/32"). The major remaining task is the planking of the fuselage with 1/8 x 3/8" strips of balsa. Glue the strips to the formers and to each other. Patience will save work later on. Nose and tail blocks, wing tips, and engine cowl can be added now. Also, the sub-rubber can be laminated together, and then glued to the fuselage.

I have found out there is no magic way to get a good finish without work. The appearance of this model, like any others, will depend on how you proceed from here. First of all, sand the whole model completely with medium to fine paper. Then fill in all nicks, dents, and cracks with plastic balsa. You may have to go over the model several times to catch all the cracks and large grain marks.

I applied two coats of clear dope with a brush and sanded again with fine paper. Apply two more coats of clear, sand again. I covered the model with Silkspan, applied wet, and using dope. When it dries, it looks like a mess, but ignore it and slop on two more coats of clear dope.

Use real fine wet-or-dry sandpaper (No. 320 or No. 400) and sand, but be careful not to sand through the Silkspan. Apply five coats of sanding sealer, lightly sanding with fine paper between each coat. Before applying the final coat of paint, install a canopy and add the various fuselage bulges, air-scoops, and the pitot-tube support. These items need to be filled in before applying four coats of silver dope.

Add the insignia and aircraft numbers. I used solid decal sheets from which I cut the Russian insignia. Finally add wheels, landing-gear doors, and the antenna mast. The pitot tube can be made from a thin dowel or tubing. It has to be removable.

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A Veco 1 3/4" needle-nose spinner is used for display and flying. The rockets are made from wood dowels with plywood fins. Py-lons are made from balsa.

I fly my model on 60' lines. A paved flying surface is a must!

R/C Championships

Continued from page 30

maneuvers, many planes designed for FAI competition are larger than average U.S. contest designs. Some would fare poorly in the intricate and rather sharp maneuvers required in the U.S. Class-C schedule. Our team felt we should get closer to the FAI stunt schedule, or adopt it outright for our top competitions. It is tough to have to master two flight patterns, and so different in style. A top competition pilot in the States must be equally adept at both.

Almost everyone used digital proportional equipment. (The percentage of U.S. propo systems is dropping as more overseas equipment is developed.) Our count shows that only 18 of the 67 flyers used U.S.-make gear, and some of this may have been manufactured overseas under license.

Engines were all 60's or 61's. Our count showed 21 Supertigre, 11 Rossi, 7 Merco, 6 Webra, and smaller numbers of other makes.

Other than generally larger size for the sweeping FAI maneuvers, many models featured considerable fuselage side area, to help in clean rolling maneuvers, especially Slow Roll.

Innovations were seen. Several flyers had working flaps. Marrot had unusual flaps hinged in the middle, at the wing trailing edge near the fuselage. When actuated, they projected both above and below the wing surface, to provide drag. The flaps were used only for landings and Tail Slide. Several flyers had in-flight trimmable needle valves, several others retractable landing gears. All models were equipped with mufflers since Germany has a mandatory muffler rule. Some, however, were pretty loud—maybe gutted to reduce back-pressure?

A variety of frequencies were available: spots near 12, 27, 32, 40, 72-75, 144, 433, MHz as well as the 50-MHz band. Official tally shows that all were on 27 MHz (using the spots standard in the U.S. plus 27.12 MHz.) except for six on 72-75 MHz and two on 32 MHz.

Every World Championships has had its good and bad points. U.S. modelers used to meet with 60 to 70 contestants, more than one flight line, with half a dozen events, may think it odd a World Championships has so many problems. Transmitter impounding was a sore point, no "reserve time" was al-

EVERY GOOD GUY

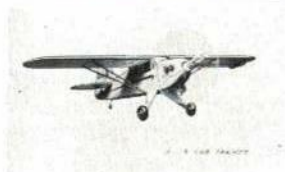


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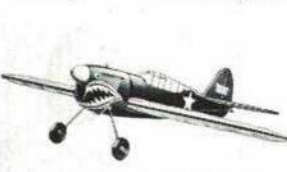
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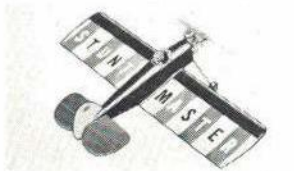
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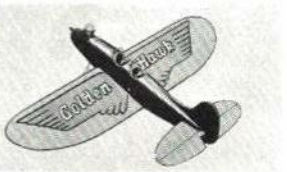
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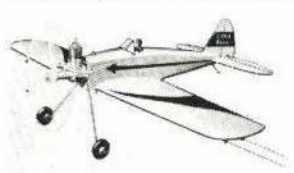
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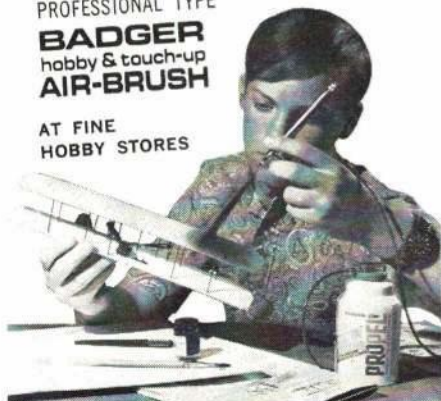
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lowed for in case of bad weather (there were rain delays). Spectator control was non-existent, and the only bleachers were reserved for sponsors. Press credentials were handled promiscuously; one "reporter" stepped on our Jim Whitley's stab!

The Team Trophy, held by each winning team until the next Championships had not been returned in time for re-awarding at Bremen. It was an embarrassing moment for all Statesiders when it was announced at the awards banquet that the Trophy had not been returned from the U. S. It would be shipped to the winning team later.

Besides Stunt and Scale Teams, our contingent included one jury member, Maynard Hill; and a judge, Bill Northrop. In a last-minute mixup, Bill became acting head judge just before the meet started.

At a World Champs, many added problems arise: many nationalities involved, language, customs, long-distance travel, etc. From most viewpoints therefore, Bremen was a big success. The German Aero Club made possible a fine World Championships.

