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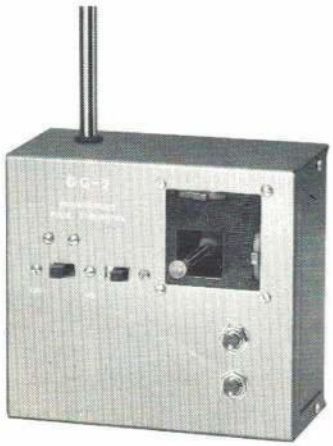

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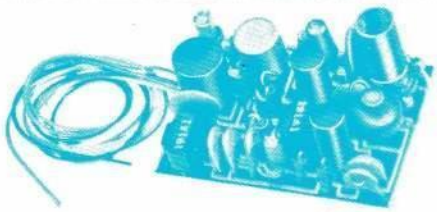

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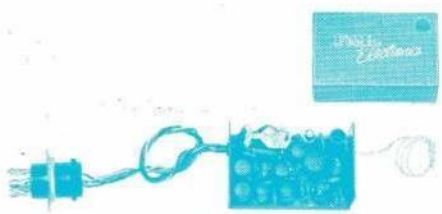

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american aircraft MODELER

VOLUME 67, NUMBER 3 SEPTEMBER 1968

COVER PHOTO: True scale in all dimensions is this R/C Fokker D-VIII by Joe Tschirgi. Powered by a Supertigre 60, it is equipped with Digimite 4Rs radio. Authentic camouflage has individually dyed silk lozenges.

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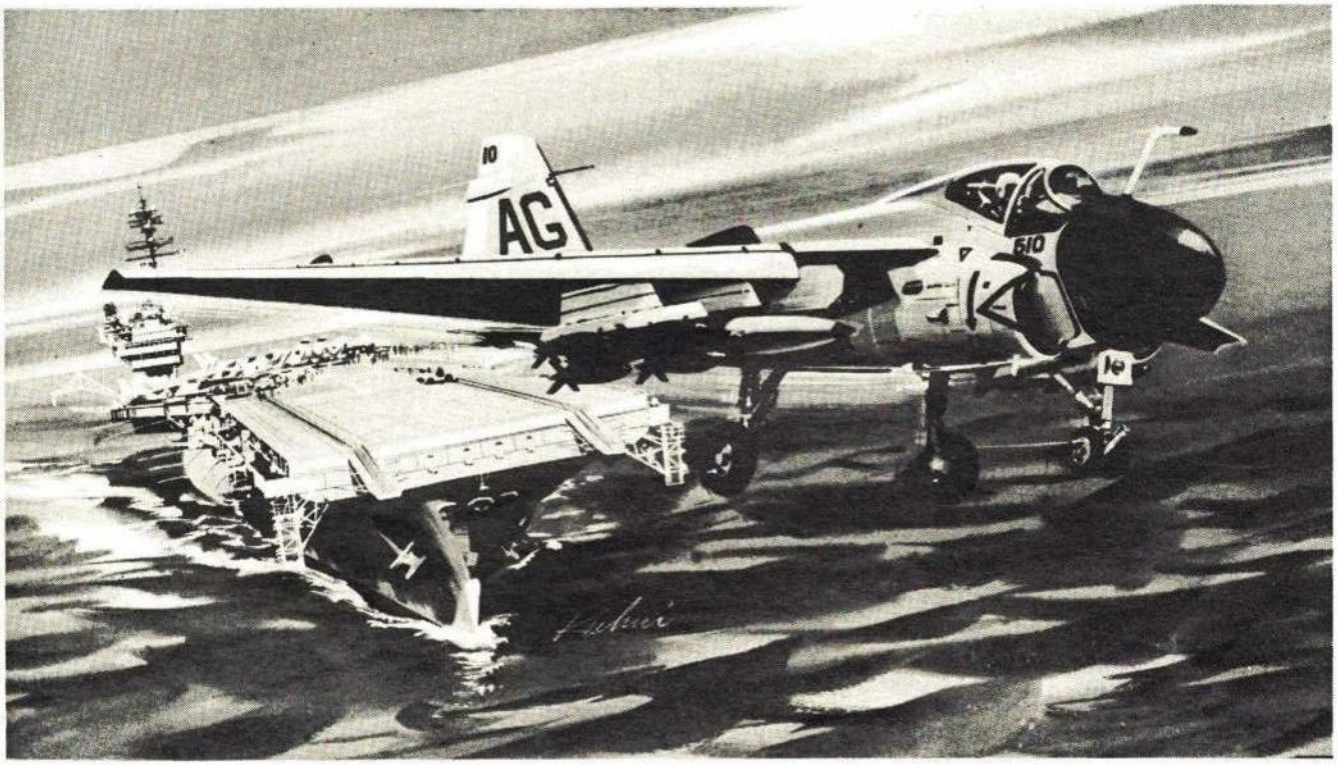

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STRAIGHT AND LEVEL

Magazine audiences have a lively sense of participation in policy making. But do we need less talk and more deeds?

ALL editors, we suppose, must be equally sensitive to the pressures of the times. For these are days when an expressive citizenry is quick to criticize. Temperate letters do suggest and reason — but there also is now an aura of impatient demand. Even in general national magazines, shoot-first-and-ask-questions-afterwards, cancel-my-subscription letters, reflect some readers' impatience with any formula which must be weighed by the common-denominator of today's many-faceted audiences. What a challenge!

It seems not to matter that policy is successful, or that ability to serve increases steadily. For as long as anyone thinks a magazine can do better *for him* — for the whole broad spectrum of modeling really — an editor must listen and act.

In the case of the American Aircraft Modeler, more than 120,000 copies must be printed, on good paper, with lots of color. Circulation increases prove everybody's demand for quality. A big-time model airplane magazine today must have from 72 to 88 pages, depending on combinations of other sought-for-values — such as our four-color centerspread. Such a magazine costs well upwards of $20,000 an issue to produce, or about a quarter million bucks a year. Lump five magazines together, and their publishers must get back a gross of about a million dollars a year to break even. And, this is only a model airplane hobby! It isn't golf, or cooking, or cars.

Who is unhappy? What do they want? Will they get it? This magazine has its own brand of critics. Not a great many, true, but they are highly articulate. We fail the beginner, argue the intellectuals. We discriminate against free-flight, charge the hard-core competition types who want no part of the outside world and its needs — not even if an extroverted effort might bring in thousands more builders.

At work is an inverse relationship between the magazine and audiences who really participate in the publication's policies. Once, an editor was sacred (or a sacred cow), treated with deference; while, at the same time, talented, inspired contributors produced all manner of goodies. Today, he holds a peace-seeking dialogue at the barricades, while the talent which once produced a world of wonderful stuff, now protests while producing little of value. The sophisticated, well-heeled modeler — and is he a modelbuilder? — is constantly flying when he isn't criticizing!

Who will write a decent article on cutting and sanding of balsa wood? Who will tell us how to cover with Jap tissue, Silkspan, silk or nylon? Who will explain how to adjust a free-flight model? Tell us how to make that airplane fly! Or show kids how to start an engine? To bend wire? To rig control-lines? To avoid warps? How to build? To select a kit? Who will make pictures? Draw good sketches? Few people care.

We editors constantly get told off. The cockpit is full of pilots. They want an editor to perform miracles. Has he some magic wand that conjures up world-beating material that used to be created by the Krafts, Goldberg's and Cal Smith's?

The challenge confronts us all. The constant use by all the magazines of a handful of name contributors reflects the narrowing of the field. Visitors to this office — from Chicago, Los Angeles, Houston, any place — make brilliant cases for more free-flight, more control-line, more radio. Ask any of them what they can contribute and they fall through the floor. Back home, their fellow club members — 25, 50, even a 100 — forward demands. Ask any of these clubs what they have done for their favored activity, and they are struck dumb.

Perhaps we should ask ourselves not what the hobby can do for us, but what we can do for the hobby. Kids look for help and answers. But, among their peers, the skills and know-how of modeling apparently are sinking into extinction. What is left after ready-to-fly? Why in Heaven's name, must it come to that? Ready-to-fly (from gliders, ROG's, to R/C) is essential, true, but good and lasting things are forever being forgotten in stampedes to climb on this or that worthy bandwagon. Slot cars for example. Remember?

This probably will be the last time S&L will belabor the question of who is going to help beginners or, start the youngsters. Response to this type of editorial has been unique in our experience. When the magazine appears, there is a rash of long-distance phone calls, many from industry. A few disagree. All are concerned. Off-the-record calls and letters from industry — and from model-airplane-oriented people outside the industry, who produce films and books — tell us of projects underway. Where do we go from the AMA Delta Dart, we've asked more than once. Several manufacturers have told us of graduated series. Of course, we already have some.

After several years of hearing about the getting-started problems in all areas of the model press, we all probably are sick of constant exhortations. Good. Perhaps we've finally reached the point of doing something tangible about this headache — and on a much-needed broad front.

R/C profiles are here! Long a way of life in control-line, the profile R/C is coming on like gang busters. Sterling showed an interesting foam-wing Mustang at the DC/RC Symposium which had the complete installation in the wing, accessible from the bottom. Asked about future plans, Eddie Manulkin has ideas about a German WW II fighter to give combat to the Mustang. If pylon goes that way, he also may market Goodyear profile types. Expendable R/C jobs? Kinda grabs you!

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A.M. Reviews

STANLEY M. ULANOFF

Aeromodeling, by R. H. Warring, 168 pgs., $1.45. Published by Aeronautica, John W. Caler, 7506 Clybourn, Sun Valley, Calif.

IN this handy pocketbook, Ron Warring, a world-famous authority, shows how to build and fly all types of model flying planes including gliders, rubber-powered models, free-flight power models, control-line models and radio control planes. Beginning with a description of the necessary tools and materials, he then gives detailed instructions for different methods of construction for all types of models. These include doping, covering, finishing, trimming and operation of engines. Also included are explanations on flying techniques, trouble-shooting, sport and contest flying and their rules. The modeler will also find many tables useful to guide him in his project. Both beginners and veteran modelers should find Aeromodeling helpful and instructive.

Flying Fury: Five Years in the Royal Flying Corps, by James T. B. McCudden; edited by Stanley M. Ulanoff, 356 pgs., $6.95. Published by Doubleday & Co., Inc. Garden City, N. Y. (This review by Col. A. R. Druss, U.S.A. Ret.)

THE latest in the superb series "Air Combat Classics" — outstanding true stories of the World War I aces, is Major McCudden's account of his experience in the Royal Flying Corps from 1914 to 1918. Colonel Ulanoff has taken this exciting story, long out of print, reissued it with a new forward and introduction and added new supplementary materials — photographs, diagrams and statistical data on the aircraft in which McCudden flew and fought against.

Jim McCudden's record is truly remarkable. He worked his way up through the ranks from a bugle boy in the Royal Engineers to Major and squadron leader in the Royal Flying Corps. With 57 victories, his score would undoubtedly have been much higher had he not been killed in an airplane accident. He flew in almost every type of British fighter aircraft and fought duels with many of Germany's greatest aces.

The book is not a dissertation on combat aeronautics, nor a series of stories about air duels. Rather it is a faithful personal record of McCudden's years with the RFC.

Flying Fury reads well; the story seems to pour out as if the author were talking to you across the table. This is remarkable since McCudden had never written anything except military reports and personal letters. He had little schooling. The book was written in a little more than a month before his death and, during that time, he was doing strenuous work as a fighting instructor in Scotland. Aviation enthusiasts consider Flying Fury as one of the ten best narratives on World War I aviation.

Model Aeronautic Year Book Reprints, by Frank Zaic and published by Model Aeronautic Publications, P. O. Box 135, Northridge, Calif.

SEVERAL of the well-known model aviation books by Frank Zaic are available now as reprints. Titles included are — 1935-36 Model Aeronautic Year Book ($1.50); 1937 M. A. Year Book ($2.50); 1938 M. A. Year Book ($3); Model Glider Design from 1944 ($3) and R. J. Hoffman's Model Aeronautics Made Painless, vintage 1955 ($2). These are invaluable as they present the history of modeling and offer background material — practical and theoretical — that the serious modeler cannot afford to be without. A descriptive list of their contents is available upon request. They are semi-stiff covered and 5½ by 8¼ in size. MAP intends to reprint the 1934, 1951-52 and 1953 Year Books later in the year.

Building Aeroplanes for 'Those Magnificent Men,' by Allen H. Wheeler, 95 pgs., $2.95. Published by Aeronautica, John W. Caler, 7506 Clybourn Ave., Sun Valley, Calif.

IT was the job of Air Commodore Allen Wheeler C. B. E. to build the 1910 airplanes used in making the 20th Century Fox film "Those Magnificent Men in their Flying

Machines." How this job was done and what it entailed from the historical as well as the technical point of view, is the story of this book.

With 50 interesting illustrations of both the original planes and their replicas, the book describes all the difficulties involved not only in building the replicas, but also in making them fly. Since these planes had to be authentic copies of their 1910 counterparts, so authentic that even schoolboys could not criticize, the magnitude of this task becomes apparent.

The five planes reproduced were the Santos Dumont Demoiselle (tractor monoplane), the Latham Antoinette (tractor monoplane), the Bristol Boxkite (pusher biplane with forward elevation), the Eardley Billing (tractor biplane) and an Avro Triplane. Aviation fans interested in the old-timers should find this book quite informative.

Private Aircraft and Civil Airliners, by Kenneth Munson, 173 pgs. each; $2.95 each volume. Published by The Macmillan Co., 866 Third Ave., N. Y., N. Y.

THESE are two handbooks in a multi-volume series of "The Pocket Encyclopedia of World Aircraft in Color." Other volumes are Fighters, and Bombers.

These handbooks cover the principal aircraft of the world, complete with colored plates and brief but comprehensive descriptions. The illustrations combining visual appeal and essential details of construction, include the major aspects — side elevation and plan views from above and below. The accompanying text describes each airplane's development and commercial career.

Private Aircraft covers the post-war private, business and general purpose aircraft developed by nations all over the world. Included among the 80 aircraft illustrated and described are the Piper Apache, Beech 18, and Lodestar from United States; the de Havilland Bonanza and Tiger Moth from the United Kingdom; the Mitsubishi Mu-2B from Japan; and the Antonov An-2 from Russia.

Continued on page 71

A rousing success

Our club in Atlanta was introduced to indoor by Mike Fodor while at Georgia Tech. The "Easy B," in the Oct. '67 issue, formed the basis of our first contest, which was a rousing success.

We borrowed a high school gym with a 30-35 ft. ceiling, dome-shaped. Nine adults and four juniors present for flying; seven adults and two juniors completed all official flights. Most of us hit at least one three-minute flight and there was one near-four-minute flight. To me, this is remarkable in that all of us are first-time indoor modelers with our first models; we normally fly competition free flight or control-line.

I flew a condenser-paper model (not eligible for the contest) to two effortless four-minute flights on half-winds. Now, the whole club is hooked. Our plan is to hold an AMA sanctioned contest in the Atlanta, Ga. area next fall, probably October or November. We hope to borrow the dome again (at Cumming, Ga.). Our thinking is to include Easy B as a junior-senior event; paper stick; microfilm; scale, and glider. Indoor is definitely "in" again in Atlanta after a lapse of 26 years!

Incidentally, the Easy B is the most trouble-free model design I have ever seen. Those built by my 11- and 15-year-old sons flew right off the board with no adjustments required other than those built in.

John H. Krickel, Atlanta, Georgia

Flying bandanna

We have followed instructions in Ken Willard's "Thumbtack and a Dab of Glue," in the May issue, and on the first try, the engine flew so far that we lost it. We took the engine out of a Cox Trainer and we cannot find the engine.

The instructions did not say to tie a string to the engine and if it had, we would not have lost it.

If you have a used spare engine, put it in the mail. We would greatly appreciate, and would be able to fly the airplane again or even try the bandanna trick with a kite string.

It takes five weeks of 100% savings of my allowance to buy such an engine, and I cannot afford to lose engines like that.

Your magazine is wonderful. To be fair, this was a used engine, but it worked well — so any small good engine will do.

Tom Orlowski. Witnesses: Delmar Lafky, Tom Tupy, Ronnie Tupy, Paul Tupy, Daune Lafky

Sorry about that. We found a used engine to replace it, but there was no return address on your letter. You other guys don't get ideas. Ed.

Wants more rocketry

You have probably received hundreds of letters like this one, but I decided to throw in my two cents worth. I am a California rocketeer, and a member of the Birch Lane section of the National Assoc. of Rocketry. As a member, I receive this magazine as part of my membership.

As you know, your magazine devotes about four or five pages to Rocketry. Each month, I anxiously wait for these pages. This is the best literature available on Rocketry, but I wish there were more.

The members of our organization number about 11,000. I believe that we rocketeers make up a fair number of American Aircraft Modelers, and I think that we would all appreciate a tiny bit more representation in your magazine.

Jim Delwiche (no address)

Historic watch fob

I was going through some boxes on a forgotten shelf and ran across the watch fob given to all contestants in the first National Model contest. I wondered how many of those contestants are still active. Forty years have passed since then. It might be interesting to know how many of the old AMLA members are AMA members today. So I decided to make a plastic replica of the watch fob and send it to you.

I have never been able to get over the fever contracted when the airplane bug bit me back in 1922. Living in a small Minnesota town, there were no hobby shops, or anyone to show me how to go about building even the simplest type of model. So I learned by mail and through the American Boy Magazine. And not being able to go to Detroit, I built a solid model of the Ford Trimotor and shipped it to the contest. It was far from being good enough to place.

Although I only participate in contests once in a great while, I keep up my membership in AMA and do act as a scale judge when called upon. Here is a picture of the latest model. It is a model of the Great Lakes 2T-1E, parked on the line with my Great Lakes 2T-1a. Same scale, ½ inch equals one foot.

I have been in many departments with Lockheed for the past 17 years. I am now in the model section of Sales and Advanced Design, which I like best. It sort of proves to me that if you keep at something long enough, it eventually will pay off.

Cedric E. Galloway, Burbank, Calif.

Ced is one of the all-time greats in the scale field. Great Lakes buffs will appreciate the novelty of two fine jobs, each a different version, in the one photo. Ed.

It's Polish, not French

I was delighted that you saw fit to include photos of my Wilga rubber scale job in the

Continued on page 74

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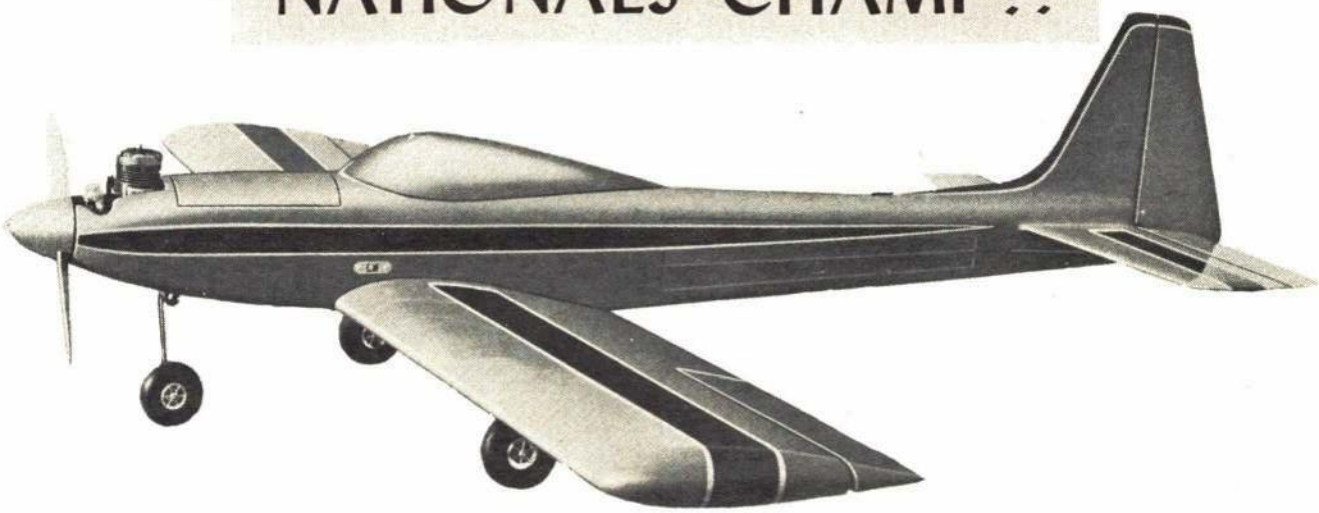

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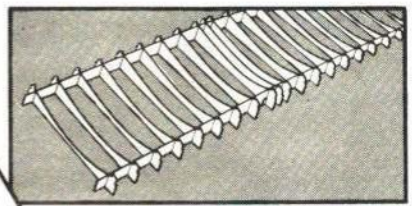

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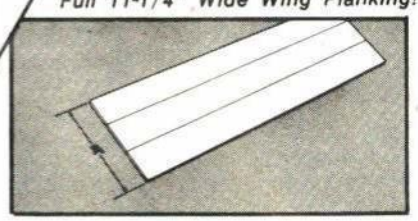

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HAROLD W. WARNER
photography / THE AUTHOR

The Key to the Junior Problem?

Proved by six years of solid results this co-curricular school club program supplies many missing answers.

HOW many times have you seen the words "junior problem"? A hundred times? A thousand? Well, if you're ready to admit that they just don't make kids like they used to, buddy, you have plenty of company. I feel that the kids do pretty well for themselves considering what today's society thrusts upon them. Want to make a modeler of every kid on your block? If you're easily discouraged, forget it. If you're enthused with a missionary zeal, let me make a few suggestions.

Six years ago, as a new teacher in an urban junior high school of about 1,700 prospective modelers, I founded the Sepulveda Balsa Butchers. Since I had not built models for ten years, I went to a local hobby dealer for advice on how to get things rolling, and he spent several hours discussing the subject, and even came to our first meeting to give an informal talk on what makes things fly. Since that time, I have found almost every hobby dealer in the area to be a gold-mine of ideas. Material help such as discounts for club members and prizes for contests is also invaluable to a new club. Without their help, I might have become quite discouraged the first semester.

Having put an announcement of the first meeting in the school bulletin, I eagerly awaited the hundreds of boys which would surely be overjoyed to become a part of an activity as utterly fascinating as aeromodeling. When only about 30 showed up, I was disillusioned to say the least. Undaunted, however, we embarked upon a building program which was designed to arouse interest in all concerned. About half of the original group survived until the end of the semester. Today, we average 40-50 members each semester. Since then, we have tried many things — some resounding successes, some dismal failures, but still the club survives. A few of our ex-members are pilots today. One took seven trophies at the Dallas Nats, and many drop in to see me on their way to serve their country in various ways. I think the fight is worth it.

After six years of struggle, I'd like to suggest a few courses of action which may be of use to the up-and-coming junior club. Please keep in mind that being a co-curricular club in a public school, opens up certain areas, but restricts others. A private club might well avail itself of handy facilities of the local school such as gym, handicraft shop, or football field.

First and foremost, keep in mind the psychology of the pre-adolescent. In general, he has a short attention span unless the activity is fiercely interesting. He is used to more of the "good things" of life than you or I were, and may look down on modeling as "kid stuff." You and I know that the public thinks model airplanes are for six- and seven-year-olds, so how do you convince a very status-conscious youngster that he will not be laughed at? Also the number of pursuits open to today's youngsters is, to say the least, staggering. At our school alone there are 26 clubs ranging from ham radio to chess clubs. An after-school activity has to compete with Scouts, dances, paper routes, and just about triple the amount of homework you and I took home. Many of my 11-13-year-olds have horses, mini-bikes, Little Leagues, music lessons, color TV's and swimming pools to occupy their time. Clearly, the prospective sponsor must realize all of these factors which are going to deter the kids from a model club. However, there is another facet to the modern child which was there when we were young, too, and that is an innate curiosity — a desire to explore, to investigate. There is also a desire to create, and to create something worthy of praise from his peers, his parents, the people he respects. This is the key.

One of the first things a new club might want to do is build its image. Having an experienced modeler or two put on a demonstration, gives modeling a little prestige. Our club membership doubled after practically the entire student body watched one of our hand-launched gliders soar daintily up and out of sight in an early-morning thermal before school one day. A U-control stunt exhibition will bring spectators from chess club, after-school football, and just about anywhere within earshot. A display of well-built model aircraft along with some that are easily within the capabilities of a junior modeler provides prestige from the more difficult ships, but a goal to attain or exceed with the less-perfect craft.

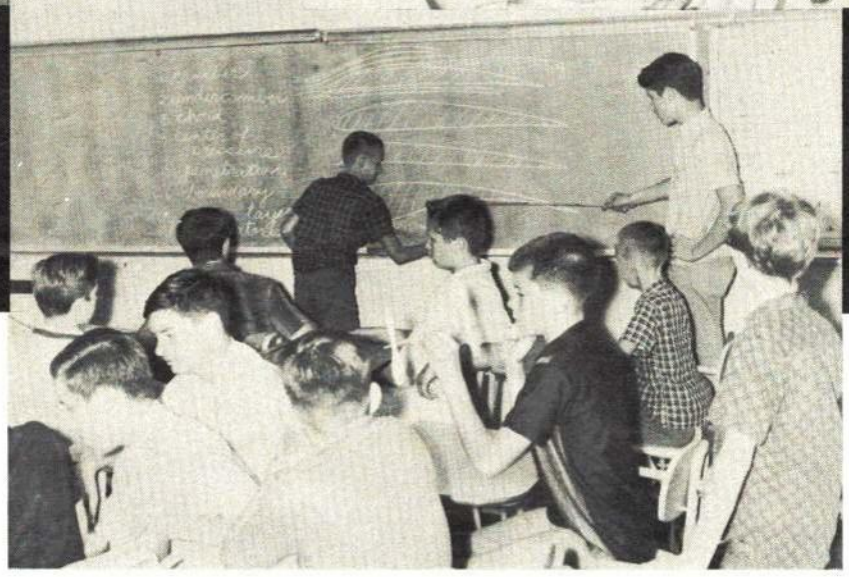
One or two building sessions a week is a must, with expert guidance always at hand. Members of local model clubs are more than happy to lend a hand in a beginners' program. A small initiation fee, dues, and auctions of donated models and supplies can build the club's supply-chest.

What will you need?

For a club of 30, I would suggest the following: one doz. X-acto knives, inexpensive variety; 1 razor-blade plane with several replacement double-edged blades; 75 sheets of assorted sandpaper, mainly coarse, cut into quarters; 1 roll transparent

Good performance, up to two-minute flights, by an ROG will sustain a youngster's interest.

Built-up and tissue-covered models demand more skill; group discussion to solve problems.



Classroom talks on theory, though necessary, are brief. Students' attention-span is short.

waxed paper; 1 pint model cement and several small plastic squeeze bottles; 1 large box of dressmakers' pins; 50 scrap-wood blocks of various sizes to use as sanding-blocks, dihedral props, etc.

Sixteen to 24 building boards (local lumber yard will saw 8 from sheet of soft fiber wallboard); 1 gallon nitrate-type airplane dope; 1 gallon pyroxylin nitrate thinner; 5-6 oz. plasticiser for dope. TCP, castor oil, or "warp-resistor"; 1 doz. ¾" artists' brushes (inexpensive variety).

There are many items which one might add to the list, but I have found the above to be rather indispensable. If the club is to build just kit models, fine, but I have found many good hand-launched gliders, rubber jobs, and other models in magazines just waiting to be gobbled up by cost and quality-conscious juniors. A little tracing and a ditto machine will make copies of good plans available to all club members, and kits for these planes can be put together by club members in cooperation with a local hobby dealer much more cheaply than one might imagine. Commercial kits are handy, but often are atrociously priced, poorly designed, and filled with balsa unsuitable for anything but axe handles or doorsteps.

A good sequence of beginners' projects might look something like this:

1) Small Vee-dihedral hand-launched glider 7"-12" span of good 8-12 lb. grain contest balsa. (Light wood is a *must*. Cuts, sands easier and results in a lighter, more forgiving plane.)

2) Polyhedral contest hand-launched glider such as the "Omega" or "Sweepette" type; 3/16 to ¼ light C-grain balsa wing, spruce fuselage, 1/16 or 1/32 sheet C-grain stab.

3) All-sheet rubber ROG type plane, 12"-16" span made of 1/32" sheet, with plastic propeller of Sleek Streek variety. Good rubber such as Pirelli 5/32 and a winder a must for interest-sustaining performance of one to two minute flights. (All-sheet gas models can be used at this time also.)

4) Built-up stick-and-tissue model either rubber, gas, or gravity powered. A towline glider is a good idea since it avoids the added hassle involved with building a good nose block or fiddling with an engine.

5) Advanced models adapted to abilities and interests of members. It is a good idea to keep a small stock of graded kits on hand for modelers who are ready to "move up."

I have found that a successful building program starts with a short talk and demonstration on what we are going to be doing, has one or two completed or partially completed models on hand for reference, and a great deal of patience with inexperienced modelers. When you see one member having trouble, call the entire group together for an on-the-spot demonstration of how to correct it. You can bet that this will keep ten others from making exactly the same mistake.

Do not let members take their planes home! Why? Well,

A first, original design effort benefits from quality wood and rubber. A winder is a must.

Monthly contest winners receive points. Total for year determines who gets perpetual trophy.

Much can be done to make a basic, sheet-balsa glider perform. Flight trimming starts here.

Larger models are a joint effort by the club members. Ramrod 1000 was the Butchers' first.

either their cat will eat it, mother will throw it out by accident, little brother will break it or something. Convince them that building the model is only half the job, and that trimming it for flight is just as important. Make sure that an experienced modeler is there to help with those first few flights which will mean either a happy modeler with an airborne plane, or a disgruntled one with a pile of broken balsa to show for his best efforts. Take it home *only* after proper trimming.

A good idea is to schedule a practice session or two with ready-made gliders or rubber jobs to teach adjustment techniques and basic aerodynamics. Save that hand-made job for the club contest at the end of the building program.

Balsa Butchers have one outdoor and one indoor contest a month, timed for endurance-best of six flights. Prizes are modest, usually donated, but usually there are enough for all entrants to go home with something, even if it is only a tube of glue for the "worst crash."

We have tried many things such as design contests; exhibits in the cafeteria, monthly indoor scale meets; "smallest-plane-to-fly-five-seconds" contests; rubber scrambles where one boy winds and launches an ROG while his buddy retrieves quickly — the total time-in-the-air for a five-minute period being their score; "most unusual" contests; and, of course, the gamut of AMA events. We have built club project planes which kids who couldn't afford their own could work on. These were later auctioned off, the proceeds being used to buy a new kit or materials.

Business meetings of the club are enlivened by movies (obtained from the Los Angeles City Library, the Air Force, or local aircraft companies), slides, model flying and building demonstrations, and talks by experienced modelers.

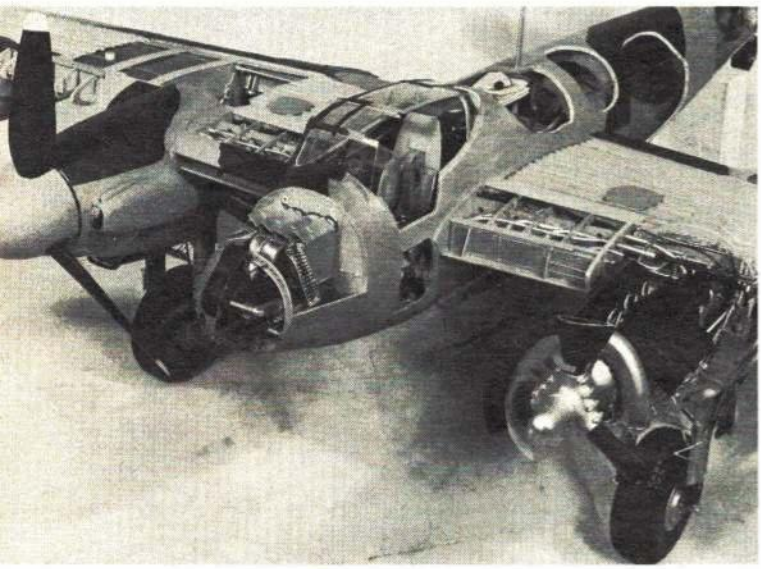
The key to interesting the modern youth is to make him a part of modeling by helping him succeed. Give him a plane he can build. Help him over the rough spots. Let him show it off to his friends in the club when it flies. Give him the praise and encouragement he deserves. He has no use for anything boring or unrewarding in this age of over-stimulation and push-buttons. When we experienced and concerned modelers bemoan the "junior problem," we should try to put ourselves in the shoes of the jet-age youngster. If he cannot achieve some success, he will turn to football, slot cars, TV, etc. for his pastimes. These are O.K., but why lose a potential model aircraft enthusiast because of inadequate adult guidance? Would *you* be a modeler today if your efforts in that direction brought you nothing but disappointment? There are too many other things for kids to do nowadays. Let's sell model aviation; let's follow up with a program which will keep the kids involved and growing with the hobby; let's ask not what the kids are doing — but what we are doing for them. Many haven't even heard of model planes.

model world

...on the international scene

IMPERIAL WAR MUSEUM

THE FOREMOST SCALE MODEL COLLECTION IN BRITAIN



Mosquito VI was equipped with two 1460-hp Rolls-Royce Merlin 12-cylinder liquid-cooled engines and armed with four 20-mm Hispano cannons under the floor and four .303-in. Browning machine guns in the nose. This aircraft was built of plywood with exception of nacelles, wheel doors, ailerons and elevators. Its top speed was 380 mph at 13,000 ft. and a service ceiling of 34,000 ft.

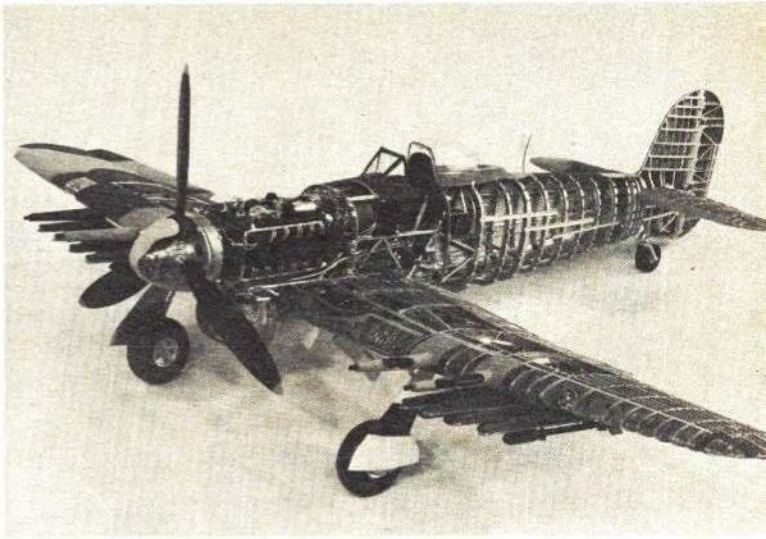
THE Imperial War Museum, London, England, was founded by the War Cabinet in March, 1917, and established by Act of Parliament in 1920 as a memorial to the effort and sacrifices made by men and women of the British Empire during the First World War. The purpose of the Museum is to collect, preserve and display materials and informations bearing upon the two world wars, Korea, Kenya, Egypt, Malaya, and other military operations since August, 1914 in which Great Britain or other members of the commonwealth have been involved.

Among the array of weapons there are displayed about ten semi-cutaway aircraft models of World War II. These models show every detail of the interior of the aircraft, such as the engine, ammunition belts, bulkheads, spars, ribs, fuel and air lines, and machine guns. Most were built by Mr. C. V. McCann, a member of the Museum's exhibition staff. Each required about three years to complete. All parts are constructed from scrap metal, plastic or wood. No prefabricated parts were used.

Other aircraft models, in the World War I period, include the German Fokker E 1, the first plane with machine gun firing through its propeller; the FE 2b, a fighter-reconnaissance aircraft; the SE 5, one of the best fighters in World War I; the Handley Page 0/400 of 1917, the first British heavy bomber at that time; and the German Zeppelin L33. The number of aircraft models in this museum, is small compared with that of our Smithsonian Museum, but is of excellent quality.

The museum houses a notable collection of full-scale aircraft from earliest days of military aviation to the advent of the jet engine.

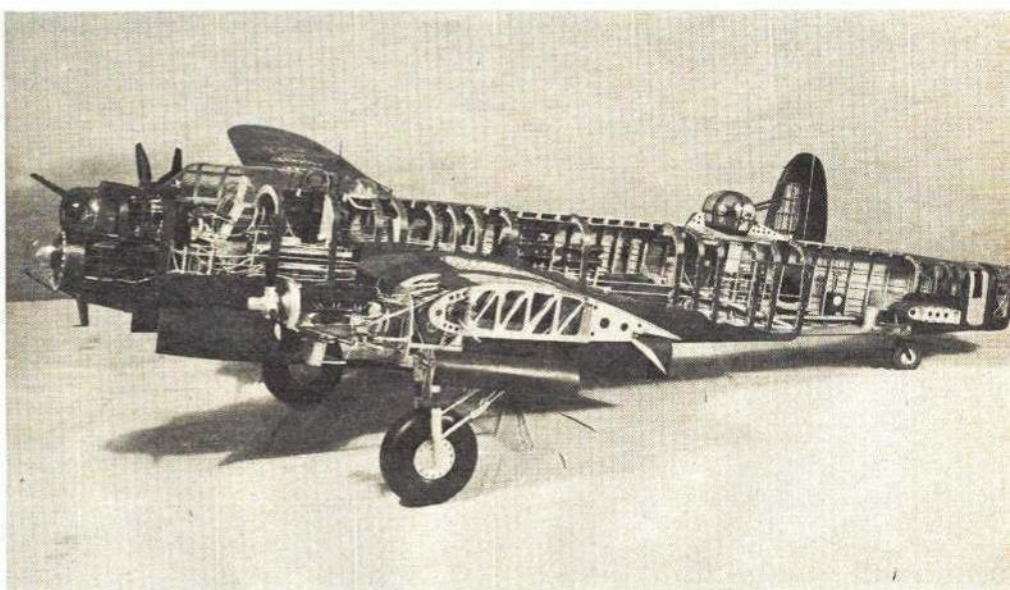
Aside from aircraft the Museum has about a hundred models of war ships, several models of tanks, and a large collection of machine guns, grenades, rifles, orders, decorations, medals, uniforms, and tanks.



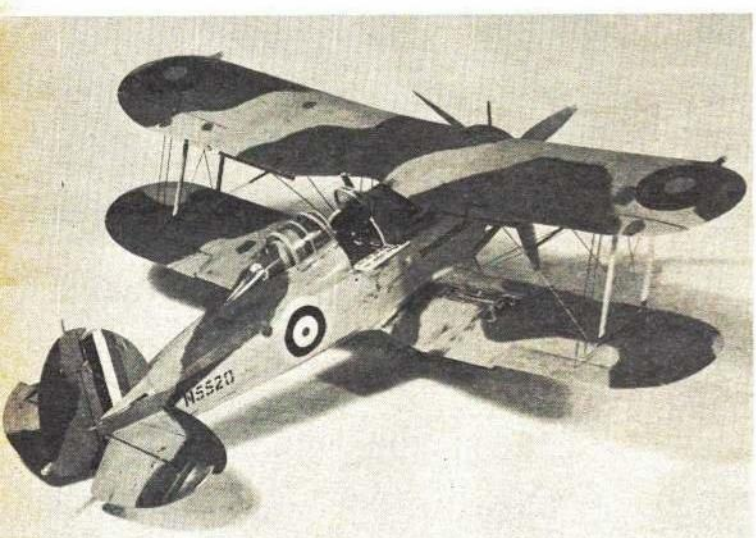
Typhoon IB was operational from November, 1942 until end of World War II. It was equipped with four 20-mm Hispano Mk I cannons and 2200-hp Napier Sabre IIB engine. Eight 3-in. rockets could be mounted under both wings. Maximum speed 409 mph at 10,000 ft. Rate of climb was 5 minutes 55 seconds to 15,000 ft. It was originally designed to counter the FW-190, but was found better in a ground attack role than in intercepting. The Hawker Typhoon IB, in 1/12th scale, is shown in 198 squadron markings as it appeared in France in August 1944.

