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MARCH 1972
02303

AMERICAN aircraft modeler

School for RC beginners in Birmingham, Alabama—see p. 26

Free-flight scale delight—Pilatus and Turbo Porters for rubber and CO_2

A Control-line stunt practice plane for small places

Detailed P-51 4—views by Karlstrom—p. 35

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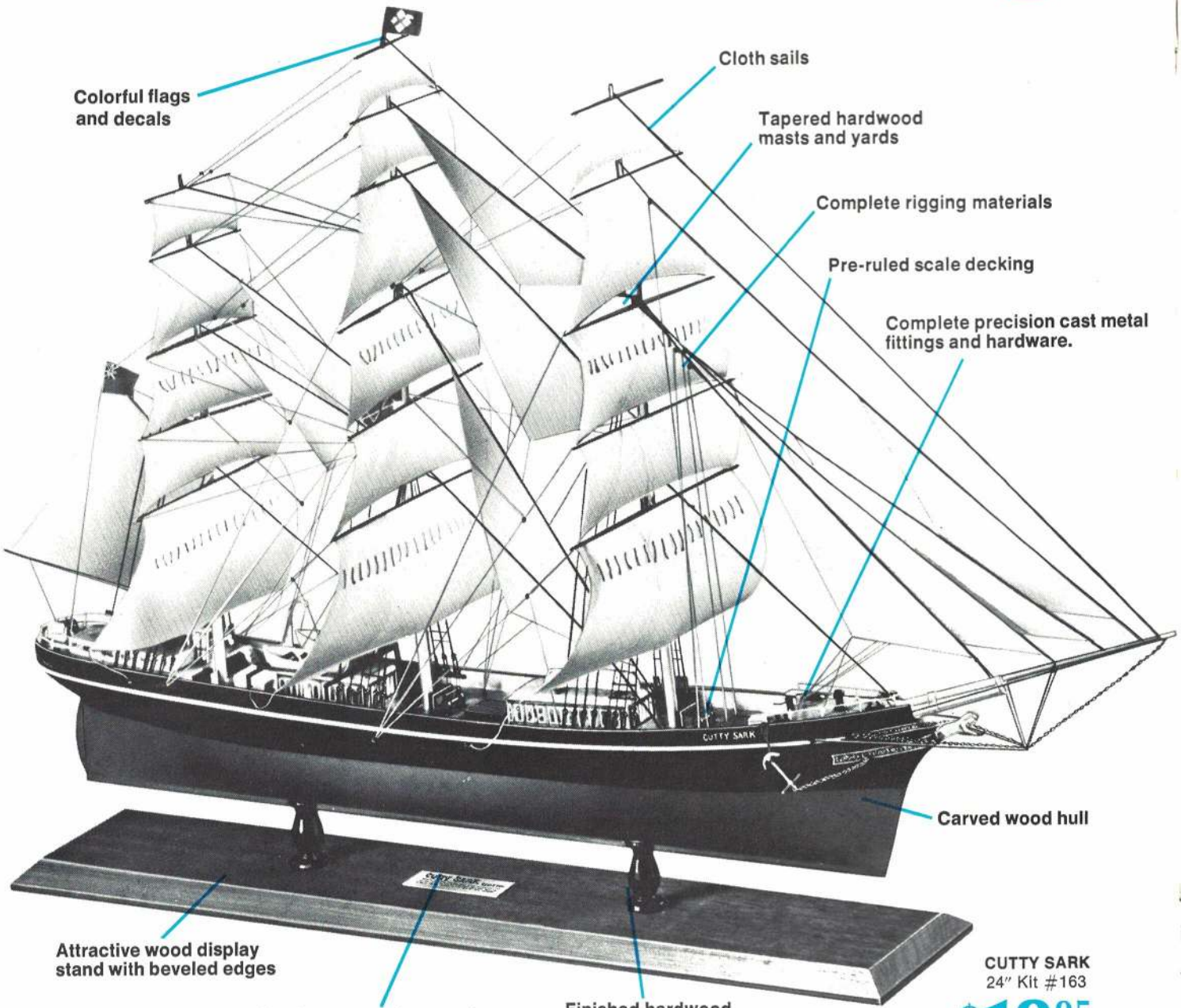

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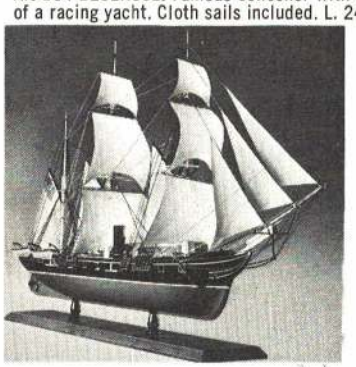

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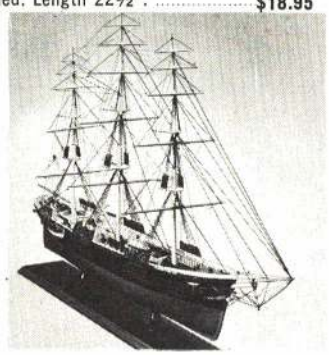

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AMERICAN aircraft modeler

Cover Photo: Model planes express how their designers like to fly. "Little Bird" is an explosively fast and powerful RC model. Lyn Gallup's model poses with Janice Seidl, photo taken by Dr. Alexander McBride.

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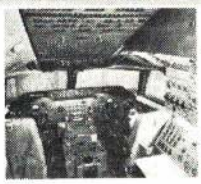
MONDAY, SEPTEMBER 30, 1968, 11:00 a.m. A crack appears in the giant curtain as the hangar doors separate. The 747's nose appears, her cockpit windows, 3 stories high, looking like huge sunglasses on a bulbous nose. Then you see her wing roots, 7 feet thick where they join the fuselage, and the inboard nacelles, 8 feet in diameter. Slowly she moves from the cavernous hangar . . . a "moby dick" lumbering out for air.

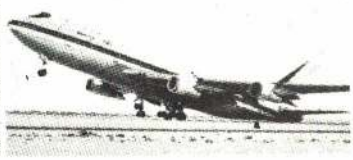
It was a cold wintry February morning in 1969 when Boeing's chief test pilot, Jack Waddell, taxied the first 747 into position for takeoff. In his hands was perhaps the biggest aviation gamble of the 20th Century. It was the moment of final truth when plans, projections, estimates, and guesses give way to irrefutable fact!

The story of this flight, of the plane and its beginnings, and of the people who risked everything to build it, is the subject of Douglas J. Ingells' dramatic new book, 747 — STORY OF THE BOEING SUPER JET. Using a well-detailed narrative punctuated with what must be some of the most spectacular aviation photography ever published, Ingells traces each step of the 747 story — from first design to present day airline operations. You'll read about early proposals (there was even a mid-wing design), wind-tunnel tests, early flights, recent changes. You'll see Ingells' breathtaking in-flight full-color pictures of the 747; his closeups of the interior (including the flight deck); his dramatic sequential photos of final assembly; his runway-edge pictures of flight testing (the shots of the "minimum unstick" tests — the Vmu flights — are really something!). Ingells literally puts his reader in the pilot's seat, the passenger's seat, the designer's office, even the Boeing boardroom; and when he's finished you'll begin to realize just how big and unbelievable this magnificent new airplane really is!

At a time when not many really understand the 747, Ingells' obvious knowledge and research are welcome. Here are the facts, not myths! Dimensions, performance figures, capabilities. You'll read about new terms like "ovalization," "PNdb," "Autoland." You'll see the actual pilot-to-ground tape transcripts of the first flight. Ingells even throws in a few conversation stoppers: like the fact that the 747 carries more stewardesses than the first Boeing carried passengers; or that just one 747 wind-tunnel test model (approximately 9 feet long) cost more than an actual, full-size DC-6 did! And wait until you see the lavish full-color pictures of the 747! Each page, each picture is an experience in itself. You'll see every side, every aspect of this Super Jet. And when you think you've seen it all, Ingells puts you right alongside 747 Captain Bob Weeks of Pan American, and you fly an actual passenger flight to London (Pan Am's Flight 2) in the "Clipper Red Jacket."

By the time you finish reading Doug Ingells' book, you'll know the 747 inside and out. You'll know its history and its potential; its capabilities and limitations. More than that, you will also know about the long and very proud line of big airplanes that came before it — "early days" Boeings like the XB-9, P-26 and the famous "299" . . . the B-17 and B-29 "Fortresses" . . . the first 707 commercial jet, then the 720's, 727's, and 737's that followed . . . the great bombers, the B-47's and B-52's . . . for Ingells, in telling the 747 story, really tells the story of Boeing itself.





Left: The 747 Flight Deck — the nerve center of the Super Jet. Instrumentation and navigation devices are the same type of inertial guidance systems used on the Apollo moon missions!

Right: Vmu (Velocity minimum unstick) flight tests. Note extreme takeoff attitude; the tail is actually dragging on the runway as pilot tries to pull the 747 off at lowest possible airspeed.

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WHEN IT COMES TO BEGINNERS EVERYONE BOILS POTS. WHAT WE NEED IS A CHEF! OR ONE BANG-UP PROGRAM?

All editorial writers receive memorable letters. Those which have the most to say usually are marked "Personal–not to be printed." It is great to read them. But on occasion someone heatedly questions your ancestry. These comments don't get printed either!

Most people write because a responsive chord has been touched; they have experiences and ideas to add. Real wisdom lies more in the questioning mind of a thoughtful reader, than in the skywriting of some typewriter jockey. So it is this month that we quote at length a letter from Mr. Linus Boehle. It is indicative–as you will see–of the man that he uses a subscription order envelope, adding the postscript on the outside, "Thanks! Not as a dealer, but as a concerned model builder," and affixes a stamp on a postage-paid envelope.

Concerned modeler he may be, but our interest in him is as a concerned dealer. "I run a small hobby shop (Bonne Hobby Shop, Bonne Terry, Mo.), and I've often wondered how to get the kids started right," he begins in response to the January editorial. "We run Craft classes. Why not model airplane building classes?