Getting Started

Continued from page 40

the batteries all the time, even when they are at neutral. However, they are light, have plenty of output power and are of simple construction. Well-designed servos of this type are surprisingly precise, move rapidly and have ample power for control purposes in small planes. Their rather high battery drain is no problem in these days of nickel-cad rechargeable batteries.

Feedback servos are more sophisticated, draw much less average current (they draw very small power except when they are actually moving, or holding a surface deflected under heavy load) than spring-centered types. The motor of a feedback

servo also has a reduction gear train linked to the output disc (or to push-pull output, and sometimes to both). There is also a potentiometer linked directly to the gear driving the servo output shaft. This is the "centering pot." At neutral, the moving arm of this pot is at such a position on the resistance element that there is no (or very little) current going to the motor. An incoming turn signal from the transmitter (in simpler propo systems, this could be a pulse-length or pulse-rate change) reaching the servo transistor amplifiers, "unbalances" the amplifier circuit to which the centering pot is connected. This results in current of proper polarity reaching the motor to drive it in the desired direction. The motor turns — and the pot turns with it — until a balance is again reached under the new conditions, whereupon drive power to the motor is cut off, and the servo stops. It stays at that deflected position until the transmitter stick is again moved (either to neutral or to any other off-center position), when the sequence is repeated.

In the past the pot has been the real problem of feedback servos, due to wear and becoming dirty. This trouble has just about been licked currently. The control pot in the transmitter gets just as much movement as does the corresponding centering pot in the servo, of course. But it isn't subject to constant and heavy vibration as is the servo pot, so has a much longer and more peaceful life.

Digital servos are also of the feedback style, but they have added circuitry not required in the simpler feedback pots found in analog propo systems, and we won't go into these extra complexities now.

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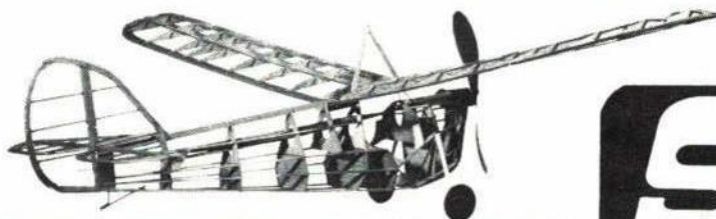


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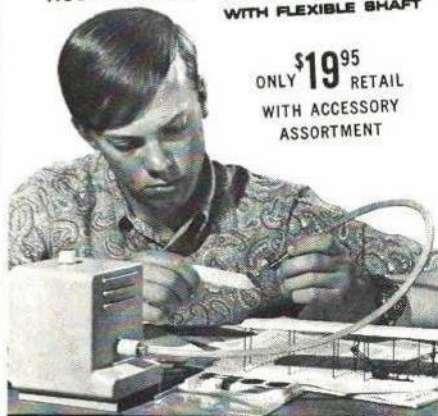
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Contest Gas Model

Continued from page 39

one-degree positive incidence setting. The model was adjusted to fly against the torque (to the right with a righthand propeller) and was adjusted to glide in the opposite direction.

This was accomplished by offsetting the motor a slight amount to the right. The rudder was set at neutral and the left wing was "washed in" a slight amount. This allowed the model to turn in a smooth flight without any hair-raising banks and turns that accompany so many gas-model flights.

Scimitar

Continued from page 18

aileron stick. That's a big help.

You will notice when you examine the airfoils closely, that the percentage of thickness progresses in reverse from the tip to the root sections. It's an NACA 0012 at the root and an NACA 0018 at the tip. This airfoil progression, plus the high percentage of taper, requires a foam type of construction to make it practical to build. Incidentally, wing cores and, we think, completely assembled wings, can be purchased from Foam Crafts, P. O. Box 336, Campbell, Calif. 95008. We can highly recommend the quality and accuracy of their wing cores. Construction is not difficult and, because most of you who would take on a project of this type are experienced modelers, we will not go into laborious detail.

The fuselage is a good place to start. We used the crutch method of construction which makes it almost impossible to build a fuselage that is not true. Start with a flat

board to build upon. Pin the $\frac{1}{2} \times \frac{1}{4}$ " crutch longerons to the plan so that the nose end hangs slightly over the end of the building board. This will make it possible for you to install No. 1 plywood bulkhead without removing the crutch from the plan. Our objective here is to construct the entire lower half of the fuselage without removing it from the building board. Glue the $\frac{1}{8} \times \frac{1}{4}$ " cross pieces and the No. 1, No. 2, No. 3, and No. 4 plywood lower bulkheads into position. Cut the doublers from $\frac{1}{4}$ "-thick sheet, warp them to conform to the fuselage side curvature, and glue them into position. The $\frac{1}{4}$ "-sq. bottom longerons now can be fitted with the uprights and glued into position with the bottom cross pieces. The lower box now is ready for its sheet covering.

When the assembly is thoroughly dry, remove it from the building board and install all the top bulkheads. Sheet cover the turtle deck and plank the forward portion of the fuselage back to the No. 4 bulkhead. Epoxy the lower engine mount to the cowl block and glue the block to the fuselage. The engine, bolted to the lower mount, will act as a jig to hold the upper motor mount and cowl block in position while the glue dries. Now the cowl sides and fillets are installed.

The nose-gear mounting is self-explanatory and works quite well. The fuel tank is a 12-oz. "Taurus" tank put out by World Engines. The canopy is from Rivets and can be obtained from K&K Fiberglass, Campbell, Calif.

The tail surfaces are quite typical and need no explanation, except use lightweight wood throughout and keep them as light as possible.