SUSAN CHUN

photos / IMPERIAL WAR MUSEUM



Lancaster Mk I was equipped with four Rolls-Royce Merlin 20's of 1280 hp. It appeared in 1942, armed with eight .303-in. Browning machine guns. Its maximum bomb load was 18,000 lbs. Its maximum speed was 275 mph fully loaded at 15,000 ft. Range was 1730 miles with 12,000-pound load. The Lancaster changed little throughout its life, a tribute to the soundness of the original design.



Gloster Gladiator was equipped with Bristol Mercury VIIIA 830 hp supercharged nine-cylinder aircooled radial engine. Armed with four Browning .303-in. guns, two mounted one on each side of the fuselage and two mounted on the under side of the bottom wing. Its top speed was 257 mph at 14,600 ft. and service ceiling was 33,500 ft. This was Britain's best biplane before the monoplane era, begun by the famous Spitfire, Hurricane, etc.

Curtiss JN-4D Jenny

Built by the thousands during WW I, this gawky, lumbering trainer became king of the postwar barnstormers. The model captures the in-flight realism of by-gone days.

DICK HANSEN

TO the fledgling birdmen of WW I, the Jenny was what the AT-6 became to thousands of WW II pilots. Designed and built by Glenn Curtiss, it was originally intended as a trainer for the Glenn Curtiss Flying Schools.

With the outbreak of WW I, the Jenny was ordered in large numbers by the U.S. Army as well as Great Britain, France and Canada. Of the 7,000 JN-4's built, over 3,000 were the "D" model. With a wingspan of 43' 7⅜" and length of 27' 4" she was big and cumbersome. Power was an OX-5, V-8 90-hp engine which yielded top speed of 80 mph. Stalling speed was around 45 mph. Later versions were equipped with the 150-hp Hisso engine which upped performance considerably.

So many were left after the war that the Jenny was greatly favored by the barnstorming and stunt pilots. Cost was just a fraction of what the government had paid, and some came new in the crate. They were still sold as surplus as late as 1927. Just about any airshow that was worth seeing during the 1920's, and up into the late 1930's, had at least one Jenny performing. The last time I saw a pure Jenny perform at an airshow was 1947. She was the star of the show, in my estimation.

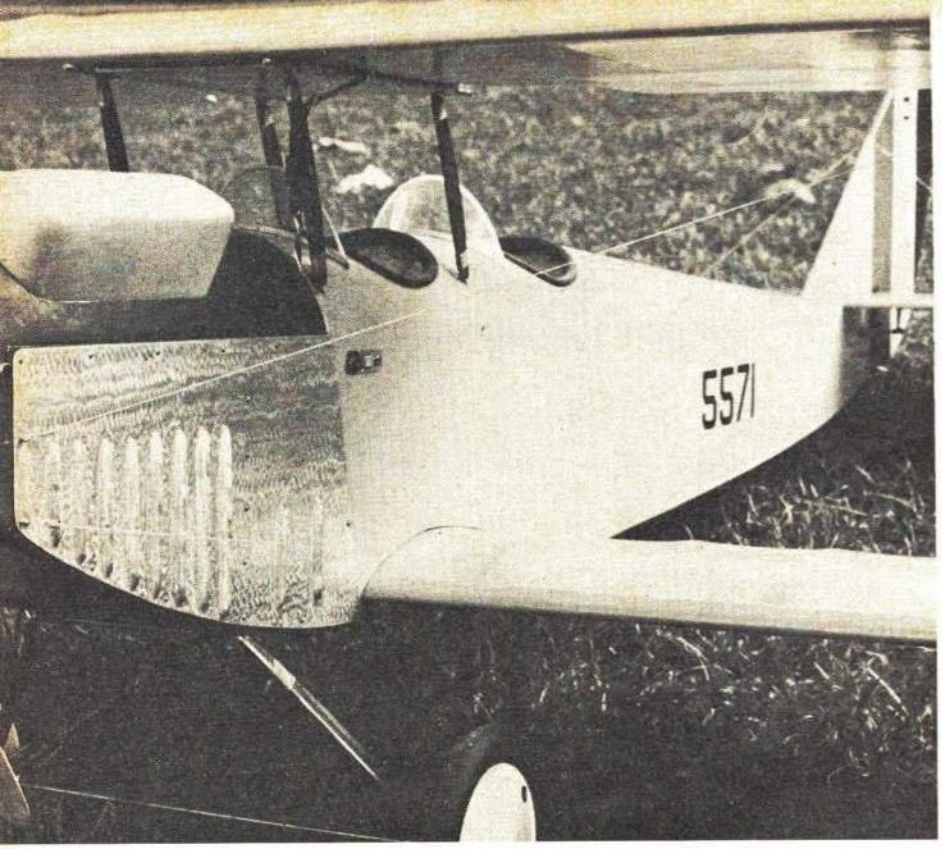
Introduction: You will be surprised how much easier a large airplane is to fly and handle on rough ground. The swing in our club is to the larger airplane as we find it more realistic in the air and on the ground. Nothing gathers crowds at the local flying field like a large aircraft, especially a scale job, with two wings — what will they think of next!

The Jenny is a fun airplane, not a super-detailed ship to win contests with. Although she does have two trophies to date, it is not hard to build and, in fact, was one of the easiest in a long list of craft including an 8-foot Aeronca Champion, 6-foot Kingcobra, two Astro Hogs, etc. Flying characteristics were better than anticipated. Wind penetration is good. She turns well on ailerons and flies a little faster than expected, probably due to the thin leading edge. Having a simple flat bottom airfoil creates much lift at slow airspeeds and much more lift at higher airspeeds. It should be flown with this in mind.

One drawback of large aircraft is the assembly and disassembly time at the field. This is why the wings are of one-piece construction and the only functional flying wires are included.

Most early biplanes were noted for their short nose-moment arms. Not so the Jenny. However, construction should be on the heavy side in the forward section as I had to add a slight amount of dead weight in the nose to balance properly. Do not

Although not a super-scaler, the Jenny has won a few scale contests because of its great realism. In flight, it is as stable and stuntable as a real Hisso Jenny.



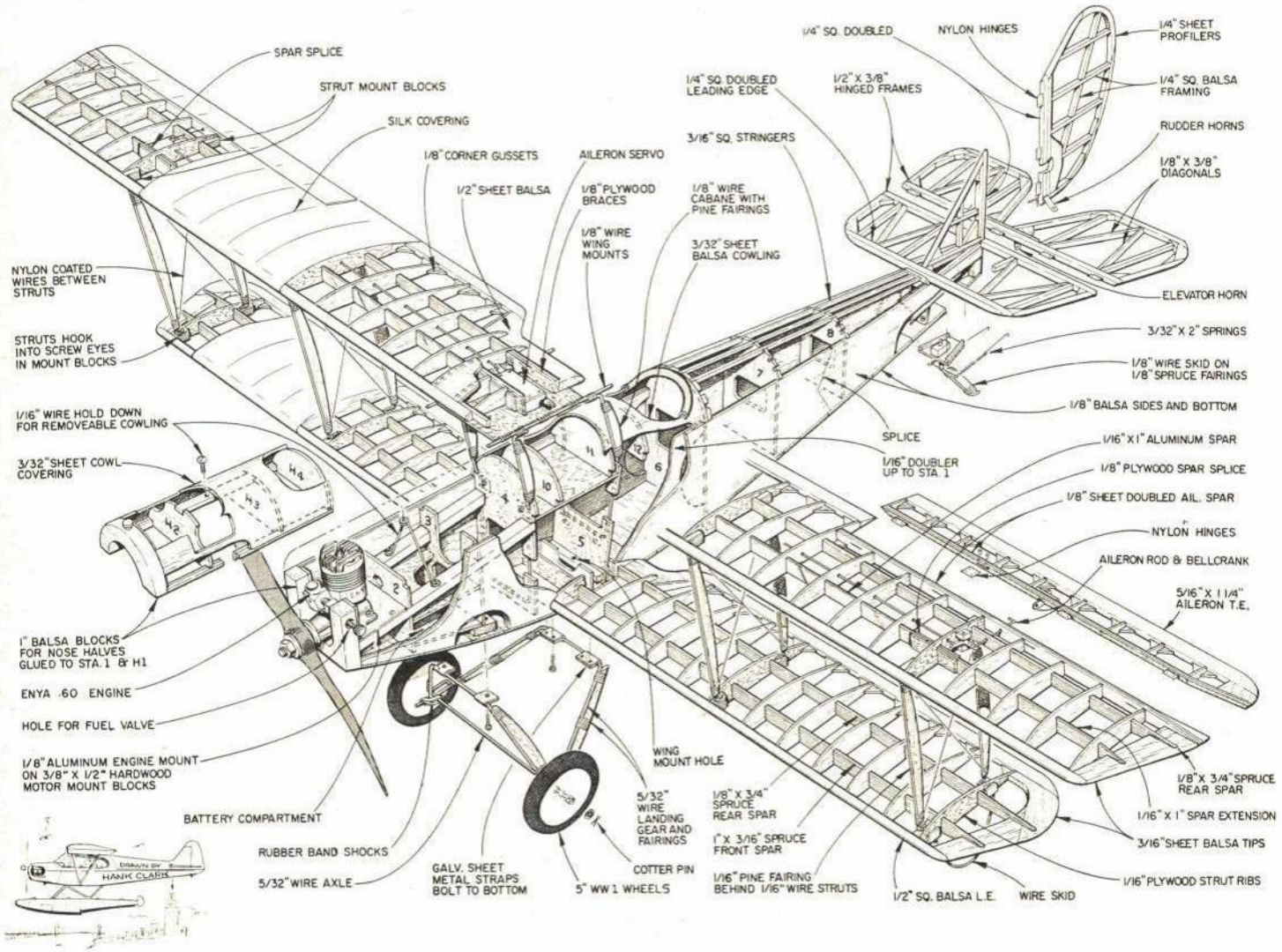
Forward fuselage side panels are made of soft, thin aluminum, shaped and burnished by hand. They are screwed in place over the balsa sides. Dummy engine heads servo as cooling outlets for the hard-working Enya 60 engine.

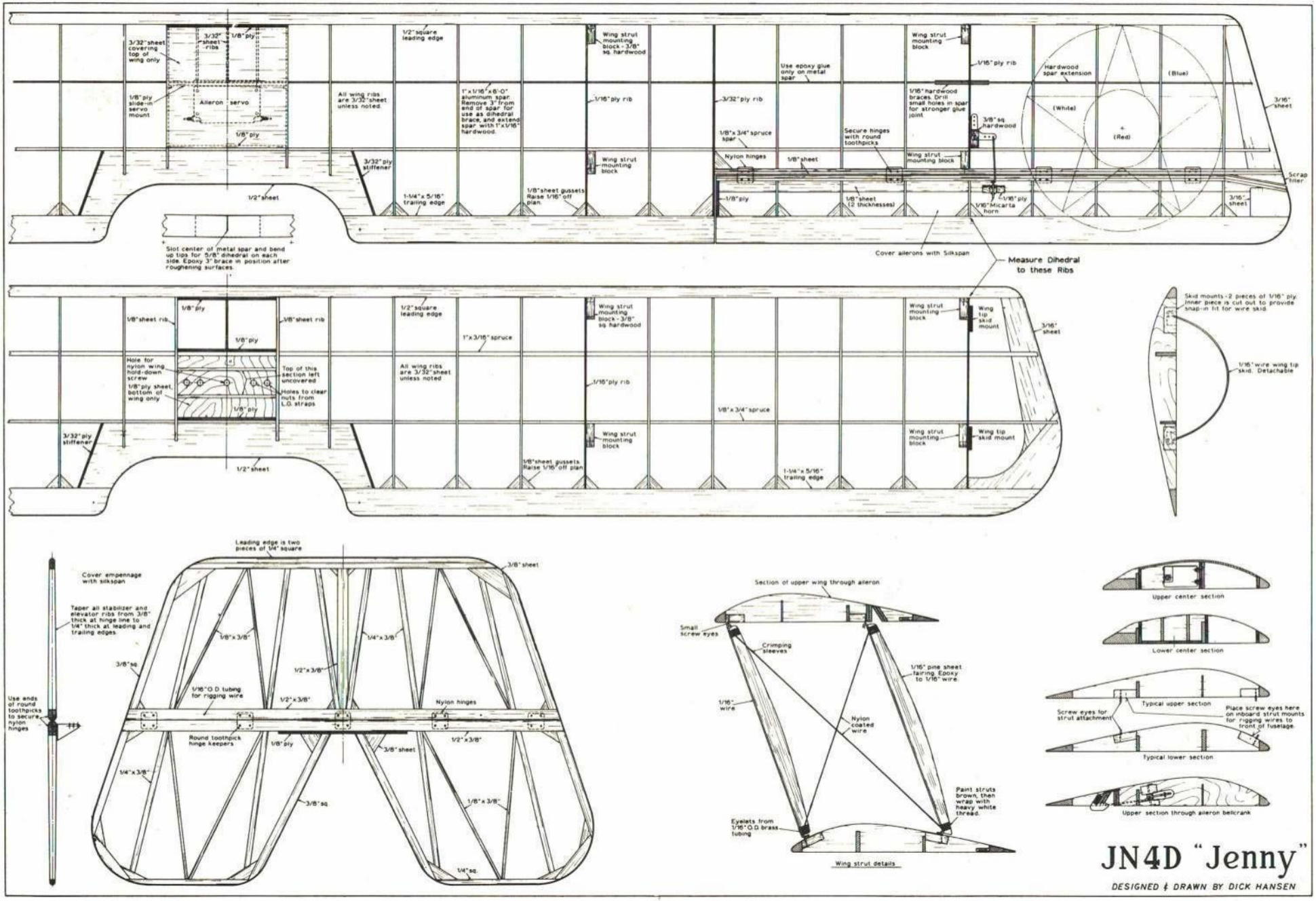
worry too much about weight, except in the tail as this plane could weigh three pounds more and still fly well. Do make sure there is ample cooling for the engine. It is easy to burn one up, as I did in my Aeronca Champ for lack of adequate venting.

Changes made in the plans over the original model are: straight bottom hatch, aileron horns on bottom of aileron, nylon screw for landing gear and lower wing hold-down, although Dzus fastener or camlock can be used. Also the use of a round 8-oz. tank rather than an oval one.

The model has been flying for over a year with only one mishap. That was an engine backfire in the air that resulted in a lost prop nut and washer. She is powered by an Enya 60 and guided by a Kraft KP-6 proportional rig. If you are worried about the metal-to-metal connections causing interference in your receiver, you had best re-engineer these for noiseless operation.

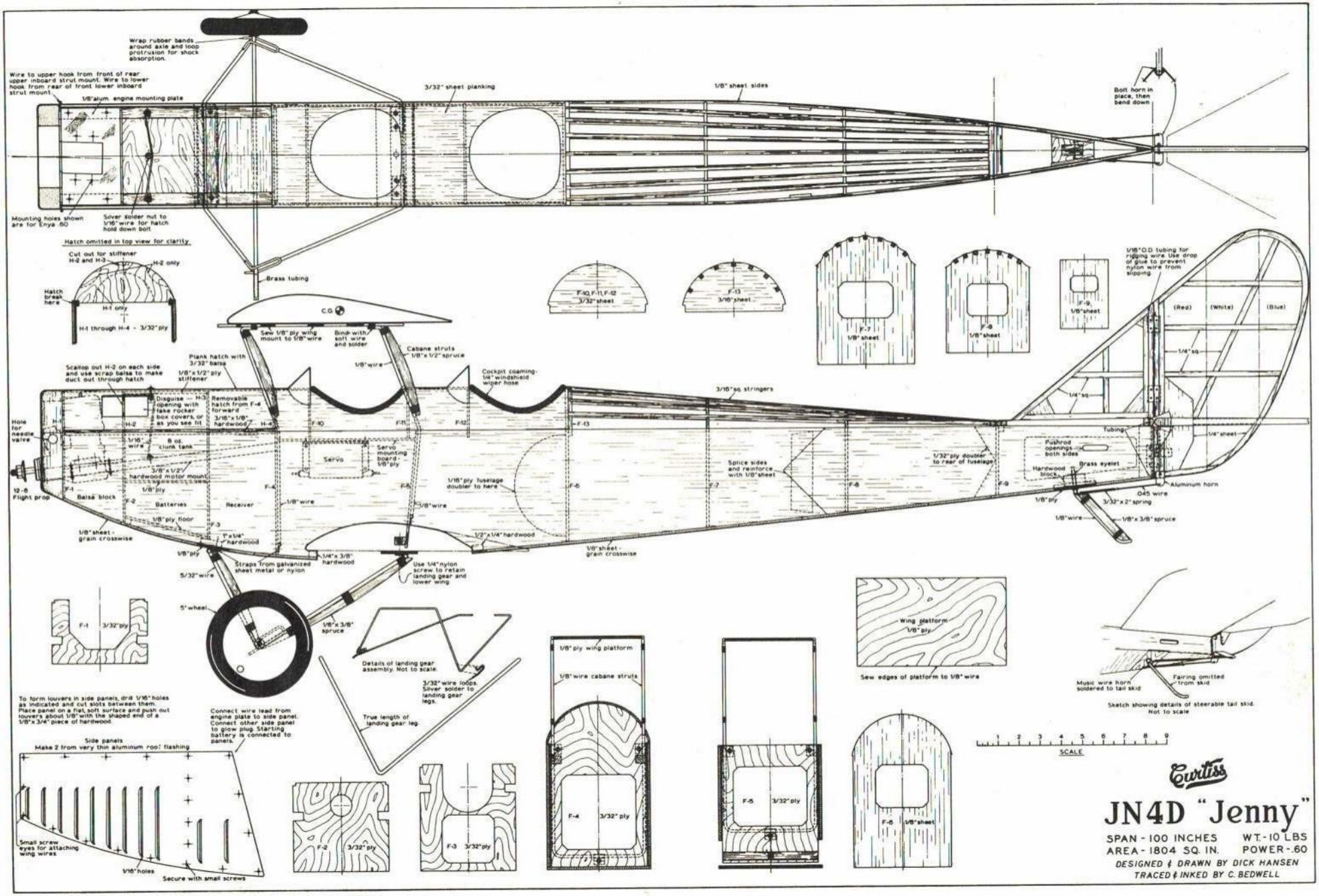
Fuselage: Construct entire aircraft with Titebond glue except where noted. Cut fuselage sides from $\frac{1}{8}$ sheet and splice where shown. Use $\frac{1}{16}$ plywood doubler forward and $\frac{1}{32}$ plywood doubler at the tail. Use contact cement for these. Cut out all formers. Bend cabane struts from $\frac{1}{8}$

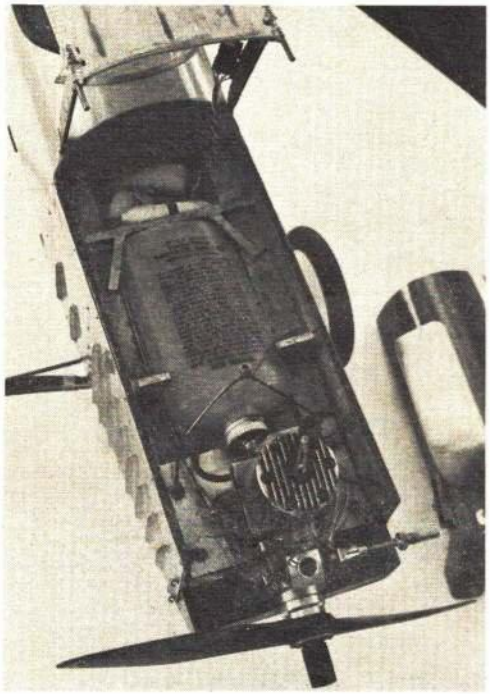


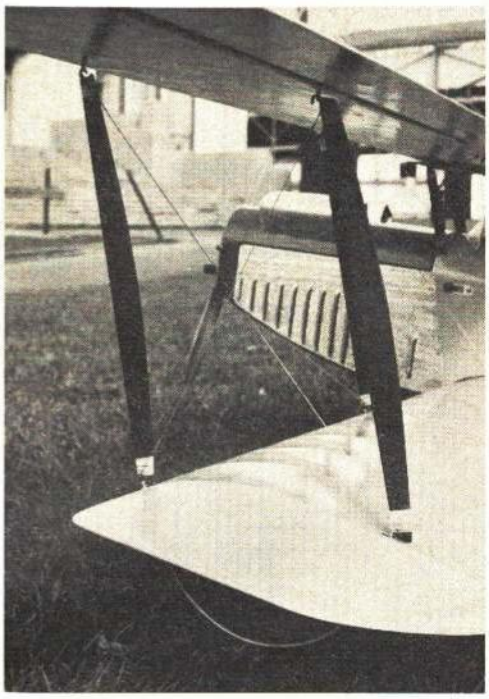


JN4D "Jenny"

DESIGNED & DRAWN BY DICK HANSEN


Wrap rubber bands around axle and loop protrusion for shock absorption.
Wire to upper hook from front of rear upper inboard strut mount. Wire to lower hook from rear of front lower inboard strut mount.
1/8" alum. engine mounting plate
3/32" sheet planking
1/8" sheet sides
Bolt horn in place, then bend down
Mounting holes shown are for Enya .60
Silver solder nut to 1/16" wire for hatch hold down bolt
Hatch omitted in top view for clarity.
Cut out for stiffener H-2 and H-3
H-2 only
Hatch break here
H-1 only
H-1 through H-4 - 3/32" ply
Brass tubing
C.G.
Sew 1/8" ply wing mount to 1/8" wire
Bind with soft wire and solder
Cabane struts 1/8" x 1/2" spruce
1/8" wire
Plank hatch with 3/32" balsa
1/8" x 1/2" ply stiffener
Scallop out H-2 on each side and use scrap balsa to make duct out through hatch
Disguise — H-3 opening with fake rocker box covers, or as you see fit
Removable hatch from F-4 forward
3/16" x 1/8" hardwood
Cockpit coaming - 1/4" windshield wiper hose
3/16" sq. stringers
F-10,F-11,F-12 3/32" sheet
F-13 3/16" sheet
F-7 1/8" sheet
F-8 1/8" sheet
F-9 1/8" sheet
1/8" O.D. tubing for rigging wire. Use drop of glue to prevent nylon wire from slipping.
(Red)
(White)
(Blue)
1/4" sq.
1/4" sheet
Tubing
Hole for needle valve
12-6 Flight prop
1/16" wire
8 oz. clunk tank
3/8" x 1/2" hardwood motor mount
1/8" ply
Balsa block
Batteries
Receiver
Servo
Servo mounting board - 1/8" ply
1/16" ply fuselage doubler to here
1/8" wire
1/8" ply floor
1/8" sheet - grain crosswise
1/8" ply
P x 1/4" hardwood
1/4" x 3/8" hardwood
1/2" x 1/4" hardwood
1/8" sheet - grain crosswise
Splice sides and reinforce with 1/8" sheet
1/32" ply doubler to rear of fuselage
Pushrod openings both sides
Hardwood block
Brass eyelet
Aluminum horn
.045 wire
3/32" x 2" spring
1/8" ply
1/8" wire
1/8" x 3/8" spruce
Straps from galvanized sheet metal or nylon
5/32" wire
Use 1/4" nylon screw to retain landing gear and lower wing
5" wheel
1/8" x 3/8" spruce
F-1 3/32" ply
Details of landing gear assembly. Not to scale.
3/32" wire loops. Silver solder to landing gear legs.
True length of landing gear leg
1/8" ply wing platform
1/8" wire cabane struts
F-4 3/32" ply
F-5 3/32" ply
F-6 1/8" sheet
Wing platform 1/8" ply
Sew edges of platform to 1/8" wire
Music wire horn soldered to tail skid
Fairing omitted from skid
Sketch showing details of steerable tail skid. Not to scale
SCALE
To form louvers in side panels, drill 1/16" holes as indicated and cut slots between them. Place panel on a flat, soft surface and push out louvers about 1/8" with the shaped end of a 1/8" x 3/4" piece of hardwood.
Connect wire lead from engine plate to side panel. Connect other side panel to glow plug. Starting battery is connected to panels.
Side panels
Make 2 from very thin aluminum roof flashing
Small screw eyes for attaching wing wires
1/16" holes
Secure with small screws
F-2 3/32" ply
F-3 3/32" ply
Curtiss
JN4D "Jenny"
SPAN - 100 INCHES
AREA - 1804 SQ. IN.
WT. - 10 LBS
POWER - .60
DESIGNED & DRAWN BY DICK HANSEN
TRACED & INKED BY C. BEDWELL





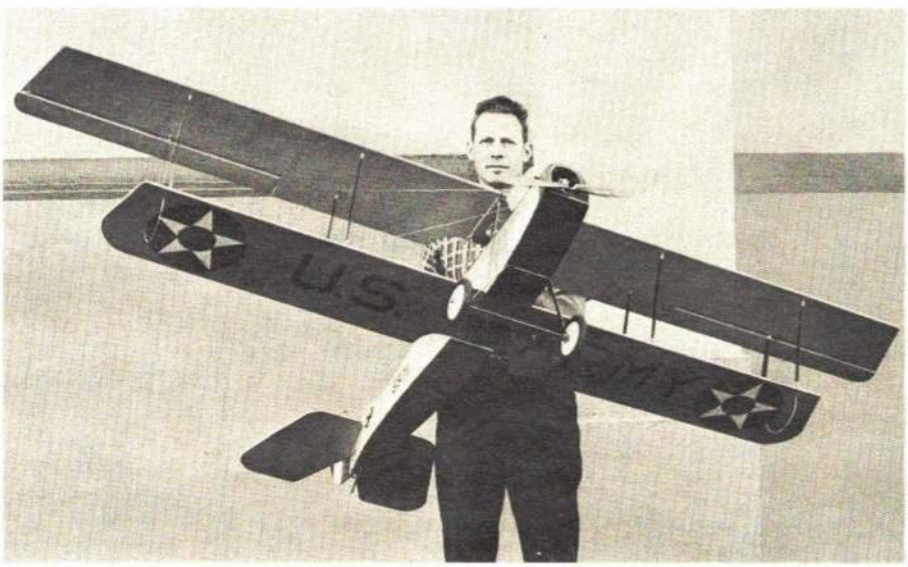
Left: Enya 60 installation offers lots of cooling for the engine, a large oval-shaped fuel tank and break-away motor mounting. Note aileron plug and leads beside left, front cabane strut.

Center: Wood finish on panel and Tatone instruments. There were not many gauges on real Jenny's either! Right: With six feet of wing span, the struts are functional.

wire and fit to formers F-4 and F-5 with straps of galvanized sheet metal before these formers are glued in place. Join halves together at tail and glue all fuselage formers in place. Glue in hardwood engine bearers, forward landing gear mounting block, with blind nuts installed, and top and bottom of battery compartment. Fit lower nose block. Glue the hatch rails together and let dry before pinning to fuselage for hatch construction. Glue in servo mounting. Board under formers F-10 and F-11. Use 1" sq. balsa for nose ring and 1/8 aluminum plate for engine mount.

After hatch rails are dry, pin to fuselage and glue formers in place. Plank hatch with 3/32 x 3/8 balsa strips. Cut cooling holes in each side of hatch, scallop out former H-2 and build air ducts from scrap balsa through each hole. To hide these outlets, I used fake rocker box covers open at the rear; however, you may have better ideas closer to scale. Construct a metal exhaust extension for the engine or build an exhaust duct into the hatch. Hatch is held in place with a single bolt through top of hatch to nut soldered to a loop of 1/16 wire screwed to engine bearers.

The nose side panels are made from very thin aluminum roof flashing. Drill 1/16 holes where indicated and cut slot between them. Place panel on a flat soft surface and push slots out about 1/8 to 3/16 with the sanded end of a 1/8 x 3/4 stick. Screw panels to side with smallest wood screws available noting that two open screw eyes forward are used for attaching flying wires from upper and lower wings.



Author explains that wing tip skids are as important on model as on real Jenny. On grass, all ground handling is easy with the effective, steerable tail skid. However, it takes practice on hard surfaces. Tip skids prevent wearing out wing tips!

Bend landing gear from 5/32 wire and shock loops from 3/32 wire which are silver soldered to main gear. Make axle from 5/32 wire using 5/32 I.D. brass tubing for extension. Drill small hole in each extension to receive cotterpin keeper. Secure axle by wrapping rubber bands around it and extended point of loop for shock absorbtion. Rear landing gear struts are attached to 1/18 plywood plate with metal straps and the whole assembly pivots on the forward gear mount.

Cut two 8-13/16" lengths of 1/8 wire and wrap and solder to top of cabane struts then sew and glue a 1/8 sheet of plywood between them for a wing mount. Cut out cockpit openings after planking top of fuselage with 3/32 x 3/8 strips. Use automobile windshield wiper hose for coaming. Windshields are cut from heavy acetate plastic.

Make aileron servo connector hole near one of the forward cabane struts and secure connection by taping to cabane strut while flying. Glue 3/16" sq. stringers in place and hardwood braces at lower wing opening. Glue 1/8 plywood tailskid mount in place before sheeting bottom with 1/8 balsa. Make tailskid from 3/32 wire and brass eyelets and install before gluing stabilizer in place. Solder 1/32 wire bellcrank to tailskid for steering spring to hook on. Drill and install 1/16 O.D. brass tubing at bottom of tail for tail bracing wire to pass through.

Sand well and cover with silk.

Wing construction, upper: Cut all ribs from 3/32 balsa sheet, except for those indicated as plywood. The 6-foot aluminum spar is available from most building supply stores. You can substitute a thicker wood spar if you like, but it will not flex as well nor be as strong as the metal spar. Cut three inches from the end of the spar for use as dihedral brace. Hacksaw two-thirds of the way down in the center of the spar and bend up so there will be 5/8 under each wing tip. Rough up center area of spar so that epoxy glue will hold well. Extend metal spar to tips with 3/16 hard-

Continued on page 64

The Legendary Supermarine Spitfire Mk-I

The beautiful fighter that saved England in the Battle of Britain.

JOHN N. TOWNSLEY

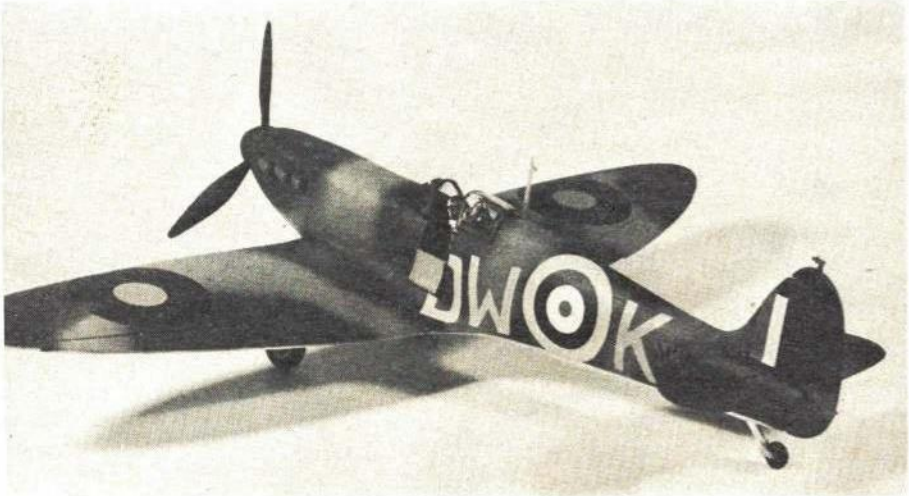
DURING the hectic days of the Battle of Britain in August, 1940, the British pilots in their sleek Spitfires and husky Hurricanes were the deterrents to the Luftwaffe's hopes of an early, easy victory.

Although Sir Winston Churchill's famous, oft-quoted tribute was primarily directed to these heroic pilots as the "few" to whom the many owed so much, their aircraft also must surely be accorded a share of the praise. Even at this early date, these planes were recognized as a paramount value as fighter aircraft; the ensuing four and a half years of varied wartime duty only confirmed and enhanced the earlier, favorable opinion of them.

Our scale model is built from the Revell 3/8" scale Supermarine Spitfire Mk-I. (Kit No. H-282), retailing at $2. The markings are those of the 610th "County of Chester" Squadron, R. Aux. AF, used in the Battle of Britain and stationed at Biggin Hill.

Specifications: One 1,030-hp, 12-cylinder V-type liquid-cooled engine. Span: 36′ 10″; length: 29′ 11″. Performance — maximum speed: 362 mph; rate of climb: 2,350 ft. per min; combat range: 394 mph; ceiling: 31,000 ft; armament: eight 0.303 in. Browning machine guns with 300 rounds per gun.

Color scheme: Undersurfaces of wing, stabilizer, landing gear struts, covers and fuselage below color line are robin's egg blue. Refer to the photos in article for color lines in applying earth brown and dark green camouflage colors on upper surfaces. Dark green portions are sprayed dark green and the lighter areas are dark earth.



Although camouflage color schemes are not difficult, they are not haphazard patterns either. Author tells how to achieve authentic results with either spray or brush.

Preliminary procedures: Check for missing or broken parts. Make test assembly of parts without using cement, to be sure that parts will fit together well. Any parts which do not fit smoothly can be filed until corrected. The kit I used, however, was very free of flash, with well-fitting parts and excellent matt finish decals — truly a four-star kit, recommended for beginner, occasional, and advanced modeler alike.

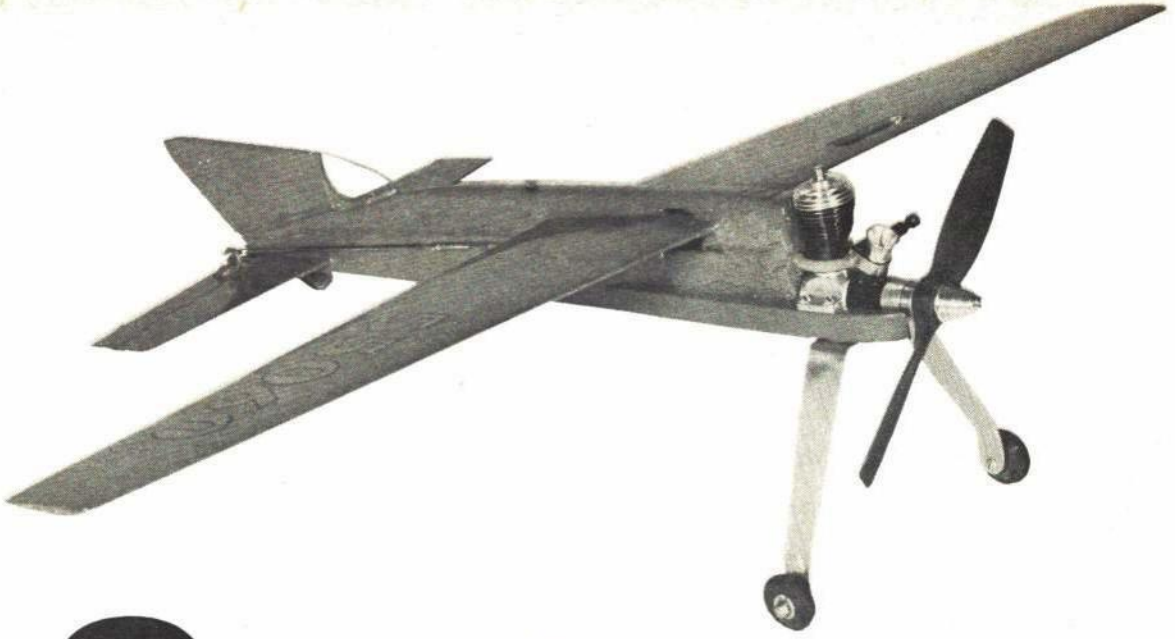
Next, dunk all parts in warm detergent suds, scrub with toothbrush to remove any mold release, then rinse in lukewarm water and air-dry thoroughly.

Painting of small parts: Paint wheel wells yellow-green, wheel centers aluminum, tires black. Main landing gear struts (right and left): aluminum. Radiator screen: black. Paint following parts yellow-green: rear bulkhead, seat and right and left seat frame, instrument panel and pilot area (instruments: aluminum and black). Propeller, spinner, and propeller exhaust: matt black. Landing gear covers: robin's egg blue outside and yellow-green inside. Pilot's uniform: RAF blue; boots, gauntlet gloves, helmet: matt black; parachute straps: gray; Mae West jacket: bright yellow; parachute pack: olive drab.

While handpainted parts are drying, you can do some customizing. Following are some of the mods I incorporated in my model: Aileron hinges on part #53 were cut off. Use scrap styrene to fill up openings in aileron parts 48, 49, 50 and 51. Also, cut hinges from parts three and four on rudder line. Fill up both holes in part #25 (rudder) with scrap styrene. After painted parts are dry, assemble as per kit plan.

Brush-painting: Use a good quality quarter-inch brush (square tip, preferably) to paint bottom of wing with robin's egg blue. Thin your paint with thinner, using enough so that the paint is thin enough to brush on smoothly without runs. Practice on parts of old kits to get the right consistency required. A minimum of four to six hours

Continued on page 52



Santana

A Half-A proto speed plane designed for and flown by a twelve-year-old to first place at the 1967 Nationals. Author tells how you can win with it too.

DALE KIRN

EVER wonder what it takes for a Junior to win an event at the Nationals? More than likely, you probably already have a preconceived idea that it involves a special reworked engine, special fuel and a plane that was built by his Dad. There is no doubt that these conditions have existed for many a Junior who has won an event. But this was not true in the case of the Junior who won first place in ½A Proto at the 1967 Nationals.