"Admittedly many dealers wouldn't know motor offset from a football play, but they all have customers who do, and many would be glad to teach the kids fundamentals. "I came along before the advent of the Delta Dart, etc. Where do we get them? Or at least plans for them? Sounds like just the thing! "It's strange; many 9- to 10-year-old boys come in and want to build an 8-channel radio model. Most of them haven't been closer than 50 feet to any model airplane (except plastic) and they think they can just buy a kit and get it off the ground by next week. (What do you think the odds for success would be?)

"I steer them to a dime glider," Mr. Boehle continues, "tell them as simply as I can how to adjust it, and ask them to come back when they can get it to stay up for 20 seconds. Then I go on from there! Perhaps I don't sell so many by this method, but I sell more to my customers who do follow my direction."

The gist of the January editorial was that, although millions of people are exposed to model airplanes in some form in the market place, there is yet a beginner problem; and that good display, demonstration, and instructions therefore can never be perfect. That, additionally, the Delta Dart program is a splendid way to get kids started–given the opportunity (so far only demonstration groups) of having a little supervision and guidance, but there is little effective follow-up except that of hoping that some of the kids will be inspired to hang on after this pin-point exposure. Although a number of manufacturers dutifully aim at these prospects, the drop-outs are nevertheless discouraging in number. Everyone is always expressing concern for so-called "grassroots modeling."

We spoke, in January, of the near-futility of the promotional effort this industry makes for the development of model airplane building. Many teachers have had workshop experience with modeling, and manage to relate it in varying degrees to school activities. But their fine effort is only a fractional part of the whole school system. The AMA, and other people, have held numerous demonstrations in which thousands of kids have participated. These demonstrations have been held during the Nationals, in schools with the support of the Hobby Industry Association of America, at trade shows, and so on. This magazine published plans of the Delta Dart in the April, 1967 issue; AMA always has information and will lend help. Several manufacturers have run kits in quantity prices for special groups for whom a short run will be made. The customer can even get his own name or message printed on the covering paper. Yet, people ask, what is the Delta Dart and where do we get them?

In the old days, when hobby shops were model plane oriented, most dealers ran backroom modeling seminars during the evenings. They also sought an affiliation with local school clubs. Today's hobby emporium, geared as it must be to trains, sports, crafts–frequently more so than model planes–usually cannot perform these services. Yet, many do have Craft classes, as Boehle points out. The praiseworthy efforts of associations, manufacturers, and magazines are applied piecemeal, rather than in unison. During World War II the British had trouble with Rommel in North Africa. With superior tank forces they, for a time, made piecemeal commitments, whereas Rommel went for broke. Eventually the British caught on and played the same game.

We do have a trade organization, the Hobby Industry Association of America. Members of the model airplane division of the HIAA, for the most part, feel that HIAA does not do enough, or is inept in its support of model aviation. Yet, were model plane manufacturers to proceed on their own, they'd find themselves too involved with their own problems to be effective as a group. Collective promotion is not their forte. The effective presentation of airplane modeling's image theoretically is within the expertise of HIAA. It would be a great leap forward if the aircraft members of the Association, and the HIAA, would generate enough heat to objectively analyze the problem, and then come up with a meaningful game plan to be executed with the coordinated support of all related associations, individual manufacturers and the magazines.

That a genuine program which would work on a continuing basis cannot be devised is unacceptable balderdash. Everyone boils pots–but why can't there be a chef? The present situation is public relations at probably its worst.

Bill Winter

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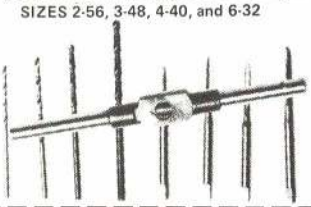

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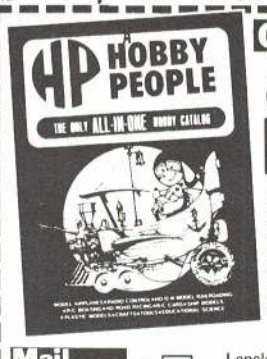

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modeler mail

Remembers Fireball

My father was building model airplanes when he was my age (15). Looking through the Dec. issue of **AAM**, he instantly recognized Jim Walker's A-J Fireball.

He had this model kit when he was a boy and agrees with everything in the article except with the picture of what the kit would have looked like. He said everything in the picture is correct except the fuselage construction. In the original kit, the fuselage was machined balsa and came in two pieces–the top and bottom. It was machined inside and out, and all the modeler had to do was give it a light sanding and some paint. My father mixed clear lacquer and talcum powder and brushed it on for a slick finish before painting.

At the time he built it, the kit cost $7.50–which was a lot of money in those days.

Marc Hollingsworth, San Bruno, Calif.

Dad was correct! Your publisher built two of them. The O&R glow fuel then in use smelt like shoe polish. Ask him.

–Publisher

More on Ryan ST

I thought a couple of comments might be in order regarding Don Berliner's article on the Ryan STs in the Aug. issue of **AAM**.

There is an impression that the PT-21/PT-22/ST-3KR series of primary trainers were merely an updating of the prior Menasco-powered PT-16/PT-20/STM series. This is not correct as the first series was built around the Menasco installation and as you know it was necessary to replace this power plant for U.S. Army Air Corp training with the radial Kinner as used in the PT-16A and PT-20A aircraft.

At that point in time, it was decided to go into volume production of an airplane specifically designed to military requirements and out of this came the Kinner-powered PT-21 group of planes. This was an entirely new design with an entirely new set of production tooling.

Both the early Menasco series military trainers and the later Kinner-powered PT-21/PT-22 aircraft got their greatest usage at the primary military training schools operated for the U.S. Army Air Corp by the Ryan School of Aeronautics at San Diego and Hemet, California and at Tucson, Arizona. Training at that time being was being handled by civilian schools under contract to the Army Air Corp and was not conducted at Randolph Field, which was a strictly military operation which trained military pilots prior to the contract school.

It should also be borne in mind that the civilian operated military flying schools were distinctly separate from the CPTP (Civilian Pilot Training Program).

The full page picture on page 32 bears a caption which implies that this is a Randolph Field operation. Actually, it is Ryan's School of Aeronautics off San Diego, California. I should know as I took the picture.

William Wagner, Ryan Aeronautical Library San Diego, Calif.

Gee, Thanks!

I have been reading **AAM** for the past two years. I would like very much to compliment you on having a magazine so well organized that no matter what age level reads it, the magazine can be enjoyed and appreciated. Each of my issues is re-read and put away for future reference.

Model plane building is my most enjoyed hobby, and even though I cannot afford to build an RC, I still enjoy what I am doing. I'm sure all will agree with me when I say this is one great hobby which teaches you patience, perserverance, and stick-to-it-tiveness that will be appreciated in years to come!

I would and probably many other **AAM** readers would enjoy a few articles on different seaplanes and possibly their plans to further increase our knowledge of these magnificent water-birds.

Thanks again for a GREAT magazine.

David Rzepka, Detroit, Mich.

Unbeatable Scale Record

Really enjoyed the new magazine, **Junior Modeler.** Surely you have established an unbeatable record in scale models with the "Earth-Moon Gizmo's" scale of one to 250,000,000–Wow! Especially liked the "Feathercopters," "Sticky Glue Mess," and the Introduction to R/C."

Frank H. Scott, Dayton, Ohio

Suggests HL Glider Series

This is intended to tell you how fine I think **Junior Modeler** is and to offer a suggestion for a future article.

First, **Junior Modeler** is what I think a model magazine should be. The emphasis is on (1) Fun, and (2) How-to-do-it. I think magazines, years ago, must have been like this. Cutthroat competition is okay, I'm sure, but that's not what I call fun. My personal formula is hand-launch gliders, informal rubber flying scale, and (strangely enough) ROG's (Raise Off Ground). "Do-it-yourself" is another favorite format for me, even in branches of the hobby I haven't yet tried: RC, rocket, CL.

The subject suggest? An all-about-hand-launch gliders article by someone with great experience both indoors and out. The last HL article I remember in **AAM** was August of either 1967 or 1968. I've never seen a complete treatment anywhere (comparable to, say, Valle's 3-parter on indoor microfilm in a recent **AAM** series). Surely you know someone (Conover?, Hines?, Mathis?) who is up to the task.

Pat C. Jupiter, Seattle, Wash.

That's a tall order in this day and age, Pat! But all those in favor, raise their right hand.

–Publisher

Camp and Fly Weekend

The Aero Modelers of Middletown, Rhode Island would like to hear from any member in District I or II who would be interested in a scheduled "Camp and Fly Weekend." Those members who enjoy camping could combine it with their flying for an enjoyable weekend in the Newport, R.I. area. This would give their families a chance to enjoy both too. Kindly send a post card if you're interested.

Roy Mytinger (o-76901), 25 Renfrew Ave., Middletown, R. I. 02840

Needs info

I recently obtained an Atwood & Adams model "J" Super Champion from one of my father's friends. The only information I could find was that it was manufactured before 1946. I would like to know the displacement and whatever other facts any one might have on the engine.

Noel Beardsley, 39 S. Clayton St., Centerburg, Ohio 43011

The Champion had .60 displacement. The Triumph could be either .49 or .51. Some of the 60's were distinguished by a front rotor, with the intake passing under the crankcase, and up behind the case, where the needle valve was located.

–Publisher

Beginning ½A Racing

I am a member of AMA and have been modeling for about three years now. I have received your magazine for about two years. It is very good, although you can't buy much FF equipment or specialized CL equipment through the magazine.

I am a fairly competent modeler; in fact, I

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just recently designed and built a ½A combat plane. It flies very well and is fully stuntable.

I am writing because I have never seen any information on getting started in ½A racing, especially proto speed. I was hoping you could run a series of articles recommending how to get started and where to get supplies.