The wing is of foam-core construction. Many good articles have been written de-

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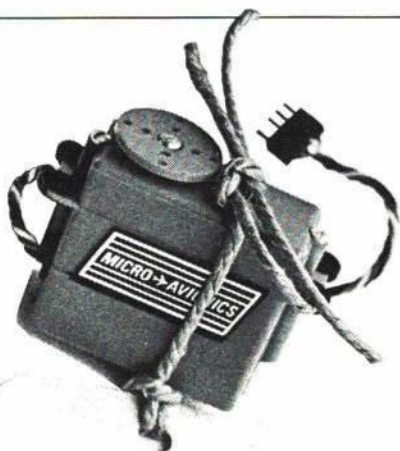
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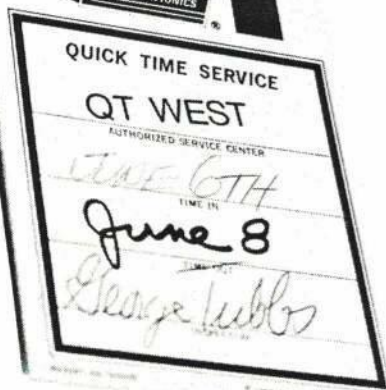
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scribing in great detail how to do it. If you have not yet tried a foam wing, we suggest you dig up one of these articles. The one thing you must do before you proceed with the wing is to predetermine your wing-servo mounting. The plan does not detail any radio gear installation because most of the popular radios on the market today require different servo mounting techniques, and the servos all seem to have different outputs and amounts of throw.

The important thing is to predetermine which set of holes in the wing bellcranks you will use to get the desired aileron total movement shown on the plan. This movement will give you a medium roll rate. The differential of up-to-down aileron movement can be obtained in two ways. If you use the wheel drive on your servo, you can attach the pushrods on each side of center. If you use the linear outputs on your servo you will have to install 60-degree bellcranks

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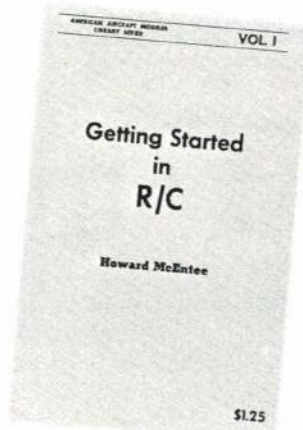
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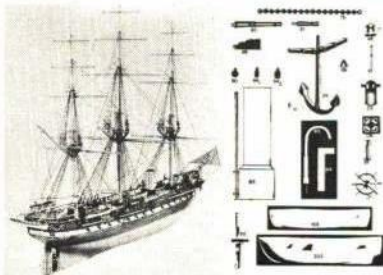
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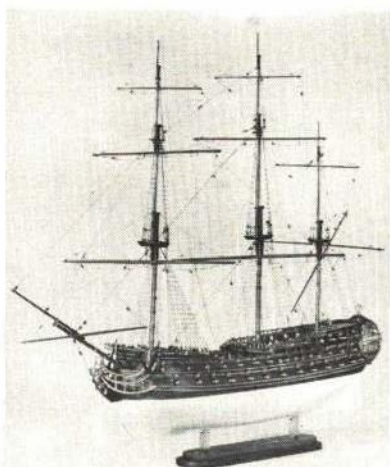
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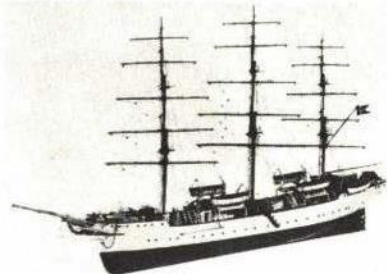
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in the wing instead of the 90-degree bell-cranks shown on the plan. We prefer using the wheel servo output because this gives a great deal of adjustment latitude, so that you can obtain the roll rate and aileron differential you prefer. Use whatever hinge you have the most experience and good luck with. We have always had success with nylon two-piece hinges. I like them because you can disassemble the control surfaces for finishing.

Finish the ship to suit yourself. We have always used the Hobbypoxy No. 2 finishing method with great success and we find it to be as durable and light in weight as any we have tried. However, we do not recommend that you use any epoxy paint without good spray paint equipment.

The total weight, dry, should be right at 6 lbs.

Oh, yes, it does look like the low-tail Rivets, doesn't it?

Tail First

Continued from page 13

a stronger and neater appearing job.

After the two leading plane panels are thoroughly dry, remove them from the building board. Using a sandpaper block, bevel the two ends as shown on the drawings. Sand with a gentle pressure so that the structure will not be damaged. Next, apply glue to both beveled edges, place the parts on waxed paper, and elevate one edge 2", to achieve the correct dihedral (up-tilt) angle. It is important that this joint be allowed plenty of drying time.

Fuselage: Choose a light but stiff piece of 1/8 x 1/4" balsa strip, and cut it 9" long. Another piece of the same stock is cut 3/8" long to serve as the bearing block. Cut a shallow notch in one face as shown on the drawing. This angled notch offsets the thrust line, and locates the prop-shaft bearing, which is cut from aluminum tubing.

Roll the tube back and forth under a sharp blade to score a groove around it. Then snap it apart, and use sandpaper to smooth the end. Roughen up the outside of the tubing with a knife or sandpaper, so that glue will be better able to adhere. Glue the bearing block onto the fuselage, add the tube bearing, wrap the whole assembly with sewing thread, and apply a thin layer of glue over the thread.



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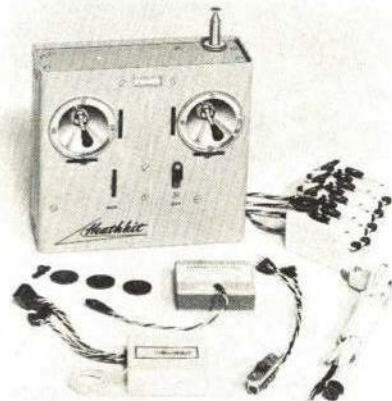
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Using needle-nose pliers, bend the wire hook for the nose to shape, and apply it to the fuselage with thread and glue binding. While you are bending wire, bend the propeller shaft to the shape shown.

Cut out the leading plane mounts and wing mounts from 1/32" balsa sheet. Make paper patterns of these items to be sure that they are the right size and shape. Mark their positions on the fuselage sides with a pencil, and glue the parts in place.

Propeller: This little prop is not difficult to make, but take your time for best results. The hub is made from two pieces of 1/8 x 1/4 x 1" glued together, or if you happen to have a scrap of 1/4" sq. balsa strip, use that. The wood for the hub should be medium hard, not soft. Find the exact center and push a straight pin through it. This is easier said than done, and you may have to try it more than once to get the hole properly centered. It might help to push the pin halfway through from one side, then halfway through from the other, until the holes merge. The object, of course, is to achieve a true-running propeller that will not wobble.