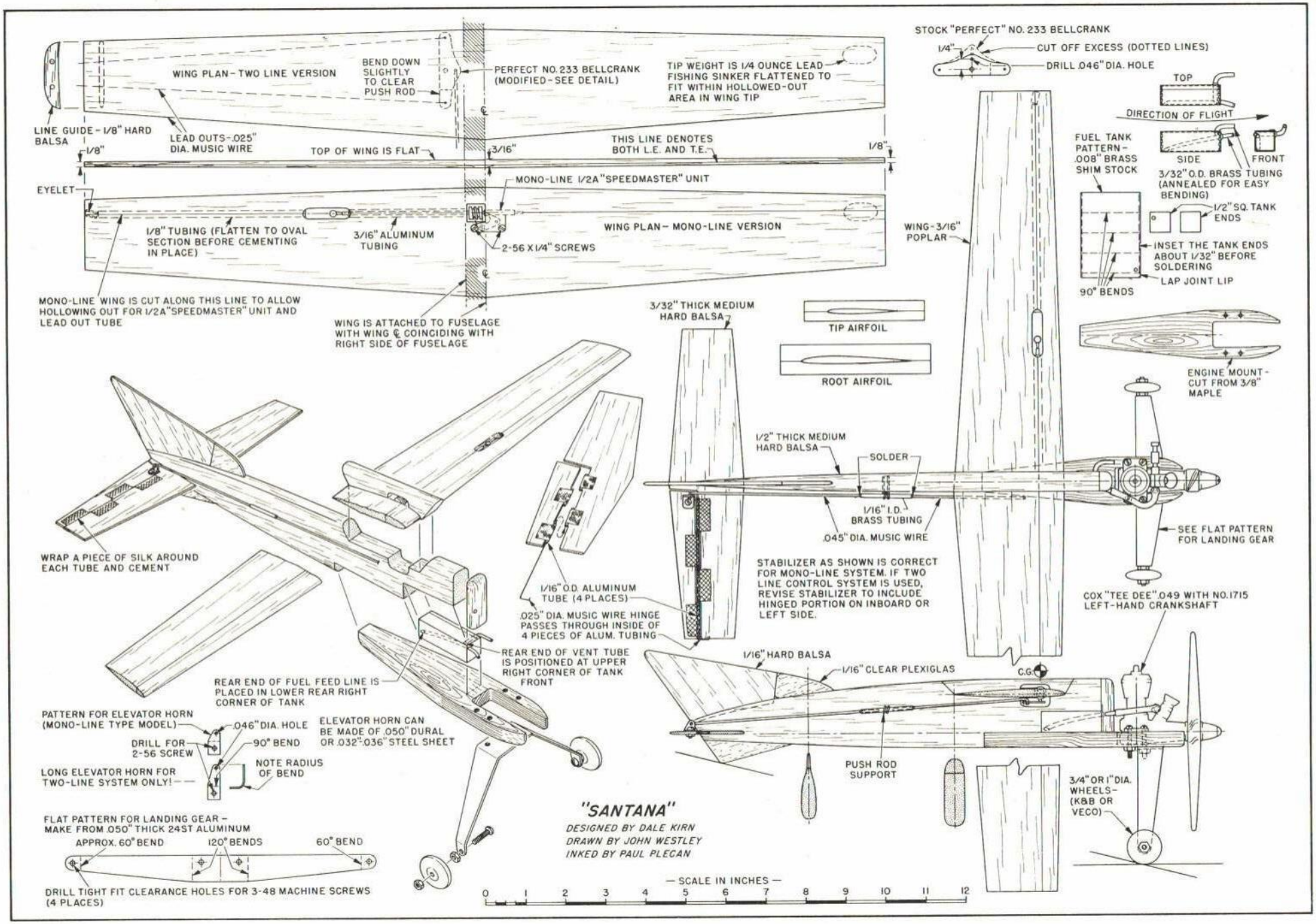
Fortunately, some model clubs have taken a very active interest in helping the younger set, and the results have been very gratifying. A product of one of these programs is young 12-year-old Jimmy Wade of Anaheim, Calif.

Jimmy had his first flying instruction early in June — just seven weeks before the 1967 Nationals. He was trained on a Mono-Line plane equipped with a Cox QZ 049 engine. Since he had never flown a two-line plane before, he caught on to Mono-Line flying quite quickly. After his solo flight (on 50 foot of line), he put in approximately 50 to 60 more flights. As he became more familiar and at ease with the plane, a faster propeller and hotter fuel was used to get him ready for ½A Proto — the event he wanted to enter at the Nationals. Jimmy couldn't miss this opportunity — the Nationals were to be held at Los Alamitos NAS — almost next door!

Within three weeks, he was flying this Mono-Line trainer with a Tee Dee 049 and using racing fuel. He just couldn't seem to get it to go fast enough. Next step was to learn how to fly in a pylon. The solution to this problem was to take off with his wrist already in the pylon. This is not easy to accomplish unless you are flying clockwise. Since he was flying counter-clockwise, a reverse pitch propeller was used to make sure the plane would not turn in at him during that critical first

Jimmy Wade's success at the Nats is a tribute to his gung-ho ability, a fine Junior program, the tutelage of Dale Kirn—and Santana.

Santana is a tough, reliable plane. Engine and landing gear are mounted firmly on hardwood base upon which the rest of the fuselage is built. The tank is above the base and within the fuselage.


WING PLAN - TWO LINE VERSION
BEND DOWN SLIGHTLY TO CLEAR PUSH ROD
PERFECT NO. 233 BELLCRANK (MODIFIED - SEE DETAIL)
TIP WEIGHT IS 1/4 OUNCE LEAD FISHING SINKER FLATTENED TO FIT WITHIN HOLLOWED-OUT AREA IN WING TIP
LINE GUIDE - 1/8" HARD BALSA
LEAD OUTS - .025" DIA. MUSIC WIRE
TOP OF WING IS FLAT
THIS LINE DENOTES BOTH L.E. AND T.E.
1/8"
3/16"
EYELET
MONO-LINE 1/2A "SPEEDMASTER" UNIT
1/8" TUBING (FLATTEN TO OVAL SECTION BEFORE CEMENTING IN PLACE)
3/16" ALUMINUM TUBING
2-56 X 1/4" SCREWS
WING PLAN - MONO-LINE VERSION
MONO-LINE WING IS CUT ALONG THIS LINE TO ALLOW HOLLOWING OUT FOR 1/2A "SPEEDMASTER" UNIT AND LEAD OUT TUBE
WING IS ATTACHED TO FUSELAGE WITH WING ℄ COINCIDING WITH RIGHT SIDE OF FUSELAGE
STOCK "PERFECT" NO. 233 BELLCRANK
1/4"
CUT OFF EXCESS (DOTTED LINES)
DRILL .046" DIA. HOLE
TOP
DIRECTION OF FLIGHT
SIDE
FRONT
FUEL TANK PATTERN - .008" BRASS SHIM STOCK
3/32" O.D. BRASS TUBING (ANNEALED FOR EASY BENDING)
1/2" SQ. TANK ENDS
INSET THE TANK ENDS ABOUT 1/32" BEFORE SOLDERING
LAP JOINT LIP
90° BENDS
WING - 3/16" POPLAR
3/32" THICK MEDIUM HARD BALSA
TIP AIRFOIL
ROOT AIRFOIL
ENGINE MOUNT - CUT FROM 3/8" MAPLE
1/2" THICK MEDIUM HARD BALSA
SOLDER
1/16" I.D. BRASS TUBING
.045" DIA. MUSIC WIRE
SEE FLAT PATTERN FOR LANDING GEAR
WRAP A PIECE OF SILK AROUND EACH TUBE AND CEMENT
1/16" O.D. ALUMINUM TUBE (4 PLACES)
.025" DIA. MUSIC WIRE HINGE PASSES THROUGH INSIDE OF 4 PIECES OF ALUM. TUBING
STABILIZER AS SHOWN IS CORRECT FOR MONO-LINE SYSTEM. IF TWO LINE CONTROL SYSTEM IS USED, REVISE STABILIZER TO INCLUDE HINGED PORTION ON INBOARD OR LEFT SIDE.
COX "TEE DEE" .049 WITH NO. 1715 LEFT-HAND CRANKSHAFT
REAR END OF VENT TUBE IS POSITIONED AT UPPER RIGHT CORNER OF TANK FRONT
REAR END OF FUEL FEED LINE IS PLACED IN LOWER REAR RIGHT CORNER OF TANK
1/16" HARD BALSA
1/16" CLEAR PLEXIGLAS
C.G.
PUSH ROD SUPPORT
PATTERN FOR ELEVATOR HORN (MONO-LINE TYPE MODEL)
.046" DIA. HOLE
DRILL FOR 2-56 SCREW
90° BEND
NOTE RADIUS OF BEND
LONG ELEVATOR HORN FOR TWO-LINE SYSTEM ONLY!
ELEVATOR HORN CAN BE MADE OF .050" DURAL OR .032"-.036" STEEL SHEET
FLAT PATTERN FOR LANDING GEAR - MAKE FROM .050" THICK 24ST ALUMINUM
APPROX. 60° BEND
120° BENDS
60° BEND
DRILL TIGHT FIT CLEARANCE HOLES FOR 3-48 MACHINE SCREWS (4 PLACES)
3/4" OR 1" DIA. WHEELS - (K&B OR VECO)
"SANTANA"
DESIGNED BY DALE KIRN
DRAWN BY JOHN WESTLEY
INKED BY PAUL PLECAN
— SCALE IN INCHES —
0 1 2 3 4 5 6 7 8 9 10 11 12

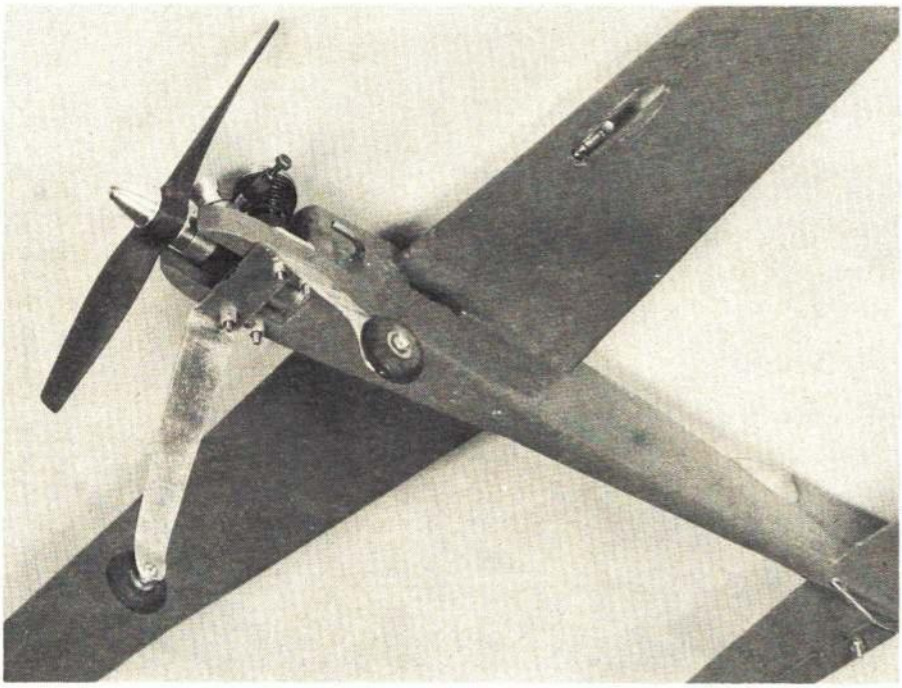
half lap. In no time, he had the technique mastered.

Time was growing short to build and test a ½A Proto for the Nats. It was then that I designed Santana for Jimmy and in no time at all the balsa chips were flying. This plane featured an upright engine with a suction-type tank and Mono-Line control. Jimmy made the plane entirely by himself. Matter of fact, he rebuilt it four times before it was flying and holding together the way it should. A real tribute to the determination of a 12-year-old boy who had his mind set on flying this event at the Nationals.

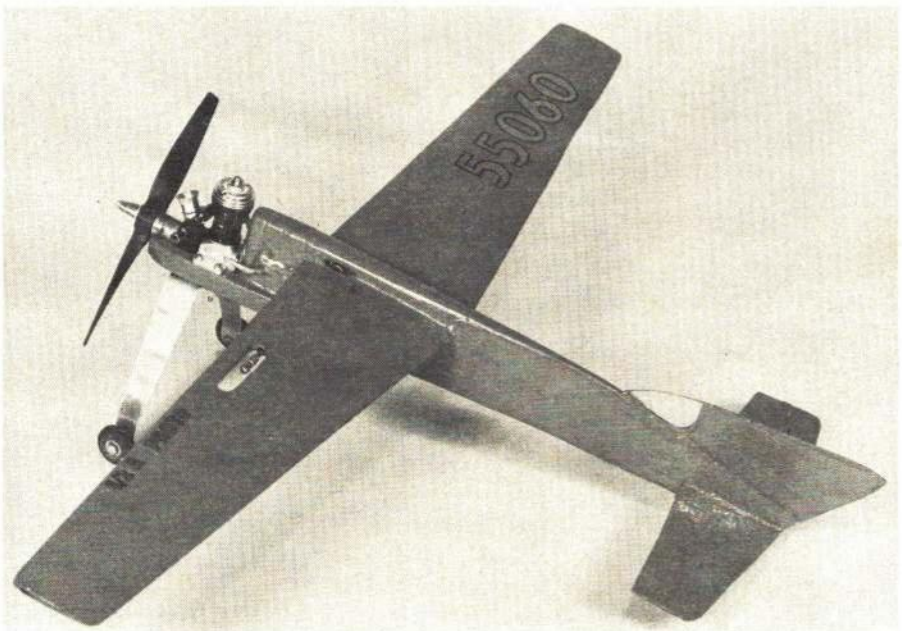
It was powered with a standard Tee Dee 049 that was fitted with a left-handed crankshaft so that a reverse pitch propeller could be used. Nothing else was done to it other than break it in on mild fuel until it was loosened up. The fuel tank was a simple constant pressure type. Only thing different about the location of the tank (for a profile plane) was that it was faired into the fuselage for less drag.

But the biggest factors that made Jimmy win was the proper fuel and propeller combination for the weather conditions at the time he flew. Through prior testing records it was learned that a 5 x 4½ reverse pitch prop and RAMM fuel gave the best results. He merely waited until the temperature reached 78 degrees, and then put in his winning flight.

The propeller was an experimental one made by Cox. Although it was plastic, it was reinforced with fiberglass for ridigity. There were about six of these propellers "loaned" out to any ½A Proto flyer that wanted to use them. Four out of the first five places in Junior ½A Proto were won with reverse pitch Cox props. There is no question in my mind that this reverse pitch propeller route is the answer for a successful ½A Proto flight every time — even for a novice. Cox is now producing a three-bladed (5 x 3½) reverse pitch pylon propeller, part No. 7508. Grish also makes several reverse pitch nylon propellers.



These views of the Santana demonstrate the ruggedness and straight-forward design of this racing model. It is essentially a profile job whose tank and engine blend into the cross section of the body. Cox TD 049 has reverse rotation crankshaft and reverse-pitch, wide-blade, high-thrust experimental prop. The combination really moves!



One final comment before discussing the construction of the plane. The 1967 Nationals was the first contest Jimmy ever entered. He not only won first place, but put in three flawless flights.

Selection of control system: Two control systems are shown on the plans. The winning plane used Mono-Line, but it probably will go nearly as fast on two-lines. Mono-Line is more difficult for a youngster to install correctly as there can be absolutely no binding anywhere in the completed system. It also takes about three times as long to install in the wing.

Two-line is easier in this respect. It is quick to install as everything is mounted externally on the bottom of the wing. If you are looking for the easy way out and plan on using a reverse pitch prop, the two-line system is the answer.

Both systems have their good and bad points. Mono-Line is stronger, safer and faster. But it is much more difficult to install. The two-line system can get you into trouble from the safety aspect. Two .006 lines are safe if the line ends are attached properly and you are extremely careful not to get any kinks in the lines. A sticky control system spells disaster no matter what method of control you use.

Engine: Nothing needs to be done to a standard Tee Dee 049 if conventional propellers are going to be used. However, if you decide on going the reverse pitch route, a left-handed crankshaft (part No. 1715) must be substituted for the regular shaft already in the engine.

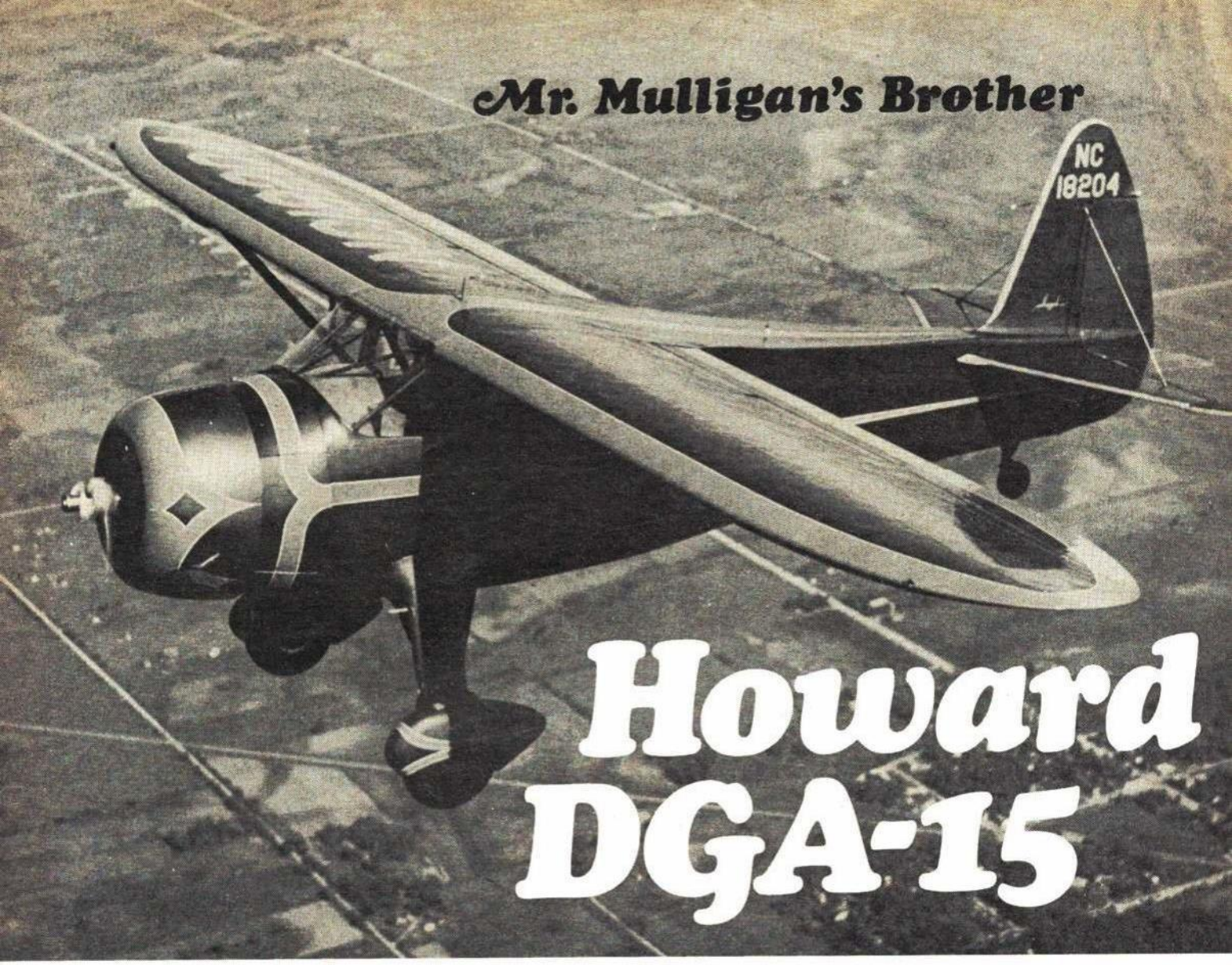
Here is the procedure for replacing the crankshaft: 1) Remove back cover, cylinder, piston and rod assembly. 2) Screw a 5-40 x ½" screw all the way into front of crankshaft. 3) Place back end of crankcase and prop screw between the jaws of a vise. When jaws are tightened together, the drive plate will be forced off the end of the crankshaft. 4) Remove standard shaft and replace with left-handed shaft. 5) To replace drive plate you merely tighten up a propeller back onto the drive plate. Use the regular Tee Dee prop screw and spinner for this operation. Make sure the drive plate is held flat up against the front end of the crankcase before tightening up the prop screw into the new shaft. If it isn't, drive plate will not go on square.

Fuselage: Cut the engine mount crutch out of ⅜" thick maple. Drill the engine mounting holes so that a 3-48 machine screw will pass through them easily. The fuselage is made out of ½" thick medium hard balsa, cut to outline shape. Use a band saw if possible, especially to cut the slot for the stab. A notch will have to be cut just under the wing where the brass cam of the Mono-Line unit is located so it doesn't touch at the point. No notch is necessary for a two-line plane.

Rudder is cut out of 1/16 hard balsa and cemented into position. When it is dry, add the cockpit and tail skid. Both are made out of 1/16 thick plexiglas. When these parts have dried, sand the rear portion of the fuselage to a streamlined section as shown on the plans. Cut and fit the piece that goes over the top of the wing, but do not cement it into position at this time.

Cement the crutch to the fuselage. It is strongly recommended that you use an epoxy-type glue — and throughout the en-

Continued on page 65



Mr. Mulligan's Brother

Howard DGA-15

Excellent fairing of the big, powerful Wright Whirlwind into the fuselage shape on this DGA-8, and the careful fairing of the struts and flying surfaces, gave it a 200-mph cruise.

With Mr. Mulligan and the DGA-15, Benny Howard mastered the racing and commercial fields of aviation.

PAUL R. MATT

DURING the 1935 Cleveland National Air Races, famed racing pilot Benny Howard made headline news with an airplane few experts expected to do little more than make a good showing. The 2050-mile Bendix cross-country race was won by that Damned Good Airplane (DGA-6), Mr. Mulligan. The gleaming white high-wing speedster looked more like a visiting private or commercial product than the racer it was. Piloted by Benny Howard and Gordon Israel, Mr. Mulligan nosed-out Roscoe Turner that rainy Friday afternoon by 23.5 seconds, averaging 238.704 mph for the long flight from Burbank, Calif.

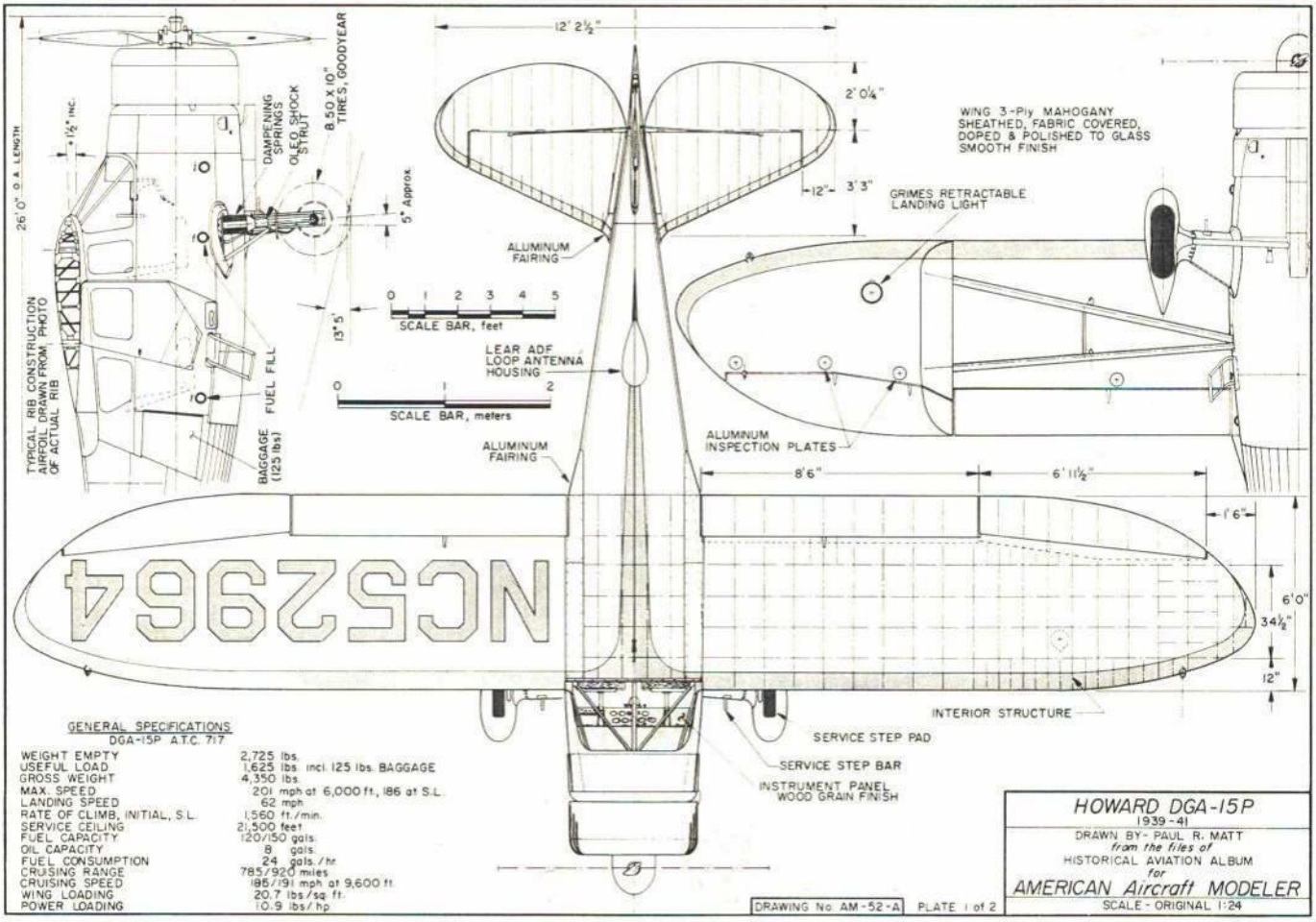
Howard racers won $17,250 prize money in nine major events that year and Mr. Mulligan stood out like a sore thumb as something different among the many special one-place low-wing racers. DGA-6 had a great potential in other fields and Benny Howard readily stated, in an interview, that they were indeed working on a design for commercial production based on the lessons learned with Mr. Mulligan.

The racer was designed and constructed in accordance with ATC requirements and it would only be a formality to have Mr. Mulligan certified for the commercial market. However, Howard and Israel, who worked together on all the racers bearing the DGA symbols, not only wanted a competitive racing machine in Mr. Mulligan, but they also hoped for an efficient four-place private and commercial plane as its future. As Benny Howard expressed it . . . "we wanted a whole airplane, not just half one."

Interest in a modified version was sufficient enough for Howard and Israel to press the new design into the final stages. Late in 1936, the prototype DGA-8 was produced, followed shortly thereafter by the -9 model. The original was powered with a Wright R-760-E2 Whirlwind of 300/320 hp, while the optional -9 featured the Jacobs L-5 of 285/300-hp engine. A series of tests and demonstrations were carried out. Public acceptance appeared ready and on January 1, 1937, the Howard Aircraft Corp. was formed with headquarters at 5301 W. 65th St., Chicago.

During 1937, both the DGA-8 and -9 received their ATC in the four-place commercial and utility category. A third model, the DGA-11, was introduced also. It had the big 400/450-hp Pratt & Whitney Wasp Jr. installed and promised to be the most powerful and highly maneuverable private plane in its class. Its final certification was long and drawn out. After a number of changes and modifications, it was finally put into quantity production some time later as the DGA-15 series.

These commercial versions of Mr. Mulligan were larger machines and featured many refinements making them more suitable to the private market and average pilot. The wing was enlarged from the short Mulligan span of 31 ft. to 38 ft., the wing area thus increased from 137 sq. ft. to 185.52 sq. ft. The surface area of the tail planes were similarily increased and the landing gear underwent the oleo and spring treatment, abandoning the simple

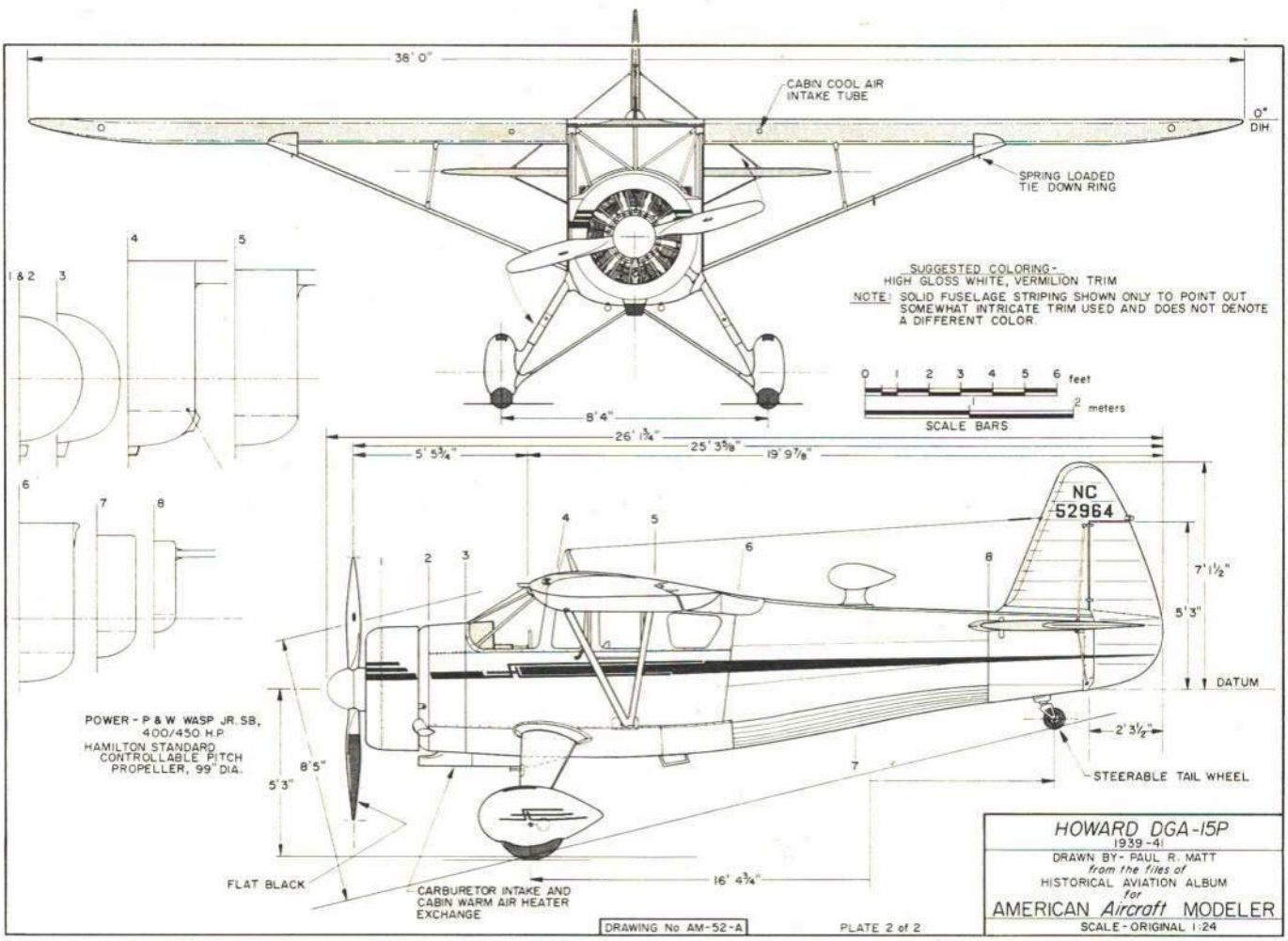


GENERAL SPECIFICATIONS
DGA-15P A.T.C. 717

WEIGHT EMPTY	2,725 lbs.
USEFUL LOAD	1,625 lbs. incl. 125 lbs. BAGGAGE
GROSS WEIGHT	4,350 lbs.
MAX. SPEED	201 mph at 6,000 ft., 186 at S.L.
LANDING SPEED	62 mph
RATE OF CLIMB, INITIAL, S.L.	1,560 ft./min.
SERVICE CEILING	21,500 feet
FUEL CAPACITY	120/150 gals.
OIL CAPACITY	8 gals.
FUEL CONSUMPTION	24 gals./hr.
CRUISING RANGE	785/920 miles
CRUISING SPEED	186/191 mph at 9,600 ft.
WING LOADING	20.7 lbs/sq. ft.
POWER LOADING	10.9 lbs/hp

DRAWING No. AM-52-A PLATE 1 of 2

HOWARD DGA-15P
1939-41
DRAWN BY- PAUL R. MATT
from the files of
HISTORICAL AVIATION ALBUM
for
AMERICAN Aircraft MODELER
SCALE - ORIGINAL 1:24



DRAWING No AM-52-A PLATE 2 of 2

HOWARD DGA-15P
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for
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SCALE - ORIGINAL 1:24

hard-rubber shock mount used on the racer. The cabin appointments were more luxurious and more suitable instruments were installed.

Throughout 1937 and 1938, sales were sufficient enough to keep the small plant busy but orders were received one at a time, custom needs, and hand-crafted items were orders of the day. During 1939, a re-organization, re-financing and re-engineering program was undertaken. Concentration was placed on getting greater utility out of the design and promotion of the plane as a worthwhile investment. The plane was not just a good private aircraft. It was fast enough, and had ideal appointments for even the most discriminate corporate use. Besides, its inherent stability and over 21,000 feet service ceiling made it valuable for aerial mapping and photography. These features had to be brought out and they also had to be built into the aircraft itself.

Considerable attention was devoted to the pilot and passenger requirements. The cabin was enlarged, making it a five-place machine. The window area was greater, with a higher windshield affording better pilot visibility. There was increased fuel tankage. The wheel tread widened and the tail surfaces again enlarged. This final refined version became the DGA-15 series.

During the year, a few DGA-12s were built which, powered with the 330/350-hp Jacobs L-6 engine, were prelude models for the more familiar and most popular DGA-15s. The market opened more readily with these developments. By 1940, the Howard facilities were doubled and personnel increased to meet the expansion of DGA-15 production. During the year, ATC 717 was granted three models, the -15P with P&W Wasp, -15J with 330/350-hp Jacobs and the -15W with 350-hp Wright E-2.

Mr. Mulligan's brothers were true pilot's airplanes, powerful, fast, highly maneuverable . . . one had to keep ahead of the ship at all times. Still they were stable, easy to control and respected for their strength and ability to out-perform anything in their class. Once the throttle was opened, you knew you had a bundle of power and spirit at your command. The DGAs can be put in the class with the Stinson Reliant, Spartan Executive and Waco E, but with a bit more performance to call upon. The DGA-15P had a list price of $19,885. This included everything except minor optional equipment. No piker, it cruised at 187/192 mph on 75% power, could hit 201 mph at 6,000 ft. and still land, with full flaps, at 60/62 mph.

Construction of the fuselage was of rectangular welded steel tube, aluminum-covered nose and cabin area, and faired fabric-covered aft. Tail surfaces were fabric covered over welded steel tube framework. The wings were built of solid spruce spars, spruce ribs and covered completely with three-ply mahogany. The final finish was an envelope of fine fabric, doped over the mahogany, and hand-polished to a smooth finish. The result was a wing approaching a plastic smooth surface, cutting drag to a minimum, a heritage from previous Howard racing aircraft. The flaps and ailerons were of similar construction and finish. All wing components were hand-crafted at the Kroehler Furniture Co. in Kankakee, Ill.

Another carryover from Mr. Mulligan, and somewhat of an engineering innovation, was the positioning of the fuel tanks in the belly of the fuselage. This feature had several advantages and one serious disadvantage, according to some pilots and engineers. In favor of the belly tanks is the lowering of the center of gravity. In a high-wing design this promotes unusual stability, especially in rough air. Some pilots reported you never lost your heading with a Howard, but with full tanks and rough air, you sure felt a pendulum swing. This feature did make for a comfortable ride and it is always easier to fly on instruments under stable conditions. In addition, far more tankage could be employed, and the wings could be kept clean and thin in airfoil section. This gained speed and the wing could be light-weight and simple in construction.

Three separate tanks were employed in the fuselage of the DGAs. Normal capacity was 40 gals. per tank, but an oversupply of 150 gals. total could be accommodated.

Continued on page 50

The DGA Howard's were fast, powerful, and highly maneuverable pilots' airplanes. And they were roomy, comfortable — steady flying machines much liked by the passengers.

Even the popular DGA-15p looked like a racer. The aluminum fabric-over-steel-tube fuselage and plywood-fabric covered wings were always finished to a gleaming polish.

An unusual feature was the fuselage fuel tanks which permitted the thin airfoil wing. Refueling was easy at waist height. With full tanks, the low CG was a stabilizing pendulum.

First, hand-glide your new model. Pick an elevated spot, so it will stay aloft long enough to settle down to normal flying speed and start to show any signs of a turn.

DESIGN AND FLIGHT
RUBBER-POWERED MODELS

Fork-like arms of the winding stooge hold the model's fuselage. Pin through the rear motor peg transfers winding pressure to the stooge. Sturdy winder is also important.

Part II: design and construction of the propeller; a rubber motor's care and treatment; and flight trimming.

FRANK HEEB

THERE is no argument that the two-blade folder is the best configuration, but the single-blade folder does offer some advantages. The beginner, sport or non-competitive builder can do well with it. Ease of carving, folding, and no blade matching are in its favor. And a well carved single blade folded neatly against the fuselage is better for the glide than two mismatched blades that don't fold properly.

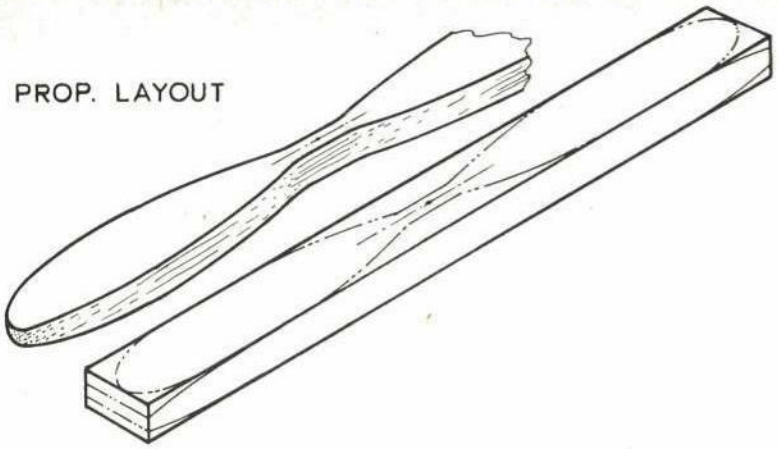
Theoretically, a pitch/dia ratio of 1.5 is necessary for maximum propeller efficiency. Such a high ratio is seldom used now, especially in Wakefield; 1.4 oz. of rubber simply isn't enough power to turn a 22 in. diameter prop with 33 in. pitch. Over the years the 22P-22D (plus or minus a couple of inches) evolved and is practically the standard Wake size. Surprisingly enough, Joe Foster won the 1953 Wakefield Trophy with a 22-22 driven by over 5 oz. of rubber, and that size has stuck with us as rubber weight went to 2.8, 1.7, and now 1.4 oz.

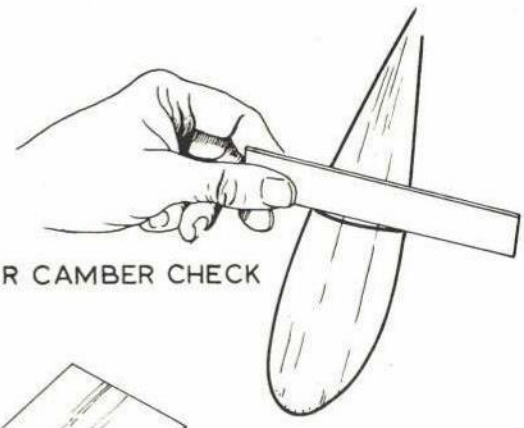
For the last rule change, I reduced my blade width about ⅛ in. and the pitch from 24 to 22 and retained the 22 in. dia. Large dia/low pitch is the rule for rubber limited events. Maybe 24 or 26 in. dia with 18 or 16 in. pitch is even better — this is an important area for experimentation. The big unlimiteds need more pitch and blade area to use their longer, heavier motors efficiently. I use a 24 in. dia/28-in. pitch wide-blade prop and get a 1½-minute motor run.