I don't seem to have too much luck with powered FF, but I can put together a HLG with no trouble at all–they seem to fly no matter what I make them look like.

I'd say the big hang-up with us juniors is lack of money. Since I am the only modeler in my family, I have to get everything myself or wait until somebody gives me a present. Oh well. . .someday maybe I'll be rich, and then watch out!

Donald TerBeest, Garden Grove, Calif.

Help for Czech-mate

I have a friend in Czechoslovakia–Jaroslav Dobrovolsky–who is some super-mechanic in the Zlin factory. I met him when he was at the ACA Nationals a couple of years ago. He helped me a great deal on my Zlin then, and has answered all my questions by mail since.

I would like to do him a favor, and wonder if you or your readers can help. He is looking for parts, or inoperative, or systems to what he says is a no-longer-being-made radio control unit–The "Orbit 3-plus-1 Set."

I would gladly pay the going price and then some to be able to help this guy out, as he has been of such value to me. Hope you can help.

Edward A. Fitch, M.D., 906 E. Southmore, Pasadena, TX. 77502

Bipe Correction

Concerning Don Berliner's excellent article in Dec. 1971 **AAM**, "Last Bipe Fighter": in case other people (besides myself) are considering building a model of the "jaunty little biplane from Long Island" (flying or otherwise), you might wish to point out one slight error that appears on the drawings.

The drawing shows the F3F-1 with the Fighting Squadron Three emblem (Felix the Cat), and mentions under color scheme that these were "white tail planes." However, the fuselage number shown, 6-F-2, says that the aircraft was the number two plane in Fighting Squadron Six. Originally, the Saratoga had the Fighting Six (VF-6); however, they were later changed so that the numbers corresponded to the carriers to which they were attached: 1's for Langly, 2's for Lexington, 3's for Saratoga. At that time, the fuselage numbers were also changed; therefore, the drawing should show the number as 3-F-2 to be agreement with the rest of the description of a VF-3 plane.

Your readers might also like to know that if they change the last digit, the paint job will also be wrong, since the "red upper cowl half: was only for the number 2 plane. Number 1 had an all red cowl, number 3 a red lower cowl half; the same pattern was then repeated in white, blue, black, and green for numbers 4 through 15.

Dennis J. Lenahan, Wichita Falls, Texas

Old Timers

The effort expended by you and the staff of **AAM** regarding the Old Timer movement is

sincerely appreciated. As you know, most miniature aircraft builders under the age of thirty-five have never built a true old time aircraft, much less fired up an ignition engine. It is my opinion that this category of modeler, especially the junior modeler, is missing one of the more thrilling and majestic aspects of free flight. Giving due respect to the modern high power to weight ratio glow engine, there is still nothing that compares with the sound and the exhaust smell of the ignition engine.

Those of us involved in Old Timers welcome all, especially the junior modelers, but to date it has been difficult to obtain a following of juniors interested in the pre-World War II miniature aircraft. One reason for this is that the Old Timer movement has had little publicity until the recent participation of **AAM**. I feel that this effort alone will increase the ranks of the movement, and all of us hope that you can continue with this support.

Phillip H. McCary, Jr., Beverly Hills, Calif.

Dormitory Squeeze

Having just bought your magazine for December 1971, I read first, as usual, "Straight and Level." I greatly enjoyed the article, especially about the guy building his indoor model in the college dorm. He had it easy! I'm in college and building a semi-scale Chipmunk in my dorm. Do you know the difficulties of storing a 54"-wing in a dormitory room that is already filled with a stero, books,, magazines **(American Aircraft Modeler)**, rat racers, combat ships, etc., plus what my roommate has?

I am anxiously awaiting the arrival of your new magazine, **Junior Modeler,** on the newsstands. I wish you luck in its success.

James E. Lacy, Stanton, Kentucky

The first issue of **Junior American Modeler** *appeared on time, November 1. By the time you read this, you will have seen the January-February 1972 issue. "Junior" has been well received, and pages are being added with the March-April issue. And beginning with that issue, it will be found on more newsstands. Since it will be sometime before* **JAM** *is available nationally on the stands, the interested* **AAM** *reader can make sure of a copy by checking his local hobby shop and, if it is not there, by ordering a subscription.*

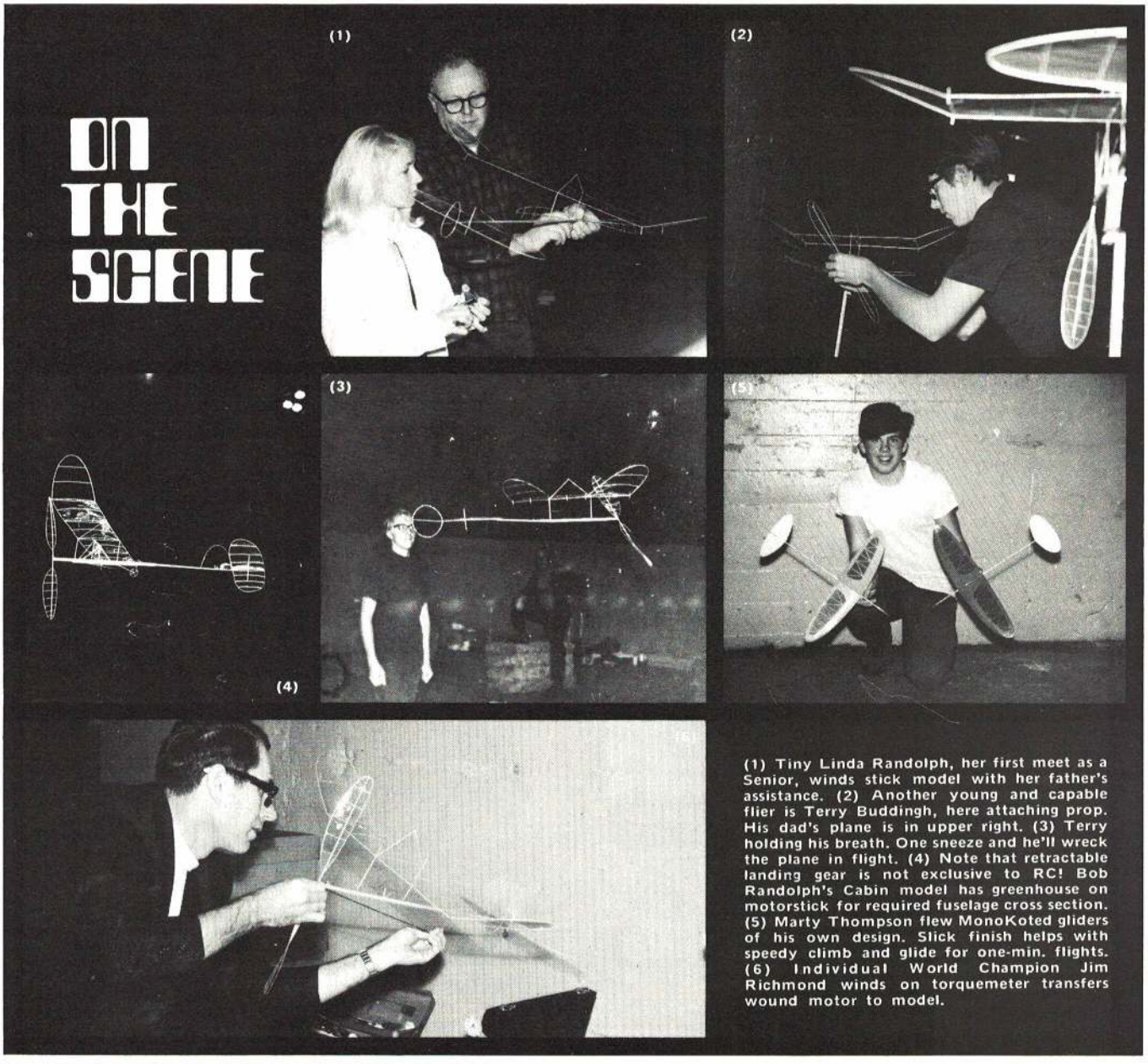
–Publisher

Florida Invitation

My wife and I are model builders and flyers (RC, UC, and gliders). We have five acres in Ft. Myer, Fla. and we have made a flying field. We would like any interested persons in our area to come out and fly with us. We know there are people down here who would like to do these things, but just don't know how to reach them. Even people who come down to Florida for the winter might want to bring their planes along and try our weather patterns.

Persons interested in joining us should write, as I have no phone.

Mr. and Mrs. Bill Cuthbut, Rt. 6, Box 777, North Ft. Myer, Fla. 33903



(1) Tiny Linda Randolph, her first meet as a Senior, winds stick model with her father's assistance. (2) Another young and capable flier is Terry Buddingh, here attaching prop. His dad's plane is in upper right. (3) Terry holding his breath. One sneeze and he'll wreck the plane in flight. (4) Note that retractable landing gear is not exclusive to RC! Bob Randolph's Cabin model has greenhouse on motorstick for required fuselage cross section. (5) Marty Thompson flew MonoKoted gliders of his own design. Slick finish helps with speedy climb and glide for one-min. flights. (6) Individual World Champion Jim Richmond winds on torquemeter transfers wound motor to model.

Photos by Bob Meuser

ELEGANT MODELS IN THE COW PALACE

by BOB MEUSER

There is something simple, pure and elegant about indoor flying that sets it apart from other branches of the hobby-sport. With the artificial constraints of a rule book at a minimum, no radio waves or control lines to guide his craft, and no thermals to aid flight, a modeler's ability to design, construct and fly a model is put to the ultimate test. There is no panel of officials to pass subjective judgment–it is all between the modeler with his model and the stopwatch. To be sure, there is an element of luck to it, but it is mostly luck created by the modeler himself.