Next, measure and mark the portions of the hub which will be cut away to receive the prop blades. A diagonal line drawn on each end of the hub will help establish the depth of each cut. And speaking of cutting, watch out for your fingers while working on such small pieces as this. Shaving away the wood a chip at a time is safer than trying to hack out the entire corners at once.

The two prop blades are cut from 1/32" sheet balsa. It is well to use a paper pat-

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tern as a guide for accuracy. Round the blade edges slightly with sandpaper. Glue the blades onto the hub, making every effort to center them properly. When the blades have dried, push a thin wire through the hole in the hub, and see if the prop balances. If one blade drops to the bottom, sand it to reduce its weight. Time spent on this operation will result in smoother flights.

Slide the propeller shaft through the bearing tube and add a couple of glass "seed beads" to serve as thrust bearings. Place the prop on the shaft and check that there is enough clearance between the blades and the end of the fuselage. It may be necessary to use an extra bead or two to provide the proper spacing. Using needle-nose pliers, bend the end of the prop shaft into a "U" and force it into the prop hub. Apply a film of cement over the area to keep the wire in position.

Covering and decor: Select the lightest grade of tissue that you can find for covering. Only the tops of the leading plane and wing are covered. The original was covered with red, white, and blue tissue, which is quite effective. The leading plane is red, and the wing is white with blue tip panels. Another interesting scheme would be all-white with red and blue "racing stripes." The small "Tenderfoot arrow" may be emblazoned on the side of the wing mount if desired.

Have your mother, sister, or girl friend iron out the tissue prior to using it to make it as smooth as possible, since it will not be water shrunk on the model. Allow the tissue to cool to room temperature before applying it. With care a tight job will result, since there are no curves involved.

We obtained good results using Sig "Lite-coat" as a tissue adhesive; it is heavily plasticized (prevents over-shrinking) and resists warping. It is also possible to use rubber cement to attach covering material, and you may wish to give it a try. By experimenting with different approaches to model building, you will soon discover the system that works best for you. Trim the excess tissue off with a sharp razor blade.

After the wing is covered apply glue to both sides of the center rib and insert it between the wing mounts. Press down until the wing mounts touch the underside of the wing's tissue covering.

The leading plane now may be glued in place. Check that it is correctly aligned as viewed from both the front and side of the model. Add a drop of oil to the prop-shaft bearings and you are ready to go.

Flying: Since this model is small and light, it should be flown only under calm conditions. If you have access to a suitable indoor flying site, such as a gymnasium or hangar, so much the better. Indoors, or under dead calm conditions, the model may

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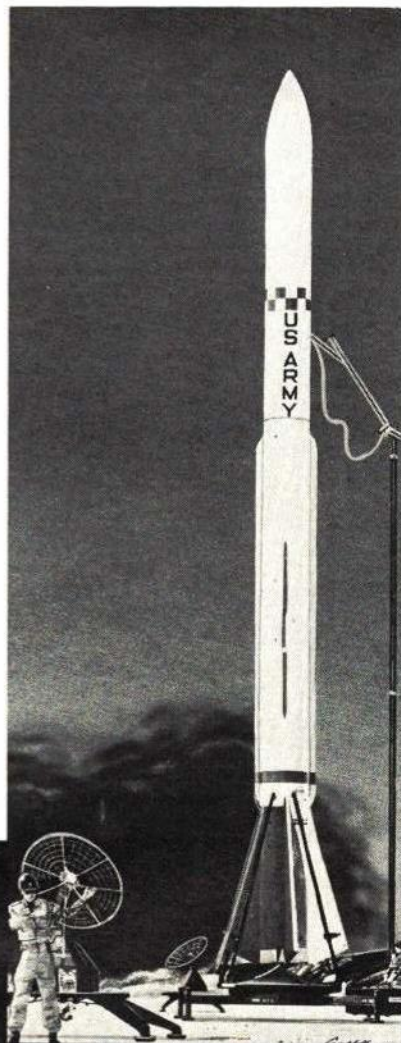
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be flown with very low power. It is better to start with too little power rather than too much, at least until an understanding of the model's flight characteristics has been gained.

A couple of gentle test glides will probably establish the need for a tiny bit of clay ballast at either the front or rear of the fuselage. Next, try a few hand winds, and observe the flight pattern. With the offset thrust line, the model should circle to the left, assuming that there are no serious warps, and that the power is kept fairly low. If the model resists turning to the left, a small amount of clay can be added to the left wing tip. Other turn adjustments can be made by means of paper wing-tip tabs, if necessary.

When satisfied with the results, wind in perhaps 100-150 turns and try again. With low power, the model should behave quite docilely, but with great power increases, you may note a pronounced tendency to roll to the right, when first released. Through the years, model canard designers have contrived many different ways of combating this problem, such as alterations in wing positions, other dihedral combinations, counter-rotating props, and so on.

There is another, rather sneaky, approach to the rolling-to-the-right problem that seems to have been largely overlooked. Simply launch your over-powered canard straight up! The model may roll to the right as usual, but in the near vertical attitude, who cares! It seems that once the critical stage has been passed, the model regains its composure and continues on in fine fashion. On the other hand, if it is launched horizontally, the roll to the right is apt to be rudely terminated by contact with the ground.

This is an excellent model to experiment with since it is quick and inexpensive to build, and if damaged, can be repaired easily. After you have succeeded in getting good flights from your "Tail-First Tenderfoot," why not build another, but higher performance version? Here are a few suggestions: 1) Use lighter wood, 2) Sand the corners of the fuselage to reduce weight and streamline, 3) Blend in the wing and leading plane mounts to the fuselage, by careful sandpapering, 4) Round all leading and trailing edges, 5) Try different power combination, 6) Use rubber tube and a wind-er, 7) Keep experimenting!

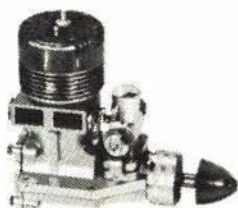
Suggested tools list: Pencil, ruler, single-edge razor blade, modeler's knife, wire cutters, needle-nose pliers.