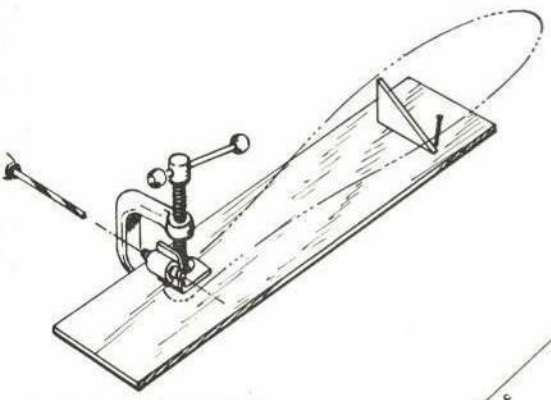
An accurate airfoil section must be maintained for the whole blade length. The blades must be visualized as small wings that lift forward as they rotate. Excessive undercamber (blade shaped like a scoop) causes drag and absorbs energy from the motor. An undercamber of no more than ⅛ in. and maybe a lot less, is best for a blade width of 2 inches. I have never liked the concept of a flexible Wakefield prop blade that increases pitch during the first part of the power run. A blade that flexible isn't strong enough for me, and the excessive high pitch certainly absorbs power just when it is at maximum. This is fine for indoor models with 60% of the gross weight in rubber, but we don't have a power problem, nor any power to waste, with only 1.4 oz. of rubber.

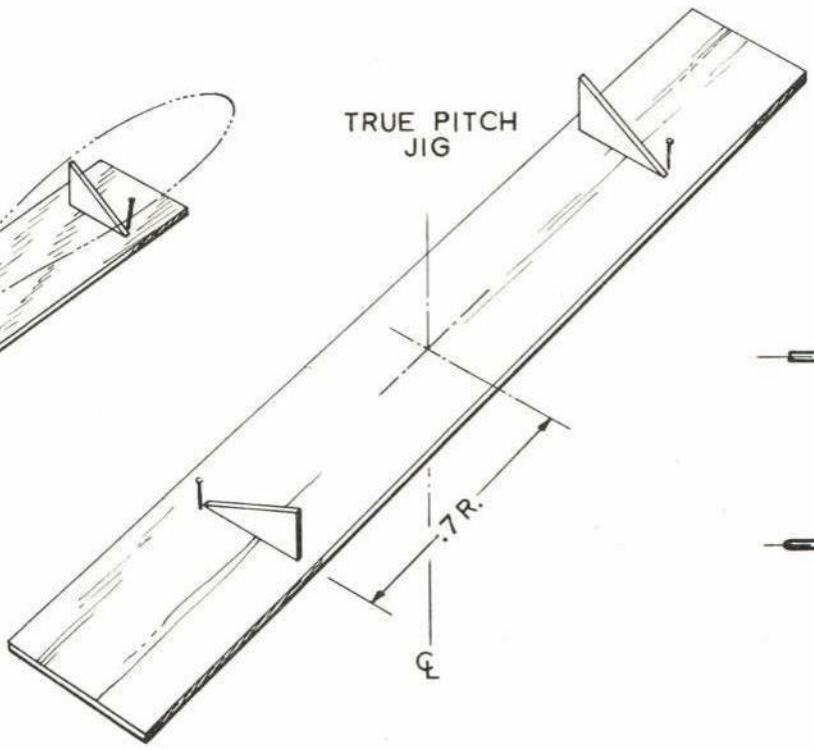
It is important to lay out the prop outline accurately so that true pitch will result when the block is carved across the diagonal. With the pitch, dia., and front blade shape known, I lay out the full-size front view on graph paper. Next, I plot the side elevation block thickness from the "radius vs pitch divided by 2 Pi" chart. This chart is widely used; with the pitch and diameter known, the pitch angle and block thickness can be determined at any radius. Several U. S. and British articles have been published on this true pitch method of prop layout.

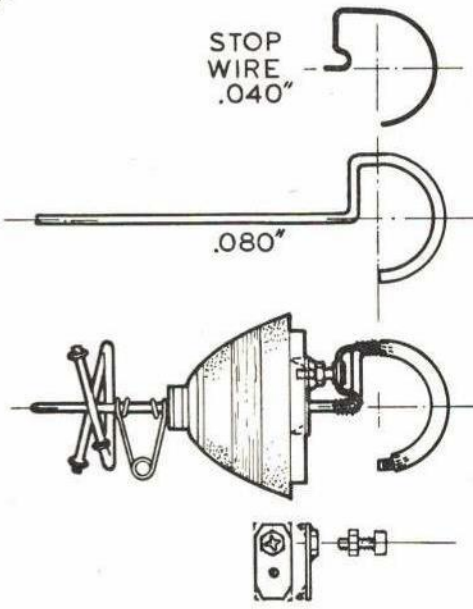
I always jig or band saw out the front view first. Then I glue the sawn-away marked pieces back in place; next I saw the side view. I mark the leading and trailing edges with a grease pencil so that I won't cut into them. After carving in the usual manner (undercamber first) and rough sanding, I mark the radii at 1 in. increments with a grease pencil on the un-











dercamber. Now the painful part: I lay a straight edge chordwise over each mark, holding the prop so that the straight edge shadow falls on the undercamber. This quickly checks two things: the depth of the undercamber and its true shape. I purposely carve the underside slightly shallow so that I'll have wood to remove to correct any errors. I work from the center out, carve and sand the area at one radius, then do the same radius area on the other blade. Admittedly this requires judgment, patience, and a lot of time, but when you're done you know that both blades match as well as the effort that was put into them. Since I want a rigid blade, I cover with tissue, apply 8-10 coats of talc and dope mixture, sand between coats, etc.

Prop hardware and fittings: Soldered wire or machined aluminum prop hubs are used on 90% of all modern contest rubber models. Both are good, strong, and reliable. Since first-class, small machine tools are required to make some of the bar stock hubs shown in the magazines, I prefer to suffer with wire bending and soldering. I have used the Z-shaped wire hub since 1952 and have never had a solder joint fail — blades will break off first on impact.

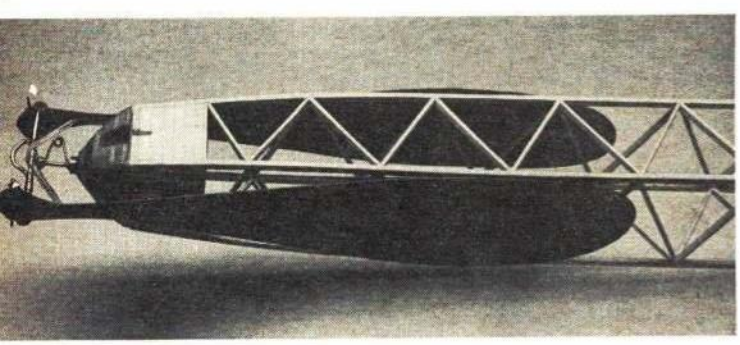
The important things that help maintain accuracy in the wire-construction hub are the two simple jigs shown in the sketches. One is a drill jig for drilling the fold hinge holes in the blades. The other is a

Continued on page 59

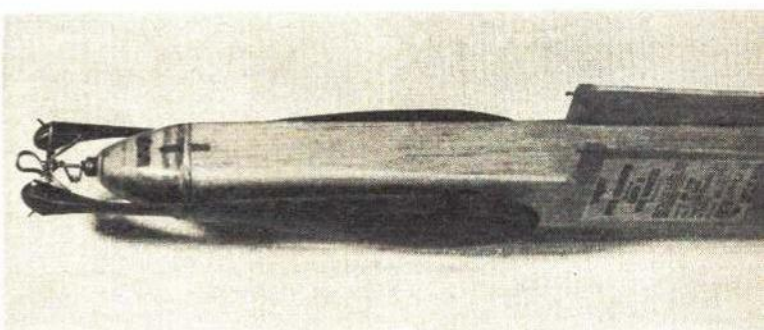
No. of strands ¼ flat Pirelli	10	12	14	16	18	20
Turns per in., broken-in motor	29	27	24	22	19	17

These values are the ultimate limits, or failure points.

Use this turns chart as a guide to maximum turns that can be expected. Later, design your own to suit your stock of rubber, your break-in procedure and flying conditions.



Large prop and lightweight airframe identify an Unlimited model. Rubber band at prop's hub keeps the blades snugly folded.



Wakefield model's sheet fuselage guards against "blown" motor damage. Marks on nose block help key it correctly in fuselage.

Technical Notes

Dual-nosed glider: Having flown an R/C glider with a .09 engine on the nose for some time, Dick Sarpolus (34 E. Highland Ave., Atlantic Highlands, N. J. 07716) made a streamlined cowl for the engine, per our sketch. It was fabricated from several layers of fiberglass over a wooden form, using Hobbypoxy cement. He also made another cowl which almost completely encloses the engine, for use when flying the glider via Hi-Start. Our heavy dotted lines show the power cowl, and lighter lines the streamline job. Thus, the glider may be quickly changed from one mode to the other without having to remove the engine and rebalance the glider. Small screws hold either cowl onto the nose.

Keeping dirt out: Usable with either reed or propo servos is an idea from Tiny Harley (318 East Ave., N. Augusta, S. C. 29841). He was bothered by dirt and dust getting into the servos of his Citizen-Ship propo outfit, and cut a shield of thin plastic for each, per drawing. In this case, the shield was put inside the case, held firm by the two screws that hold the servo output arm. The plastic should be thin, and as large as possible without binding inside the case. Some of the thin, tough plastic sold for making control surface hinges should be ideal for this purpose. If you can't get the plastic inside the servo, even a piece on the outside should be better than none at all.

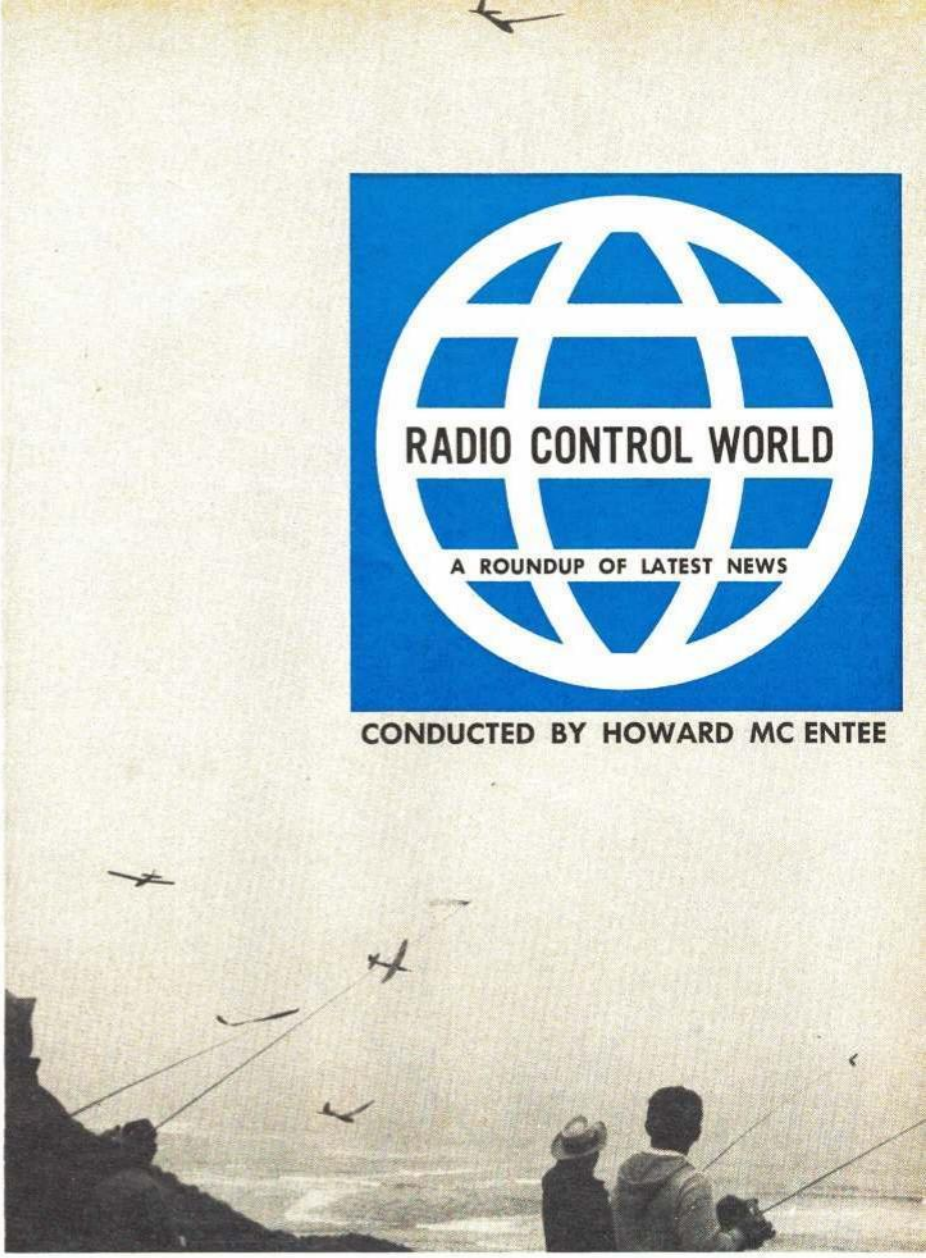
Adding a tailwheel: Needing a tailwheel on a plane that had never had one, Austin Leftwich (907 Drexel Hills Blvd., New Cumberland, Pa.) pivoted the wheel wire in a tube cemented into the fuselage tail. A washer soldered to the bottom of the wire acts as a bearing point on this tube. The rudder was given an oversized slot as depicted, and upper wire end was placed therein, after the slot had been filled with Clearseal (any other of the rubbery forms of cement would do as well). This cement allows for any misalignment of the wire and rudder hinging, also takes up some of the shock while taxiing.

Helpful printer: Since the exact twice-size printed circuit board drawing for the Albin receiver (p. 35, May '68 issue) was not quite full column width, our helpful printer simply extended the right edge about ⅛" to such width — thereby neatly shorting out the whole works! Note that the PC drawing should be clipped on the right so that there are four separate sec-

RADIO CONTROL WORLD

A ROUNDUP OF LATEST NEWS

CONDUCTED BY HOWARD MC ENTEE



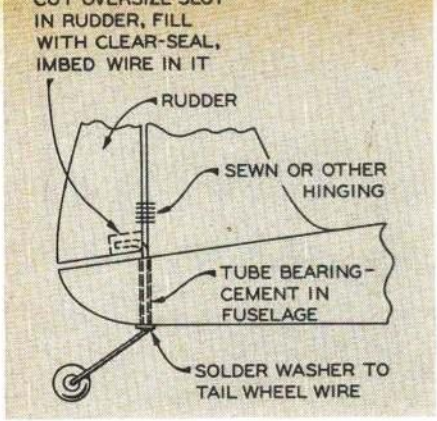
A gaggle of gliders. Six at one time during a practice session over the high cliffs of the Pacific Coast. You can't safely fly six powered jobs at one site!

An editorial — *(R/C models today are just too expensive — in both monetary value and in the tim*

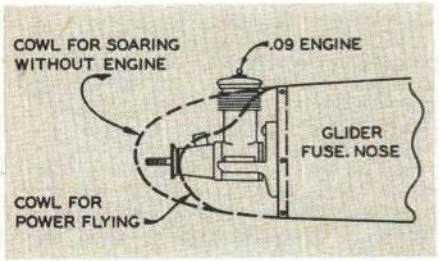
IT has been something of a surprise to us to find that many flyers who operate (most of them legally!) on the amateur 50-54 MHz band don't know that there is a group of recommended spot frequencies set up by the AMA for such use — others may have heard about these spots but don't know what they are. Though they have been mentioned in this and other magazines before these are the spots and the ribbon colors to go with them: 53.10 MHz (black-brown); 53.20 MHz (black-red); 53.30 MHz (black-orange); 53.40 MHz (black-yellow); 53.50 MHz (black-green); 51.20 MHz (black-light blue); 52.04 MHz (black-violet).

The first five spots are for exclusive superheterodyne use, the last two for exclusive super-regen use. This is the only R/C band where there is enough room to operate both hets and regens together (latter not allowed on 72 MHz). It should be evident that the significant feature of all the 50 mc ribbons is black. This is the "band designator," just as a white ribbon is utilized with certain ribbon colors to show specific spot frequencies on the 72-76 MHz band. You'll note the color sequence is the same as on 27 and 72; it starts with brown and follows the resistor color code thereafter. It was felt best to deviate a bit from the general scheme of employing brown for the *lowest* spot frequency, as has been done on both 27 and 72, to emphasize the fact that on 50, the two *lowest* spots are for regens only.

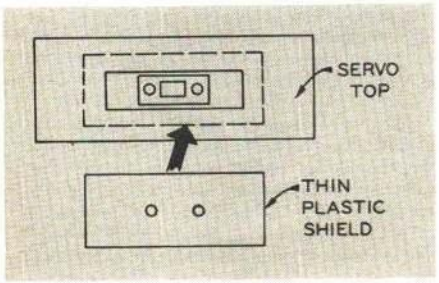
Some may ask why were these rather odd spots chosen. And why we can't use all the rest of that space in the 50 MHz band for R/C too. The AMA Frequency Committee spent much time weighing *all* the factors involved. These include harmonics from the 27-mc spots, image frequency spots of receivers, and other subtle matters we won't go into now. Just on the matter of images, most R/Cers don't know that their supposedly extremely-sharp-tuning superhet receiver can operate within a reasonable number of megahertz from adjacent spot frequencies — but that it is relatively wide open to a frequency two times the intermediate frequency of the receiver (generally about 900 KHz, and generally lower than the nominal receiver frequency) away. For example, a receiver on 53.10 would be vulnerable to a strong signal on about 52.20 MHz. But the AMA-suggested spots have taken this into account, and all the R/C spots are safe from interference of other nearby R/C transmitters.



Leftwitch's easy and durable method of attaching tail wheel to Goodyear racer also offers some shock absorption.



Interchangeable noses! Sarpolus uses either noisy nose or noiseless nose and gets more flying with one glider design.



Any means of keeping dirt out of servos is worth repeating. On Citizen-Ship servos just add piece of sheet plastic.

tions of copper (the black areas) there. Some experimenters have had problems adding a dual output circuit in the usual manner, which requires just one added transistor, to operate such dual coil actuators as the Adams.

The circuit shown on p. 34 of the Albin article works O.K., but is more complex than really needed. The simpler circuits produced a form of oscillation, but there is a fairly simple cure. Bill Albin designed this circuit expressly for a single coil actuator. He originally had a decoupling filter as shown on the partial circuit herewith, but removed it, since it wasn't found necessary with such an actuator. But if you want to add the usual single transistor setup to this circuit, probable oscillation troubles will be prevented by adding the 10 mf electrolytic capacitor and 220 ohm resistor we show here; note shift of 3V + connection also. These additions will have no effect on the circuit for single-ended actuator (or escapement etc.) use, of course. Albin is presently experimenting with a simple audio filter addition to his receiver, which will make it much less bothered by nearby signals; we'll include full info in A.A.M. when Bill is satisfied with his results. The revised circuit will also include dual-ended output.

72 MHz transmitter output: Interesting list of transmitter input and output powers has been received from Nate Rambo (1158 Baywood Ave., Camarillo, Calif. 93010), who found it in an FCC listing of R/C equipment approved for use on 72 MHz, as of Jan. 1, 1968 (there are doubtless many more makes approved by now). Transmitter make comes first, then DC power input to final amplifier of transmitter, and lastly the RF power output of transmitter: Bonner, 1W, .72W; Logictrol, .8W, .2W; Kraft, .4W, .2W; Micro-Avionics, .85W, .5W; Citizen-Ship, .4W, .075W; Orbit, .66W, .35W; PCS, .4W, .2W. It isn't known whether these figures are for the very latest lines of each make; they are all for full house digital equipment, however. Incidentally we'd like to note here that the photos of a slick aerobatic Chipmunk on p. 31 (June '68 issue of A.A.M.) may show a plane belonging to Art Scholl, but the smiling countenance in lower pic is our ole buddy, Nate. Someone must have given insufficient caption info!

Bonner mods: A most interesting report of info he obtained during a visit to the

Ed Von Adelung at 74 proves that model flying will keep you young! He flies and wins open pylon racing events.

Bonner factory has reached us from Major James Burwell (QTRS 1662A, Fort Belvoir, Va. 22060). Too long to print here verbatim, but these excerpts should be useful. Jim was told that on Bonner 4RS digital outfits numbered below 48,000, the factory will update the servos for $2 each (ship just the servos to Mr. Frank Kagele, Bonner Specialties, 9522 W. Jefferson Blvd., Culver City, Calif. 90230 — or ship entire outfit if you want the full system checked and aligned; Frank assures that you will miss no more than one weekend of flying). The servo mods include increasing output arm travel, replacing ringed rollers with a new plastic ring for increased reliability. New half servo cases cost 50c each. Send system parcel post, **Special Handling**; Kagele says it will then go airmail anyway. The ITT connectors used on this system cost $2-$3 for each half; due to unusual construction, male halves are called female and vice-versa, so send a drawing of the exact pieces you want. They come with wires (about 6" long) attached, and are sealed, as on servos.

Warning that plane battery is going dead is that you will need definite down and right trim; land fast! There may also be some sluggishness in such maneuvers as

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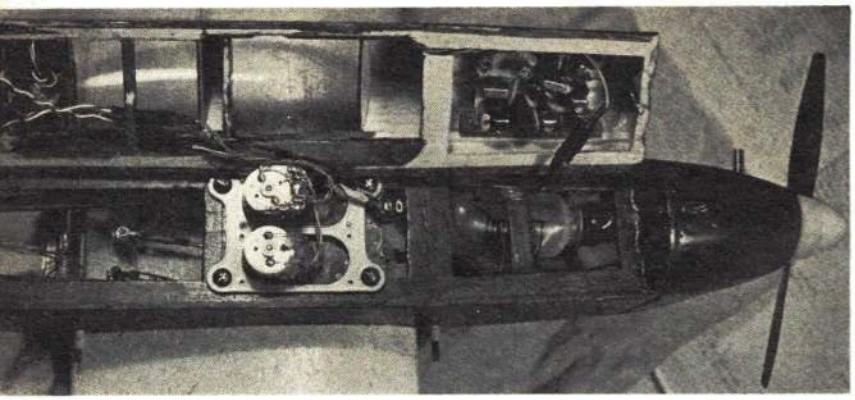
invested — to risk their being wrecked by some idiot bootlegger.)

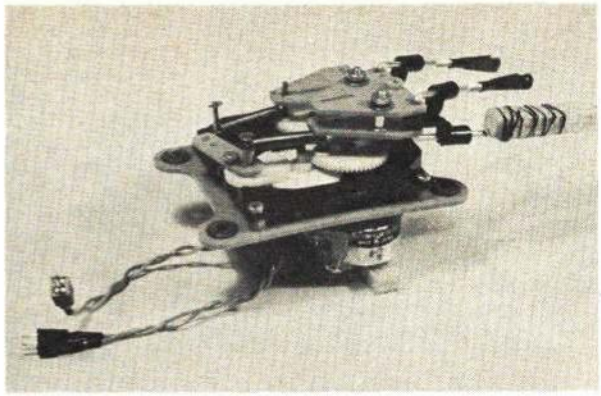
As for using more space on the 50 MHz band — makers of 50 MHz gear now have to stock crystals for at least the five superhet spots — in addition to what they must carry for 27 and 72 MHz. Let's not ask them to stock a *larger* number! As for the flyers themselves, we have five spots on 27 MHz (six, if you count 27.255, which is not in very wide use for R/C), seven on 50 MHz, and five more on 72 — how many planes can you put in the air at one time, at any one field?

So we do have recommended 50 MHz spots. Do you *have* to use them? No you don't. They are not required by the FCC, as are the spots on 27 and 72. But — you stand a darn good chance of shooting down a fellow modeler, if you use other spots. Similarly you stand just as good a chance of getting shot down yourself . . . dig? The old-time users of 50 MHz have become used to checking other users of this band for frequency before turning on a transmitter. Many newcomers to 50 MHz just aren't that careful. But with ribbons and the recommended spots in use, things will be much safer all around.

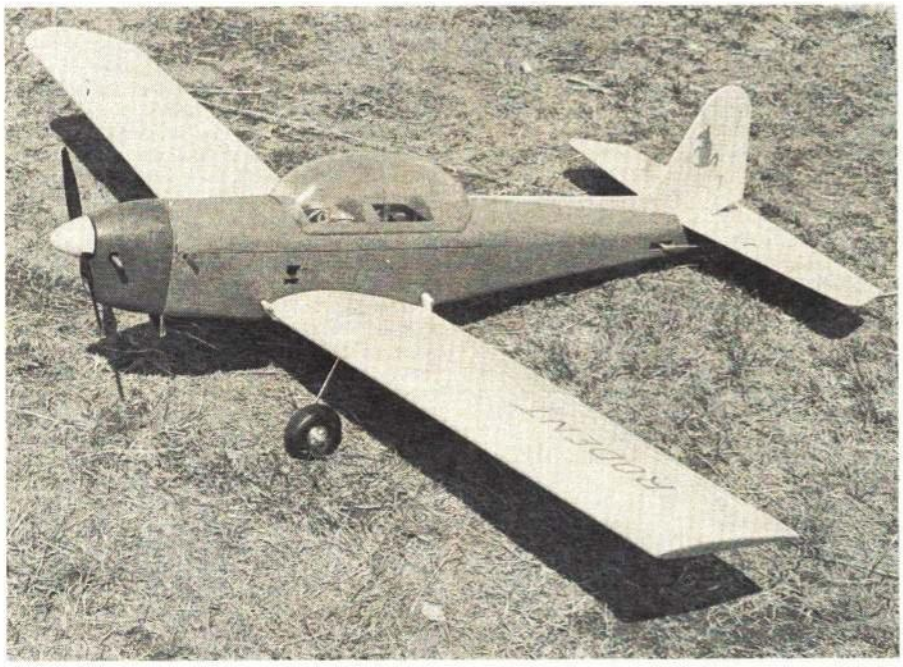
While the 50 MHz spots aren't required by the FCC, they probably will be mandatory at AMA-sanctioned meets, since operation of two or more flight lines simultaneously makes precise frequency control necessary. Oddball frequencies won't do any more — as this writer learned to his sorrow last summer! Since they'll be mandatory at meets, we feel every R/C club should stress their use at club fields — where three or four 50-MHz transmitters can be in use at one time.

One last point on the use of 50 MHz R/C frequencies in general. Note that an *FCC license is needed for such use* — despite what you might hear from scofflaws (some of whom won't bother to obtain an FCC license for *any* frequencies). Perhaps we'll always have such bootleggers with us, but the FCC is cracking down harder and harder on unlicensed operations on the Citizen's Band spots. And they can (and do) monitor the ham bands as well. These stupid non-licensed operators — regardless of band — simply serve to give *all* R/Cers a bad name, and could lead to loss of R/C frequencies — to say nothing of their chances of a heavy fine or even a sojourn in jail. R/C models today are just too expensive — in both monetary value and in the time the builder invests in them — to risk their being wrecked by some idiot bootlegger, who is likely on an oddball frequency!





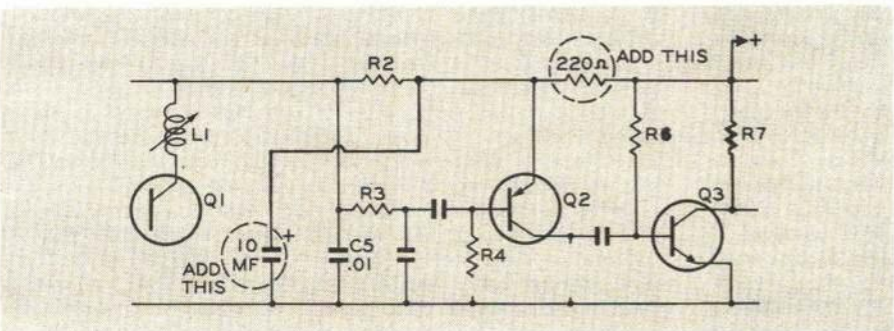
Left: Abbott W. Lahti pilots neat semi-scale D.H. Chipmunk equipped with his small single-channel dual-proportional system. Flies on coupled aileron-rudder, elevator, and engine (by go-around). Right: Clever mounting of dual output on rudder servo for aileron coupling. Below: Receiver and decoder are mounted in top hatch.



snap rolls. You should get 2-4 hours of flying with a fully charged battery (measuring 5.6-6V); if you don't, check for binding or jamming linkages, especially on throttle servo.

The 4RS system cannot be changed to 6RS without extensive (and expensive) rebuilding — transmitters are quite different. 4RS receiver could be converted to six control — but then would not work on 4RS transmitter, so factory will not do such conversions. Kagele can give address of a dealer who will give you a good swap price for your 4RS system, on a 6RS. The 6RS receiver is same size and weight as 4RS, incidentally.

Replacement of servo feedback pot should not be needed before the motor brushes require replacement. New pot costs $2 per servo, installed at factory. Following his visit to the Bonner premises, Jim notes that he found the plant well-organized, well-run and well-equipped. Sounds like a satisfied customer!



Bill Albin offers the above suggestion so that users of his micro-receiver can drive dual-coil magnetic actuators. Note the addition and modifications used.

Using MonoKote: While covering a large glider wing with this material (the "New" dry variety) we found a neat way to assure adhesion to the underside ribs of an undercambered wing. Sid Axelrod had suggested following the iron tip closely with a cloth, to hold the heated sheet in place while the cement reset; we found a small dampened sponge worked even better. It also helps seal the covering to sheeted areas where there is sometimes a tendency for a "blister" (due to air trapped under the heated sheet) to develop. This job was started with a GE travel iron, per Top Flite recommendations. It worked fine, but partway through the job we put into use a special industrial sealing iron (available from Darin Bros., 5221 Allen Rd., Allen Park, Mich. 48101, for $15), which we now much prefer. See New in R/C — July — for info.

Tiny power supply: With such receivers as the Albin, Bentert, etc. making it possible to install R/C in very small and light models, the power supply becomes a matter of real importance. For the smallest and lightest possible battery, we still feel the Eveready silver-oxide cells are tops (two S76 cells were found to give almost 40 flights of three min. each, with a ten-minute rest between each, in groups of five per day; the load was kept constant at 30 ma, and the voltage at this load stayed above 2.5 until the cells were exhausted). For those who want a little more power, and can stand a bit higher weight, we suggest the Eveready No. EXP825 cell. Two of these in series were found to give six flights of 5 min. each, with 15-min. rests between each, before they dropped below 2.5V. Again, the load was kept at 30 ma. As with all alkaline cells, which these are, they had lots of life left at voltages below 2.5. In fact we kept up the five-min.-on, 15-min.-off routine (with several longer rest periods ranging from two hours to overnight) for over three hours, and the cells still seemed able to proceed farther. However, the voltage had dropped to about two — so there wasn't much use to continue, as most receivers get real unhappy before this point.

Unlike the S76 cells, which can give just about as much power continuously, or in short spurts (in other words, they need no rest periods to recuperate), the EXP825's definitely do need plenty of rest time (they were really designed for photo-flash operation, which requires occasional heavy but short current spurts, with long rest time between). But with a weight of about ¼ oz. each, and small size (each cell is .850″ dia by .220″ thick) they can be useful; they cost 50c each, are probably available at camera stores.

Competition

New R/C record: The AMA has applied to FAI for recognition of a new R/C record for Closed Course Distance, set on Feb. 17 by Bob Kunce, at Redlands, Calif., when

Continued on page 71

Little Galloping Ghost by Airtrol

Low cost proportional with all dry batteries, smallest size, and ready to fly.

HAVING covered a pair of full-house digital rigs in recent issues, we now go back to simpler — and much lower cost — equipment, a complete GG outfit from one maker. Latter claims this system will handle planes with engines from .049 to .35 cu. in. Due to the small size and light weight of most of the components, we imagine most of these GL-100 outfits will be utilized with planes of the smaller sizes.

Since most modelers are familiar with GG systems (if those new to R/C are not, they can check into the matter in recent R/C books, or just look at the simpler systems used at most flying fields — GG is just about everywhere today!) we won't go into the theory of operation here. Suffice to say that the entire GG system consists of just four parts: the transmitter with built-in pulser, the receiver, the servo and the battery pack. The whole system (less dry batteries, which will add about $3.40 to total cost, if bought from electronic wholesale houses) costs just under $100. For this you get a pulse proportional setup that will handle rudder, elevator (fully proportional) and engine throttle (positionable).

The transmitter is small and light, and despite a rather long antenna, feels very comfortable when held in both hands; neat appearance is enhanced by the control stick, a miniature version of those used on the latest digital transmitters. You can even "thumb" the control lever, just like the multi hotshots do! The stick has no built-in trim adjustments, but there is a separate pot and panel knob for varying pulse rate (which allows elevator trim). The engine control action is had via lever at the left — up for high speed — down for idle. All the small electronic parts are on a single PC board. The control stick pots are of Ohmite make, among the best to be had, and should last indefinitely.

Circuitwise, the pulser is a typical unijunction variety, which controls the output of the multi-vibrator AF modulator. Latter in turn, applies modulation to the output of the RF section (a 27 MHz crystal oscillator, followed by an amplifier). There is only a single RF tuning adjustment for the entire transmitter. The amplifier is loaded and tuned solely by the antenna itself; this antenna *must* be fully extended to produce maximum output. Rough field-strength meter checks showed that the output was quite good, compared to several other transmitters we checked under the same conditions. Motor control is had in the usual way: by switching to steady modulation (no pulsing, for high speed) or cutting modulation entirely (low speed).

The compact relay-type superhet is protected in a case of plastic, whose two halves are held firmly together by four metal clips. The receiver has six transistors (crystal oscillator, mixer, two IF stages, 2nd detector and AF output), and there is only a single tuning adjustment here, too. It should be peaked up after the equipment has been installed in your model.

The GG servo utilizes a Furiuchi 3V motor, and nylon gearing throughout. As with other GG servos, engine speed control is had by the "go-around" system; when the transmitter throttle lever is operated, the rudder and elevator gears spin rapidly (the control surfaces therefore flap over their full range, giving a net control action of somewhere around neutral), driving extra gears that are linked to the throttle. It takes only six go-arounds to move the throttle from one extreme to the other, thus requiring a fast and light touch to stop the throttle where you want it. In effect, you have six different throttle positions, including full high and low. Pulse rate of the system is fairly high. The rudder and elevator definitely do flap back and forth. But they do so at quite a high rate, high enough that most planes could not follow the wiggle, even in full up elevator (lowest pulse rate).

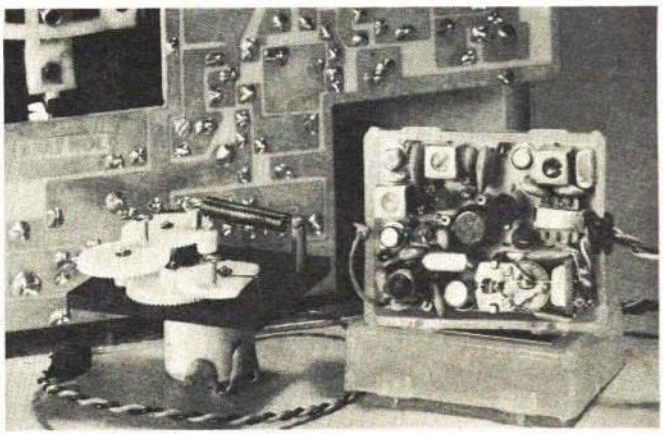
The battery supply would normally be six pencells (alkaline style preferred), which are held in a plastic case of Du-Bro style. Two cells power the receiver, the other four are for the servo. All parts of the plane installation come fully wired and with connectors attached. These plug into matching connectors which are part of the on-off switch assembly. While these connectors are polarized, and a hep modeler wouldn't go wrong in assembling them, the uninitiated could make a boo-boo (like, hitching the battery pack and receiver together directly — heaven forbid!). We feel these plugs should be color-coded and illustrated in the instructions, for those beginning modelers who just don't know nuttin' about R/C or electronics.

The instructions furnished with the GL-100 system are sufficient for the more experienced flyer who has already tangled with GG. However, we feel they could be much more complete, to help the novice get the most out of this neat and compact outfit.

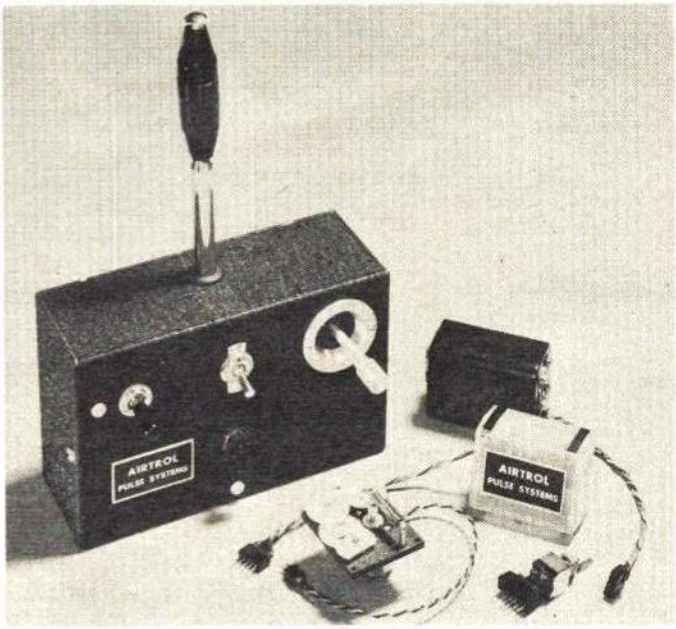
GL-100 receiver; measures 2 1/16 x 1 5/8 x 1", weighs 1.85 oz. with case and cable (1.45 oz., less case — for those who must save every bit of weight possible); a 24" vertical whip antenna is recommended, with 6" lead to receiver; current drain in neutral was 30 ma, went to 49 ma with full tone (high throttle) and to 8 ma with no tone.

GL-100 transmitter: case measures 6 1/4 x 4 x 2 1/4" less control protrusions; weighs 1 lb. 9 oz. with battery and antenna (requires 9V battery, Eveready #266 or equiv.); maker claims 150 mw output (thus an FCC

Continued on page 53



Close-up shows the Airtrol-built Controlaire receiver and Airtrol-designed servo and transmitter. An important feature of the system is economical operation on alkaline dry batteries.



Small and light Sunday flyer's system is a dependable single-channel set with a very selective superhet receiver. The servo is designed for rudder, elevator, and motor control.

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COMMANDER DE SUPERHET RECEIVER

This is the first superhet receiver to be produced by Ace R/C! And it is a first in many respects: Small—measures only 1⅝ x 1½ x ⅝"; Light—weight is about .6 ounce; Relayless—but double-ended (DE) with 1 amp transistors in output for hookup direct to dual coil actuators; Adaptable—may be easily changed to single ended output for escapements or decoders; Low voltage—works reliably at maximum range on just 2.4 volts; Versatile—works with most any transmitter of from 400 to 1400 hz; Pulses—exceptionally fast!

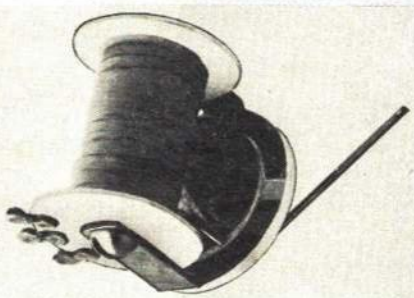
Manufactured by Ace exclusively under license agreements with designers — several circuit breakthroughs found only in this unit.

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

Not only is the Commander the smallest and lighest superhet available today—it is also the lowest priced at this special introductory offer.

Available on 26.995, 27.045, 27.095, 27.145 and 27.195 mHz. Be sure to specify.

No. 12K1—Commander DE SH, Rx, Assembled $26.50



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Other Adams Actuators in low voltage coils in both single and twin magnet assemblies in stock. LV Single $6.95. LV Twin $9.95. Improved!