Attracted only by a handful of trophies, many of them secondhand, and the prospect of flying with and against each other in cooperative competition, indoor modelers ranging from beginners to World Champions converged on San Francisco's Cow Palace last December, coming from as far as Chicago and San Diego, to compete in what turned out to be one of the largest indoor competitions in the West in decades. The meet was the brain child of Bud Romak, Manager of the U.S. team which took second at the 1968 Indoor World Championships in Italy.

Few contests can boast having three-fourths of each of the last two U.S. World Championship Teams and two World Champions, but that is the way it tallies when you get Romak, Bilgri, Mather and Richmond together.

Saturday morning saw the hand-launched glider end of the Cow Palace alive with young fellows, all of them flying well and a few showing champion form. By Sunday the arms were tired and Paul Andrade had it to himself. Manny Andrade admonished Paul not to throw so hard as Paul was putting them into the girders 96 ft. overhead. Manny remembers 25 years earlier when the Oakland Cloud-Dusters brushed these same rafters with their tiny, now obsolete Class-A gliders for many flights of over one minute at a time when the rest of the country was lucky to make 50 seconds.

Fifteen-year-old Marty Thompson, with four outdoor national records to his credit, put up at least fifty flights with three different gliders before cracking the one-minute barrier with an official flight that was a shade better than any of his test flights–that takes concentration! He did it with a model having a built-up wing covered with MonoKote–somewhat unusual for an indoor glider. After building for five years Marty entered his first contest when only eleven years old. He can now add another trophy to his collection of almost fifty.

Junior indoor fliers across the country can heave a sigh of relief–Linda Randolph, who has seventeen national record certificates, is now a Senior. Bad luck forced one of her models into the girders on the first day, but she nevertheless took home a trophy. Her father, Bob, flew a unique Cabin class model having a retractable landing gear to first place.

It is heartening to see a youngster, following in the footsteps of an illustrious father, rack up a nice string of records and trophies. It is even finer to see a young modeler like Terry Buddingh, who has the help and encouragement of his Dad, also a newcomer to modeling, do so well. Terry, holder of both the hotly contested outdoor Hand-Launched Glider and ½A Gas records, has been building indoor models for only a

(Continued on page 54)

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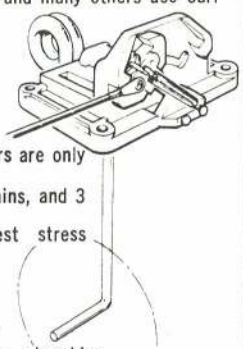

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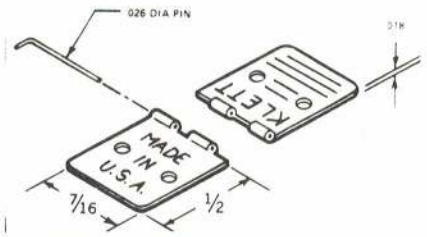

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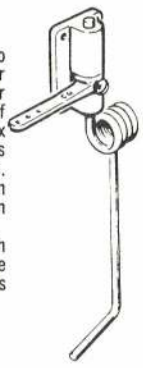

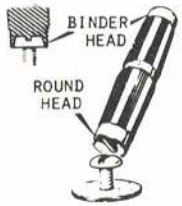

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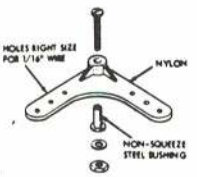

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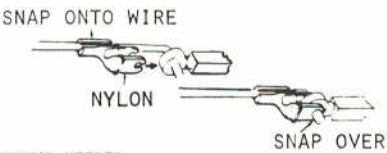

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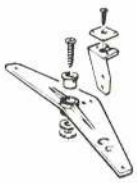

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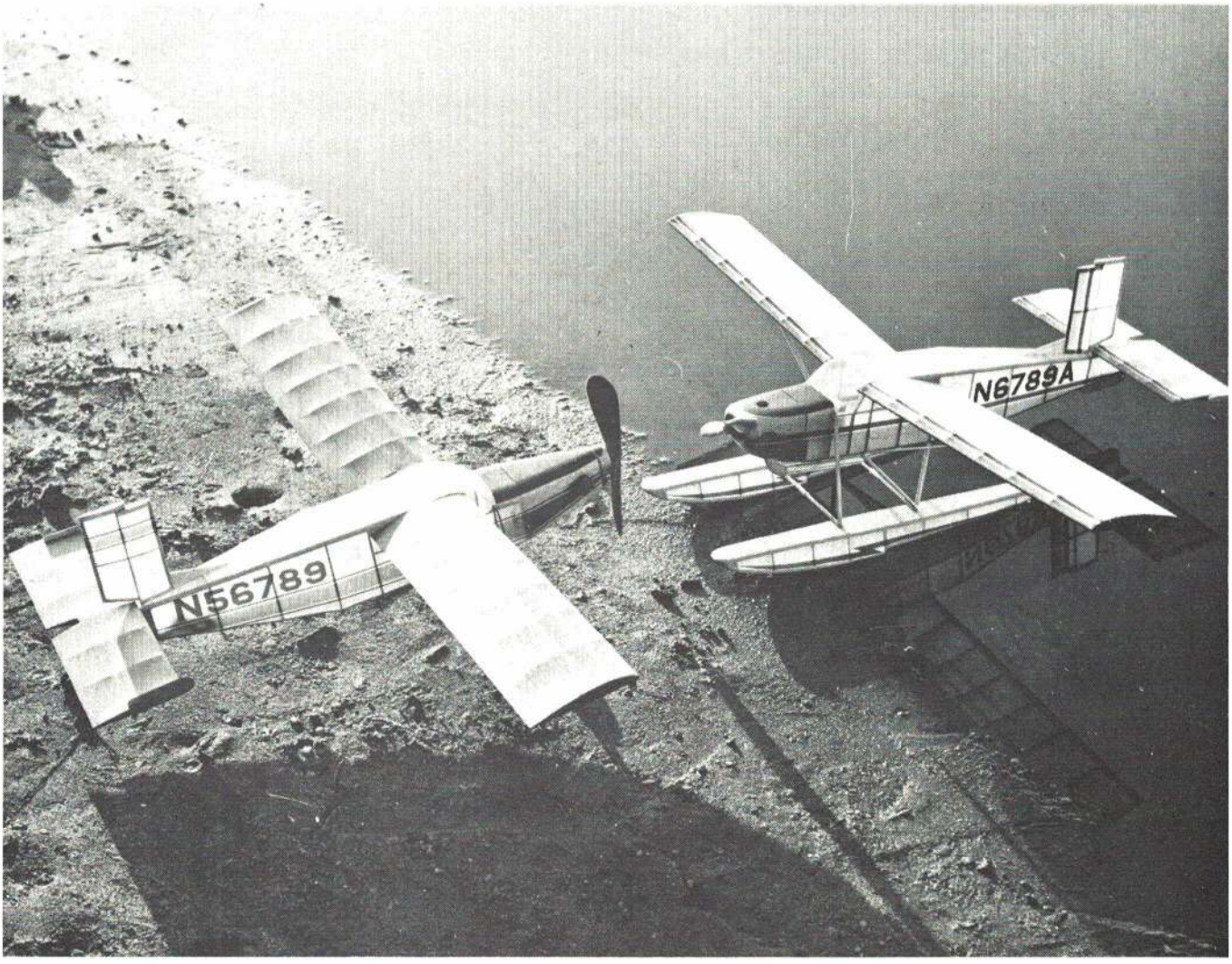


BOTH CO_2 AND RUBBER POWERED, LAND AND SEA VERSIONS OF THE PILATUS AND TURBO-PORTERS MAY BE BUILT FROM THESE PLANS.

by WALT MOONEY

14 March 1972

The Pilatus Porter and Turbo-Porter are not what one might call beautiful models. They are angular and not very well streamlined. However, beauty is as beauty does, and the Pilatus Porters do an awful lot. They are extremely efficient workhorse types of airplanes and they have good short field takeoff and landing capability.

So far our Porters have taken two firsts, a second and a seventh place. The firsts were as a landplane Junior entry at the August Orbiteers scale contest, and as a Junior seaplane entry at the second N.A.R. Flightmasters contest. The second was an Open entry at the Flightmasters seaplane contest. The models shown are convertible, seaplane to landplane and CO_2 to rubber power, and fly extremely well in either of the several configurations. The seaplane will consistantly ROW unassisted, although the rubber-powered version requires twice as much power to get off the water as it does to take off the ground on its wheel landing gear.

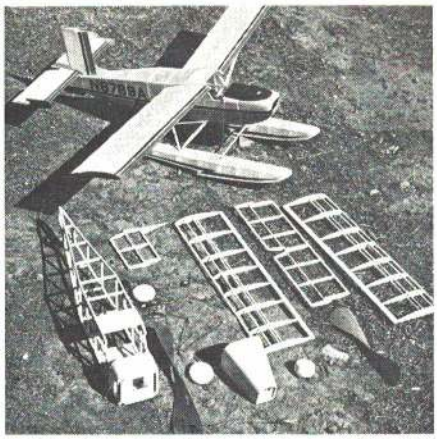
The CO_2-powered version is a Pilatus PC-6 and the Turbo-Porter is a PC-6/B-H2 powered for real with a 550 shp Pratt and Whitney PT6A-6 turboprop engine. Turbo-Porters have been equipped with several different engines, but this version has the simplest cowl shape.

Although the plans look a little complicated, especially because two versions are shown, it can be built by a beginner who has never built a scale model before–provided he is careful and patient. Several have been built by Juniors with little experience. In fact, their building efforts and questions resulted in several changes to the plans, and hopefully to an improved model article. It is my hope that these Porters will inspire some newcomers to try Scale and so a description of the model construction is in order.