Miscellaneous supplies: Sandpaper (No. 400 or 600), sandpaper block, Celotex or equivalent building board, Saran-Wrap or waxed paper, glue, straight pins.

Continued to page 66

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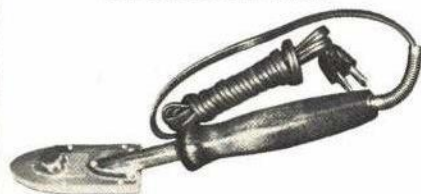
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Note: except for the $\frac{1}{16}$ " sq. balsa strips, enough material will be left over to build additional models.

Ryan M-1

Continued from page 25

construction, using $\frac{1}{16}$ " sq. longerons, forward fuselage uprights and diagonals. The aft section uprights and diagonals are $\frac{1}{16}$ x $\frac{1}{32}$ ". Build two side frames on the lower plan and let the glue dry thoroughly. Meanwhile, cut out the required bulkheads, nose formers and webs shown on the plan from the stock size required. When the side frames glue is dry, take them up and join together with the formers F-1, F-2 and F-3, cross members and C-1 and C-2.

Locate the sides on the plan top view to keep the sides aligned. Complete the installation of the diagonals. When the glue is dry, glue on the $\frac{3}{32}$ " side panel sheets from the forward upright to the cowl block former (C-1) and up against the horizontal web (C-2). The cylinder block formers (C-3) mount on top of the web (C-2). The cylinder block sides (C-4) glue each end to (C-3) and along their lower edge to (C-2). After the cowl side panels are in place and the glue is dry, the lower cowl cover of $\frac{1}{8}$ " sheet stock can be fitted and formed to match the cowl block former (C-1) contour. Glue on the $\frac{1}{16}$ " sq. cowl stringers between the two (C-3) formers, and add the $\frac{3}{16}$ " sq.

soft balsa cylinder head blocks to the length shown, then rounded on top.

Check alignment of the formers and the fuselage. Place a straight-edge or straight balsa stick about 10" long across the wing-mount position at both front and rear spar positions. The edges of these should be at the same level both sides of the center line on each end of each stick or straight edge. Also place one stick across the area where the horizontal will attach to the fuselage and sight to check their being parallel. Correct any out-of-line condition; this will affect the model's ability to fly well when completely assembled.

To complete detailing add the aft rubber peg support, and its reinforcement — made from .010 or .015 plastic — glued to the inside of the support on each fuselage side. The $\frac{1}{16}$ " sq. longeron corners should be sanded to a radius along the length of the fuselage. Also the top longerons, vertical and diagonal members above the fuselage cowl formers F-2 and F-3 are sanded to a round section as these will be exposed on the completed model.

Assemble the nose block unit from N-1, N-2, N-3, N-4 and N-5. Check its fit into former C-1 and the alignment with the cowl sides and cylinder block sides. Carve and sand N-3, N-4 and N-5 to form the contour blending with the cowl sides and bottom. Also form the profile or side shape shown on the plan. Note that the N-1 $\frac{1}{32}$ " plywood disc is set at an angle to give both right- and down-thrust. Hold these angles as correctly as you can and drill a propeller shaft hole $\frac{1}{32}$ " dia. in the center of the disc and square to it. The propeller and thrust bearing will be held at the angle of the face of N-1 disc when the rubber motor is wound.

Continued on page 69

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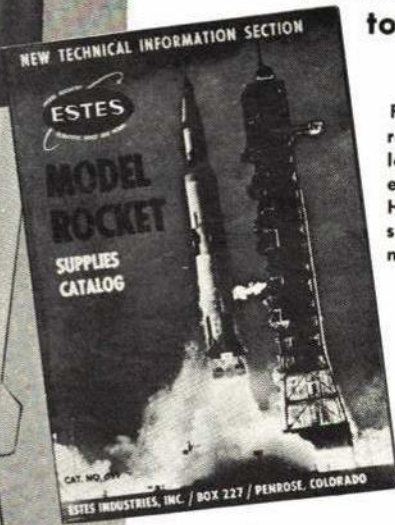


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A transistor power transmitter by Dick Jansson . . . secrets of relayless operation . . . RC for small boats . . . installations for Septalette magnetic actuator

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January/February 1964
"What Level of Excellence" by Vernon C. MacNabb . . . the sealed nickel-cadmium battery by Carl Lindsey . . . portable power pack peaker . . . Fosgate transmitter . . . anatomy of a racing hydroplane the WHITE HEAT V . . . RC bibliography

March/April 1964
Updating the ORION by Ed Kazmirski . . . high stability pulser on 22 volts . . . servo mounting ideas . . . a scale USS NAUTILUS RC submerging submarine . . . making styrofoam core wings

May/June 1964
An interference resistant receiver by John Phelps . . . HALF PINT power cruiser . . . the Gemini single channel transmits switcher . . . proportional control in perspective by Phil Kraft . . . an RC army tank . . . the RC JAY, an easy flying low-winger

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Fiberglass techniques by Dale

Willoughby . . . the Colver superhet and decoder . . . SCALE at British Nationals . . . hydroplane the WHITE HEAT 60 . . . high performance analog feedback servo by John Phelps

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The beauties of simple proportional control by Frank Adams . . . the RESCUE CRAFT an electric powered boat . . . equipment survey . . . the OX-5 CHALLENGER biplane SCALE model

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An RC Camera Plane, Part I transmitter by John Phelps . . . "Flying More" . . . Enjoying it Less" by John Worth . . . design airplane ideas . . . RC submarine that goes under. USS GEORGE WASHINGTON . . . and adjustable voltage regulator

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When the fuselage wood work is done and sanded glue in place on each side of the wire the stubs for the forward landing gear struts. Form the $\frac{1}{32}$ " wire axle and .025 wire rear strut to the pattern shown on the plan. Solder the $\frac{1}{16}$ " dia. brass tube cross-bars to the axle. Locate and bind the axle wire assembly to the fuselage cross member at the centerline.