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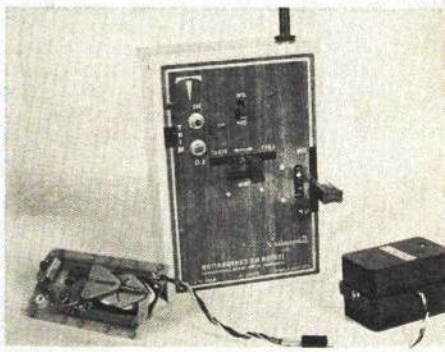
Whether it's Tufline fuel tubing, or a 2/56 x 1⅛ machine screw, or an item from almost an major manufacturer, the chances are good tha Ace has it in one of the most comprehensiv lines of Accessories, Components or Equipmer available anywhere. Our own designer-approve radio kits are added to by lines from E-H Bonner, Lanier, Midwest, Bee Line, SPL, Coverit Jensen, Rocket City, Su-Pr-Line, Sterling, MR Enya and Webra, etc., etc., etc.

NEW!

DICKERSON—TESTOR CONVERSION KITS



Although intended primarily to convert the Testor Skyhawk to GG operation for rudder an elevator (motor if desired), the kits below ar among the most versatile ever offered.

The plane conversion kit will give GG for the Skyhawk, but also may be adapted for airplane up to .19 power! May also be used with almos any other type of receiver—relay or relayless

RECEIVER CONVERSION KIT

The Dickerson conversion kit for the Skyhawk receiver utilizes some of the components al ready in the unit, but adds a switching decode to convert signals for a Rand LR3. Kit consist of PC board for housing switcher, LR3, switch and charging jack on a 2⅝ x 4¼" deck. Con tains all transistors and resistors. LR3, con nector, switch and charging jack are not sup plied.

No. 15K53—Dickerson Skyhawk Rx Conversion Kit, $11.50

TRANSMITTER CONVERSION KIT

While foregoing may be used with any GG trans mitter, this kit makes the conversion of the Testor Simpulse Tx into a two stick GG trans mitter easy and simple. Only hand tools re quired. Basic kit contains all pots, brackets extra stick assembly (SPST push switches fo motor available as extras.)

No. 11K5—Dickerson-Testor GG Tx Conversion Kit, $11.50

No. 30K3—SPST push switch for motor contro (2 required) each, $.45

TESTOR RX CONVERSION PC BASE

Printed Circuit base for plane and receiver con version is available separately for the scratch builder.

No. 28K75—Dickerson-Testor Rx Board, $3.25

NEW!

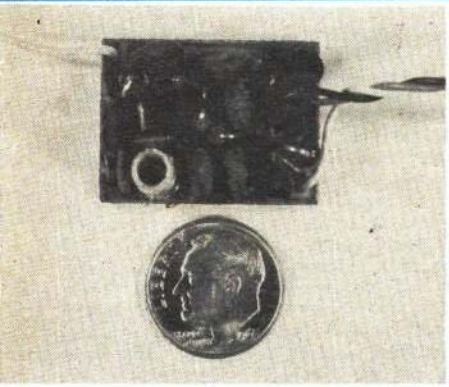
TRANSMITTER SIGNAL STRENGTH METER KIT

Would you like to add a signal strength mete to your Jansson or Commander or almost an R/C transmitter that does not have one bui in? This simple Ace kit, while designed pr marily for the Jansson transmitter, can easil be adapted to any transmitter that allows jus a bit of room in case.

The S/S Meter Kit monitors the RF going int your antenna and is reliable indication of th signal you have from your transmitter.

Simple to install: All components mount o meter except for connections to antenna an case. Kit contains all components, includin instructions.

No. 22K17—Transmitter S/S Meter Kit..... $4.9



NEW! ALBIN MICRO RECEIVER KIT

Would you believe a superregen receiver weighing just .2 oz? This Bill Albin kit design measures 13/16 x 1 1/16", uses silicon transistors, 1/8 watt resistors, micro mini caps, drilled 1/2" PC base. Single ended output for actuators of Bentert type.

While it is superregen, this kit will be used in applications where this is not too important. Makes indoor R/C a distinct possibility!

Recommended for those with some building experience, since small size makes care necessary. Not complicated, however.

No. 12K60—Albin Micro Receiver Kit, $12.95

NEW! AOSK II KIT

A switcher for the Albin .2 oz. receiver and the Adams Baby so you can use one set of batteries and don't have to use a spring for return!

Designed to fit on the actuator itself, this Add On Switcher Kit II is micro miniature. Designed for the Albin receiver only.

Complete kit contains 1/2 etched and drilled PC base, 1/8 watt resistors, tantalum cap, two Motorola transistors and full instructions. A gem of micro miniaturization using discreet components.

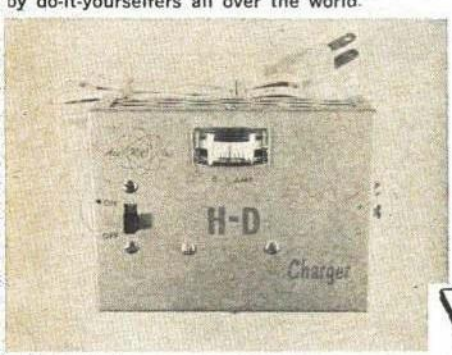
No. 15K55—AOSK II Kit.....$3.25

DECODER KITS

Ace has the American Modeler featured Simpro III kits, which allow you to go to decoder action for GG with two actuators for less wiggle, more power. Also kits for the Rand Switchers and Decoders. Full details in our 1968 catalog. (NOTE: Decoder systems require faster pulse rate than ordinary GG systems.)

COMING SOON! — Don Dickerson's Dual Dither low cost all transistor decoder for use with Rand actuators; a Micro Decoder Center which is all solid state including Adams actuators for completely inter-action-free flying. Also the Radio Control Modeler Decoder which will be featured soon will be available in kit from Ace.

Watch our ads for details—or better yet get on our mailing list by sending us an order! Free catalog supplements AND R/C Data—acclaimed by do-it-yourselfers all over the world.



NEW! H-D CHARGER

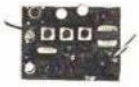
The H D refers to Heavy Duty—and that's exactly what this brute is—capable of charging your larger nickel cads and wet cells. For rates of 100 ma up to 1 amp. Has meter for monitoring and for setting of charge rate. Not dual purpose, but made for those husky charging jobs where you need the power. For nickel cadmiums from 1.2 to 10 ampere size. Will also series charge transmitter battery packages. Adjustable internal resistor sets rate.

Uses all new components double the ratings necessary to assure long life. Housed in aluminite case, with ventilated back, and rubber feet. A deluxe design. Assembled, tested, guaranteed.

No. 34K1—H-D Charger, assembled.....$13.95

NEW! ACE GG PACKAGE!

Galloping Ghost Transmitter by Dick Janson 9 volt battery- Citizenship SSH Receiver and the new Rand GG pack, with batteries.



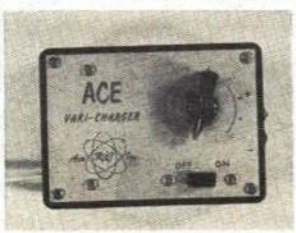
If You are going GG—Go First Class—With ACE GG!

Now you can go First Class all the way with simple proportional on Galloping Ghost. Ace has pioneered in proportional for 14 years. This is a combination package that we believe takes the best of all of the components that are available and puts them into one first class package.

Start with the Galloping Ghost Transmitter by Dick Janson, which has been acknowledged as being one of the most versatile, couple this with a the new improved Citizenship SSH Receiver and the new Rand GG pack, with LR3 and new 600 ma GE sintered and vented batteries, and you have a winner! The package even includes a 9 volt battery for the transmitter—the dependable Mallory M1603. The Ace GG package is completely prewired and requires only installation in the plane. . . . Weight of the receiver with GG Pak, LR3, nickel cadmiums, and harness, hooked up ready to install is approximately 7 ounces, yet it has power enough to handle planes with engines up to .35. **Go First Class—Go Ace GG.**

No. 10G1—Ace GG Package, ready to go with all batteries $129.50

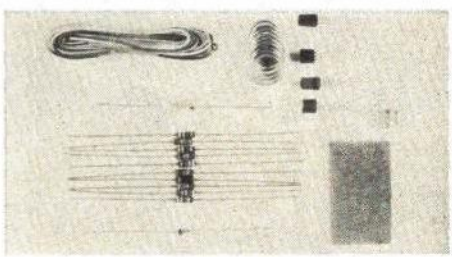
PROVEN WINNER! ACE VARI-CHARGER



IN KIT FORM OR ASSEMBLED

Will charge nickel cadmium batteries—20 mils to 150 mils. Capable of charging up to 12 volt packs. Indexed dial & simple chart for correct milliamp reading for charging different size battery packs. Completely isolated from AC line supply. An extra deluxe item. New transformer of highest quality. UL approved line cord. On-off switch. 500 milliamp diode. Full instructions.

No. 34K21—Ace Vari-Charger assembled $8.95
No. 34K22—Ace Vari-Charger Kit 7.50



NEW! MARKS BASIC VERSAPULSER KIT

The Versapulser is a revolutionary design as up to date as tomorrow. Features a rate adjustment that allows it to be used with ANY pulse system that is on the market today. It is linear over the entire range And no interaction pulse rate is completely variable from 2 to approximately 50 pulses per second. This means it can be used with magnetic actuators, Rand and other types of actuators, Rand Dual Paks, Simpro, and other decoders that require the faster pulsing, including the ones that use feedback servos. No other pulser is available today that is as capable of this broad rate change, and yet still feature complete linearity and less interaction, than any pulser in use . . . Secret is a linear stabilizer, which was developed by Fred Marks, and which is an Ace exclusive priority design . . . Basic kit is offered two ways so it may be easily adapted to any existing tone transmitter. With tone key in negative side (Mule, etc.), you need Model NPN. With keying in positive leg (Commander, Kraft, etc.), you need Model PNP . . . Basic kit contains all components such as resistors, capacitor, printed circuit board, all transistors and diodes. Base measures 1 3/4 x 11/16 inches, so it may be fitted into a very small space inside your case. Uses same 9 volt battery.

Versapulse Kit does not contain: Pots, switches or stick assembly. Pots required for the stick are 2.5K for width, 10K for rate, and 5K is required for rate adjustment.

No. 15K49—Marks Basic Versapulser Kit, NPN, $12.25.

No. 15K50—Marks Basic Versapulser Kit, PNP $10.75.

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Lighter-Than-Air Craft

Hot Air Balloons

Here's pure entertainment with a minimum of expense. Put a hot air balloon in your sky!

ROY W. BEECHING, JR.

FOR your friends' entertainment and to keep the neighborhood kids out of mischief for hours, flying model-size hot air balloons tops the program. The cost is small — the enjoyment large. Once I had a nephew march down a road with a large, blue and white balloon riding above him on a long length of thread.

Our drawings and photos will show you how to make and launch a tissue-paper balloon. There are a few pointers, however, that will give you more fun and longer flights.

In general, the larger the balloon, the longer the flight-time will be. For really satisfactory flights, the minimum size of balloon you should make is about four to five feet in height. Easiest way to get the right size is to buy regular wrapping tissue paper in packages that have sheets about 30 inches long. Three of these sheets, pasted together end-to-end, will make a "gore" about seven feet long. Eight of these gores will make a hot air balloon bag about five feet tall when inflated. Use ordinary library paste or white glue for assembling your balloon.

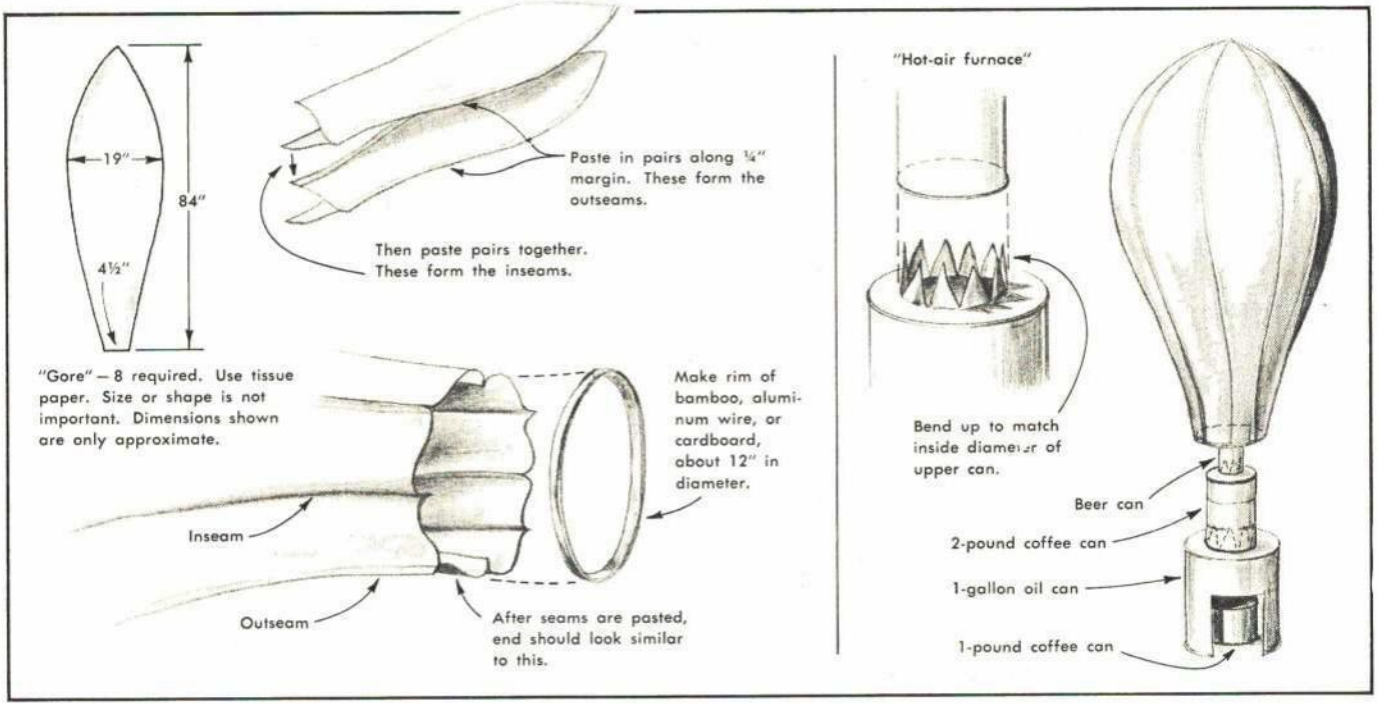
Never have I lost a balloon in a tree or on a roof — they seem to always bounce and roll off. Once I tested a new bag at night by attaching a 20 foot thread to its lower rim and pulled the balloon back after each flight.

Just one last word about safety — these big tissue bags are harmless in themselves, but *do not* release them with any flame or fire to be carried aloft. The fire hazard is too great and property damage or personal injury could result!

Depending upon wind speed, nice long flights will result from the hot air generated by the simple, tin-can heater. Place a wad of cotton in the burner-can, saturate with rubbing alcohol and ignite. Take care not to spill any alcohol on yourself, and be sure not to add more alcohol until you are positive that the previous flame has been extinguished. Hold the bag over the chimney and let it inflate.

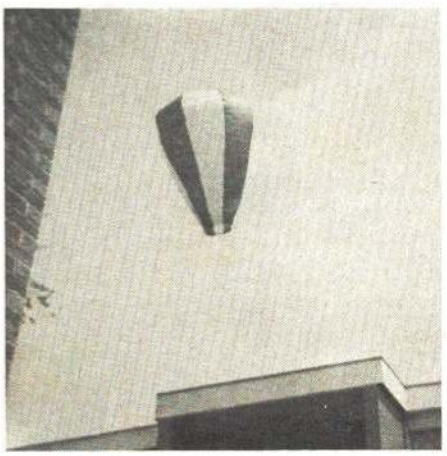
Should a bag catch fire during inflation, just step back and let it burn. It will burn quickly with no damage. Never try to inflate a balloon indoors for this reason. Just in case, build your balloons two at a time.

Happy ballooning!



Here is a simple way to check a balloon for rips and tears — use an electric fan!

Tin-can furnace is more efficient and inflation easier when sheltered from wind.



A basic form of flight — pear-shaped balloon sails gently over a neighbor's roof.

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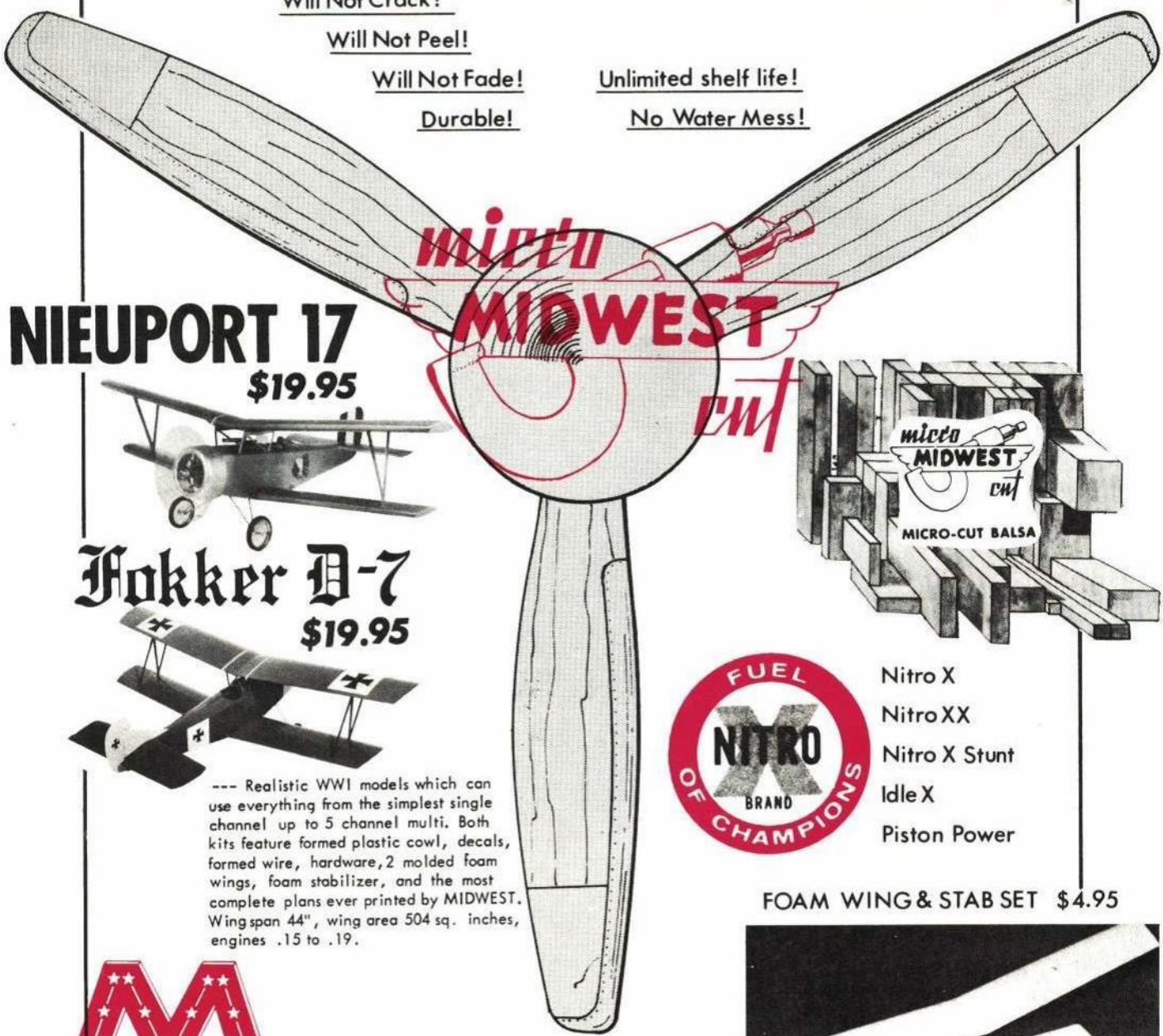

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--- Realistic WWI models which can use everything from the simplest single channel up to 5 channel multi. Both kits feature formed plastic cowl, decals, formed wire, hardware, 2 molded foam wings, foam stabilizer, and the most complete plans ever printed by MIDWEST. Wing span 44", wing area 504 sq. inches, engines .15 to .19.

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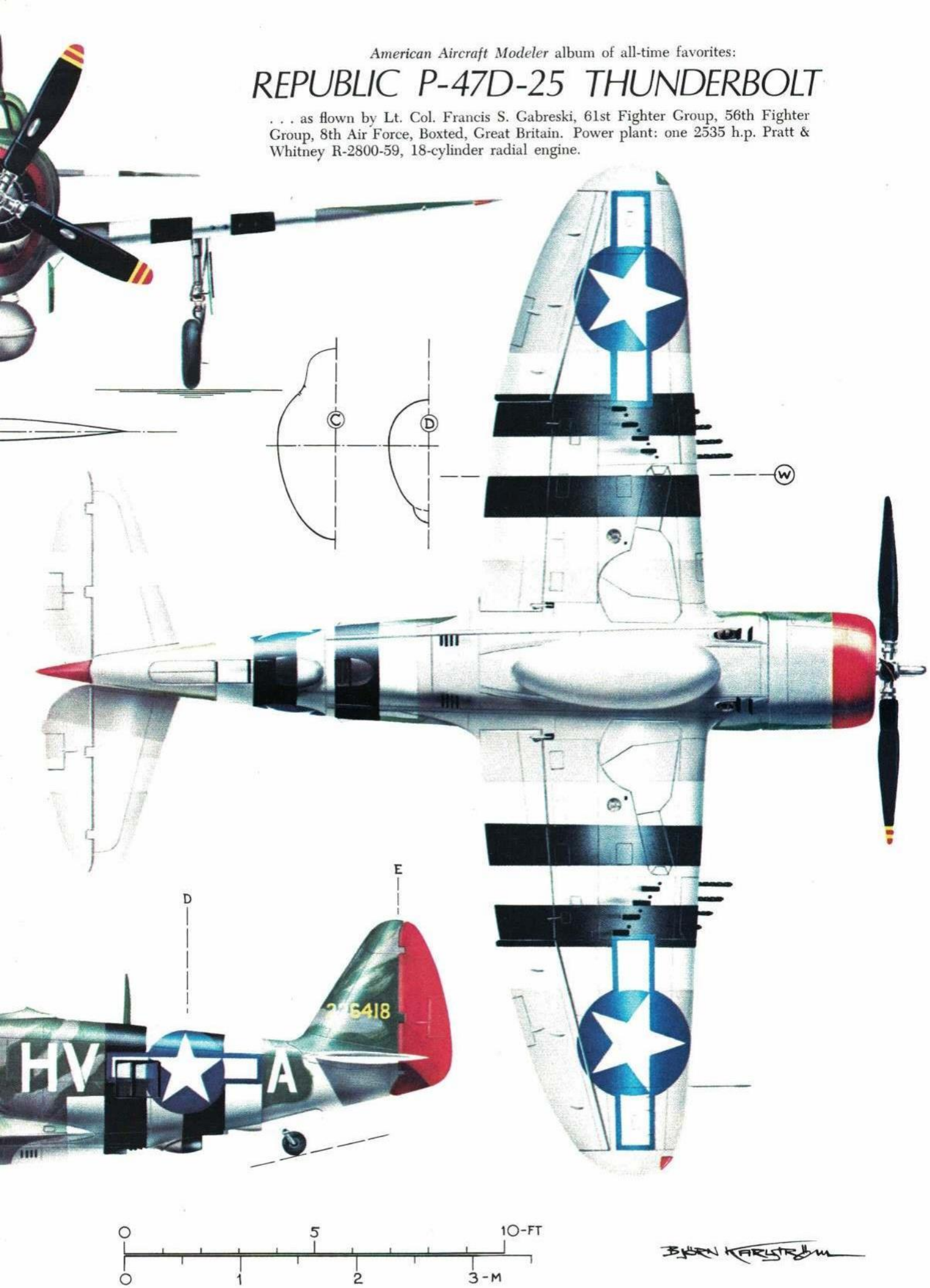
American Aircraft Modeler album of all-time favorites:

REPUBLIC P-47D-25 THUNDERBOLT

. . . as flown by Lt. Col. Francis S. Gabreski, 61st Fighter Group, 56th Fighter Group, 8th Air Force, Boxted, Great Britain. Power plant: one 2535 h.p. Pratt & Whitney R-2800-59, 18-cylinder radial engine.



BJÖRN KARLSTRÖM

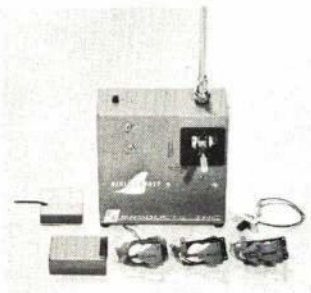
FROM THE RELIABILITY LEADERS

HI-REL LOGICTROL PROPORTIONAL RADIO CONTROL SYSTEMS

HI-REL XL-3 SYSTEM

This new HI-REL System from EK is ideal for beginners and for mini-size airplanes. It's extra little and extra light on the budget. The XL-3 offers three controls — two are proportional and motor control is positionable. It has the same HI-REL features as the dynamic LOGICTROL III Mini-System. The complete system includes a single stick transmitter, 3 Mini-Mite servos, a 4.8 v.—500 MA/HR nickel-cadmium battery, receiver, and switching harness. Operation instructions are included. Complete system price is $250 less charger and transmitter battery pack.

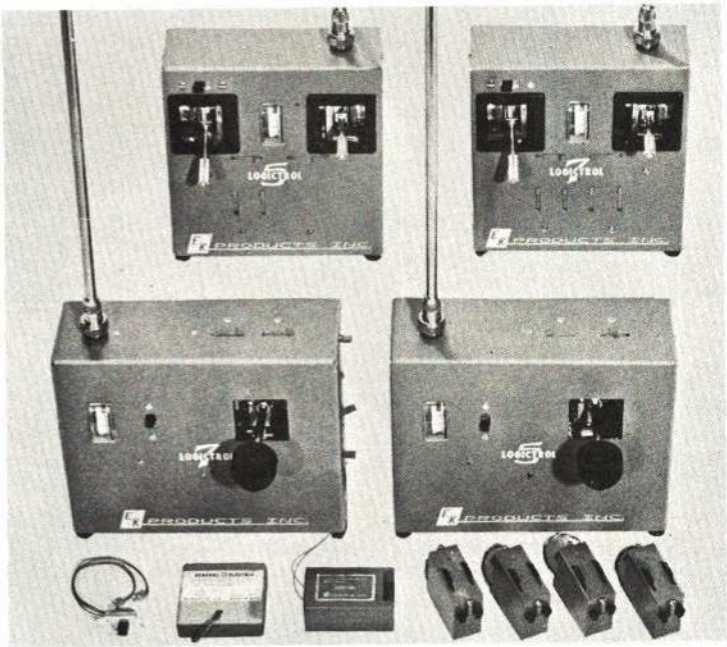
HI-REL DIGI-GHOST



The DIGI-GHOST uses the same HI-REL features found in the LOGICTROL III MINI-SYSTEM. A complete system includes transmitter, receiver, Rand actuator(s) 3.6 volt Nickel Cadmium battery, and switch harness. Charger and transmitter battery pack are not included. Two DIGI-GHOST models are available: The DG-1 (low rate) price is $135—The DG-2 (high rate) price is $180. The transmitter is equipped with a switch for low or high rate.

HI-REL LOGICTROL III

- MINI-SYSTEM



50% smaller receiver — 40% smaller servos — 14½ ounce flying weight — 3-wire plug-in servo system — New Mini-Mite servo with dual linear outputs - 5/8" stroke, 4 lbs. thrust — New Plug-in receiver with important circuit refinements — Only receiver in the industry with double tuned front end with R.F. amplifier — Hi-impact polycarbonate thermoplastic receiver and servo cases — Smaller 2 wire battery allows operation when one cell is dead — Reliable open gimbal control stick (no neutral backlash) — Single or dual control stick transmitter with 5 or 7 controls

LOGICTROL 5 may be expanded to 7 controls

A complete LOGICTROL III MINI-SYSTEM includes: transmitter of your choice with integral 12 volt, 500 ma/hr. nickel-cadmium rechargeable power pack and dual function charger; receiver of your choice with 4.8 volt 500 ma/hr. nickel-cadmium rechargeable power pack; 4 Mini-Mite servos; a two-wire switch harness, A.C. charging cord and D.C. charging harness, all completely wired, ready to install. Operation instructions are included.

COMPLETE SYSTEM PRICES

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THIRTEENTH IN A SERIES:

Getting Started in R/C

The Nickel-Cadmium Rechargeable Battery

HOWARD McENTEE

PRACTICALLY all of our more sophisticated radio systems are powered by nickel-cadmium cells — and so are many of the simplest systems. Why this heavy preference for the nickel-cadmium type? Experience has proven that at the present state of battery development, these cells (often called nickel-cad, or just nicad — though the latter is really a trade name of a specific make) are the most trouble-free and reliable power units for use *by the average hobbyist.* Other types of storage cells known as secondary cells — to distinguish them from the so-called "dry" cells, which cannot really be recharged) have much more capacity for the same size and weight, or other useful features. But basically, the nickel-cad will stand more abuse (that's just what most of 'em get in radio control applications!) and still come back for more.

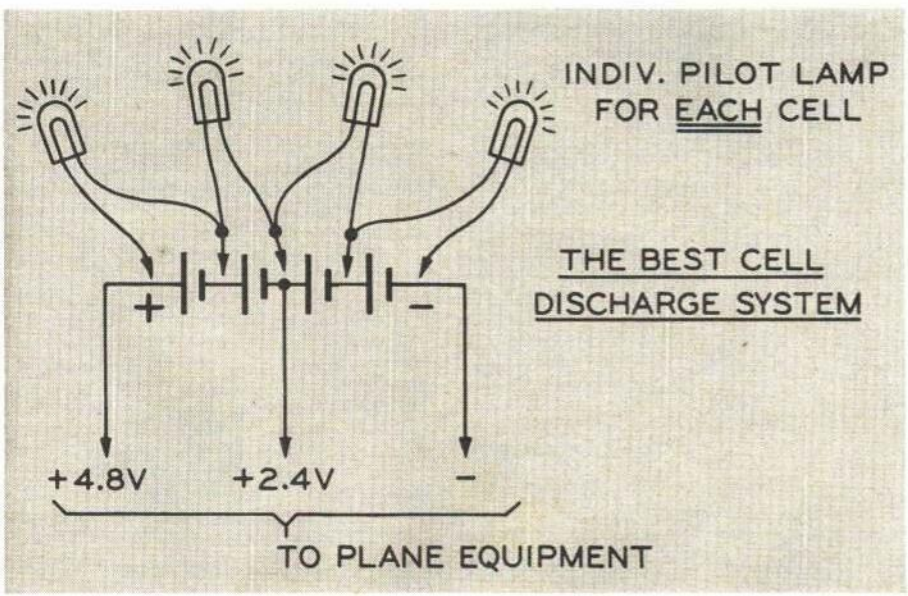
As the name implies, the two plates of these cells are formed of nickel (positive) and cadmium (negative) compounds; the electrolyte is a strong alkaline solution (potassium hydroxide). One of their biggest advantages is that they can be completely sealed and yet will withstand a moderate overcharge. Most rechargeable cells "gas" heavily when overcharged and must have a vent to allow this gas to escape — or the cell will burst. Actually, many "sealed" nickel-cads (particularly the cylindrical types) do have a safety vent; this is normally closed, but if internal pressure rises because of improper usage, the vent will allow a pressure drop, closing when the pressure-producing condition ceases. The cell will then function as before.

Vented cells come in plastic cases with a screw-type vent on top. They are not used to any great extent in R/C, except as glow plug heating units or in electric-drive boats. Most of these cells come from war surplus stock. They are cheap, rugged and will take quite a beating. With proper care they will last many, many years. Incidentally, the vents of such cells should be unscrewed partially (but not removed) when charging. Never leave the vents off — carbon dioxide in the air is injurious. These cells should show liquid level up to a mark seen on the case side, *when they are fully charged.* Use only distilled water for refilling. Never fill with a syringe or other instrument that has been used on lead-acid batteries (and vice versa).

You'll hear the term, "sintered" cells. This refers to units that will produce heavy current on discharge — they are "high rate" cells. Sintering is a special technique for producing plates with a greatly increased area. Such cells normally have a higher capacity for the same size and weight, compared to non-sintered types.

The voltage of nickel-cads is lower than that of dry cells, or of lead-acid units. Average lead-acid cell voltage is the highest — a bit over 2 volts. Dry cells run around 1.5V when fresh. Nickel-cads average around 1.2V. Dry cell voltage drops continuously in use, of course; nickel-cads (and lead-acid types) produce most of their output, under moderate loads, at the voltages noted. Any cell will drop its voltage under very heavy load, even though it may continue to have a lengthy power output at the lower voltage.

First thing to do when you purchase new nickel-cads is to charge them. Some are shipped well-charged, but most are not. These cells can be stored for long periods in a discharged state (which is ruinous to lead-acid cells), so there is no real need to charge them fully until they are to be used. Charging rate is universally considered to be "C/10". The "C" stands for rated capacity; thus, a 500 maH capacity cell would be charged at 1/10th of this, or at 50 ma.



The cells must have more power put into them than can be removed — for like everything else, they are not 100% efficient. Generally if you charge cells for about 16 hours at the rated charge current (C/10) they will be fully charged. After that, you can drop the charge rate to as low as C/100 (5 ma current for 500 maH capacity cells) to keep the cells fully charged until you wish to use them. This is termed "trickle-charging" and can go on indefinitely. It's generally felt that there is no advantage to trickle-charging your cells when you will not need them for long periods.

No harm is done by giving nickel-cads a "fast charge" when you know they are low, as long as you *make certain* the higher than normal charge rate is reduced well before a full charge has been reached. This is really a trick that should not be attempted unless you are experienced at cell use and have accurate measuring instruments to check cell voltage.

One of the great advantages of the nickel-cads we use today is that they can withstand moderate overcharge — at the standard C/10 rate — for considerable periods and without harm. You shouldn't overcharge purposely. If you leave your cells on charge at the normal rate for a few hours more than necessary, or even a day or two — no damage will be done. But we repeat — *don't purposely overcharge.*

Nickel-cads, especially the sintered-plate types, can be discharged at extremely high currents without serious damage, but there are some points to remember. Most such cells we use today are rated for full capacity only if discharged at the C/10 rate. Thus, a 500 maH cell can be expected (when new) to give 50 ma. current to a load for 10 hours. At higher discharge rates, the ampere-hour capacity is reduced (even though you may have charged the cell fully). To save weight, most R/C cells (especially those in planes) are discharged at higher than the C/10 rate. To be on the safe side, better estimate that your cells will give only about 75% of the rated capacity. Both discharging and charging at higher than the specified rates (our old C/10 again) will shorten battery life. At the discharge rates we generally use in R/C, this shortening won't be too serious. All rechargeable cells lose capacity through use; thus a set of nickel-cads might have only 75% of their original capacity when you put them into use for the second flying season — even though they may be completely reliable at that time.

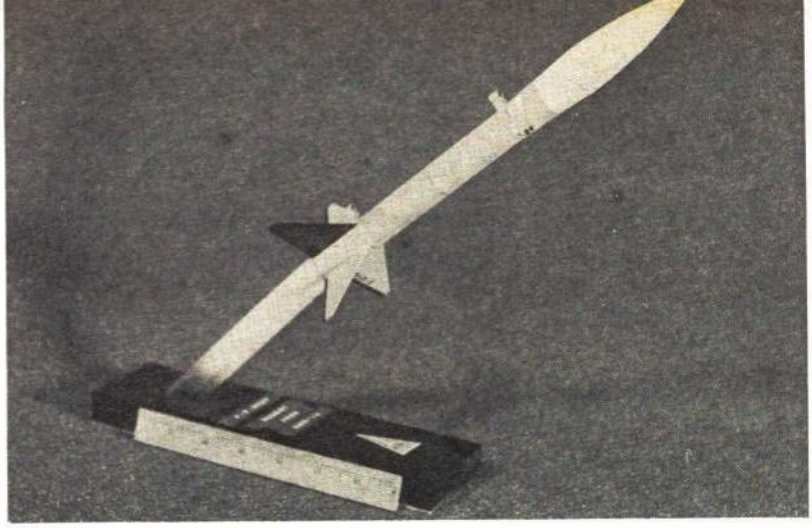
A point that helps prolong life of R/C cells is the fact that we do our utmost to come nowhere near complete discharge of our cells — for to do so would lead to catastrophe. We normally use what is termed "shallow discharge". Probably the majority of R/C nickel-cads are seldom more than half-discharged, before they are fully charged again (putting in a "full" charge, after an incomplete discharge, will cause no damage). Shallow discharging prolongs the cell's life.

Unfortunately there is *no* sure way to check how much charge is left in a nickel-cad cell. The best method, therefore, is to keep rough track of the number of hours in use, making very sure you come nowhere near a full discharge. If your transmitter and plane batteries discharge at different rates — that is, perhaps the transmitter battery could be expected to give 5 hours use with a full charge, while the plane batteries would last only 3 hours maximum, keep this fact in mind. This is actually the situation in many R/C systems today. Another factor is that transmitter drain is usually pretty steady re-

Continued on page 48

COUNTDOWN

HONEST JOHN



Scale data, for use in model rocket competition, on the Army's first unguided artillery rocket.

Author's Honest John is very colorful with flourescent red-orange, white and black. It has held U. S. Class 2 Scale Altitude record and won NARAM-6 and 7 scale events.