The body is started by building two sides directly over the plans, using 1/8" square balsa for the longerons and 1/16 x 1/8" on edge for the uprights. Cut the fuselage cabin ribs from 1/8" sheet and make them part of the sides. To obtain the sharp corner in the longerons aft of the wing, carefully break the stick at the correct point and cement it back together, bent the correct amount as you lay the longerons down over the plan. To get the sides exactly alike, it's best to build them both at the same time directly over each other. It is also important to have all the longerons made of balsa of the same stiffness.

While the sides are drying, cut out the fuselage formers, the fuselage bottom plate and the parts for the motor mount if you are making the CO_2 version. This version is made so it will hold a quick change motor installation as shown on the plans. It was designed this way because anyone owning one of these great little engines will want to put it in several models. The motor mount thus consists of an open-ended box built into the first two fuselage formers aft of the cowl. This box can be omitted if you are building only a rubber-powered version, but will be needed for the CO_2 and the convertible model which will have the rubber motor running through it when it is not being operated as a CO_2 job.

Cement the two forward formers to the bottom plate and build the motor mount box inside the formers, being careful to have everything properly aligned. Now remove the sides from the plan. Carefully separate them, inspecting them for any loose joints, and remove any fuzz or plan paper stuck to them. Then carefully cement them in place on each



Simple box structure makes a pretty but angular model. Three-spar wing is not highly warp resistant, so keep it pinned to your board when shrinking and doping.

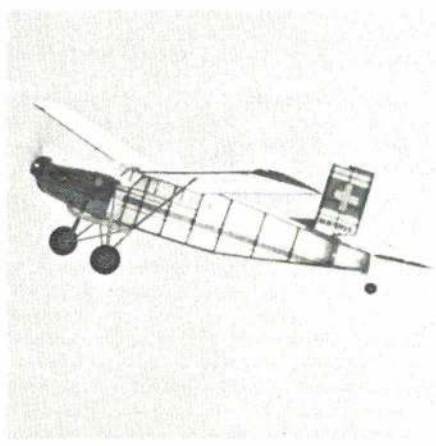
side of the bottom plate and former assembly. Next, install all the cross members in the forward parallel sided part of the fuselage. If the formers and bottom plate were properly lined up, your fuselage will automatically be correctly aligned–if not, it will be crooked, so it is very important to check the assembly of the formers and bottom plate against the plan as you put it together.

When the forward part of the fuselage is dry, crack the longerons at the bend and bring them together at the back of the fuselage. Cement the rear uprights of the body together after thinning them and tapering the longerons as shown in the top view. These aft uprights should be exactly even, and the fuselage will be perfectly aligned. Check it before the cement dries and then add all the aft cross braces.

Use 1/16" dia. aluminum tube, the width of the fuselage, cemented on the front side of the second former for the upper landing gear attach point. Add the forward combing, the cabin top sheeting and round off the longerons as shown in the sections. Do not round off the longeron where the horizontal tail attaches, nor the ribs where the wing will attach. Carefully sand the fuselage structure smooth using fine sandpaper.

The wing is a fairly simple multi-sparred structure. Make a left and right wing. Ribs are cut from 1/16" and 1/8" sheet as needed, or laminate one thick one from two thin ones if desired. The leading edge is made from a birch

Here's Douglas Mooney's CO_2 Porter. He's almost as fine a builder at 15 as his dad. If flown with a Cox 010 with restrictor, additional doping would be needed.



dowel, 1/8" in diameter. If your model shop doesn't carry them your hardware store or local lumber yard will. This type leading edge has two advantages–it is already the right shape for the leading edge of the finished wing, and it will almost never be broken in a crash. The spars and trailing edge are balsa of rather strong stock. Note the position of the strut support and install it in the wing structure. Also note that the ribs that attach to the fuselage are slanted outward at the top so that the wings will have the proper dihedral when they are later cemented to the fuselage.

The horizontal and vertical tail are constructed in the same general manner over the plans using material 1/16" thick by the width shown on the drawing. After they are removed from the plan, soft balsa pieces 1/16" thick are added to the top and bottom of the cross peices and the assembly is then sandpapered to the tail sections shown on the plan.

The cowl for the CO_2 model is carved and hollowed from solid balsa blocks. Two pieces of 1 x 2 x 2" block balsa are lightly cemented together and then carved to the outside shape. The seam between the two blocks should be on the vertical centerline of the cowl. After carving and sanding the block to shape, use a thin razor blade to separate the two halves, and hollow each half to approximately 1/16" thick all over, except at the very front where it is 1/8" thick. (See the dotted lines in the plan.) Air inlet holes must be cut in the front of the cowl and access holes are necessary to get the cowl over the top of the engine and for the CO_2 filler point. The openings cannot be just painted on, as the engine needs the heat from the air passing by to run efficiently. This applies to its tank also, which must be well ventilated if the engine is to develop enough power to fly. This is especially true for the seaplane version which requires almost twice as much power as the landplane to take off.

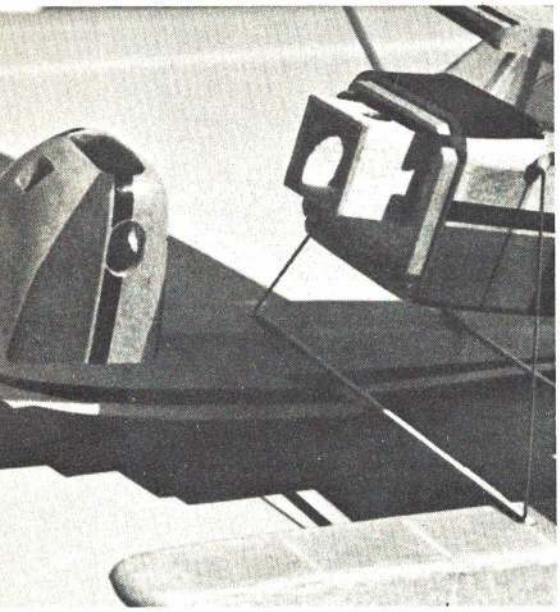
The Turbo-Porter cowl is built up out of sheet balsa with formers for shape and a block balsa front end. Cut former "K" from 1/8" sheet, "L" and "P" from 1/16". Cut two sides and a bottom from 1/16" sheet and assemble as indicated. When dry, plank the upper surface with balsa strips, carefully beveling their edges for a good fit. Note that "K" is located about 1/8" from the front. The nose block is laminated up of four pieces of 1/8" balsa, circular in shape and a square one to fit into former "K". One circle is smaller than the others to be fitted up against "K" inside the front of the cowl. The cowl locator pieces form an irregular hexagon cemented to the front face of former "M". These should be made to fit your cowl snuggly and precisely locate it on the front of the fuselage structure.

Exhausts are made from block balsa and paper tubing as required. In the case of the CO_2 model, the forward part of the exhaust stack is cemented to the cowl and is a slip fit in the aft part of the exhaust stack which is a tube attached to the finished fuselage.

The landing gear depends on the model. The floats, or pontoons, are built like two separate fuselages. Build them upside down over the top view by pinning down the two top pontoon longerons and cementing the bulkheads "A" thru "I" in place. Then add the keels shaped to the contour shown in the side view, and the two bottom longerons (or chines). When the pontoon is dry, sandpaper the upper longerons to a round cornered

contour, but keep the corners of the chines sharp–even the slightest roundness to the bottom side of the floats will increase the water drag tremendously and keep your seaplane from taking off.

Wire patterns are shown for all the landing gear structure. Be sure to smooth the ends so they will fit into the cross tube in the fuselage. There are no rigid points with respect to the fuselage of the landplane landing gear structure. The main attach point, at the upper end of the shock absorber strut, just below the windshield, is inserted into the cross tube and left free to swing fore and aft. The other two points of contact are where the braces touch the fuselage on the bottom centerline. A washer is soldered at the apex of each "V" to make a pressure pad for bearing on the bottom of the fuselage. These pads are free to slide around on impact. There are actually two wire pieces to the landing gear structure. One piece is bent up to make the shock absorber and forward brace all in one piece, and the other is bent to make the rear braces and the wheel axles all in one piece. The axle part of the rear brace is slipped



Nose box for the CO_2 installation. Box also holds the tank.

through the bottom bend of the shock absorber part and the bottom apex of the gear structure soldered on each side.

Prepare a jig to hold the wires in the right position for soldering. It should consist of a block the width of the fuselage at the landing gear position with a hole located at the right place for the upper end of the shock absorber strut. Put the upper ends in the hole and locate the top of the sidebrace bend in line and in the center. Slip a washer between the block and the top of the side braces and solder it in place. Then locate the aft brace/axle piece by slipping the axles through the shock absorber/side brace bottom bends and putting the aft brace bend against the block. Slip a washer between the bend and the block and solder it in place for the rear fuselage bottom bearing pad. Check that everything is aligned and then solder the lower joints where the axles go through the shock absorber side brace bends. Wheels are installed on the axles by soldering on a retaining washer. Many different wheel and tire sizes have been installed on various Porters, so wheel scale is not critical on a Porter model.

The landing gear structural assembly for the float version should only be done after the floats have been covered and doped. When completed and installed on the model, the floats should be aligned parallel to the body in the top view and as shown in the side view. The tops of the floats should be exactly parallel. The cross braces should be strongly attached to the floats so that the two braces and two floats make a rigid assembly. On the original model the float struts were taped to the cross braces in two spots on each brace with a single fold of masking tape. The upper end of the front strut of course inserts in the cross tube and the aft struts are taped to the bottom of the fuselage in two places with a 1/2" square of masking tape. In the event your seaplane hits the shore, the tape will pull loose without damaging the floats. To prevent tearing tissue on the fuselage bottom, put a small piece of transparent tape over the bottom tissue where the struts are taped on.

The struts for the seaplane are all streamlined by the addition of balsa fairing sticks. The landplane uses round section shock absorber struts which can be simulated with plastic tubing.

Your Porter structure should now be all assembled. Very carefully sandpaper all the parts so they have no rough edges, or strings of cement attached, and so they have the proper airfoil shapes and contours. Often what prevents newcomers from building nice-looking models is that they don't take time enough to do a good job with the sandpaper. Take it carefully and patiently, but don't overdo it. Do not sandpaper the bottom corners of the floats round–they must be sharp edged.