Position the rear strut wire at the cross member and bind in place with thread. Align and insert the rear strut ends into the axle cross-bar tubes. Check for position of the complete assembly to the fuselage. Solder the rear strut ends to the cross-bars. Now cement the axle and strut bindings to the fuselage. Make up the two side-strut frames to fit on the wire stubs each side of the fuselage. Drill two $\frac{1}{32}$ " dia. holes in each $\frac{1}{16}$ " dia. brass cross-bar spaced as shown on plan, and solder $\frac{1}{32}$ " dia. wire stubs in place. Cut $\frac{1}{16}$ " dia. aluminum-tube struts

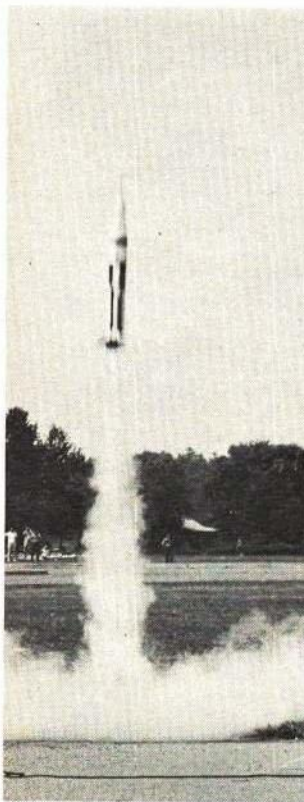
for each side, and cement in place to form the side frame. Assemble onto fuselage wire stubs with the axle wire between the aluminum tubes of the side frame. Install a piece of plastic tube for a spacer on axle stub so the wheel will not rub the cross-bar with an elastic shock absorber thread tied in place. Install $1\frac{7}{8}$ " dia. wheels.

Cover the fuselage with your tissue over all areas except the forward upper cowl section under the wing mount, aft cockpit, and the wood covered area of the engine cowling. Water-shrink and give one coat of thinned clear dope. Spray the assembly with silver acrylic lacquer (spray can type will cover well). Using silver Christmas paper, not foil, cover the fuselage cowl, starting at the rear former. Make flat patterns to follow the former shape and lay flat on the fuselage frame sides. Proceed making one section between formers at a time, gluing as you go. You can also cut panel sections

to cover the engine cowl section, simulating the cowling divisions. Attach these directly over the wood nose-section structure as far back each side as the main gear forward-strut point.

Add the tail skid, the inverted vee braces shown at wing mount to cowl top, cockpit-door outlines, fuselage lettering and door handles. Fold up the radiator from silver Christmas paper and attach to fuselage. Install rear landing gear strut fairings on the wire. Make up the exhaust piping from plastic soda straws and balsa elbows. Now you can choose the amount of detail you wish. Finish the cylinder blocks and heads jet black and the exhaust system silver. All lettering is black.

With covering complete on the wing and tail surfaces, spray finished the same as the fuselage with silver acrylic lacquer. The wing and rudder can be lettered with black as shown—the rest of the details are up to



Bill Coons sent in these live-action shots of a Saturn I-B. Doug and David Caughell watch as their dad prepares it for first flight. It was built from an Estes kit, is 37½ inches tall, uses three chutes, two on the booster and one on the nose cone. Scene is the 4th of July celebration at Saugerties, N. Y. All modeling was seen, R/C, C/L, etc. Model rocket is not fireworks and it's better than Roman candles.

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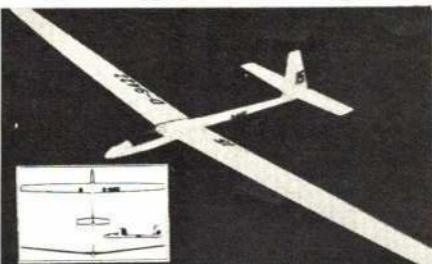
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you. Control horns, made from .015 plastic, are easily made and installed. Gray thread is used for the rigging and control wire.

Cement the horizontal stabilizer and elevator unit on the fuselage. Cut and cement the lower struts from fuselage to the horizontal stabilizer, checking to keep it parallel with the wing mount. Make a cardboard right angle template to set and glue the vertical stabilizer and rudder in place, being sure to keep the forward edge of the vertical on the fuselage centerline. Install the vertical to horizontal brace wires from silver thread.

Cement the wing onto the upper fuselage longerons and cross members. Check to be sure the wing extends the same distance each side of the fuselage. Check for squareness to the fore and aft centerline of the fuselage by using a stick to measure the distance from the tail post to the same position on each side of the wing trailing edge.

The model is turned over for the fitting

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and installing of the lift struts. Make up four struts as shown on the plan. Shape and trim to fit the wing and fuselage. Assemble the card stock fittings on the struts and paint silver. When dry, cement in place in positions shown on the plan. If you choose, navigation and landing lights can be installed. Make the landing light tail cone from silver Christmas paper and attach it to a 1/32" bulkhead. Cement on an aluminum-foil reflector surface and cover with a clear plastic bubble formed to size. Attach on under side of wing and install the small side brace between the front spar line and the side of the light assembly, as shown on the plans. Carve, sand and paint the navigation lights from balsa and attach as shown.

You are ready to put in the rubber and start flying. Use a 12" loop of 1/8" flat rubber for a light model up to 1 1/2 oz., or four strands of 3/32" flat for a heavy model 2 oz. or over. The propeller can be your own thing, carved from the raw block, or one of the excellent plastic types for sale at your hobby shop. The 7" diameter seems to work best under most conditions. A plastic spinner 1" in diameter is fitted on the propeller. Assemble your propeller on a shaft through the nose

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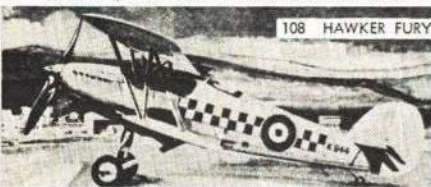
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block, using a good thrust-washer assembly or bearing for the best flights.

Check the balance point indicated on the plans. Some people are lucky. Most of us have to put a glob of clay or some other mass to get the point to work out in the correct location. You try that glide test. Hopefully all goes well and a few winds are put into the motor for an added thrill.