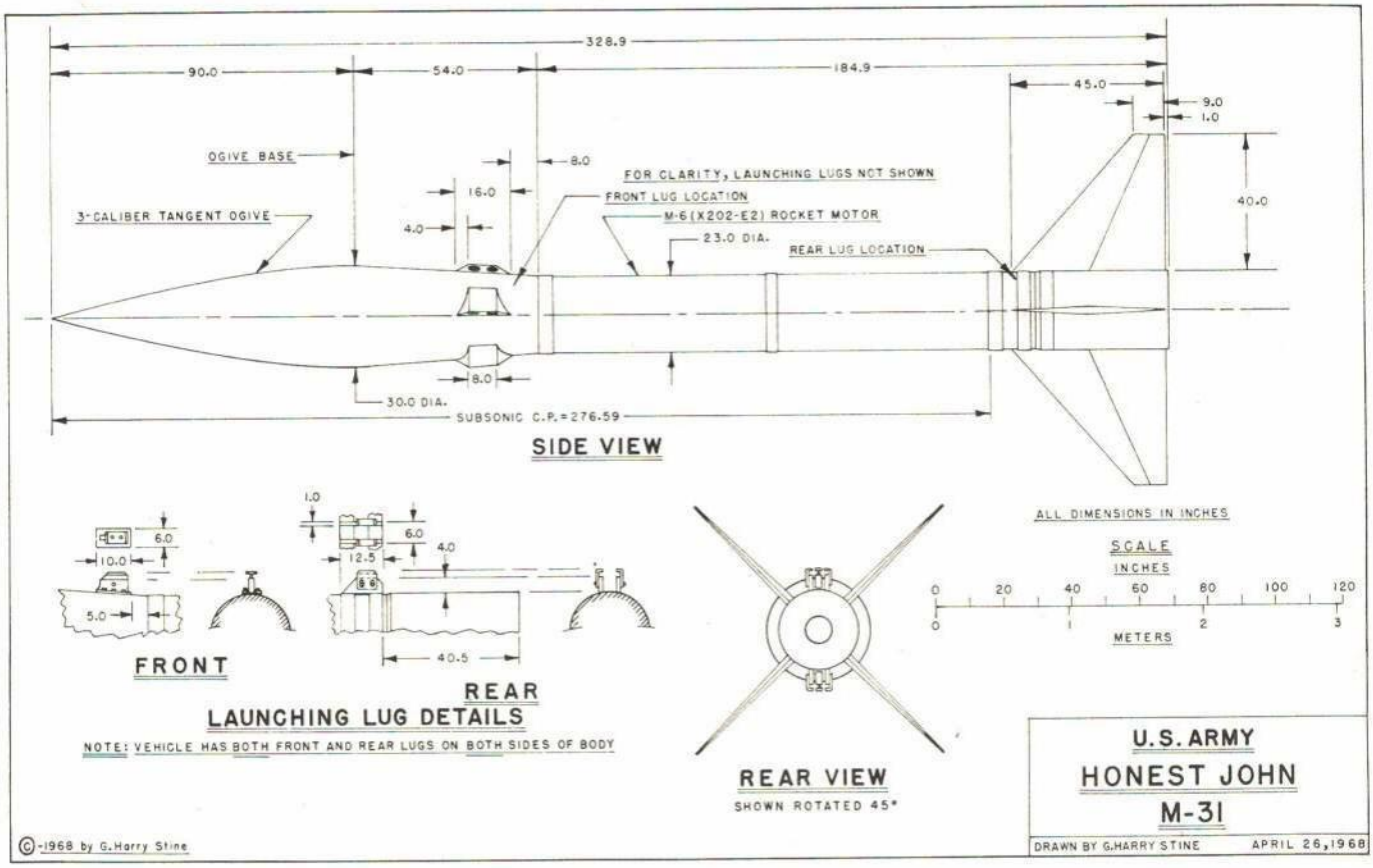
G. HARRY STINE

THIS information on the U. S. Army's Honest John M-31 artillery rocket provides astromodelers with scale substantiation data required under U. S. Model Rocket Sporting Code, 1967 Edition. It enables use of scale model Honest John kits by both Estes Industries, Inc. (Kit K-27) and Centuri Engineering Co. (Kit KC-25) for competition. The Estes H-J kit is to a scale of 1:23.56; the Centuri H-J kit is to a scale of 1:25.33. The basic dimensional data on the M-6 (X202-E2) rocket engine can also be utilized for scale models of those NASA rocketsondes using the M-6 — EXOS, Jason, Javelin, etc.

The honest John M-31 was the U. S. Army's first surface-to-surface unguided rocket intended for use as a long-range artillery weapon. It consists of a nuclear or high-explosive warhead mated to a large solid-propellant rocket motor. It is an unguided rocket depending for stability in flight on four large fins. Its trajectory is pre-determined by the azimuth and elevation of its 25-foot launching rail which is mounted on a truck for mobility. Eight small solid-propellant spin rockets located in four shrouds behind the warhead section in the nose are triggered by a mechanical trip at the end of the launching rail and impart a slow roll to the missile in flight to average-out fin and thrust misalignments in order to improve accuracy.

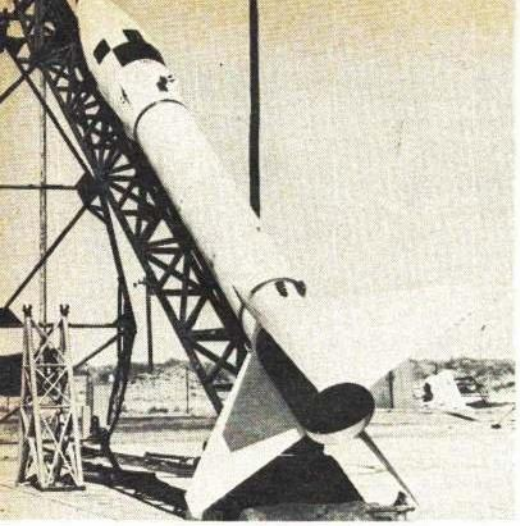
Honest John is a large artillery rocket capable of delivering a 2000-pound warhead at distances up to 15 miles. It is now considered obsolete, having been replaced by the smaller Little John rocket and the Lance rocket.

Development history: The Honest John's M-6 (X202-E2) solid propellant motor was originally developed under the Bumblebee Program of the Applied Physics Laboratory of John Hopkins University under contract to the U. S. Navy Bureau of Ordnance



Source material for the drawing above was an actual missile measured by author in June, 1957 at White Sands Missile Range.

Drawings acceptable for NAR competition proof-of-scale requirements. Because of it's missions, there are many color schemes.



H-J development round No. 1236F-M173 on the fixed-development launcher at White Sands Proving Grounds, New Mexico. Upper left fin is all black, other fins are white.

(BuOrd). It was intended to be used as the rocket booster for the ram-jet-propelled XSAM-N-6 Talos ship-to-air anti-aircraft missile, but was later replaced in this use by an improved solid propellant booster of larger diameter and shorter length.

In 1950, U. S. Army Ordnance Corps carried out some preliminary experiments at White Sands Proving Ground, New Mexico, mating solid-propellant JATO (Jet-Assisted Take-Off) rockets to inert warheads and stabilizing fins to investigate the possibilities of creating an inexpensive battlefield artillery rocket for close fire support. The successful completion of these experiments led to the Honest John in which the available M-6 (X202-E2) solid propellant ex-Talos booster 23 inches in diameter was mated to the 30-inch diameter special warhead available from the Sandia Corporation's Special Weapons Laboratory.

The first Honest John was launched from the Army Launch Area #1 at White Sands Proving Ground on June 30, 1951. The author was present, standing on the roof of a truck 1000 yards due west at Uncle Station. The "H-J," as the missile came to be known at White Sands, surprised nearly everyone with its exceedingly high noise level that was much greater than the German A-4 rockets then being flown at White Sands. It was the first time this booster, the M-6, had been fired at White Sands, previous flight tests in the Bumblebee Program having been conducted at the Naval Ordnance Test Station, China Lake, California.

Full mass production of the Honest John was started in 1952. Douglas Aircraft Company was the prime contractor with Radford Arsenal manufacturing the M-6 (X202-E2) rocket motor. At the time, the M-6 (X202-E2) motor was the largest production solid propellant motor in existence in the free world.

From 1952 through 1957, hundreds of Honest John rounds were launched at White Sands Proving Grounds for various purposes. Initially, launchings were made to determine the battlefield range tables — the trajectories followed by the H-J as a function of launcher elevation, wind velocities, and temperatures.

Early firings were made from trussed-rail-type launchers in the Army Launch Area #1 at White Sands, and launchings were usually made two at a time with three

Continued on page 54

model rocketeer

NATIONAL ASSOCIATION OF ROCKETRY
1239 Vermont Avenue NW, Washington, DC 20005
NAR

FIRE MARSHALLS OKAY ROCKET CODE

The National Fire Protection Assoc. has given approval to the Code for Model Rocketry. The unanimous approval occurred on May 22 at the NFPA's national convention in Atlanta, Ga.

The code, under discussion for over two years, spells out specifications for model rockets, engines and their use.

The fact that the NFPA did give approval of the Code is an indication that our activity is now recognized as a very legitimate one and does not fall under the catch-all area of fireworks.

This, of course, does not mean that you can immediately go out and launch model rockets from your back porch. It is now required that each state, or local jurisdiction, whatever the case may be, approve the code for their area. This will take time to do, but with the Code as a guideline the road will not be as difficult as it has been in the past.

Although there are a number of restrictions involved in the Code, it does free model rocketry of the stigma that has plagued it over the past decade.

Without qualification, the NAR and all model rocketeers owe a great debt of gratitude to Major Carroll Shaw, Connecticut State Police, Fire Prevention Division, for his nearly three years of work on the Code. He is the man who befriended model rocketry early in the game and staunchly defended it despite many differences with fire prevention experts.

If ever a man deserved praise for standing beside the model rocketeer, it is Major Shaw.

There are a number of other men who deserve praise for their work with Major Shaw. They are G. Harry Stine, Past President of the NAR; Vernon Estes, Leroy Piester, Irv Wait, George Roos, all model rocket manufacturers. In addition, we appreciate the understanding and advice given by Mathew M. Braidech, American Insurance Assoc.

NAR ACTION IN WASHINGTON

During the proceedings of the U. S. Senate on the Omnibus Crime and Safe Streets Act, model rocketry came under scrutiny. Wording of Senate Bill S. 917 threatened the very existence of model rocketry because of its pyrotechnic nature. Quick work by the NAR and several interested parties assured the fact that model rocketry would be exempted from the Firearms Act in the bill.

Several congressmen and senators got behind model rocketry and cleared up any misunderstanding in the event there was any action that could misconstrue a model rocket as a weapon or destructive device.

NARAM-10, BEST EVER

The 10th National Model Rocket Championship meet, at NASA's Wallops Island, looks like the best ever. The meet, August 19-23, will feature nine events. For the first time, launching of rockets was scheduled for early and late afternoon rather than morning and early afternoon as at past national meets.

Requests to participate exceeded the 100 mark in mid-May. Contest Manager Jim Barrowman and staff have done an excellent job in pre-meet preparations.

NAR, THE AMERICAN WAY

Passengers on all American Airlines planes have reacted quickly to an excellent article appearing in the firm's magazine. The story was written by the Ol' Rocketeer, G. Harry Stine. NAR Headquarters has received numerous requests from AA passengers wanting more information on model rocketry. The magazine, *The American Way* is in seat pockets of AA planes.

MEETS GET PUBLICITY

Several NAR meets have been getting excellent press coverage in newspapers this year. In addition, the Goddard Space Flight Center's activities in model rocketry as filmed by National Education Television Network has continued to spur interest in model rocketry.

It appears that the National Meet will also get excellent coverage on a national basis.

NEW MODELS SOON AVAILABLE

An early glimpse of some of the manufacturer's 1969 catalogs show some very interesting models. The trend to scale models is very evident. Estes and Centuri have outdone themselves in new equipment this year. Model Rocket Industries shows a wide range of models for the beginner to advanced modelers. Rocket Development Corp. has come out with a modification of the Flat Cat boost-glider that, with a little extra work, can stay up in the air for several minutes. Flight Systems has also developed some good, sturdy sport models that are real handsome.

NEW ENCYCLOPEDIA OF SPACE

An extensive article on model rocketry will appear in a new air and space encyclopedia that is nearing completion. New Horizons Publishing Co., of Chicago is now printing it. Here's a series of books that will surely be a boon to all those persons interested in space and aeronautics. Look for it in your school library this coming fall.

R/C BOOST GLIDER DEVELOPMENT

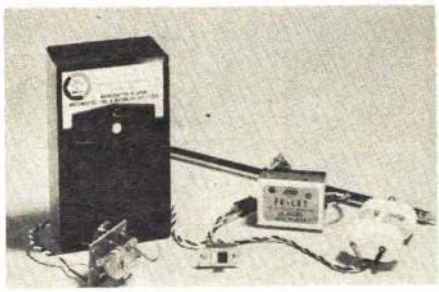
It may come at NARM-10, surely NARM-11, that you will see radio-controlled boost-gliders in flight. The state-of-the-art has developed so rapidly that it's common to see B/G's fly away at just about any model rocket meet.

Progress is rapid in the development of a miniature receiver and actuator, including batteries, that will weigh less than 1½ ounces. This can probably be diminished further to a total weight of less than an ounce!

NEW PRODUCTS CHECK LIST

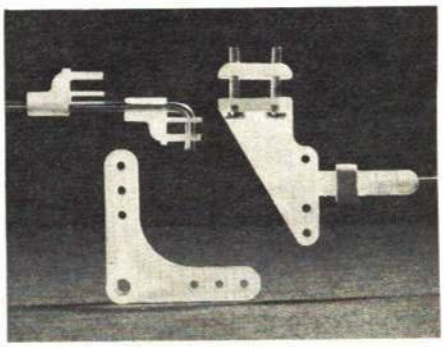
Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."

Model Rectifier Corp./Futaba R/C Systems. MRC imports two super regenerative R/C systems from Futaba of Japan. Both are single channel, dependable and fool-proof. They are uncomplicated, pre-assembled and pre-wired — ideal for the beginner.

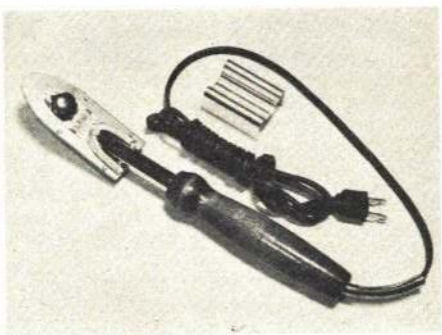


System F-66 contains a palm-size, tone transmitter, relayless receiver and a compound escapement. Wiring includes an on-off switch; connections to Rx and escapement and a two pen cell battery case (all that is needed for both the Rx and escapement). Eight pen cells are required for the Tx. A tuning lamp in the ultra-tiny Rx helps you adjust for maximum sensitivity. The Tx button activates a microswitch, giving a precise feel when "blipping." Operation is recommended for ranges not over 800 ft. Price is $39.95.

F-68 is the higher powered, long range system. Larger transmitter uses eight pen cells and has an antenna that fully collapses into the case. Relay equipped receiver requires a nine volt battery. Three pen cells power the small, two-speed motor control escapement and the motorized rudder servo. That motor control, by the way, has its own arm-like support for the other end of its rubber band drive. Rx and the motor control plug into the rudder servo's mounting board. Wiring harness for batteries and switch is already connected there. Even the rudder pushrod ends and throttle quick-link are included. Effective range is out-of-sight. Price is $69.95. For more info: MODEL RECTIFIER CORP., 5300-21st. Ave., Brooklyn, N. Y. 11204.

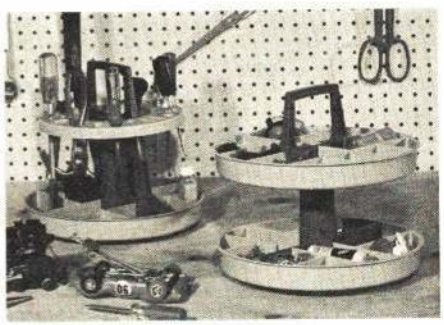


Carl Goldberg Models/Nylon Fittings. Recently C.G. Models introduced an assortment of fittings and accessories and started to add them to their larger kits. Now, all of Goldberg's R/C models include every needed fitting, whether of Nylon or metal. Photo shows several of the well-designed Nylon parts. Clockwise from top right: Long Control Horn (50c a pair) with Nylon nut plate, mounting bolts and sized for 1/16" wire. Cut the length down if desired. Clutching the horn is the Ajusto-Link (29c each, complete with 10" rod or 40c a pair, less rod). Pin is molded in and there's a rubber safety band. Next is the Aileron Bellcrank (50c a pair). It comes complete with bolt and bushing. Snap 'R Keepers — note easy mounting method — are four for 50c. Very compact — a quick and handy way to secure a pushrod. Each package of fittings has an assembly diagram and full-size drawings of that particular part printed inside the label; great in determining your installation setup. For information about other accessories: CARL GOLDBERG MODELS, INC., 2541 W. Cermak Rd., Chicago, Ill. 60608.



Hobby Lobby/Heat Sealing Iron. So many new covering materials — those requiring sealing and shrinking heat — have found wide acceptance by modelers that tools are now available for this task. Hobby Lobby sells one called the Sealector. (It's manufactured by Seal, Inc. of Derby, Conn., who specialize in a wide variety of heat-sealing devices). The deluxe model shown has a Teflon working surface about 1½ by 4 in. Sometimes a sticky residue will burn on an iron's surface. With the Teflon, simply wipe the residue off with a clean cloth. The rounded point lets you get into such tight areas as fillets and corners. Use on 115 VAC; its 165 watt, heavy duty heating element insures a rapid heat recovery. An adjustment knob allows you to select any temperature from 150 to 350 degrees F., and a close-tolerance thermostatic control will keep it there. Handle stays cool, too. There also is a six-month guarantee against defective parts and workmanship. Price with a holding stand is $9.95. Write: HOBBY LOBBY, 2604 Franklin Rd., Nashville, Tenn. 37204.

L. M. Cox Mfg./Corsair F2G-1. Most recent ready-to-fly model from Cox is this Corsair. Wingspan is 19" and fuselage length is 15". Designed as a control line trainer it will take lots of abuse; it is molded of a high-impact styrene. Also the rubber band mounted wing will pop off in a hard landing. The molded-in detail plus the included decal kit make this model realistic looking. Cox pays attention to every item — in particular — the operating and flying instructions were clear and complete. There's even a check list to help you with a balky engine. For information on the fine flying, easy-handling Corsair; its special pack, Cat. No. 7562; and its price, write: L. M. COX MFG. CO., INC., P. O. Box 476, Santa Ana, California 92702.



Rubbermaid/Tool and Parts Caddies. These caddies, of a tough two-tone gray plastic, revolve on ball bearing bases. The Tool Caddy, at $3.98, keeps your small tools ready for instant use. A compartmented base will store tiny parts and fittings. Parts Caddies — a two-tier for $3.98 and a three-tier at $4.98 — have many different sizes of compartments for storing all kinds of hardware. They're just the thing to keep the bolts separated from the screws and the 2-56's away from the 3-48's and the 4-40's. A carrying handle adds to their convenience. RUBBERMAID INC., Wooster, Ohio 44691.

SEPTEMBER 1968

model aviation

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

Community Modeling Program Within Reach of Everyone

Thousands of youngsters are being introduced to model airplanes as a result of Academy of Model Aeronautics pilot programs in Pittsburgh, and Washington, D. C. Key to the success of the program is a simple, low-cost, rubber-powered model designed by AMA Technical Director Frank Ehling. Quickly built by youngsters who have never had any previous modeling experience, it almost always produces good flight results even if mistakes are made in construction or assembly. This "instant" success is considered important to whet a youngster's modeling appetite and encourage him to continue with more advanced models.

Ehling's design, initially called the Delta Dart, was first used in 1966 when the Pittsburgh modelers produced several hundred kits by hand. They were distributed without charge to area youngsters, and a contest for these models was put on in conjunction with a regular indoor meet. The following year KDKA-TV, Radio sponsored a similar program, giving away 2,000 kits free (See Pittsburgh's Answer to the Junior Problem, April American Aircraft Modeler). These kits, produced by Sig Mfg. Co. with special imprinting of "KDKA F-1020 Racer", were the same as those then being produced and distributed as the AMA Racer.

This year in Washington, D. C., under sponsorship of the National Aeronautic Association's local chapter, the Aero Club of Washington, officials of the Academy and the D. C. Department of Recreation, put on a similar program. The model, however, was redesigned for more foolproof construction, and is named the AMA Cub. It was kitted for the D. C. program by Sig Mfg. Co. and is now available at discount rates for sponsors of community programs.

The basics of this program:

1. The Aero Club of Washington was interested in an activity which would involve the community with aviation and which would bring a good image of the club before the public. The ACW provided the funds to administer the program and to purchase the trophies and several thousand AMA Cub kits for free distribution.

2. The D. C. Department of Recreation became aware that this was a "natural" recreation center activity. It lent its recreation center leaders to register youngsters, distribute free kits, conduct building classes, and to help in running the city-wide contest.

3. The AMA HQ staff solicited sponsorship by the Aero Club of Wash. and the D. C. Dept. of Recreation, assisted in publicity both to youngsters who might participate and to the general public. Local AMA chartered club members trained recreation people as building instructors, and conducted the city-wide finals.

4. Approximately 200 youngsters, most age 8-12, competed in the finals. About ten times that number, who built models and demonstrated successful flight, received certificates of achievement.

Financing of such large programs has frequently been a stumbling block. Too often a potential sponsor has thought that his name or his product would not get enough play for his expense. This is changed, for now a sponsor can have his message splashed across the wings of the model whenever 1,000 or more kits are involved, assuring substantial advertising irrespective of the success of other efforts. Sig Mfg. Co. offers to supply the AMA Cub kits with special wing imprints at cost — $160 for 1,000 kits, including postage. Some model clubs could afford this on their own. However, outside sponsorships may accrue many long-range benefits. Such sponsors may be influential in obtaining flying sites, contest prizes, newspaper, TV and radio publicity, club meeting places, etc. Potential sponsors are service organizations (Exchange Clubs, Jaycees, etc.), shopping centers, hobby shops, department stores, TV and radio stations, newspapers, local manufacturing firms — particularly those aerospace oriented, and any large local advertiser.

Special order blanks for the AMA Cub kits in quantity, as well as the material necessary to incorporate the special wing imprints, may be had by writing to AMA HQ.

New Status for Competition Flyers?

Various plans to increase the prestige of and upgrade the services rendered to competition flyers are being explored by officers of the Academy of Model Aeronautics. Included is an aproach to provide separate and special status for competition members together with exclusive privileges and services. Competition licenses could be issued separately, in addition to basic membership, and a special competition oriented publication might be provided. In addition, the return of competition flyer voting on rules proposals is being considered.

The Academy's policy-making body, its Executive Council, is debating and is to decide on these matters at the annual

Approximately 200 youngsters, mostly age 8-12, swarmed over the Washington Coliseum this spring when the Aero Club of Wash. and the D. C. Dept. of Recreation teamed up with AMA in a city-wide program using the AMA Cub model. Several thousands of the kits were distributed.

Council meetings during the 1968 National Model Airplane Championships. AMA's Executive Director has been asked to provide data to the Council concerning costs, processing details, and feasibility. Any changes in Academy policy which may result are expected to be applied to 1969 memberships.

So-called "Sunday" flyers currently are in the majority among AMA members, outnumbering the competition flyers at least four to one. This majority, therefore, provides the greater portion of dues income, yet most AMA services are related to competition activities. This is because competition has — until recently — been the basic activity of AMA. The spectacular growth of radio control in recent years, however, has flooded the ranks of modelers with many thousands who now fly only for recreation.

Meanwhile competition activity has been decreasing. While the number of meets sanctioned by the Academy has been relatively stable, an increasing proportion are of the fly-for-fun type, organized but informal flying sessions. And in contrast to the earlier days of AMA when the membership activity was practically 100% free flight (control line became popular in the forties and radio control has boomed in the sixties) it is now estimated that less than about 10% of current activity is by free flighters.

Yet most members seem to agree that competition is the backbone of AMA. Modelers follow the leaders and the latter are those who win in competition. It is freely acknowledged, for example, that most contestants in the Nationals are there merely to rub elbows with the "name" flyers — they like to associate with them and fly with the same designs and products. So competition still exerts a tremendous influence on the activity as a whole.

And there is a growing concern that competition flyers are being outvoted and under-represented, thus making the minority position harder to overcome. There seems to be sympathy, therefore, for proposals to recognize competition flyers separately within the organization, to give them special attention and service, to allow them more say in their own activities — even if it means a higher cost to themselves.

Meanwhile, the "normal" spiral of rising expenses demands consideration of a dues increase for 1969. It has been five years since the last one. The simple solution is to apply a flat increase across the board. But a fairer solution may be to proportion the increase to services rendered. One way to do this would be to increase the basic membership cost slightly and then to add an additional fee for those desiring a competition license.

Whether any changes will actually follow the above is speculation, but the subject has been given extensive study. The Council's final decisions are expected to be announced in these pages with explanation of details as soon as possible after the Nationals meetings.

New FF CB Chairman

Bud Tenny has resigned as chairman of the Free Flight Contest Board but will continue as Dist. VIII CB representative. He accomplished a tremendous amount of work during the year of his chairmanship, leading the Board through many complex rules problems.

The new chairman is Joe Boyle, from AMA Dist. IV. He has accepted the appointment offered to him by the AMA president.

Montage shows wing imprints of several varieties of AMA Cub kits. Gives an idea of the potential for obtaining sponsors.

Canadian License Okay

Canadians who hold the flyer's license of the Model Aeronautics Assn. of Canada (MAAC) are now authorized to compete in the US and AMA sanctioned contests without the necessity of obtaining an AMA license. This results from special insurance negotiations just concluded which brings MAAC members under the AMA insurance coverage at AMA meets.

Likewise, AMA members who fly in MAAC meets are covered by MAAC insurance. The MAAC is the Canadian equivalent of AMA.

New FAI Rule Book

The 1968 FAI Sporting Code, the international rule book, may now be purchased from AMA HQ. This replaces the 1963 edition which had been substantially modified.

The new Code is not a booklet as the old one was but is in the form of reproduced letter size pages. The FAI is no longer printing the Code, so AMA HQ has had to take this means of making the Code available.

Total cost is up over that of the booklet format, but it is now possible to obtain the Code in sections, so that only those desired may be ordered.

Sec. I & II — Gen. rules, plus World Champ. details	$1.00
Sec. III — Free Flight	1.00
Sec. IV — Control Line	1.00
Sec. V — Radio Control	1.00
Sec. VI — Scale (CL, FF, RC)	1.00
Sec. VII — World Records	1.00
Complete Set (all sections)	5.00

Prices include prepaid postage. Make check or money order payable to AMA.

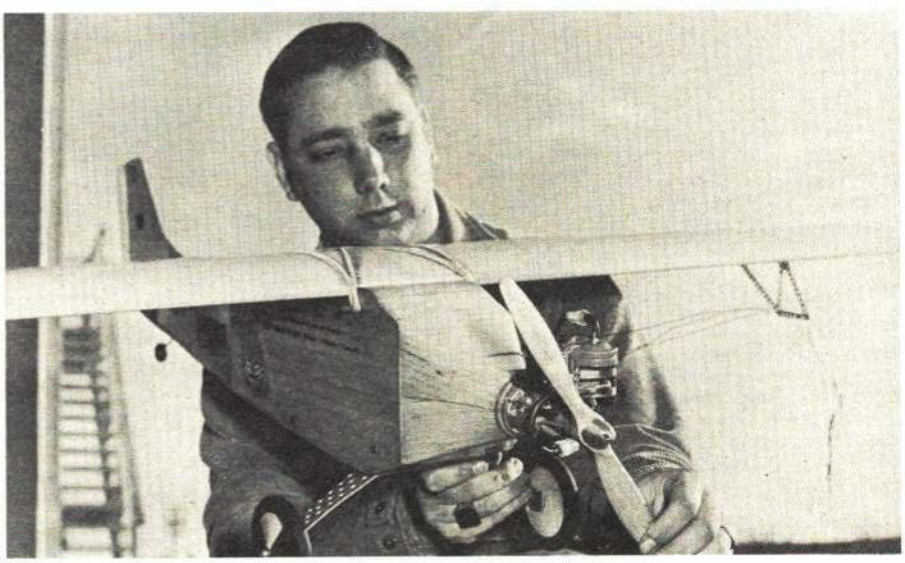
Club Promotes Itself— Helps Others

The Fairfax (Va.) Model Associates, AMA chartered club, has shown that it knows well what may happen if a newcomer to modeling has a problem with his model or equipment which he cannot solve. Lest the newcomer should throw up his hands in despair and say "never again," the club offers help.

It does this by posting eye-catching notices in area hobby shops offering assistance with construction, starting engines and flying. The notice lists the name and phone number of the club member nearest the store who has volunteered his services.

"The Fairfax Model Associates is an organization of modelers active in almost every phase of model aviation. We fly both in competition and general sport flying. One purpose of the club is to promote interest in model aviation. In order to encourage the beginner, we have assigned a club member who lives in the vicinity of this shop as a representative to help you with construction, starting of motors, and flying of model airplanes. Please call your representative for any assistance."

Good idea — should be welcomed by the shops.



Fred Ferris is shown with his Control Line Endurance model he used to capture National Open Record — 3 hours, 58 minutes, and 38.5 seconds. Model's 500 sq. in. wing carried 2 qts. of fuel. Power was Super Tigre .149. Endurance rules not printed in current book but obtainable by sending stamped return envelope to AMA HQ. (Photo courtesy Hayward Calif. Daily Review)

Goodyear Pipes Banned

President Cliff Weirick, acting in concert with the RC Contest Board Chairman, at the request of the National Miniature Pylon Racing Association, has issued an order banning the use of tuned exhausts on engines flown in RC Goodyear Pylon Racing Event. The order, effective immediately, is a safety rule enacted in an effort to hold down the ever increasing speed of these models.

Also, it should be noted that the NMPRA is making a survey to determine preference of two speed reducing measures which would be recommended for inclusion in the 1969 rules: reduction of engine size to .29 cu. in. or restricting engine air intake to .25 in. inside diameter.

Record Roundup

FAI record activity has been brisk as of late, resulting in a number of flights being reported to the Federation Aeronautique Internationale as probable international records. The most recent:

Indoor Stick, FAI Ceiling Cat. I: Stan Chilton — 17 min., 52.8 secs.

RC Seaplane, Closed Course Distance: Austin Leftwich — 21 km. (13.05 miles). This is eligible for record even though performance was subsequently exceeded.

RC Seaplane, Closed Course Distance: Maynard Hill — 60 km. (37.28 miles).

RC Seaplane, Closed Course Distance: D. L. Gregory — 116 km. (72.08 miles).

RC Seaplane, Duration: R. Gunning — 1 hr., 39 min., 17 sec.

RC Seaplane, Duration: D. L. Gregory — 2 hr., 29 min., 45 sec.

National AMA Records for outdoor models were listed in the May Model Aviation section of AAM; indoor records were listed last month. These listings should be updated by the following new records.

Outdoor Free Flight	
C Gas ROW Op. V. Cunnyngham	2:18.0
FAI Power Op. J. Smallin	23:15.0
Wakefield Op. R. Meuser	20:07.0
Unlim. Rub. Sr. S. Perryman	12:38.3
Unlim. Rub. Op. D. Orr	13:26.0
H. L. Glider Jr. T. Buddingh	11:50.0
A-2 Towline Jr. B. VanNest	18:12.0
A-2 Towline Sr. S. Perryman	11:29.6
A-2 Towline Op. R. White	19:19.0
Control Line	
Endurance Sr. J. Hollfelder	3::37:07.5
Endurance Op. F. Ferris	3::58:38.5
A Speed Op. Theobald-Wisniewsk	175.37
Jet Speed Op. Thomas-Fisher	183.60
Carrier II Op. R. Thiel	604.23
Indoor AMA Ceiling Cat. I	
B Stick Op. S. Chilton	17:03.6
Indoor FAI Ceiling Cat. I	
FAI Stick S. Chilton	17:52.8

New Recreation and Parks Program

A new and very bright happening promises much good news about obtaining flying sites and interesting young people in model airplanes. This results from continuing contacts between AMA HQ and the National Recreation and Park Association.

Already getting substantial favorable response in the form of inquiries for more information is a two-page article entitled "Model Airplane Clubs" in the NRPA magazine. The article not only highlights various aspects of aeromodeling but also indicates how AMA chartered clubs can help recreation personnel in organizing and directing model airplane activity.

Expected to produce even more response is a "how to do it" booklet being produced by the National Recreation and Park Assn. AMA HQ provided all the material for the booklet which the NRPA will print and distribute to recreation and park people all over the country (with copies to all AMA chartered clubs).

Hopefully all of these efforts will culminate in model airplanes being officially recognized as a worthwhile community activity along with such old standbys as pitching horseshoes, sailboating, and baseball.

Members of D. C. Maxecuters and Baltimore Aero Craftsmen — AMA Chartered Clubs — ran the D. C. Coliseum Meet. Max Ripken and Howard Weil (standing) timed; Dave Jordan and Mrs. John Thornhill (seated) tabulated results. Unlimited flights allowed, kept interest at high level; three flyoffs were necessary to break ties. The AMA Cub model used in the Washington, D. C. youth contest is quick to build — usually about 2 hours. Plan also serves as covering. Propeller assembly supplied in kit eliminates tricky carving or wire bending.

RC Symposium Papers

RCers who weren't fortunate enough to attend the 11th Annual Symposium on Radio Control last May will want to obtain the bound volume of technical papers presented. These are available from AMA HQ to AMA members for $2.50 each — $3.50 to others. Like its predecessors, this year's RC Symposium near Washington, D. C., was sponsored by the AMA Chartered DC/RC Club.

Papers presented in this amply illustrated, useful, informative collector's item are:

Latest Developments in a Model Sized Wankel Engine, by Fred Militky of Johannes Graupner Co., Germany.

The Capacitive Feedback Servo, by Jerry Pullen, Phil Kraft, Kraft Systems.

1.7 Meter Radio Plane, by M. Hill, JHU/APL.

Crystal Filtered Superhet, by H. R. Burrier, Bell Labs.

Construction of Large Gliders, by R. Smith, Smith & Lee-Thorp.

FAI World Records, by R. L. Gunning, Conductron, McDonnell-Douglas.

Dynamics & Control (Rubber Powered RC), by W. Hewitt Phillips, NASA-Langley.

RC Model Construction Materials, by Glen Sigafoose, Sig Mfg. Co.

New Techniques in RC Gliders, by Dale Willoughby, Willoughby Enterprises.

System Reliability, by J. Remez, Vitro Labs.

0.6 oz. Radio Control System, by Howard McEntee, American Aircraft Modeler.

Scholarships Begun

For the first time in its history AMA is planning to begin awarding a college scholarship to an academically outstanding Junior or Senior AMA member. The first scholarship of $1,000 is expected to be granted in time for enrollment in the fall semester of 1969.

The AMA Scholarship Committee, headed by Cliff Telford, has had its proposals accepted by the Executive Council. The committee envisions awarding at least one scholarship each year of $1,000 value as funds permit. Aspirants, who must be AMA members who have competed in an AMA sanctioned competition, would be rated by the National Merit Scholarship Corporation for outstanding scholastic achievement. It is expected that model competition proficiency would be used to select a scholarship recipient only if the National Merit Scholarship Corporation should determine that there is more than one successful candidate in a given year.

Look to these pages for additional details as they are finalized.

Model Club 1927 — Brewer Trophy 1968

Model airplanes **do** lead to bigger things. Take the case of Dr. Roland H. Spaulding.

In 1927 he organized one of the very early model airplane clubs in a junior high school in New Rochelle, N. Y. Then, during 1928 through 1931 he participated in aviation projects sponsored by the Daniel Guggenheim Fund Committee on Elementary and Secondary Aeronautics Education. In the intervening time he has been constantly associated with aerospace education, and to this day, although academically retired, he is active as an educator consultant to Pan American World Airways.

In recognition of his continuous, outstanding and pioneering contributions to aerospace education of the nation's youth, Dr. Spaulding was awarded the Frank G. Brewer Trophy for 1967. The trophy, administered by the National Aeronautic Association, was presented at the annual banquet of the National Aerospace Education Council in Denver last April.

We can all be proud whenever model airplanes provide a stepping stone to a career — which was the case here.

DIRECTORY OF AMA OFFICERS

Which officers live in your district? Select correct address when writing officers.

EXECUTIVE COUNCIL

President:
C. G. Weirick, 2802 New Deal Ave., Apt. C, El Monte, Calif. 91733
Secretary-Treasurer:
Earl Witt, Longview Trailer Court, R.D. #3, Chambersburg, Pa.
Executive Director
John Worth, c/o AMA Hq., 1239 Vermont Ave. N.W., Washington, D. C. 20005
Vice Presidents:
I: Cliff Piper, Highland Road, Atkinson, N. H.
II: A Schroeder, 18 Spencer Rd., Glen Ridge, N. J.
III: Eva Biddle, 2156 Street Rd., Warrington, Pa.
IV: C. Telford, 8612 Rayburn Rd., Bethesda, Md.
V: Jim Kirkland, 344 Edge Ave., Valparaiso, Fla.
VI: W. Weaver, 7248 Winchester Dr., St. Louis, Mo.
VII: Jack Josaitis, 23663 Lawrence, Dearborn, Mich. 48128
VIII: L. Peters, 3025 Hillglen Rd., Dallas, Tex. 75228
IX: Stan Chilton, 446 Ida, Wichita, Kans.
X: J. Pond, 2162 43rd Ave., San Francisco, Calif.
XI: R. D. Stalick, 2807 S. Oak St., Albany, Ore.

CONTEST COORDINATORS:

I: W. Leonhardt, 100 Abbott St., Lawrence, Mass.
II: E. F. Hoffman, 158 Carpenter St., Belleville, N.J.
III: E. Biddle, 2156 Street Rd., Warrington, Penna. 18976 (East)
M. Weisenbach, 4568 West 146th St., Cleveland, Ohio 44135 (West)
IV: D. L. Johnson, 3367 Sudlersville So., Laurel, Md.
V: T. McLaughlan, 741 W. Hernandez St., Pensacola, Fla 32501
VI: Gosta Johnson, 6810 S. Crandon, Chicago, Ill. 60649
VII: Odell Marchant, 2004 N. Hillsboro, Minneapolis, Minn. 55427 (North)
W. Hartung, 14759 Kilbourne, Detroit, Mich. 48213 (South)
VIII: M. Frank, 2933 Blankenship, Wichita Falls, Tex. 76308
IX: R. R. Combs, RR #1 Box 712, Morrison, Colo.
X: D. C. Farnsworth, 301 Carl Dr., Visalia, Calif. 93277 (North)
Pete Brandt, 5817 W. Ironwood, Palos Verdes Peninsula, Calif. 90274 (South)
XI: A. L. Grell, Rt. 1 Box 165, Tangent, Ore. 97389

CONTEST BOARD COORDINATOR: Pete Soule, 26622 Fond Du Lac, Palos Verdes Peninsula, Calif. 90274

Bold type below indicates Chairman of Contest Board.

FREE FLIGHT CONTEST BOARD:

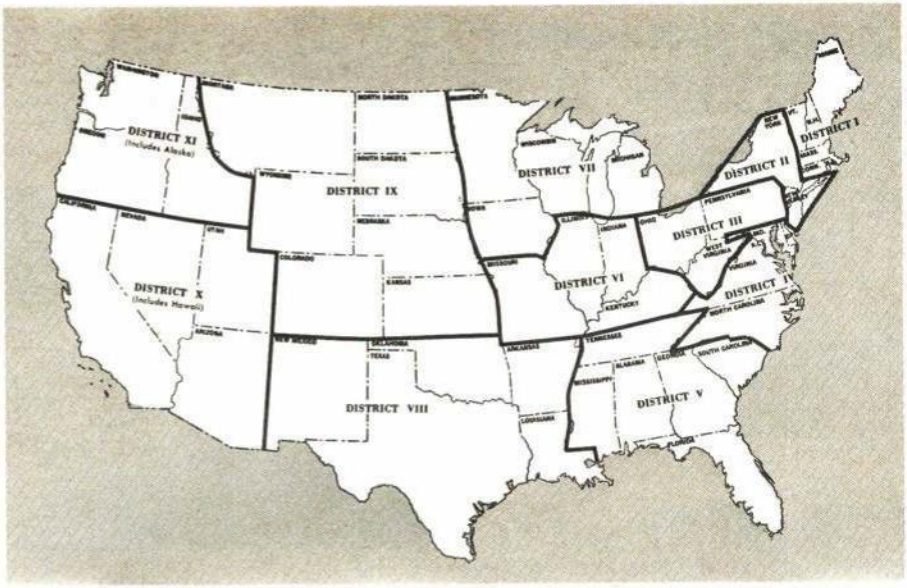
I: Henry Struck, R.F.D. #2, Hamburg, Old Lyme, Conn.
II: E. Fronczek, 34-14 Broadway, Long Island City, N. Y. 11106
III: Robert Leishman, 167 Goldenridge Dr., Levittown, Pa.
IV: J. V. Boyle Jr., 219 Shenandoah Rd., Hampton, Va. 23361
V: Jerry Wagner, 274 E. 9th St., Hialeah, Fla.
VI: Chuck Borneman, 1401 W. Taylor, Kokomo, Indiana 46901.
VII: P. W. Klintworth Jr., 894 Brooklawn Rd., Troy, Mich. 48084
VIII: R. Tenny, 432 Lynn St., Richardson, Tex. 75080
IX: Frank Monts, 6519 Marjorie Lane, Wichita, Kans.
X: V. Cunnyngham, 4337 Hornbrook St., Baldwin Park, Calif. 91706
XI: D. Sobala, 12003 S.E. Taylor St., Portland, Ore.