Cover the model with tissue. Almost any color scheme will do as this is a civilian bird. If you have access to back issues of model or aviation magazines, it will be easy to find pictures of specific Porters to copy. Water shrink the tissue by spraying the parts lightly with water. When dry, give all the parts two light coats of clear dope. Color trim was put on the original models by doping contrasting tissue in place. This is all the finish the landplane needs, but it's not enough for the seaplane.

Add two more coats of dope to the seaplane and then a third, suitably plasticized so it won't shrink too tight and warp the structure. I plasticized my dope by dissolving a piece of camphor the size of a sugar cube in two oz. of thinner and then adding two oz. of dope. Half a teaspoon of castor oil will also work for this much dope. It will also be necessary to put a couple of coats of dope on the inside of the cowl and on the inside of the nose and motor mount box of the seaplane version.

For the CO_2 version, a Cox 4½-2 propeller was used and worked very well. For the rubber-powered landplane version, a 7" dia. propeller is recommended. It is too big in diameter to be used for a rubber-powered seaplane however, so use a propeller that is only 5½" in diameter which will result in only a slight decrease in performance. I used an 8" dia. Paulonia propeller cut down to the desired diameter as a propeller on the original models, but you can carve one of your own if desired. (Paulonia props can be obtained from American Hobby Center, New York if not at your local hobby shop.) The rubber-powered model propeller hook follows standard practice. Use your favorite freewheeler device if desired.

Install the windows and windshield as the last step. On the original models the windows were simulated with light blue tissue doped on and a thin inked line drawn around them. If you prefer to make them transparent, very carefully cut some out of thin plastic, cut holes in the tissue of the fuselage and cement the windows in place using thin dope as adhesive. The windshield has compound curvature–it bulges and cannot be made exactly to scale out of a flat sheet. Ours were made by carving a wooden form to the correct shape, sanding it smooth and using it as a mold for a Mattel Vac-U-Form. The windshield is just about the maximum size that can be made on the Vac-U-Form. If you don't have one of these most useful toys for the small scale builder, you can heat your plastic and hand-pull it to shape over the form. If neither of these alternatives suits you, take a slight deviation from exact scale and make the windshield from flat sheet bent with only single curvature. This will make the windshield a straight line in the side view, from the front of the rib to the top of the combing at former "N".

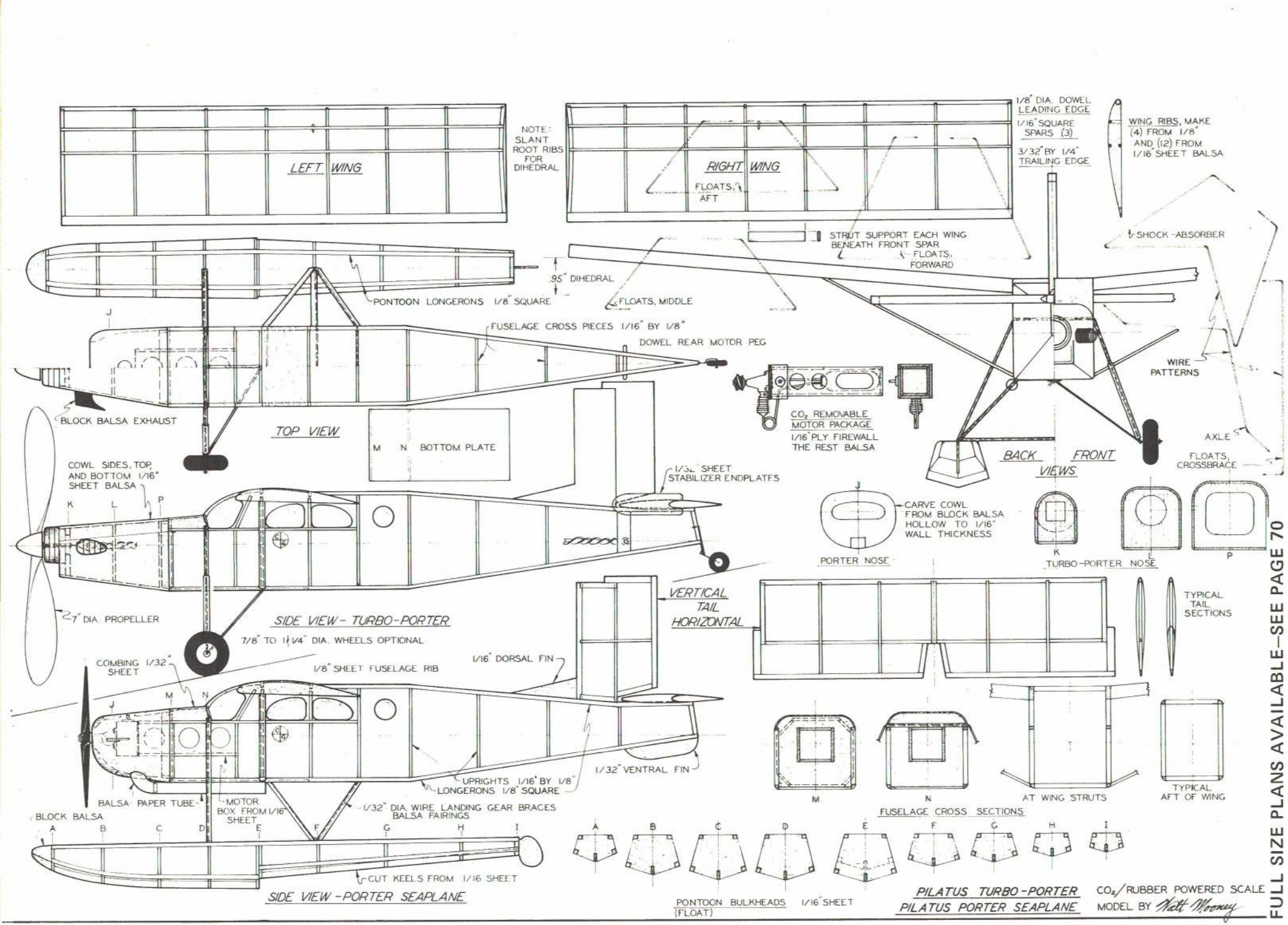
After all the doping is completed, add the license numbers or letters. Numbers one-in. tall on each side of the aft fuselage are proper for a Porter with United States registration. Decals this size are available at most model shops.

Three-views of the Porters are published in several issues of Jane's *All the World's Aircraft*. They have also been published in *The Observer's Book of Aircraft* (1965 and 1966). Perhaps the best data is obtainable in Kenneth Munson's *Private Aircraft, Business and General Purpose*, published by Macmillan Co., 1967. The Pilatus PC-6 is on page 26 and the Pilatus Turbo-Porter is located on the following page. These are only two-views, but they show both top and bottom details. Best of all, they are in color.

Flying the product of your patience and efforts is always the reward one seeks, and the Porter models should not disappoint you. Make sure the center of gravity is in the right place. The model should balance in a horizontal position if you support it at a point directly above the CG indication. The original rubber Turbo-Porter model balanced perfectly right off the board, but the CO_2 model turned out to be slightly nose heavy. It was ballasted with a small lump of clay stuck to the fuselage under the tail.

For the landplane model, standard trimming procedure is used. Balance the model, test glide it, shimming the tail to get a good glide. Check for a straight glide and remove wing warps or rudder warps if it turns. Start flying with short motor runs and low power, adjust the thrust line to give a good power pattern. Straight or gentle right turns are desired. Use downthrust if it stalls under power.

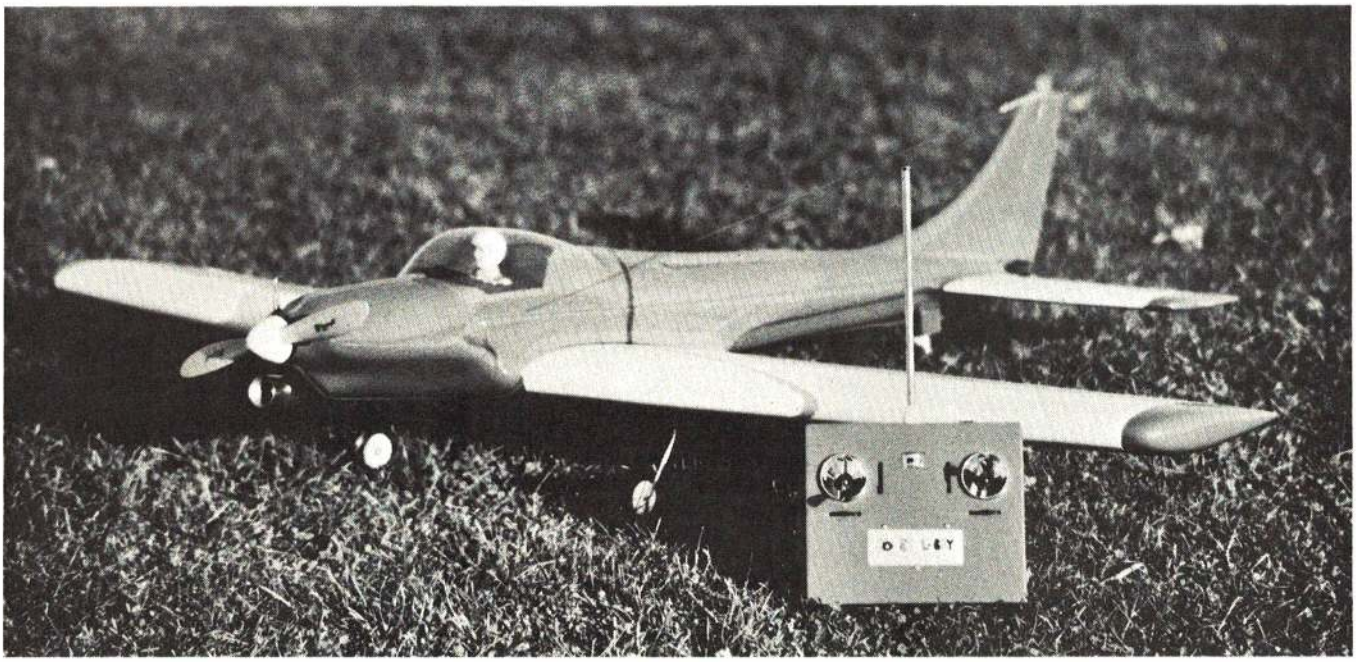
For the seaplane models, all of the above applies, however, it is amazing how much more power it takes to get off the water. Two loops of 3/16" is needed for the rubber model. It is extremely important that the model taxis on the water in a straight line. The CO_2 model required considerable right thrust to accomplish straight takeoffs. A 1/32" thick shim was used under one side of the engine crankcase, as well as a high power setting for the engine, and the model took off like a charm.