There she goes! Everything looks OK. Now for that real try; a couple of hundred winder turns and a minor adjustment and away she goes for a few rounds by herself. The fun is just beginning. Since with normal care this job won't destroy itself, many happy hours can be had learning all that the model can do under varied conditions; both indoors and out. Good luck and may fair weather be yours!

CONTEST CALENDAR

Continued from page 48

Oct. 11-12 — Mobile, Ala. (AA) 6th Annual GCRC Contest for RC. Site: Plum Fort, J. Sabine CD, 3160 Genevieve Ct., Mobile, Ala. 36606. Sponsor: Gulf Coast RC.

Oct. 11-12 — Sunnyvale, Calif. (AA) Pioneers FAI Scale RC Contest. Site: Pioneer Field, R. Morse CD, 3351 Pruneridge, Santa Clara, Calif. 95050. Sponsor: Pioneer RC Club.

Oct. 11-12 — Albuquerque, New Mex. (AA) SWAT 5th Annual FF Meet. Site: Boy's Academy, J. Bicknell CD, 12329 Princess Jean NE, Albuquerque, New Mex. 87112. Sponsor: South West Aero Team.

Oct. 11-12 — 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.

Oct. 11-12 — Abilene, Tex. (AA) Prop-Twisters Fall FF CL Contest. Site: Sea Bee Park, E. Thomas CD, 5349 Harwood, Abilene, Tex. 79605. Sponsor: Key City Prop-Twisters.

Oct. 12 — Lincoln Park, New Jersey (AA) 11th Annual Model CL Air Show. Site: GSCB Club Field, W. Swentzell CD, 10 Sunset Court, Montville, New Jersey 07045. Sponsor: Garden State Circle Burners.

Oct. 12 — Odessa, Tex. Odessa-Midland RC Fun Fly. Site: Prop Buster Park, L. Hood CD, Box 6622, Odessa, Tex. 79760. Sponsor: Prop Busters of Odessa.

Oct. 12 — Ohio City, Ohio (A) Club RC Contest. Site: Club Field, D. Kraner CD, RR No. 1, Ohio City, Ohio 45874. Sponsor: Shoo Flyers MAC, Inc.

Oct. 18-19 — Winter Park, Fla. (AA) RC Rendezvous, Annual Fly For Fun. Site: RCACF Flying Site, T. Drake CD, 1222 Via Estrella, Winter Park, Fla. 32789.

Oct. 18-19 — Oklahoma City, Okla. Oklahoma Science & Arts Hobbie FF, CL, RC Fair. Site: State Fair 10 & May Ave. R. McGee CD, 2401 Huntleigh Ct., Oklahoma City, Okla. 73120.

Oct. 19 — Taft, Calif. (AA) SCIF's 3rd Annual Texaco FF Class Event. Site: Gardner Field, B. Chandler CD, 7858 Farralome Ave., Canoga Park, Calif. 91304. Sponsor: South California Ignition Flyers.

Oct. 19 — Ft. Wayne, Ind. (A) Flying Circuits Restricted October RC Club Meet. Site: Smith Field, J. Smith CD, 2925 Ridgeway Dr., Ft. Wayne, Ind. 46806. Sponsor: Flying Circuits RC Club.

Oct. 25-26 — So. El Monte, Calif. (AA) RC Contest. Site: Whittier Narrows, J. Garabedian CD, 909 N. 3rd St., Montebello, Calif. 90640. Sponsor: San Gabriel Valley RC.

Oct. 25-26 — Birmingham, Ala. (AA) Birmingham, RC 3rd Annual Meet. Site: Edgewater Field, E. Riley CD, 1924 2nd Place, NW, Birmingham, Ala. 35215. Sponsor: Birmingham RC Association.

Oct. 26 — Sacramento, Calif. (AA) Northern California FF Council 5th Meet. Site: Jackson Road & Sunrise Ave. R. Fallon CD, 2667 61st St., Sacramento, Calif. 95817. Sponsor: Capitol Condors.

Oct. 26 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman, F. Gallo CD, 1725 Kenmore Dr., Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

Nov. 16 — Elsinore, Calif. (A) Wakefield Team FF Challenge. Site: Lake, G. Wallock CD, 220 Le Roy Ave., Arcadia, Calif. 91006. Sponsors: Thermal Thumbers.

Nov. 16 — South El Monte, Calif. (AA) SCCA Annual CL Contest. Site: Whittier Narrows, E. Danef CD, 10315 San Juan Ave., South Gate, Calif. 90280.

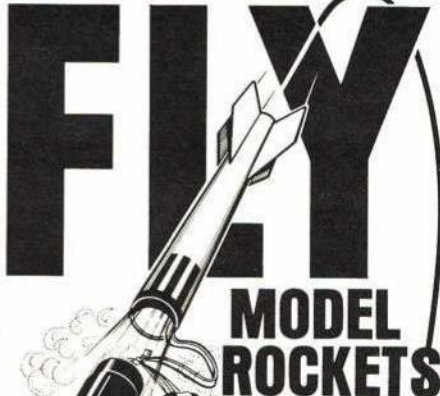
Nov. 28-30 — Marana Air Park, Ariz. (AA) Winter RC Nationals, K. McDaniels CD, 4808 E. Fairmount, Tucson, Ariz. 85716. Sponsor: Tucson RC Club.

Nov. 30 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman, F. Gallo CD, 1725 Kenmore Dr., W. Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

Dec. 28 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman, F. Gallo CD, 1725 Kenmore Dr., W. Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

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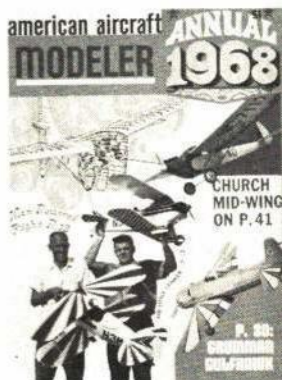
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You Said It

Continued from page 10

Draft Dodger which appeared in your March '69 issue. I hope you always publish AAM. Keep up your superb work. I'm 13 years old.

Joe Keenan, Albany, Oregon

Stoney indifference?