CONTROL LINE CONTEST BOARD:

I: D. K. Cook, 148 Belair St., Brockton, Mass. 02401
II: J. G. Pailet, 30 Emerson Rd., Brookville, Glen Head, N. Y. 11545
III: Laird Jackson, 5415 Houghton Pl., Philadelphia, Pa.
IV: H. Larsen, Rt. 1, Box 307, Manassas, Va. 22110
V: W. D. McGraw, 1325 Carol Dr., Memphis, Tenn.
VI: R. G. Marek, 1003 Tacoma St., Carpentersville, Ill.
VII: **Howard Mottin, 2124 Common Rd., Warren, Mich.**
VIII: G. M. Aldrich, 3219 Shady Springs, San Antonio, Tex. 78230
IX: J. R. Mason, 2214 S. Pine Crest, Wichita, Kans.
X: J. E. Barr, 7418 Collett Ave., Van Nuys, Calif.
XI: Keith Loutocky, 1419 S. 48th, Tacoma, Wash.

RADIO CONTROL CONTEST BOARD:

I: H. A. Thomasian, 369 Brigham St., Northboro, Mass. 01532
II: R. Noll, 96 Pine Knoll Rd., Endicott, N. Y. 13760
III: George Kane, 209 Barbara Lane, Warminster, Pa.
IV: W. C. Northrop Jr., 56 Holly Lane, Newark, Del.
V: Don Coleman, P.O. Box 436, Citronelle, Ala. 36522
VI: Bud Atkinson, 734 North 6th St. Terr., Blue Springs, Mo. 64015
VII: Loren Tregellas, 3003 S. Everett, Wichita, Kans.
VIII: C. Summers, 7132 Shook Ave., Dallas, Tex.
IX: James E. Northmore, 28207 Grand Duke, Farmington, Mich.
X: **G. E. Nelson, 8638 Patterson Pass Rd., Livermore, Calif. 94550**
XI: R. Brooke, 17845 3rd Ave. S.W., Seattle, Wash.



CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Aug. 3-4 — West Point, Va. (AA) RARC 8th Annual RC Meet. Site: Airport. F. Gregg CD, 12709 Richmond St., Chester, Va. 23831. Sponsor: **Richmond Area RC.**

Aug. 3-4 — Tahlequah, Okla. (AA) TORKS 8th American RC Annual Meet. Site: Municipal Airport. C. Brownlee CD, 3033 Rolling Stone, Oklahoma City, Okla. 73120.

Aug. 4 — Sharon, Pa. (AA) Skylarks RC Jamboree. Site: Club Field. G. Ehnot CD, 1077 March St., Sharon, Pa. 16146. Sponsor: **Skylarks MAC.**

Aug. 10 — Salt Flats, Utah. (A) Weiner Roast (Evening Contest) for FF. Site: Saltair Model Airport. J. Jackson CD, 3205 Canyon Rim Lane, Salt Lake City, Utah 84109. Sponsor: **Utah State Aeromodelers.**

Aug. 10-11 — Cedar Rapids, Iowa (AA) Cedar Rapids Skyhawks Annual RC Meet. J. Finn CD, 368 Hampden Dr. N.E., Cedar Rapids, Iowa 52402. Sponsor: **Cedar Rapids Skyhawks RC Club.**

Aug. 10-11 — Cloverdale, Ill. (AA) 6th Annual RC Contest. Site: Gary & Schick Rds. H. Mosquera CD, 361 N. Arrowhead Trail, Carol Stream, Ill. 60187. Sponsor: **West Suburban RC Club.**

Aug. 10-11 — Greenville, S. C. (AA) RC Contest. Site: Club field off I-85 between Greenville & Spartenburg. P. Byrum CD, 127 Virginia Dr., Ft. Walton Beach, Fla. 32548. Sponsor: **Western Carolina RC Club.**

Aug. 10-11 — San Jose, Calif. (AA) Wavemasters RC Contest. Site: Hwy 101 & Palm Dr. R. Morse CD, 3351 Pruneridge Ave., Santa Clara, Calif. 95051. Sponsor: **Wavemasters RC Club.**

Aug. 10-11 — Saginaw, Mich. (AA) Saginaw Valley Annual RC Meet. Site: SVRCC Field. G. Gill CD, 2020 Lone Rd., Freeland, Mich. 48623. Sponsor: **Saginaw Valley RC Club.**

Aug. 11 — Hillsboro, Ore. (AA) Nor Westers Summer FF Contest. K. Alberts CD, Rt. 1 Box 610, Ridgefield, Wash. 98642. Sponsor: **Nor Westers FF Club.**

Aug. 11 — Bellport, N. Y. (AA) 3rd Annual CL Contest. Jr. Trophy each event plus High Point Jr. Site: Rec. Field. H. Mayer CD, 18 Magnolia St., Central Islip, N. Y. 11722. Sponsor: **Suffolk Wings.**

Aug. 11 — Sioux Falls, S. D. (AA) Sioux Empire Model Airplane Championships for CL. Site: Fair Grounds. J. Donovan CD, 1409 Thompson Dr., Sioux Falls, S. D. 57105. Sponsor: **Flying Eagles Model Club.**

Aug. 11 — East Granby, Conn. Goodyear Fun-Fly. P. Caisse CD, 26 Pleasant St., Windsor, Conn. 06095. Sponsor: **Northern Connecticut RC Club.**

Aug. 11 — Davenport, Iowa (AA) 1968 Fall Annual CL Contest. Site: Mt. Joy Airport. H. Pohlmann CD, 720 S. Ohio, Davenport, Iowa 52802.

Aug. 17-18 — Omaha, Nebr. (AA) Omahawk Midwest RC Contest. Spec. Event. Site: Omahawks RC Field. R. Hess CD, 11720 Cedar St., Omaha, Nebr. 68144.

Aug. 17-18 — Ponca City, Okla. (AAA) Oklahoma CL Championships. Site: Agriculture Building Gr. G. Sanders CD, 1009 Shady Pl., Ponca City, Okla. 74601. Sponsor: **Ponca Skeeter Pilots.**

Aug. 17-18 — Jacksonville, Fla. (AA) 2nd Annual Jacksonville RC Contest. Site: Herlong Field. W. Lyle CD, 10133 Atlantic Blvd., Jacksonville, Fla. 32211. Sponsor: **Jacksonville RC Club.**

Aug. 17-18 — Endicott, N. Y. (AA) 13th Annual RC Contest. Site: Tri-Cities Airport. R. Noll CD, 96 Pine Knoll Rd., Endicott, N. Y. 13760. Sponsor: **Aeroguidance Society Inc.**

Aug. 18 — Aurora, Colo. August FF Fun Fly. Site: MMM Flying Site. R. Combs CD, R. R. 1, Box 722, Morrison, Colo. 80465. Sponsor: **Magnificent Mountain Men.**

Aug. 18 — Hastings, Minn. (AA) Minneapolis MAC Silent FF Meet. RC Glider. Site: 3 Mi. So., 1 Mi. West. D. Monson CD, 131 W. Wentworth, W. St. Paul, Minn. 55118. Sponsor: **Minneapolis MAC.**

Aug. 18 — Cincinnati, Ohio (AA) Tri-State Combat Championships for CL. Site: Lunken Airport. D. Patton CD, 2493 Downing Dr., Cincinnati, Ohio 45208.

Aug. 18 — Greenville, Pa. (AA) Merco-Macs 14th Annual FF Meet. Site: Merco-Mac Model Port. T. Engstrom CD, Box 167, Greenville, Pa. 16125. Sponsor: **Mercer County Model Aircraft Club.**

Aug. 18 — Converse, Ind. (AA) Converse RC Flying Club 1st Annual Contest. Site: Airport. W. Hutchins CD, 122 N. Munson, Portland, Ind. 47371. Sponsor: **Converse RC Flying Club.**

Aug. 18 — Olean, N. Y. (AA) AMA Goodyear Meet. Site: Line Material Field. G. Flynn CD, Rt. 2 Box 456, Olean, N. Y. 14760. Sponsor: **Olean MAC.**

Aug. 18 — New York, N. Y. (AAA) Assoc. of MAC of Greater N. Y. CL Meet. Site: Flushing Meadow Park. W. Boss CD, 145-24 223rd St., Laurelton, N. Y. 11413.

Aug. 18 — St. Louis, Mo. (AAA) Midwestern Model Airplane Championships for CL. Site: Buder Park Model Field. A. Schaefer CD, 4206 Virginia Ave., St. Louis, Mo. 63111. Sponsor: **St. Louis Yellow Jackets.**

Aug. 24-25 — Tullahoma, Tenn. (AAA) Coffee Air Foilers 9th Annual FF Meet. Site: Air Foilers Field. C. Tuthill CD, 101 Westwood Dr., Tullahoma, Tenn. 37388. Sponsor: **Coffee Air Foilers MAC.**

Aug. 24-25 — Orange, Mass. (AA) 15th Annual New England RC Championships. Site: Municipal Airport. J. Ross CD, 19 Sterling Dr., Dover, Mass. 02030. Sponsor: **New England RC Modellers.**

Aug. 24-25 — St. Charles, Mo. (AA) McDonnell 11th Annual RC Meet. Site: Conductron. B. Campbell CD, 4363 Selwyn Lane, Bridgeton, Mo. 63042. Sponsor: **McDonnell RC Model Airplane Club.**

Aug. 24-25 — Minneapolis, Minn. (AA) TCRC 12th Annual RC Meet. Site: TCRC Model Strip. D. Blazek CD, 9230 Bryant Ave. So., Minneapolis, Minn. 55420.

Aug. 24-25 — Norfolk, Va. (AA) 3rd Annual AA RC Meet. Site: U. S. Navy Auxiliary Field. B. Miller CD, 5390 Cape Henry Ave., Norfolk, Va. 23513. Sponsor: **Tidewater RC Club.**

Aug. 24-25 — Albany, Ore. (AA) Northwest FF Championships. Spec. Events. Site: Brewster Field. R. Waddell CD, 138 Peach Tree Lane, Albany, Ore. 97321. Sponsor: **Willamette Modelers Club.**

Aug. 25 — St. Clair Shores, Mich. (AA) St. Clair Shores Modelers 14th Annual CL Meet. Site: Harper & 14 Mile Rd. T. Craft CD, 29921 Rosemont, Roseville, Mich. 48066. Sponsor: **St. Clair Shores Modelers.**

Aug. 25 — Cleveland, Ohio (AA) Lakewood Flite-Masters 2nd Annual CL Meet. Site: CL Flying Field. R. Kolthoff CD, 6408 Lawnwood Ave., Cleveland, Ohio 44130. Sponsor: **Lakewood Flite-Masters.**

Aug. 25 — Ft. Knox, Ky. (AA) Tri-State Model Airplane Contest for CL. Site: Boatwright Parking Area. C. Rolwing CD, 11104 Oliverda Dr., Valley Station, Ky. 40172.

Aug. 24-25 — Tulsa, Okla. (AAA) 19th Annual FF, CL & RC Championships. B. Hanford CD, 3838 S. 88th E. Ave., Tulsa, Okla. 74145. Sponsor: **Tulsa Glue Dobbers.**

Aug. 25 — Johnsville, Pa. (AAA) Eastern States Championships for FF, CL & RC. Site: Johnsville NADC. C. Danila CD, 1913 E. Venango St., Philadelphia, Pa. 19134.

Aug. 25 — Chardon, Ohio (AA) Cleveland Radio Controlaires 6th Annual RC Meet. Site: Club Field. F. Vidmar CD, 26500 Zeman Ave., Euclid, Ohio 44132. Sponsor: **Cleveland Radio Controlaires.**

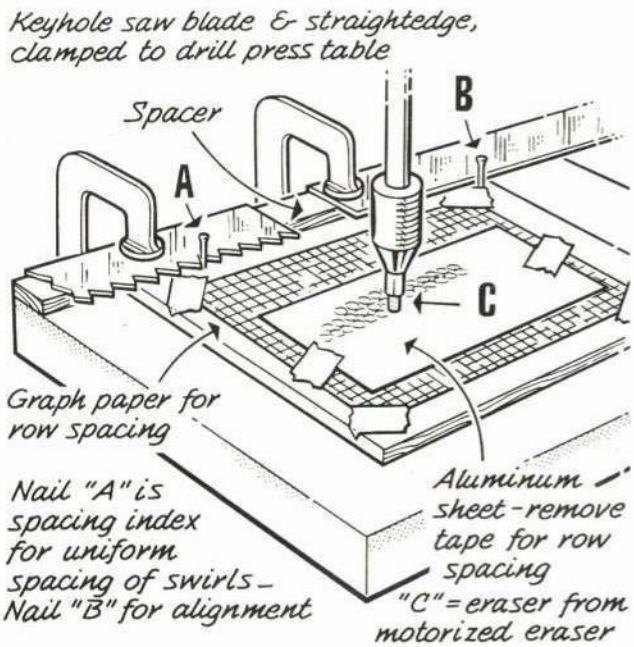
Aug. 25 — Alton, Ill. (AA) Illinois Metro-East CL Meet. Site: Civic Memorial Airport. J. Blum CD,

Continued on page 63

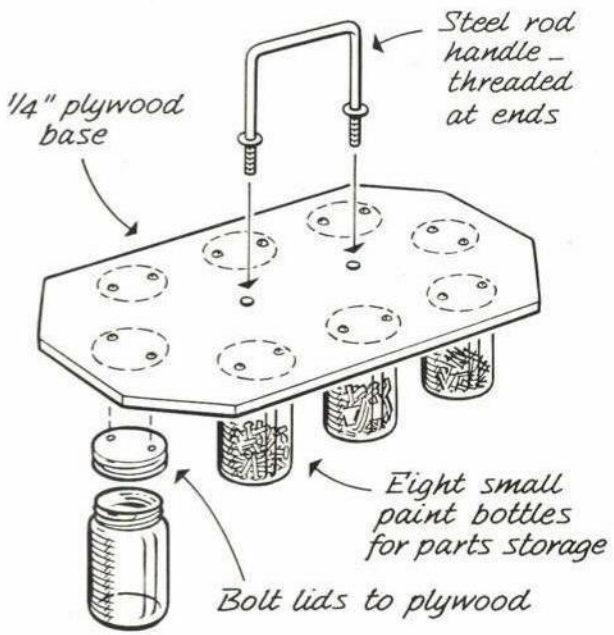
H. A. THOMAS

SKETCHBOOK

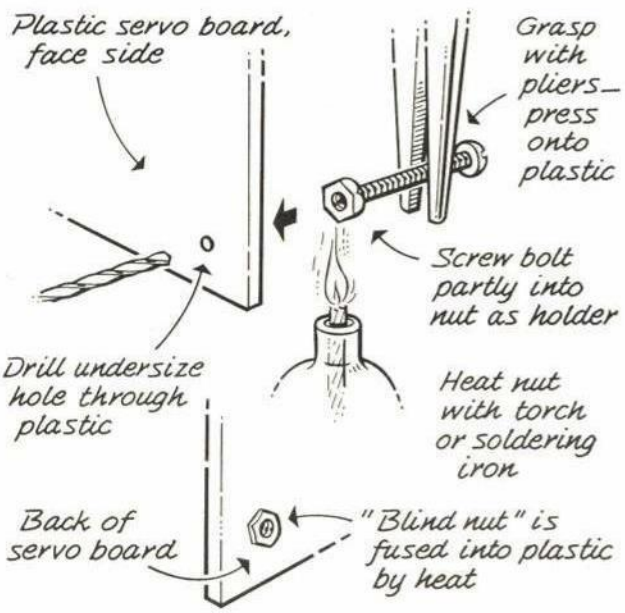
Have a new idea for construction, adjustment or operation of model aircraft or R/C? AAM pays $5 for each 'hint & kink' used. Send rough sketch and description to Sketchbook, c/o American Aircraft Modeler, Potomac Aviation Publications, Inc., 1012 14th St., NW, Washington, D. C. 20005.



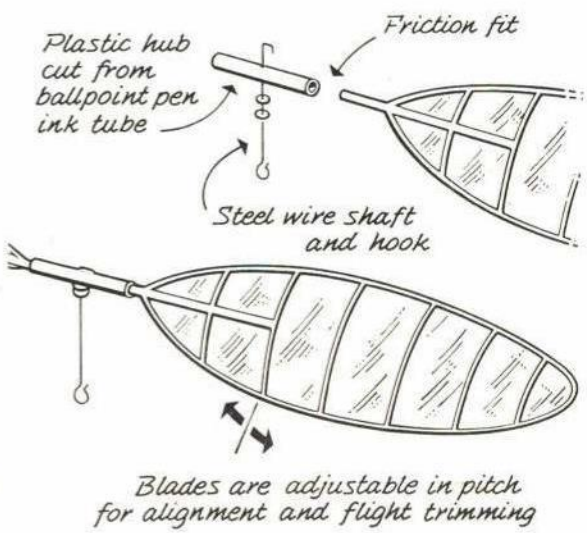
To make realistic pattern of burnished discs on aluminum, Bob Meuser, Oakland, Calif., rigs spacing guide from keyhole saw blade. Aluminum taped to graph paper guide and wood sheet. Burnishing is done with motorized ink eraser.



To keep a variety of small parts and materials sorted and ready for use, Larry Hoffman, Tokyo, Japan, devised 8-unit carrier. Series of small paint jars, with lids bolted to plywood base, comprise parts holder with carrying handle.



Harry Kelley, Dewitt, Mich., devised clever method of installing "blind nuts" to plastic servo board. Nut placed on bolt, heated with torch or soldering gun, then held against plastic to melt and fuse nut in position.



Elementary types of indoor models with built-up propellers can use hub construction submitted by Jerry Rupe, Grand Junction, Colo. Plastic tube, from ball point pen, serves as hub. Balsa stubs held by friction, are adjustable in pitch.

Getting Started in R/C

Continued from page 39

gardless of how you use the control sticks, but drain in the plane varies greatly, depending upon how much maneuvering you do (and how violent it is).

You may hear discussions of battery "memory." It has been said that if you habitually shallow-discharge your cells to about the same point each time, they will come to accept this discharge point as their *maximum* capacity. If one day you want to fly longer, they will suddenly go dead, when you get just a little beyond the usual discharge time. We have had some evidence of this effect; other users claim it's just a myth — at least in normal R/C service. Anyhow, there is a sure way to bring cells back to full capacity. It's something you should do anyhow, at least once or twice a season, to make sure just what capacity your cells really do have. This is to fully discharge each cell, then charge it up again and repeat. The discharge may be accomplished at any desired rate — the normal current drain the cells have in use is very suitable. But if you want to check the cell's actual capacity, compared to what they are supposed to have according to rating, discharge them at the C/10 rate.

Safest way to do this is to put a separate load on *each* cell. A common load for all cells in series is fine — until they get near to discharge. Even brand new nickel-cads vary a bit in capacity — and this variation may grow as they age. Thus, a set of cells in series across a single load will never all reach the full discharge state at the same time. The cell that first reaches full discharge is in bad trouble. For the other cells will continue to pump power through it but in a reverse direction to normal

charge. This is called "reverse-charging" and is the one thing that will quickly ruin nickel-cads — and may cause them to explode! This is another reason never to push your cells anywhere near full discharge — even though your equipment might still work with one dead cell.

Resistors or small pilot lamps are fine for discharging cells. Latter are especially good, as you can check by their brilliance how each cell is doing, if you have a bulb on each cell. Connect them as in our sketch; with a setup as this, no harm will be done to the first cell reaching full discharge; but when one does, you might as well remove the load from all others, since your battery capacity will be limited by that one cell anyhow.

Useful lamps for discharge of individual cells are: #46, approx. 100 ma current on a single fully charged cell; #47, approx. 60 ma under same conditions; #48 and 49, approx. 50 ma; #313, 30 ma; #31, 135 ma. These are only a few of dozens of small bulbs you can use. Note lamp brilliance when first connected to a fully-charged cell; when the lamp goes out or when it starts to get very dim, you can consider the cell discharged. Some of these lamps will not be too bright to start with, since they are intended for much higher voltage. Incidentally, under C/10 discharge, a nickel-cad cell is considered to be discharged when its voltage drops below 1.1.

One last note. Nickel-cads should *never be connected in parallel*, only in series. This is true both for charge and discharge. For a discussion of parallel and series connections, see part 8 of this series. Just remember: "Series, si — parallel, No!"

Howard DGA-15

Continued from page 29

The drawback, which some contended, was that in case of an accident, landing gear failure or belly-landing for any reason, the high risk of fire or explosion could result in disastrous consequences.

The DGA-15s found homes with a number of private pilots, large corporations and export sources. One -15W was purchased by Cuba for service with the Cuban Aviation Corps. It made quite a name for itself in 1941 when Cmdr. Oscar Rivery, Lt. Juan R. Montenegro and Sgt. Frank Medina flew it on a 22-country, 50,000-mile goodwill tour of South America. Other than fuel and oil, minor upkeep and adjustments, no trouble was encountered with the plane and it went on to serve the Cuban government as a reliable transport for nearly seven years thereafter.

When World War II broke out, the Army Air Force commandeered just about every DGA they could find. Some 20 wound up in olive-drab warpaint as the military's UC-70 series. This included the original 1936 DGA-8 which became the sole UC-70C.

The Navy on the other hand, ordered several Howards direct from the factory as their GH series. These were modified to serve through simple in-field modifications a variety of roles. The Navy GHs were militarized, featured double doors, sophisticated navigational and flight instruments, special radio gear and engine ratings to meet the more strenuous Naval needs. Several versions were fitted as ambulance planes. An extra large door was fitted to the right side so a litter could easily be put aboard and secured to special fittings. A pilot, medical attendant, and patient thus could be accommodated. The Howards served in this role on numerous occasions and thus earned the official nickname of Nightingale.

Only a few pages of aeronautical writings have been devoted to the remarkably versatile Howards. The war years brought an end to the DGA high-wing designs. Attention swung to the DGA-125 low-wing primary trainer. Mr. Mulligan was one of just a handful of American racing designs to successfully sire a private and commercial offspring with so few major changes in the process. There still are a fair number of DGAs still flying and their owners justifiably think highly of them. They can also be proud of their unusually rare breeding.

On the Coast

R/C glider pylon racing — mid-air collisions almost common. Right-of-way rule needed?

With Jerry Nelson.

Valley Flyers Goodyear Meet: The theme for this April 21 meet was fly, fly, fly. Organization was just about perfect. Over 45 heats were run off in six hours with time out for lunch. Turned out there were seven rounds per contestant — a lot of flying for a one-day meet.

Overall winner was a newcomer to the winning circle in a highly contested meet. Jim Witt has competed in Goodyear quite a bit. He flew a K&B-powered La Jollita with a recorded top time of 2:05.

The 1968 NMPRA rules were enforced to the letter. No problems were encountered. Everybody felt that using enforced rules made an excellent contest. Consistency proved to be the standard for winning. Faster times were turned in (Granger Williams did a 1:56), but many of the faster ships couldn't complete their scheduled heats.

Final results were: 1) Jim Witt, 2:05, La Jollita K&B 40; 2) Jack Stafford, 2:05, Minnow K&B 40; 3) George Kileen, 2:14, Mustang K&B 40; 4) John Greenshields, 2:31, Shoestring K&B 40; 5) Bill Salkowski, 2:14, Mustang K&B 40.

R/C Bees Glider Meet: The Watsonville/Santa Cruz Calif. R/C Bees held their second annual glider pylon race on April 27, and 28. This is the first time I have entered and raced an R/C glider. It really is a lot of fun. You have a similar thrill in racing a slow majestic glider as you do a little 125-mph Goodyear racer.

The course is along the face of a cliff overlooking the Pacific Ocean. Pylons are about 400 feet apart. The object is to complete five laps around the pylons. You don't actually fly around the pylons. You have to fly past them. Three or four ships are flown in heats, scheduled as in Goodyear racing.

Mid-air collisions are almost common. The winner of this competition, Jim Stevens, had six mid-airs. There usually is no damage because the models are going so slow. However, if they hit head on, which is very rare, a problem usually occurs. Bob "Sig" Siegelkoff hit head on with Steve Woodward. Sig's ship, an 11-pound Nelson KA6E, made kindling out of Steve's ship. Sig's ship suffered a broken canopy. Steve's was totaled.

It seems to me there should be a right-of-way type of pattern established to cut down chances of mid-airs. If ships traveling to the right would stay close to the ridge, and those traveling to the left would stay away from the ridge, then I think there would be fewer collisions. Actually, mid-airs are not too much of a problem. Jim Stevens had six and he finished every race he flew in. Most are just a touching of the wings. There isn't much impact velocity. Sig's and my fiberglass gliders do seem to have an advantage because the mid-airs are not much of a structural problem for us.

All the races started from a flying start. Twenty seconds notice was given prior to the start of the timing of the race. If you went past the start line before the twenty seconds were up, you had to make a re-start. Quite a bit of flying skill is required to pass the start line close to the zero time as possible.

Over 30 contestants entered the meet. Final winners were: 1) Jim Stevens flying an original Lead Sled; 2) Gene Downey with original Ridgehawk; 3) and Jerry Arana and a Foka with wing tip plates.

Glider quiders have some interesting names for their original ships, such as, Purple Parrot II, Ill Wind, Time and Money, Quaker Oats Box Special, Minisailer, Dynasoar, Jacobs Coat of Many Colors, Albino Buzzard.

Pioneers R/C Club Pylon Race (Turlock, Calif.): Granger Williams topped a field of 18 very fast Goodyears with a consistent

Continued on page 53

Spitfire

Continued from page 23

drying time should be allowed so that the first coat will take a little sanding with wet or dry, to smooth out any brush marks, or, if you have been unlucky — any paint runs.

Next, wash off parts with an old soft brush in warm detergent suds to rinse off sanded paint. If not smooth or covered evenly, apply second coat, and repeat the drying, sanding and sudsing process again. After all areas are painted robin's egg blue, paint upper surfaces of plane earth color, sanding between coats. Apply a minimum of three coats with the thinned-down paint. After earth color is dry, use soft lead pencil to mark out camouflage (these will be the dark green areas). While dark green paint is drying, paint canopy frames with either green or brown, to conform with camouflage pattern. When green is dry, and if you have been lucky enough not to have any paint runs, you can start to apply a few of the decals. If not, touch up lightly and paint again. After decals are applied, install parts (pilot, canopy, wheels, etc.).

Spray-painting: Almost any type of airbrush will do a creditable job on your models if the paint you use is of the proper consistency. This "proper consistency" can only be achieved by experimentation until you have the right mixture of thinner and paint. For the Spitfire, I used the Badger Airbrush No. 200. The $5.95 gun has limited adjustment for detail spraying and is only recommended if you have a budget limitation or are an occasional modeler. As to paint, "Official" paints and thinner were used throughout.

Spray entire undersurfaces of model robin's egg blue, giving particular attention to the underside of nose area and up on the sides. Two coats should be sufficient; the first to be heavier than the second for covering purposes, the second will be an overall, leveling coat of paint which has been thinned with thinner. Sand smooth with wet or dry, rinse, and allow to dry thoroughly between coats.

Mask off all areas sprayed with robin's egg blue (do not remove tape until camouflage spraying is completed). When tape has been applied, spray uppersurfaces dark earth brown (two coats sanded smooth between application, should be sufficient; if not, give an additional coat). Again, the final coat is the thinned-down mixture.

Next, use soft lead pencil, sketch in camouflage pattern which will be dark green. Mask off all areas which are to remain dark earth color and spray the dark green camouflage pattern. When dry, remove all tape. Use small piece of #400 wet or dry, dip in water, fold over and then sand very lightly all edges where the two camouflage colors meet. Feather the painted edges until smooth. Allow to dry thoroughly, assemble and apply decals as per kit instructions.

The following are a few modifications which the advanced modeler may incorporate in his model: 1) Line wheel wells with light weight styrene (about .020 stock); 2) Reposition throttle so that it will not be on the access door; 3) Door can be made operable by adding masking tape hinges. If you will take the time to carefully construct, detail, and paint this model, you will have an excellent conversation piece to display as well as a very essential addition to your Miniature Aviation Museum.

Note: There are two very informative reference books on the Spitfire which will be both interesting and helpful to the modeler: Profile Publications No. 41 "Supermarine Spitfire I and II" and the Harleyford Publication "Spitfire — the Story of a Famous Fighter."

CORRECTIONS

Frank Heeb, Rubber-Powered Models author (Part II this issue), has two corrections to Part I. Page 15 August issue, airfoil drawing shows high point nine degrees above chord line; this should be nine **per cent**! Text on page 14, Wakefield areas should be: wing — 235 and stab. — 59 sq. in. Frank's **latest** Wakefield has wing area of 239 and stab. area of 55 sq. in.

On the Coast

Continued from page 51

times around 1:55 and a top time of 1:53.7, May 4 and 5. This was Granger's contest. For once everything went just like it did at home. He flew a La Jollita (what else?) powered with a K&B 40 that turned on like gang busters. Looks like Granger is going to be the man to beat at the Nats.

Cliff Weirick did some good pylon bending to end up second place. Only reason he did as well as he did was because I called for him Sunday. Anybody can fly a racer. It's the caller that counts. (Just joking, Cliff!)

Joe Martin lucked into third with a sort of yellow trash type of victory. Consistent flying means so much in Goodyear racing, and that's what Joe did. Goodyear's junior flyer, Witt Stockwell, finished up sixth beating out some of the '67 Nats top pylon flyers (Foster and Francis for example). Witt's best time was 2:14, darn good for anybody. He flew a Palmer Glass Rivets.

Open pylon had 11 contestants. Joe Foster was first flying his Rivets type stunt job. The west coast's senior R/C contest flyer, Ed Von Adelung, flew an extremely fast K&B 40-powered open racer. Ed's ship featured a ½ in. thick sheet-balsa wing. You couldn't have talked to a happier person than Ed after he picked up his second place trophy. Third was Vic Husak.

Quite a bit was said about the NMPRA's proposal that will have to be made at the Nats contest board meeting. The NMPRA is required to submit a proposal that will slow the speeds down for the 450 sq. in. Goodyear racers. This is a very difficult decision to make. There are several suggestions to do this. Propeller size, fuel limits, venturi size, and the latest proposal — engine reduction — have been offered. Further details will be found in Howard's Radio Control World this month.

Galloping Ghost

Continued from page 35

license is required), 85% modulation at a tone frequency of about 600 cycles. We found total battery drain to be 60 ma with neutral stick (current changes considerably with pulse rate change; this figure is with an average rate setting), 45 ma with throttle lever in high position (steady tone) and 70 ma in low (no tone); antenna measures 51" long when extended, 5½" above case top when collapsed.

GL-100 servo: 1.35 oz. with connector; 1¾ x 1 9/16 x 1 5/8" overall; motor has dual capacitors and a resistor for noise suppression.

Battery case: 5.75 oz. with six alkaline cells; about 2 7/16 x 1 13/16 x 1¼" overall; switch and connector weighs .4 oz.

— Howard McEntee.

Countdown

Continued from page 41

minutes between firings. Later, firings were made from the tactical mobile launch trucks with their 25-foot launch rails. Test firings were also made from shortened truck rails.

One modification of the H-J was the "Father John" missile, basically an H-J with additional small solid propellant motors clustered around it. Only a few Father John missiles were flown.

Considerable trouble was experienced with the quenching of the huge cloud of dust and smoke kicked up by the launching of an H-J. The tremendous jet blast from the missile created a thick cloud that rose as high as 1000 feet in the air. Such a cloud would reveal an H-J launch site to the enemy at once and probably result in making said launch site a prime target for enemy artillery at once. Naturally, the technique of preventing such a cloud is highly classified!

By 1957, the Honest John M-31 was operational in the hands of special rocket artillery troops and had been deployed overseas.

The M-6 (X202-E2) rocket motor: The M-6 (X202-E2) solid propellant rocket motor is made by Radford Arsenal. It uses a modern composite solid propellant of classified nature. Its length is 184.9 inches with a diameter of 23.0 inches. Launch weight is 3783 pounds for the M-6 alone, less fins and launch lugs. The M-6 (X202-E2) produces 84,000 pounds of thrust for 5.20 seconds from 2050 pounds of propellant, resulting in a calculated total impulse of 213 pound-seconds-per-pound. (The original M-6 produced 105,000 lbs. of thrust for 4 seconds and was known as "JATO 4-DS-105,000.")

The basic M-6 (X202-E2) rocket motor is also used as the lower stage in several of the ARGO-series of rocketsondes such as the EXOS and Javelin, both of these vehicles also using the basic Honest John fin assemblies.

Color schemes: Few rockets can boast the varied number of color schemes used on the Honest John. This is because of the fact that so many different rounds were used for White Sands firings, where separate vehicles were often painted differently to provide identification on film records. In addition, different White Sands paint patterns were applied to aid tracking or data reduction for special test rounds where, for example, roll rate or attitude had to be accurately determined from phototheodolite film.

Most R&D flights of the Honest John at White Sands were painted flat white overall. In nearly all cases, one fin and aft 34 inches of the motor casing were painted flat black as follows, the missile resting on the launch rail and being viewed from the rear: Upper left-hand fin painted black on both sides; the aft 34 inches of the motor casing painted black between the two left-hand fins. The black-and-white checkerboard roll pattern forward and aft of the nose ogive base was, on all rounds of this paint scheme, identical, the aft portion being alternately white and black in circumferential quadrants as shown in the photos (two black quadrants and two white quadrants) while the forward portion of the pattern is broken into eight circumferential sectors and positioned with respect to the aft pattern as shown.

Rounds were also flown at White Sands painted fluorescent red-orange overall with blacked fins as per above, no blacked aft motor quadrants, but blacked trailing

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This is the Boeing 2707 Supersonic Transport, called the next step in aircraft development. The real aircraft, from which this 1/400 model is scaled is 318 feet long, wing span, spread, 180 feet. It's 46 feet high and weighs 338 tons. Powered by four GE4/J5P turbojets.

As projected, it can carry 300 passengers at 1800 miles per hour at an altitude of 64,000 feet. The variable sweep wings, controlled by the pilot, can be likened to gear shifting in an automobile. First dreamed about in 1952, it is estimated the airplane could be in service in 1970.

This model, 9½ inches long, is a fascinating miniature copy with sharp detailing, produced from latest Boeing information supplied to Monogram. Kit includes authentic decal markings and display base.

Ju87G-1 STUKA

German "Tank Buster" World War II

This is the first quarter-inch scale model of the famous Stuka which dominated Germany's eastern front during part of World War II. It's a model serious builders and collectors have been wanting for a long time.

This is a faithful copy of the Ju87G-1 version flown by Ulrich Rudel, credited with destroying 500 Russian tanks. Some fascinating features are complete detailing, two position canopy, detailed cockpit with seats, floor and rear guns, anti tank guns under the wings, rotating wheels and propeller, figures of pilot and gunner. Complete set of decal markings, same as those used on Rudel's aircraft.

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PA210 GOSHAWK F11C-2. Biplane Fighter of the 1930's

Scale 1/72 • Each 70 Cents

edges of all fins. Some of these had two spiral roll pattern bands wrapped halfway around between the forward and aft motor bands. Other fluorescent red-orange rounds had white ogives and transitions 105 inches back from the nose tip with blacked fins as per above.

Operational rounds launched at Fort Carson, Colorado and Aberdeen Proving Ground, Maryland, were flat olive drab overall, sometimes with white serial numbering, sometimes with black serial numbering.

Lettering on the white-and-black White Sands rounds was usually confined to the warhead serial number painted lengthwise on the ogive and consisting of the numbers "1236F-" followed by the serial number of the round such as "M585" or "M521". The word "TOP" in black appeared just forward of the forward launch lug. Sometimes the serial number of the motor and the weights, CG location, and other data was stencilled in black in 3-inch and 1-inch letters on the side of the motor casing.

Data sources: This information on the U. S. Army Honest John M-31 rocket was obtained from the following sources:

Dimensions of the missile: From personal measurements made by the author on the Honest John M-31 displayed at the White Sands Missile Range. Measurements made June 2, 1957.

From fact sheets obtained at the Public Information Office, WSMR, in 1957 and June 23, 1966.

From NASA Technical Note D-219 dated December, 1959 describing the EXOS rocketsonde and giving dimensions and weights of the M-6 (X202-E2) rocket motor as well as basic performance.

From "Sounding Rocket Study Summary Report No. AST/elR-13337," NASA Wallops Station, dated 18 April 1961, describing and giving weights and dimensions of the EXOS, Jason, Javelin and Strongarm with M-6 boosters.

From various U. S. Army Ordnance photos taken at White Sands Missile Range and Aberdeen Proving Ground, and from various photos taken by the author.

The author wishes to express appreciation to the late William Haggard and Gabriel Brilliante, Public Information Office, White Sands Missile Range, and to Robert L. Krieger and Charles S. James, NASA Wallops Station for providing the information used herein.

Rubber Powered

Continued from page 31

true pitch and alignment and assemby jig. This jig holds the blades at the proper pitch angle so that the Z wire can be bent and fit properly and soldered to the shaft.

For me, the hardest part of the whole rubber model is making the blades fold properly. I want both blades to fold as flat as possible along the fuselage centerline so that absolute minimum drag is created by the blades. Once I made a complex full-size layout, using descriptive geometry, by following instructions in a British model magazine. This was a lot of work, but it resulted in my best prop fold yet. The layout provided the two hinge angles: 13.5 degrees in the front elevation and 15 degrees in the end elevation. This prop had 3-in.-wide blades of 24 in. dia/28 in. pitch. I wouldn't have guessed the angles to be that large, and I know it would have been a poor job if I had only estimated the angles. With prop blades as large as a medium-size hand-launch glider wing, you can't afford to fold improperly.

A more practical way to get the blades folded neatly is by trial and error. Estimate the angles for the drill jig, drill the blades, cement in the tubes, bend the Z wire and try it. If angles are incorrect, remove the tubes, plug the holes, redrill, etc. and try again. My drill jig is a brass tube clamped to an angle bracket which is C-clamped to the board. Both angles are adjustable. Use the alignment jig to hold the blades at the true pitch angle each time the Z wire is changed.

Blade alignment and balance are as important as flat fold. I use stop wires through the blade hubs; these stop the blades from going forward, when under power, by contacting the Z wire. I balance a finished prop by doping the light blade. Unbalance is the main objection I have to the single blader; I have never eliminated all the vibration in spite of perfect static balance.

Boy, some of the intricate, expensive, fine-machined thrust-bearing assemblies you see in the magazines these days! I disagree with the concept completely and believe that any performance gain due to elimination of friction losses is immeasurable. Why use an instrument ball-bearing (designed for 20,000 plus rpm for several months) on a prop that rotates only 400 times in 30 seconds?

I have a much simpler design: The standard German ball-thrust bearing behind a safety-pin compression spring on a 2 mm. (.080) music wire prop shaft which rotates in a plain sleeve bearing. Since there is no .080 ID tubing available, I use

3/32 (.093) ID. After running solder in each end of the tubing and drilling it .080, I have a lead-tin sleeve bearing. Properly lubricated, it is practically frictionless. This tube is the main bearing the full length of the nose block and is soldered to a thrust bearing plate in the front and a stop plate on the rear of the block. On the rear plate I solder a 2-56 nut for the prop stop fillister head machine screw (never a wood screw prop stop, to become loose). I always shim the prop block in the drill press so that a lot of down- and right side-thrust are drilled in. Once I had a Wake prop hook (.080) straighten out and let the motor slip off while winding. This was worse than a blown motor, since all the rubber snapped back into the fuselage. So I use a double wire hook, bound and soldered. The second wire is .040 dia. and also serves as the prop stop that hits the machine screw. These details are shown in the sketches.