FULL SIZE PLANS AVAILABLE—SEE PAGE 70

Blue Ribbon Review

HOBBY LOBBY 4 IN A LANIER "COLT."



Color and trim enhance appearance, but without them, Colt still has nice lines. Ours was changed to tail-dragger to use the new CG main gear retracts. Fine combination.

by FRED MARKS

Our effort this month represents a joint venture by Duane Lundahl, a fellow DCRC member, and myself. We are grateful to Duane for assembling the model, installing the equipment and participating in flight tests.

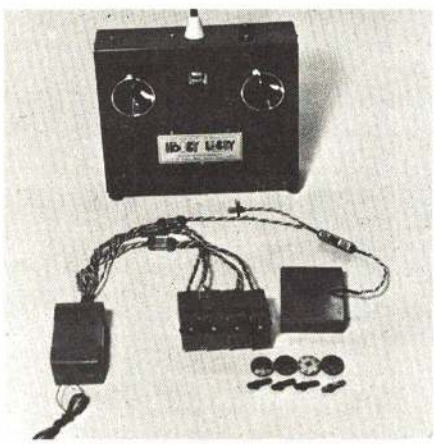
Hobby Lobby decided to have their own set built, from a proven system design, in Mexico. Many of the components are Japanese-made, so it is truly an international venture.

The set marketed by Hobby Lobby is a 4-channel system consisting of the transmitter, with integral charger for both the transmitter and airborne nickel cadmium battery packs, the receiver and four servos.

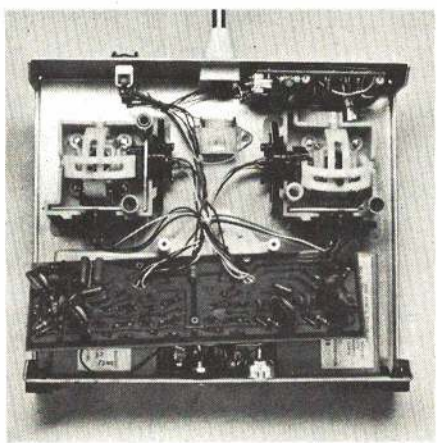
The transmitter is housed in a 7 x 5¾ x 1¾" blue vinyl case. A switch guard is provided. RF output is indicated by the small meter shown between the sticks. The transmitter operates from 9.6V provided by two GE 4 cell nickel cadmium battery packs which have the commonly used voltage dropping charger mounted between them. Charge is indicated by a neon bulb visible from the bottom of the case.

For those who have read most of the Blue Ribbon Reviews, the encoder should be quite familiar: a two-transistor free running multivibrator of fixed duration generates the synchronization pulse at a period of 15 milliseconds for a frame rate of 67 per second. The free running multi is followed by four single-transistor half-shot miltivibrators of nominally 1.5 milliseconds duration but variable 10.5 milliseconds through the control potentiometers. The train of 5 output pulses (remember there is always one more than the number of channels) is shaped and amplified by the modulator located on the RF board.

(Continued on page 48)



Performance is not sacrificed for low cost. Unique features make this possible.



Centering tension on stick assemblies are individually adjustable to suit the flier and the sensitivity of his plane.

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HOT CANARY—this all-balsa profile model of a famous racer makes a sturdy control-liner.

KNOW YOUR BALSA—a good basic article on balsa, what it is and how to use it.

And look at what's in this issue of JUNIOR AMERICAN MODELER.

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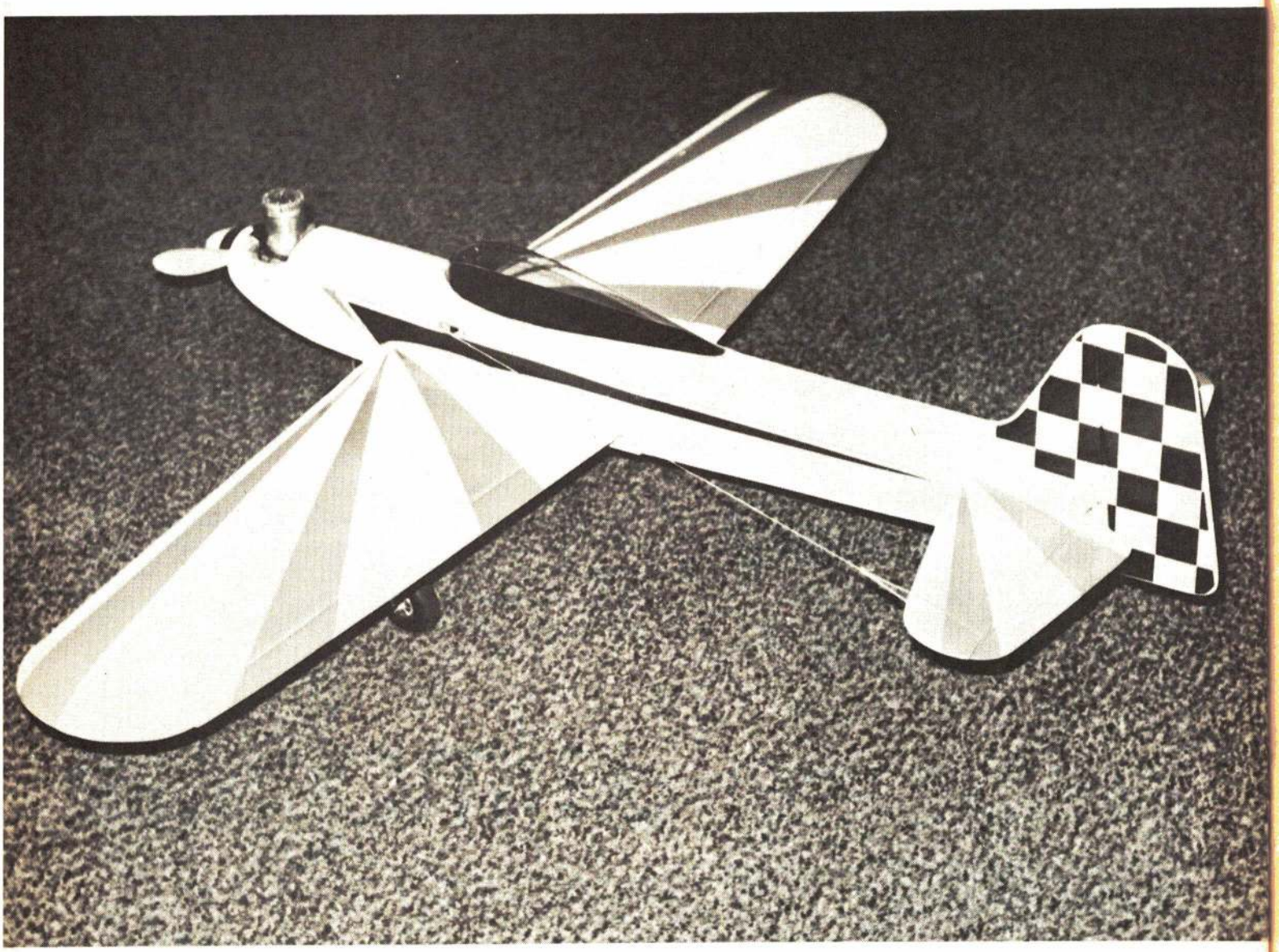
Little Bird



"A RELATIVELY SMALL AIRPLANE WITH AN APPETITE FOR LARGE ENGINES."
AUTHOR LIKES IT WITH AN ST 71. YOU JUST MIGHT PREFER A BIT LESS BHP.

by LYN GALLUP

The Little Bird is a relatively small airplane with an appetite for large engines. Even though its size belies the fact, the plane is built around the 60's and 71's. Most certainly, it will fly with the 35's and 45's, but the biggest mills give optimum performance characteristics. They allow exceptional climbing ability and remarkable penetration on windy days. The big engines also give the plane constant momentum. For example, maneuvers that greatly reduce air speed, such as snap rolls or Lomcovaks, can be immediately followed by power maneuvers like extended loops, vertical eights, or Immelmann turns, without having to worry about picking up sufficient air speed to carry through the specific maneuver. The brute force of the Supertigre G.71FI allows the plane the indulgence of constant momentum for all maneuvers. Under full throttle there isn't time for second guessing, so the plane depends upon the pilot's ability to react quickly for survival.