Read your editorial in the March '69 issue with mixed emotions. I heartily endorse your efforts to promote modeling enthusiasm among the youngsters. However, I object strongly to your one statement, as follows: "They ask for help at the flying fields where they meet stoney in-

difference, 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."

I feel that a few moments' reflection and a look at the other side of the coin, may change your mind on this subject.

Very few clubs are affluent enough to own a flying field. Most clubs have invested considerable time and effort in convincing someone that a two- to 12-lb. R/C model, thrashing noisily through the air at speeds near 100 mph, is not really a dangerous, lethal missile, but rather is a carefully supervised, controlled, safe form of recreation. This is a difficult program to sell.

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a result of allowing R/C flying at his site. This assurance will normally take the form of an insurance policy, either in the form of individual liability policies held by each flyer, or his parents, or a club policy of one form or another. These policies have a nature of being quite restrictive in their application. It is no wonder that the majority of the hard-won R/C flying sites are very carefully supervised and controlled by the model clubs. And, it is also no wonder that the clubs will insist on all flyers being members of the club to insure that all restrictions and liability requirements are met. It takes only one hotshot flyer making one low pass over the owner's head to close a flying site.

Again, many congratulations on your efforts to encourage the juniors. You may be pleased to know that at least one R/C club is making a successful effort to attract

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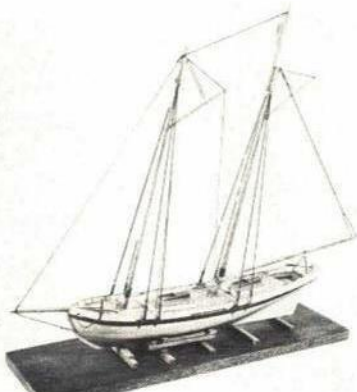
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You Said It

Continued from page 73

the youngsters. The Aloha R/C Club, Inc. here in Hawaii, is a mixed group of military and civilians who have obtained an off-duty runway at MCAS Kaneohe Bay as a flying site. We have about one third of our membership under 18 years old.

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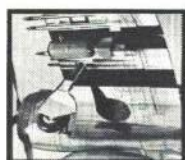
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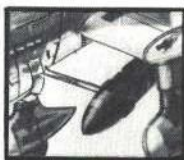
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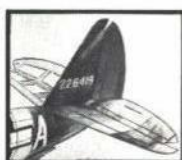
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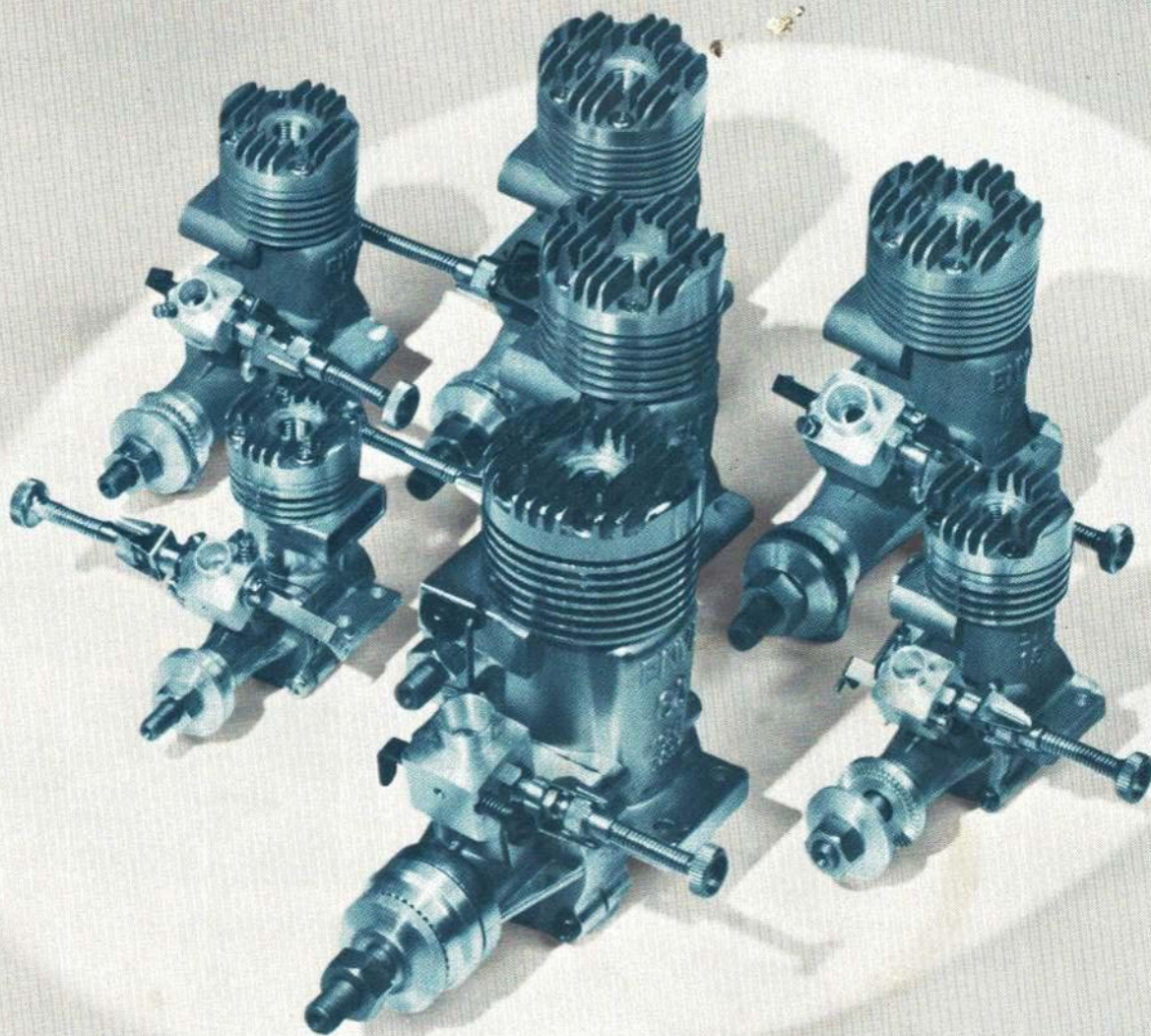
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