Motors and rubber care: There's no question that Pirelli is the best available rubber today. Perhaps the small diameter rubber used by the Russians and Hungarians is better; it certainly has a more appropriate cross-section for model use and should be much safer to wind.

Pirelli has its drawbacks, though. The main one is the variation from batch to batch, year to year, and source to source. These variations are: density, nick and tear resistance, capacity (number of winds), storage life, apparent power output, and quality in general. And we in the USA can do nothing about any of these properties. The density had steadily decreased from 1960 until 1966, when the batch received by World Engines turned out to be the heaviest in years. The 1964 and 1965 batches had the worst (from my experience) nick and tear resistance. This might have been due to a slight waviness of the edges; you could see that they were not perfectly straight, probably due to improper stripping.

I used to think that rubber should be aged for a year or so before use, but now I'm not so sure. I know that my 1961 batch used in 1963 was the best ever, but it may have been that compounding or other processing techniques made it an exceptional batch. How good it might have been in later years is unknown, but two-year storage didn't seem to degrade its properties. The indoor experts really believe in aging rubber, so there must be something to it. Proper storage is important since ultra violet rays and ozone, from sunlight and air, tend to deteriorate rubber.

Rubber lubricant is simple to make. Melt Ivory soap and glycerine in equal proportions in a heated pan. If the cold mixture is too thick, reheat and add water. I like lube that is the consistency of cold cream

or thicker. It will melt above 90 degrees F, the usual summer contest ambient temperature, but when it is thick it must be rubbed into each strand. This is good, for the motor is completely lubricated and won't splatter lube over the fuselage inside. I don't use green soap because usually it is available only as tincture of green soap which contains alcohol. This must be removed completely by boiling, for alcohol also deteriorates rubber. Ivory soap is one of the few non-detergent soaps still available.

I've tried both stretch and wind procedures of breaking in motors and ruined and blown a few in the process. I found that each way by itself has some drawbacks, so I came up with the following procedure: 1) stretch, hold for a couple of minutes, relax and stretch two or three more times until it feels that the motor has taken a permanent set and increased its length; 2) After 24 hours, wind to 60% maximum; 3) After 24 hours, wind to 80% max. Now the motor is broken in and ready for up to 95% max. in a Wake. This is it's last wind-up; I never use a motor again after high winds. I rarely exceed 80% max winds in an unlimited, and the motor may be good for half a dozen more wind-ups.

After break-in and every winding over 80%, it is extremely important to inspect each strand carefully in a strong light. Any nicks, tears, or holes must be eliminated by cutting the strand and tying a knot. I use the turn chart shown in the illustration.

To prepare for a Wake event, I make up eight motors at once. These are all broken in, inspected and stored in plastic bags. The day before the meet, I heat-soak one motor outside in a car trunk or other similar location, for three or four hours. Then it is exposed for five minutes in direct sunlight. Then I wind (still in the sun) to destruction. This is my max. number of turns for these motors for the contest. It's an expensive and tedious procedure but I don't know any better method. Of course, the motors should be lubricated thoroughly one more time before wind-up. It's been reported that some European flyers stretch their motors almost to the limit before insertion into their Wake fuselages. This certainly permits them to put in more turns, but if there is an increase of motor energy output, the results are unknown.

With the failure number of turns and 95% figures in mind, I stretch and wind and come in so that I'll reach 90% about 6 inches in front of the nose block. Sometimes I'll go over the 95% figure if the rubber feels like it can take more. This is the sudden death procedure. I don't recom-

mend it, but have done it. And I agree completely with Jimmy Patterson who said, "If the model lands without one or two broken strands, it wasn't wound enough."

I use very little slack in unlimited motors and my Wake motors are usually shorter than the hook to peg distance. If your unlimited isn't climbing all the way or not fast enough to suit you, don't hesitate to add more strands. Two strands may make quite a difference. If weight is critical or rubber is limited, remake the motor shorter with two more strands.

The latest contest strategy is to hold the fully wound model, sometimes several minutes, and wait for a thermal. There is logic to this, for the best Wake in the world can't do three minutes in a downdraft, and a "dog" can get an easy max from quite low altitude if the air is very good. So the loss of power, which certainly occurs in the held model, is more than compensated for by more favorable air conditions. The problem is to know for sure just when a thermal arrives; I've guessed wrong so many times that I have no advice to offer.

Adjustments: With the CG located 80 to 90% mean-aerodynamic-chord (aft of the leading edge) and 2 degrees angular difference, a new model should hand-glide fairly well and be safe enough for its first low-power flight. With some right, and maybe a little down, thrust built in, the model should climb in a wide right circle and not power stall. A smooth transition from power to glide should occur.

I prefer to fly rubber jobs the way a lot of fellows fly gas jobs: right climb from right thrust and left glide from left tilt, and maybe a slight amount of left rudder. Years ago I flew right-right, but every once in a while a model would get in trouble with the first burst of power and go in to the right. That has never happened with the left glide adjustments. I have never been afraid to use a lot of down and right thrust. I'll do anything to avoid a power stall.

Aerospace ground equipment (AGE: The three important AGE items required are: 1) Winding stooge. This was developed by the Cleveland boys and is the best thing since folding props. It serves as a combination tool box and jig for winding or just positioning the model for repair and other work. It permits you to fly by yourself and become independent. Railroad spikes are used to hold it in the ground. 2) Motor insertion tool. This, another Cleveland development, allows easy insertion of no-slack motors into Wake bodies. 3) Spade grip winder. Nothing cheap here, the best quality industrial hand drill modified with a spade handle and ball thrust bearing is recommended. Surplus BT-13 aircraft flap

crank mechanisms have been modified into winders, and probably there are other similar items on the surplus market.

To me, these AGE items are just as important as the launching pad for a missile or the ground power unit for a jet; you just can't get off the ground without them.

The future: Where do we go from here? We all blame inconsistent power and poor quality rubber as our major handicap. Maybe we will get new sources and better rubber formulas and processing to increase power output and rubber reliability. Or maybe we can improve Pirelli.

Prop design is an important area of research. Improvements here can be found strictly by trial and error, but who has the ambition to carve a dozen Wake props to find the best configuration for 1.4 oz. of rubber? Time will tell. Airfoils and turbulators hold the key to longer endurance; this is another trial-and-error area, unless we get some accurate low-speed wind-tunnel data.

And then there is the gimmick — variable incidence surfaces. We'll learn how to make them simple, light, reliable, and they will be used on a good percentage of contest models some day.

I am optimistic about the future. The Nationals and the Wake eliminations are tougher than ever before, yet interest increases each year. It appears that rubber models will be around for a long time.

Contest Calendar

Continued from page 46

2517 Glen Pl., Granite City, Ill. 62040. Sponsor: **Tri-City Sky Steelers & Alton Area Thunderbolts.**

Aug. 25 — Fresno, Calif. (A) Fresno Monthly Meet for FF. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702. Sponsor: **Fresno Gas Model Club.**

Aug. 31-Sept. 1 & 2 — Memphis, Tenn. (AA) Memphis RC Annual. Site: MRCC Flying Field. K. McClure CD, 3465 Powers, Memphis, Tenn. 38128. Sponsor: **Memphis RC Club.**

Aug. 31-Sept. 1 — Syracuse, N. Y. Syracuse ARCS RC Hobo Meet Fun Fly & Goodyear Racing. Site: Nedrow. E. Izzo CD, 3950 Highland Ave., Skaneateles, N. Y. 13152.

Aug. 31-Sept. 1 — Three Rivers, Mich. (AA) 8th Annual RC Multi Contest. Site: Airport. C. Groves CD, 1523 Washington Ave., Kalamazoo, Mich. 49001.

Aug. 31-Sept. 1 — Salt Lake City, Utah (AA) 9th Annual FF, CL, & RC Model Air Show. Site: Saltair Modelport. F. Haslam CD, 3731 S. 5450 West, Salt Lake City, Utah 84120. Sponsor: **Utah State Aeromodelers.**

Sept. 1 — Riverdale, Ill. (AA) IIAA Annual Model CL Contest. Site: 144 & Halsted. W. Webb CD, 15722 Vine Ave., Harvey, Ill. 60426.

Sept. 7-8 — Amarillo, Texas (AA) ARKS Annual Meet for RC. Site: Club Flying Field. B. Irwin CD, 3302 Lewis Lane, Amarillo, Texas 79109. Sponsor: **Amarillo Radio Kontrol Society.**

Sept. 7-8 — West Suffield, Conn. (AA) 4th Annual NCRCC RC Contest. Site: Weidekor Farm. B. Williams CD, 347 Southwick Rd., Westfield, Mass. 01085. Sponsor: **Northern Conn. RC Club.**

Sept. 7-8 — Marietta, Ga. (AA) Southern RC Air Races 1st Annual. Spec. Events. Site: Club Field. L. Purdy CD, Route 1, Oakwood, Ga. 30566. Sponsor: **Cobb County RC Modelers.**

Sept. 7-8 — Conklin, Mich. (AA) Grand Rapids Annual RC Meet. Site: Den Hoff Farm. J. Wolflin CD, 3971 Causeway Dr., Lowell, Mich. 49331. Sponsor: **Grand Rapids RC Club.**

Sept. 8 — Larchwood, Iowa (AA) Sioux Falls Gas Model Club Annual RC Meet. Site: Zanger Airfield. D. Lilyquist CD, 1315 S. Norton Ave., Sioux Falls, S. D. 57105.

Sept. 8 — Riverdale, Ill. (AA) Chicago Model Masters CL Contest. Site: 144 & Halsted. W. Webb CD, 15722 Vine Ave., Harvey, Ill. 60426.

Sept. 8 — Bong Field, Wisc. (AAA) 25th Annual Midwestern State Championships for FF. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: **Chicago Aeronuts.**

Sept. 8 — Dayton, Ohio (AA) Dayton Buzzin Buzzards Annual CL Jamboree. Site: Municipal Model Flying Field. C. China CD, 5028 Broughton Pl., Dayton, Ohio 45431. Sponsor: **Dayton Buzzin Buzzards.**

Sept. 8 — Deer Lake, Pa. (AA) Tri-Co. Wing Snappers 6th Annual RC Meet. Site: Airport. E. Stoyer II CD, 210 Washington St., Schuylkill Haven, Pa. 17972. Sponsor: **Tri-County Wing Snappers, Inc.**

Sept. 8 — Kansas City, Mo. (AA) Sky Devils 1400 Lap RR 3rd Annual Meet. Site: Swope Park. T. Kegerries CD, 5239 Bryams Ford Rd., Kansas City, Mo. 64129. Sponsor: **Sky Devils MAC.**

Sept. 8 — Orange, Mass. (AA) Antique Model Rally for FF. Site: Airport. L. Wellman CD, R.F.D. 1 Gillette Rd., New Hartford, Ct. 06057.

Curtiss Jenny

Continued from page 22

wood. Bevel ½" sq. leading edge to rough shape before pinning in place. Pin down spars and edges and glue in all ribs using epoxy on the metal spar only.

Notice that the hardwood wing strut mounts are located flush with the lower surface of the upper wing and flush with the upper surface of the lower wing. Use small screw eyes cut down to receive 1/16 wire of wing struts. Fill screw holes with epoxy before installing screw eyes permanently. The struts are held in place by tension from nylon-coated stranded fishing

NOTICE

The Hobby Helpers full size plan advertisement in the 1968 ANNUAL was in error and should read:

Plan AMA 68A contains only the GRUMMAN GULFHAWK.

Plan AMA 68B includes both the CHURCH MID-WING and the LITTLE STINKER.

wire at the lower wing strut mounts. Struts fold up against upper wing for storage. The nylon wire with crimping pliers and metal sleeves are available at sporting goods stores. Put in extra screw eye ¼" ahead of rear inboard screw eye. The wire from this goes to the upper open screw eye at the nose of the fuselage. Build ailerons along with the wing using a plywood end rib. Hinge with nylon and use round toothpicks for keepers.

Cut out small area in 1/16 plywood rib for aileron bellcrank to pass through. Make sure there is no slop in aileron linkage. Cover ailerons with silkspan.

Lower wing: Make both spars of hardwood. Note the location of lower wing tip outline on plan. The ⅛ plywood center plate has five holes in it. The center hole is for the wing and landing gear hold-down screw and the other four are to clear the landing gear strap nuts. Put in extra screw eye ¼" behind front inboard screw eye for a line that attaches to the lower open screw eye on nose of fuselage. Wing tip skids are made removable for ease of covering and maintenance.

Make four rear and four front wing struts from 1/16 wire faired with 1/16 sheet pine or hard balsa. Also make four fairings for cabane struts. Paint these and landing gear struts brown and then wrap with heavy white thread where indicated on plans.

Cover both wings with silk, pulling just tight enough to remove wrinkles to prevent warping. Cut out area just above holes in center plate for F-5 to fit into.

Tail construction: The vertical fin and rudder are ¼ sq. balsa. Use larger hinge at bottom of rudder to take shock from tail skid. Notice brass tube for wire brace. Bend rudder tailskid horn from aluminum and bolt in place before bending arms down. Connect skid to rudder with small springs from hardware store. Extend with 1/32 wire.

Horizontal stab and elevator require ½ x ⅜ main spars and ¼ thick leading and trailing edges. Taper all ribs from ⅜ to ¼ for airfoil. Again put in tubing for bracing wire. Cover empennage with silkspan. Line up and glue to fuselage.

Conclusion: The plane turns very well on the ground with the steerable tailskid, and combined with the wing tip skids, it is almost impossible to turn over. Most realistic takeoffs are made with a little down elevator to raise the tail before lift-off. For landings, feed in the down elevator just as the main gear touches so that she does not balloon. Don't panic when the wings flex up when pulling out of a loop or dive as they are quite flexible and strong.

It is a big bird, but once you get used to the larger variety, you will never be satisfied with the smaller spread!

Santana

Continued from page 26

tire plane. It is readily available at any hardware store and comes in two tubes. Mix according to directions for an exceptionally strong and fuel-proof bond.

Fuel tank: The fuel tank is made of .008" thick brass shim stock. Source for this material is any auto supply parts store.

Follow this procedure for making the tank: 1) Cut large piece (tank body) to size and mark off bend lines. 2) Use a long nose pliers and bend tank sides at 90 degrees. Do same for the overlap portion (seam). 3) Solder along this seam. Soldering iron must be hot enough to allow solder to flow smoothly. Resin core solder is recommended. 4) Cut end pieces (2) and fit to inside of tank ends. It may be neces-

sary to file the corners of these pieces before you get a snug fit.

5) Press the front tank cover in position about 1/32 from the front of the tank and solder around all the edges. 6) Anneal a piece of 3/32 O. D. brass tubing about 6" long. This is done by passing it through a flame until it becomes red hot. When it cools, you can bend it very easily with finger pressure. 7) Pierce the two holes for the tubing into the tank with a sharp ice pick or an awl. A snug fit is desired at these two points, so don't make the holes too large the first time. 8) Cut the two pieces of annealed tubing to proper lengths and file a 45-degree angle on the end of each piece. 9) Solder the fuel pick-up tube into position at both points of contact in the tank. The 45-degree opening faces into the tank. 10) The pressure vent (straight at this time) is now pressed into the tank and soldered into position. The 45-degree opening faces the rear of the tank. 11) Back end cover is now pressed into position and soldered. 12) Flush tank several times with laquer thinner. This is to cut all the resin that has accumulated inside the tank during the soldering processes. When thinner comes out clear, tank is clean. 13) Bend pressure vent and end of fuel pick-up tube as shown.

Tank can now be epoxied into fuselage. Don't be afraid of getting too much epoxy around all the surfaces (tank and fuselage) that touch. The hard balsa fairing that goes in front of the tank can be cut to shape. It is not cemented into position until after the wing and wing fairing are cemented into position on the fuselage.

Tail assembly: The stab and elevator are made from 3/32 thick medium-hard balsa. The aluminum tubing and .025 diameter music wire hinge system is highly recommended. However, it is not the easiest thing to install. There is a right and wrong way to do it. Here is the suggested way: 1) Cement the 1/16 O. D. aluminum tubes to the stab with a 1/32 diameter music wire inside of them for alignment. 2) Follow the same procedure for the elevator tubes. 3) After the cement around the tubes has dried, wrap a small piece of silk around each tube. Allow about 1/4 overlap on the top and bottom to cement onto the balsa.

When the .025 diameter music wire is passed through the tubes, the elevator should drop without any hesitation. If it doesn't, there are two things that could cause it to stick: A bent hinge wire, or there is not enough clearance between the elevator and stab. A small piece of fine sandpaper worked between the cracks will quickly solve this problem. Be careful not to sand the silk loose from the aluminum tubes! Sand only towards the bare balsa.

The leading edge of the stab should be sanded round. Sand trailing edge to a fairly sharp edge.

If you are using Mono-Line, the elevator is located on the outboard side of the plane. This is to facilitate a straight pushrod from the control unit to the elevator horn. For two-line flying, locate the elevator on the inboard side of the fuselage so the pushrod from the bellcrank goes straight back to the taller elevator horn. Make the elevator horn. A longer horn is used for two-line flying. This cuts down on the control sensitivity. Just be sure you make the right length horn for the control system you choose.

The elevator horn is fastened to the elevator with a 2-56 pan head screw and nut. After it is in place, apply epoxy glue liberally around the nut and any portion of the horn that touches the elevator.

Another important note on the elevator horns. The Mono-Line horn sticks "up" and the two-line one points "down." Don't get 'em mixed up. Especially the Mono-Line one. Turning the handle over to get "down for up" just doesn't work with Mono-Line.

Do not permanently install hinge wire until after plane is painted.

Mono-Line wing: Cut wing to outline shape from $\frac{3}{16}$ thick poplar or basswood. Draw a straight line all the way across the top of the wing as shown on plans. Use a #11 X-acto blade and handle. Cut the wing into two pieces on this line. Spot glue them back together and let dry. When dry, mark off the leading and trailing edge reference lines. Cut out the two airfoil templates and proceed to carve the airfoil. Check airfoil frequently and allow for sanding to get the proper shape. You will notice that there is a "lift" section at the center of the wing which tapers to a symmetrical section at each wing tip. This is

done to give adequate lift during flight and minimizes tip drag.

Break leading edge section off now and hollow out passageway for the two lengths of aluminum tubing. A small X-acto gauge or a Dremel motor tool will hasten this operation.

The long section of ⅛ O. D. aluminum tubing is ovaled slightly for two reasons: It allows the flying line to pass through easily, and it adds rigidity to the inboard wing. The shorter section of tubing (3/16 O. D.) is for keeping the joint of the two wing pieces from breaking out. Both of these tubes make the inboard wing stiffer which is a very important requirement for any Mono-Line plane. Should the wing flex during flight, the control system will bind and will not operate smoothly.

Cut out the center section to receive the ½A Speed-Master control unit and epoxy it into place. When epoxy has set, drill out the two mounting holes to clear a 2-56 machine screw. Install the two screws and nuts.

The two pieces of aluminum tubing in the inboard wing are now epoxied in place. Add wing tip eyelet and cock it slightly forward. Be sure the centerline of the control unit passes through the back edge of this eyelet. If it doesn't, the control unit will bind under tension.

The front section of the wing can now be epoxied into position. Flatten a ¼" ounce lead fish sinker and cut a recess for it under the outboard wing tip. Epoxy weight in place.

Form the front pushrod and cut to length. Slip the end with the 90-degree bend through the hole in the Mono-Line bellcrank. Drill 1/16 diameter hole through wing for bellcrank pivot pin. Push the bellcrank pin (with bellcrank and pushrod) into position over control unit cam. Press cam follower pin all the way down into the brass cam groove. Now, pry the bellcrank up slightly so that when cam is rotated and released, the bellcrank will snap back to neutral quickly and without sticking. When this has been accomplished, solder the protruding end of bellcrank pivot pin (on top of wing) to the mounting bracket. Cut off excess portion of pin.

Wing is now ready to install into fuselage. Be sure to use epoxy glue for this bond. After wing joint onto the fuselage has set up, you may epoxy the wing fairing over top of wing. Also the fairing that goes in front of the fuel tank.

Two-line wing: Cut wing to outline shape. Since complete control system is mounted externally, it is not necessary to split wing into two pieces. Mark off leading and trailing edge reference lines. Carve and sand airfoil to match airfoil templates. Modify a Perfect bellcrank as shown on the plans. Drill a hole in the wing for the bellcrank mounting screw. Do not install bellcrank at this time. Install outboard wing tip weight in the same manner as described for the Mono-Line wing. Lead-out line guide is made out of 1/16 plexiglas.

Use .025 diameter music wire for the leadouts. Make one leadout at least 1½" longer than the other. This will prevent the line connectors from getting tangled during flight.

Landing gear assembly: Saw landing gear to outline shape out of .050" — .062" thick 24 ST aluminum. Drill holes as shown and then sand (or file) all outer edges round. Bend gear in four (4) places (per plans). Use two 3-48 machine screws for the axles. Place a 3-48 screw through an axle hole, tighten a nut onto the landing gear and solder it. Hole in the wheel hub will have to be drilled out slightly so that it will pass over the threads and turn freely. Put another nut on the end of the axle (with wheel in

place) and solder. File off any excess threads that may stick out. Follow same procedure for other wheel. Lay landing gear assembly aside until after plane is painted.

Painting: Sand entire plane with #320 wet-or-dry sandpaper. Mask off the cockpit area with masking tape. Stuff some tissue around the Mono-Line unit to prevent paint from getting on the cam or bellcrank area. It is suggested that the elevator be painted separately. Be extremely careful not to get any paint inside the aluminum hinge tubes. The original plane was given two coats of Poly Aqua epoxy paint (Hobby-poxy will work just as well). No primer was used. But the entire plane was sanded after the first coat of paint had dried.

Final assembly: After paint has throughly dried, the control system can be hooked up. All that is required for Mono-Line is to cut a piece of .045 diameter music wire to length shown. Bend one end at 90 degrees and place through elevator horn. Now, put a drop of solder on the end that sticks out on other side of elevator horn. This will prevent pushrod from working out during flight. A piece of 1/16 I. D. brass tubing is used to make the pushrod splice connection. This assures the proper length pushrod the first time. For Mono-Line control, the elevator must be in neutral (level position) when the flying line is not connected.

Before you solder the two pushrods together, you must make a pushrod support. This is to prevent the pushrod from vibrating and giving erratic control action during flight. A straightened paper clip that is wrapped twice around a 1/8 diameter drill bit will give you the proper clearance. Slip the support onto the pushrod and then solder the tubing and pushrods together. Now, push this support into the fuselage

as shown. You can use the same method of hooking up the pushrod for two-line control if you like. If you are real careful, a single piece pushrod can be made.

Bend a hook on the end of the elevator hinge wire and push through all the hinge tubes. When positioned, apply a small amount of epoxy on the end of the hook to keep it from working out of the stab. If your plane is to be equipped with a two-line bellcrank, now is the time to install it. Use the 3-48 mounting screw that comes with the bellcrank and attach it to the wing. Be sure to bend the rear portion of the bellcrank down slightly so it will clear the pushrod.

Mount landing gear assembly and engine. Use lock washers on screws that hold the landing gear assembly in place. Hook up fuel line tubing from tank to needle valve body on engine.

There are two ways you can fill this type of tank: 1) Disconnect fuel line tubing from needle valve and hold the plane with the nose pointing straight up. Attach fuel bulb to the plastic tubing and transfer fuel into tank. When tank is full, fuel will come out the pressure vent. 2) Hold plane with nose pointing down and fill through the pressure vent. Needle valve must be opened about four turns to let air escape from tank during filling process. When tank is full, fuel will come out the venturi on the engine.

Check balance point to be sure plane is not tail heavy. If it is, do not attempt to fly it. Control will be too sensitive. Do not worry if the balance point comes out slightly ahead of the recommended place. This will only make the plane fly more stable in windy weather.

Finished plane should weigh between 5 and 6 ounces.

Test flight: Select a paved area that is free from dips and cracks. Check controls with the engine running before you fly. This is to make sure they work free. Vibration (caused by the running engine) does some funny things to the lines and control systems. If the controls don't work smoothly on the ground under these conditions, you can be relatively sure they won't be any better once the plane is in flight. This applies to both Mono-Line and two-line planes.

For reverse pitch prop flyers, a Grish 6 x 4 (pusher prop) is recommended for the test hop. Engine will not run too fast with this prop and will give you a chance to "feel" the plane out. Once you have become familiar with **Santana's** flying characteristics, try a 5½ x 4 Grish reverse pitch prop. With this prop and Cox Racing fuel you should hit around 68 — 72 mph proto speed.

To get up into the 80-mph range, a prop with more blade area is necessary. Unfortunately they are not available yet in reverse pitch. You either have to carve your own props, or run the engine in the conventional direction. A much wider range of props are available then. First place in Senior ½A Proto at the 1967 Nationals was won with a Cox 5½ x 4 plastic prop. They are readily available at your local hobby shop. Be sure it is the gray plastic "Competition" series.

You may find it necessary to trim the diameter down on this Cox prop to 5¼" or even 5" for faster speeds. All depends on the weight of your plane. Only by trying various propellers and fuels can you find what combination will give you the fastest speeds for your particular plane. Keep a record of all test flying so that you can have a good chance of duplicating your fast speeds when you are at a contest. There's little time for testing then, during the heat of competition.

A.M. Reviews

Continued form page 9

Civil Airliners covers the post-war air transport picture. While the bulk of the civilian transport aircraft was produced by the United States manufacturers such as Douglas, Lockheed and Boeing, among the 78 aircraft illustrated and described are many from England, Russia, France and Japan.

These little handbooks with their full color illustrations and detailed descriptions should be of great value to the aviation buff or researcher.

Radio Control World

Continued from page 34

he piloted his plane over the closed circuit for a total of 332 kilometers. Unless a foreign modeler had made a greater distance within a month or two previous to this — or has done so since, this should be the new World Record.

RCIA Masters Tournament: The idea was suggested at RCIA meeting held during the Toledo Conference in late Feb., but it has now been announced officially that this R/C industry group will sponsor a meet to be called the Masters Tournament. First one will be held in September, if a suitable location can be found. The RCIA will furnish all trophies, and there is a good chance they will also pay judges travel expenses, unless the site selected is near areas where sufficient capable judges may be had. Final details have not been worked out, but it is expected this will be an invitational event, with contestants qualified beforehand. RCIA is looking for suitable sites and for clubs which will undertake to aid in running the event. Bids should be submitted to Phil Kraft, (2466 Seaman Ave., South El Monte, Calif. 91733). On alternate years, it is expected that the members of the FAI World Championship team will be selected at this Masters Tournament.

Probable limitations: Having tried several methods to slow down the 450 sq. in. size of Goodyear racers without taking all the thrills out of the event, the NMPRA has decided that the best bet would be simply to drop the engine size limit to a maximum of .29 cu. in. instead of .40 as at present. The present rules (including .40 engine size) will be followed throughout the 1968 flying season; any limitation will be started in 1969.

Races have been run with all engines fitted with an 11″ dia. prop. Tries have been made with a reduced carburetor diameter (.250″ dia. maximum). So-called "standard" fuel has been used. Consensus at this writing is that the .29 engine size max. is the simplest and best solution. Tests were made by Joe Foster flying his hot Rivets, both with his own racing .40, and with a .29 supplied by K&B (and made with some of the parts of the Newton/Nightingale speed engines, by Bill Wisniewski). Joe found that the engine change raised times from an average of 2:00 min. with the .40, to 2:30 with the .29. Foster commented after the tests that he really found the .29-engined plane more enjoyable to fly — it gave him a bit more time to think, and to change flight path as required.

Coming from a top Goodyear pilot (winner of 1967 event at Nats, and many many races since) this comment carries real weight — it isn't just a statement from a flyer who was never able to handle a .40-powered racer! In general, .29 engines will bolt into the same mounts as will .40's (of the same make), so no extensive plane

mods will be needed. At this writing, the idea is still to be voted upon by NMPRA members, but it's strongly supported by Ed Shipe and other responsible NMPRA officers. At press time: 29's voted in for '69.

Clubs and Modelers

Pulse-rate-width rodent: Plane by latter name has been fitted with his own rate decoder by Abbott Lahti (56 Bellis Rd., Cambridge, Mass. 02140), who has sent fine pix of his servo installation. This low winger has coupled ailerons and rudder (CAR), plus elevator control, operated from two Rand servos. In order to link the CAR servo, an extra Rand triangular block was bolted atop the one already on this servo, and this unit linked to the ailerons. Spacing between the two blocks is 3/16", and 3-48 screws hold them together. The two Kwik-Links go to aileron operating arms; wood pushrod is for the rudder. This same servo also handles engine throttle. It and the separate elevator are held in a Rand dual mount. An SH-100 receiver, less relay, drives the Lahti rate decoder and servo amplifiers, and is used in the Rodent without its case.

Third Annual N. J. R/C Show: Possibly spurred by fine weather, a record crowd turned out on April 21 to practically swamp the Monmouth Model Airplane Club show held at Red Bank, N. J. Since there was plenty of water nearby, an exhibition of flying model planes off water, plus a couple of R/C sailboats, was also offered, and was highly successful. The Grand Ballroom of the large Molly Pitcher Inn proved far too small to hold the commercial exhibits, planes brought by the modelers, and the swarms of people who attended. A still larger spot is a must for 1969! There were some 430 paid entries (women and children admitted free) and there were 19 manufacturers and hobby houses exhibiting.

Help needed: No R/Cer needs be told how expensive equipment, balsa, engines, parts and so on are today. This problem is limiting the efforts of Edwin Wilson to teach interested members of the East End Boy's Club (1519 Story Ave., Louisville, Ky. 40206) to fly simple R/C planes. Ed has been aiding both a slot-car group and a model plane division at the Club; latter had eight active members in April (ages from 9 to 15 years). The modelers call themselves the Flying Tigers, and expect soon to become an AMA-chartered group. All have learned to fly control-line, and Ed has been teaching them to handle a simple radio plane. The latter has become pretty well beat, and Ed wonders if any of our readers have old but still usable model plane parts or equipment they will donate in the cause of getting all the Flying Tigers airborne via R/C; items other than R/C are welcome, for they can be utilized for UC flying. Any donations to this non-profit organization are tax-deductible.

FAI R/C Record Trials: The DC/RC announces they will sponsor the usual trials for FAI altitude and speed on Labor Day weekend, Aug. 31, Sept. 2, at U. S. Naval Weapons Lab, Dahlgren, Va. Other events may be conducted, if there are participants, and time allows. Club hopes more gliders will be on hand for official tries this time; none were flown officially last year (but this writer can attest to tremendous lift at one point which carried a glider almost out of sight straight up!). All models entered in trials must have been flown previously, as attested by any contest director. Further info on trials from C.D., Dr. John Symborski (1423 Crestridge Dr., Silver Spring, Md. 20910).

New in R/C

Probably the **smallest twin cylinder engine** to be marketed is available from **J. A. Thompson** (Box

533, Cave Creek, Ariz. 85331). It is composed of two Cox .02 engines geared together opposed on a common base, weighs 2.8 oz. and measures 3⅜" maximum width (including glow plug terminals) and about 2" from rear plate to front of prop driver. One of the **Tee Pee line** of engines and accessories, it lists at $49.50. A **dual-Cox .049 twin** is same price. Both engines are fitted with dual exhaust throttles of the rotating sleeve style. These sleeves may be had separately for Cox engines from .01 to .15 — $.98 any size. They can be installed without disassembling engines, have screw attachment for linkage. The twins have patented method of lubricating the gears for long life and minimum wear. Maker also has five cylinder radial engines in two sizes, using Cox .02 and .049 engine units.

Kits for **Hydro Skis** developed by **Autocon Corp. (250 Orchard Rd., E. Patchogue, N. Y. 11772)** include precision-cut foam cores, all the hardwood parts needed, **Marvelite** birch 3-ply for covering, plus complete instructions for building, installing and flying. Units are 38" long for complete water stability, weigh about 1.2 lb. per pair and will support multi planes up to 7½ lb. Kit price, $24.95; instructions and info separately, 35c.

If the sizes are correct for you, the **self-sticking model plane license numbers** by **Midwest Products Co. (400 S. Indiana St., Hobart, Ind. 46342)** are a fine solution to putting a neat license designation on your plane. All numbers available (also the letters AMA) in black, white, red or yellow, and 3" height. We understand the numerals in 1" and 2" sizes will soon be made. They are very thin and stick tenaciously

Complete revision of the book, **Radio Control Manual, by E. L. Safford Jr.** brings this volume up to date with dozens of transistor circuits. Includes data on R/C planes, boats and cars, R/C gear from the simplest up to full digital. This 192-pager is now published by **TAB Books (Blue Ridge Summit, Pa. 17214)**, a concern which is now publishing many volumes from the old Gernsback Library. This updated R/C book lists at $3.95 in paperbound style. The experimenter should find the modern circuitry most useful.

Valuable safety product from **Rocket City Specialties (1901 Polk Drive, N. E., Huntsville, Ala. 35801)** are their **Connector Locks.** These plastic items slip over the flat connectors used in the new Heathkit digital system — same connectors were used in older Kraft outfits (prior to Gold Medal series) and have been used by other makers as well.

Locks come packed four in a bag, 79c. Other useful items from same source are Instant pushrod ends (for ¼" sq. wood rods), 59c a pair; and there are several colors of pushrod exit guides to trim up fuselage side and provide a smooth "bearing" where rods exit near tail. Send for full list of Rocket City products.

Plans for a line of **WWI scale R/C planes** may be had from **Lou Perretti Model Engineering Co. (76 Condit St., Harrison, N. Y.).** They are highly detailed, and to a scale of 2" to 1'. Presently available for **Fokker Triplane, SPAD, Albatros DV, Pfaltz,** for $7.95 per set. **Eindecker EIII** plans are $6.95. In more modern vein, there are also plans for several multi stunters and a pair of Goodyear pylon racers.

Modelers in the East can save much time on **Kraft repairs** by contacting **Tony Bonetti (161-175 Linden St., Hackensack, N. J.)** by mail, phone or in person. This authorized Kraft representative offers rapid repair service, will loan Kraft servos while yours are being worked on, handles sales and dispenses information. Service is much faster here than you'd get by shipping your rig to California!

One of the **smallest superhet 27 MHz receivers** now on market is new item from **Ace Radio Control (203 W. 19th St., Higginsville, Mo. 64037).** Big feature is double-ended output, to drive such propo magnetic actuators as the Adams and Cannon units. Receiver comes in finished form, measures 1½ x 1⅜₁₆ x ⅞₁₆" overall and weighs a bit under 1 oz. This receiver will also drive single coil actuators, escapements etc., of course. Later models will be offered with special output circuitry to handle motorized servos and so on. Price to be announced.

Word comes from **Citizen-Ship Radio Corp. (Indianapolis, Ind.)** that their new and much smaller **type DMS servo** may be used as a direct replacement for the larger **DPC,** in any C-S digital propo system. New servo is faster in action than old, too. You can use any combo of new and old servos you wish. C-S will convert any **DP-3** or **DP-5** transmitter to include newer model control sticks for $15; includes new stick and yoke assemblies, heavier centering springs, nylon inserts for openings in trans. case — plus retune of transmitter. Concern notes that the new and much smaller **DPR-4 receiver** will give four channel operation when used with **DPT-5 transmitter,** or three channels with **DPT-3 transmitter.** It is not necessary to match or specially tune the new receiver to older transmitter — just be sure you order correct RF frequency.

New catalog and **price list** from **Ra/Car Developments (522 W. Central Park Ave., Anaheim, Calif. 92802)** lists every component needed to make your own car; all parts available individually, or you can purchase a complete car ready for radio installation and painting, for $250. Ra/Car stocks several lines of propo multi equipment, which can be shipped at same time you buy a car. Cars are designed for easy replacement of any component, to take care of normal wear or crashes. Bodies are molded of extra tough Lexan, in several different styles; semifinished and unpainted, they cost $7.50 to $13 each, can be "customized" by buyer; the plastic used is transparent. All Ra/Car cars and parts are to ⅛th scale of full size.

INDEX TO ADVERTISERS

YOU said it!

Continued from page 11

AAM Annual, but I'd like to correct the aircraft designation as captioned. First off, it's not a Potez, it's a PZL (Polskie Zaklady Lotnicze) which is Polish, not French.

Secondly, the PXL-104 should be PZL-104. As to the Wilgo-3P, it should be Wilga (Polish for "Thrush") and this model is not a 3P, it's a C. The 3P is powered by a radial engine, while the C, which was the second prototype, had a Continental 0-470 of 225 hp.

Don Typond, Air Progress

A goof of this magnitude takes considerable planning. The question is: who put the overalls in Mrs. Murphy's chowder — or who played with the computer. Ed.

More three-views

The change in A.A.M. is for the better, from the texture of the paper to the quality of the articles.

Very pleased with your scale three-views and aircraft history sections. These are excellent for scale info. Please have one for a Fleet #2 biplane soon.

The above interest prompts me to ask that all scale models published as construction features have a good three-view for scale data and presentation.

H. R. Braunlich, Poughkeepsie, N. Y.

Mailing strip situation

It's a crying shame to have magnificent covers such as the June issue showing the S6B and hide a critical part of it with a mailing strip.

No doubt someone spent a lot of time and money on this splendid drawing. Surely a bit of coordination with your cover artist would provide a space for the subscriber's name and address.

I believe all your fans as well as illustrator, Bjorn Karlstrom, would appreciate seeing some results from this well-intended constructive criticism.

Lawrence T. Hord, Jr., Editor
MRCC Memphis Monitor, Memphis, Tenn.

We are coordinating with artist and printer in order to rectify this problem. Postal regulations dictate acceptable positions for mailing labels. Ed.

From cover to cover

I like your magazine very much, but I think you could include more articles on control-line sport and stunt. I would also like to see an article on a good 049 stunter. All in all, your magazine is one of the best of its type money can buy. I read every issue from cover to cover.

Ted M. Wallach, Allentown, Pa.

Peanut scale

In July, you had an article in the Model World section about "Peanut Scale." You said something about 10c kits. Are these available? Also, a little more information on the planes and contests.

It's a great magazine, especially with your new centerspread. (Good Annual too.)

Brent Kelley, East Aurora, N. Y.

The man who mentioned 10c kits was talking about kits on the market years ago. For information on peanut scale, write: Bill Hannan, c/o American Aircraft Modeler. Ed.

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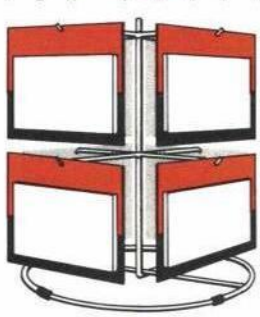

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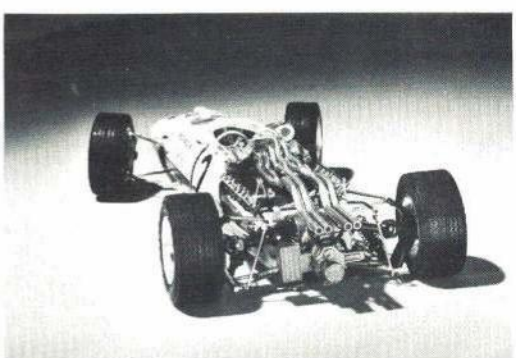

This is the reproduction Mr. Honda himself marvels at . . . the model of the car Richie Ginther has driven and won with in racing competition. And, of course, it's a product of MRC-Tamiya, who has earned your model respect in the past and now offers this new FORMULA for detail.

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