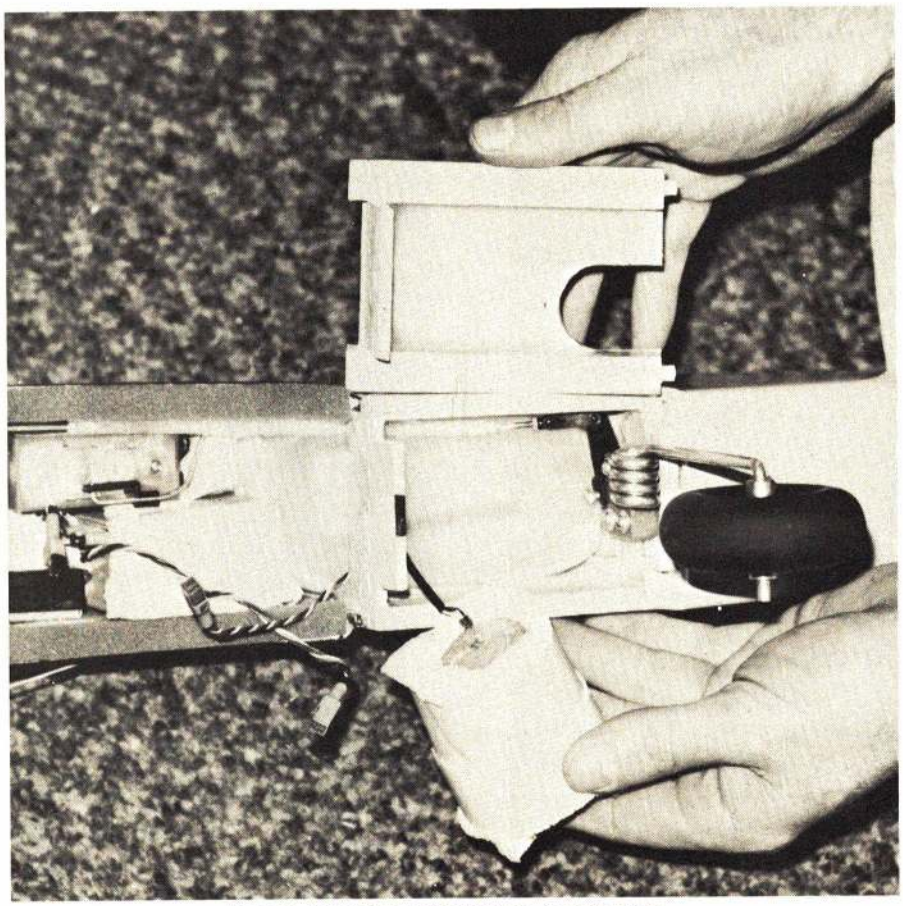
This model is the culmination of a series of modifications that began when the prototype first took to the air in the spring of 1969. The original flew well, with the exception of one problem—its overall pitch stability was not quite adequate. To correct this situation, a degree of incidence was added to the wing which put it at a "constant" angle of attack, thus eliminating the searching effect of the pitch axis. This, coupled with slightly increasing the nose moment and decreasing the elevator areas, enabled the plane to then groove in a proper manner.

From its inception, it was decided that all unnecessary drag on the design would be kept to a minimum. The fuselage is quite narrow, being only 2¾" wide, and the wing is thin and laminar at the root. An original 14.7% section is employed, progressing out to a conventional 17.7% section at the tip. A lengthy root core allows the wing to remain thin at 14.7%, and the taper makes it thinner yet at the tip, even though the percentage is greater. This greater percentage at the tips gives more lift; due to the taper, it creates less drag. This feature, along with the gracefully tapered tips which reduce turbulence and increase tip efficiency, makes the wing resistant to tip stalling. To achieve better symmetrical balance, the design has opted for a mid-wing type configuration, which allows it to perform smooth rolls with little, if any, fussing with the elevator.

The Little Bird has a very large rudder; every inch of it is necessary if the plane is to sustain true knife-edge flight. It also adds considerably to the overall aerobatic capabilities of the airplane when rudder control is necessary for the proper execution of a maneuver.

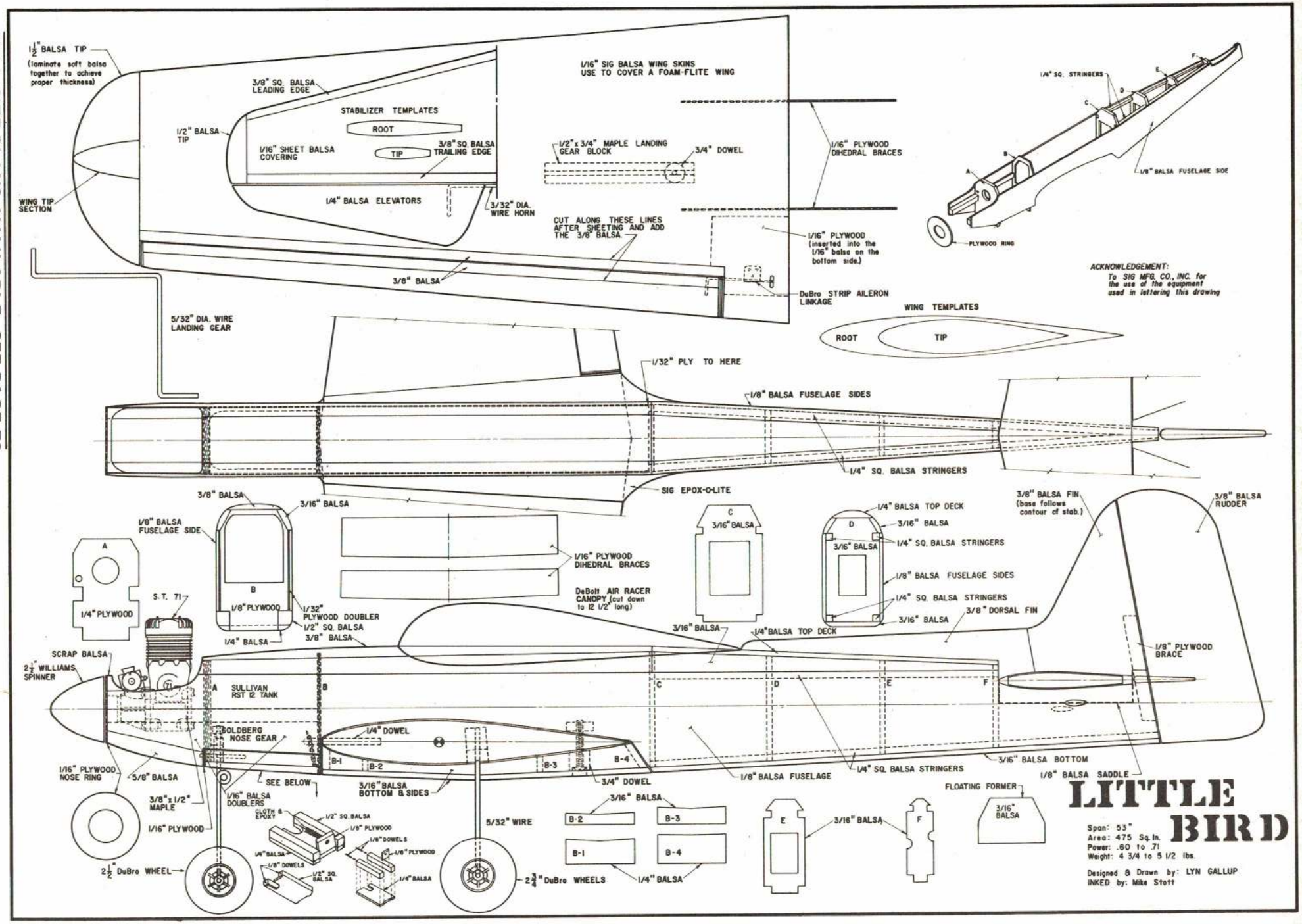
This plane should be built with the thought of not sacrificing strength to save weight in mind, as it must be able to withstand high speed maneuvers without coming apart. 5¼ to 5½ lb. is ideal for all around performance, for it gives the plane strength and makes it very nice to handle in the wind. At 5½ lb. the plane has no undesirable sinking characteristics, due to its efficient airframe.

(Continued on page 92)



Bottom hatch is neatly held in by the wing dowels. Note tank extends behind the bulkhead.

FULL SIZE PLANS AVAILABLE–SEE PAGE 70



TINY, QUIET, SMALL-SITE CONTROL-LINE STUNT PRACTICE PLANE IS 049-POWERED, YET REACTS LIKE A BIG 35 JOB ON LONGER LINES.

Two for the show

by JAMES A. WILSON

Everybody loves a biplane, but so few really fly well—at least in the control-line stunt category. Most flop around in the maneuvers, always seeming to be on the verge of stalling clear out of the air. Very few have that "flying on rails" look.

"Two For The Show" flies like the conventional stunter with its small frontal area, long nose moment, and large stabilizer. A good power plant helps too. The Cox Medallion or a Tee-Dee fitted with a Medallion intake and carburetor assembly will supply the power necessary for good maneuvers.

. We would like to put in a word, or rather several words, for ½A flying. It's cheap and requires smaller areas to fly in. Best of all, the ½A isn't so noisy. Those large 40's and 60's may sound like music to our ears, but our neighbors don't seem to appreciate them. In fact, they have managed to get us thrown out of many flying fields because of too much noise.

Good performance can be obtained for ½A's if a few rules are followed: use good fuel and keep everything clean. Keep weight down and use a good engine.

Start construction of this model by cutting out all the parts. Use medium soft balsa, as the finished weight should be kept to four to six oz. Next, build the fuel tank. We like to build our fuselage around the tank to avoid cutting and chopping later. However, don't bend the curve in the filler tube yet.

Epoxy glue is a boon to the modeler. It puts things together to stay, so use some to stick the mounts to the fuselage sides. When this is dry, glue the tail end of the sides together; slide the tank tubes through the holes in F-1 and the inboard fuselage side. Slide the 1/16" sheet between the mounts and tank, and then epoxy everything in place. Bend up the gear, and epoxy it between the two B-2's. When this has set up, epoxy it into position in the fuselage.

The remainder for the construction is very conventional. The bulkheads, stabilizer, and elevator assembly can be added, followed by the bellcrank and controls. The wings can next be built and installed, but do not add the struts yet. Top and bottom fuselage sheets and blocks, and rudder can be put on.

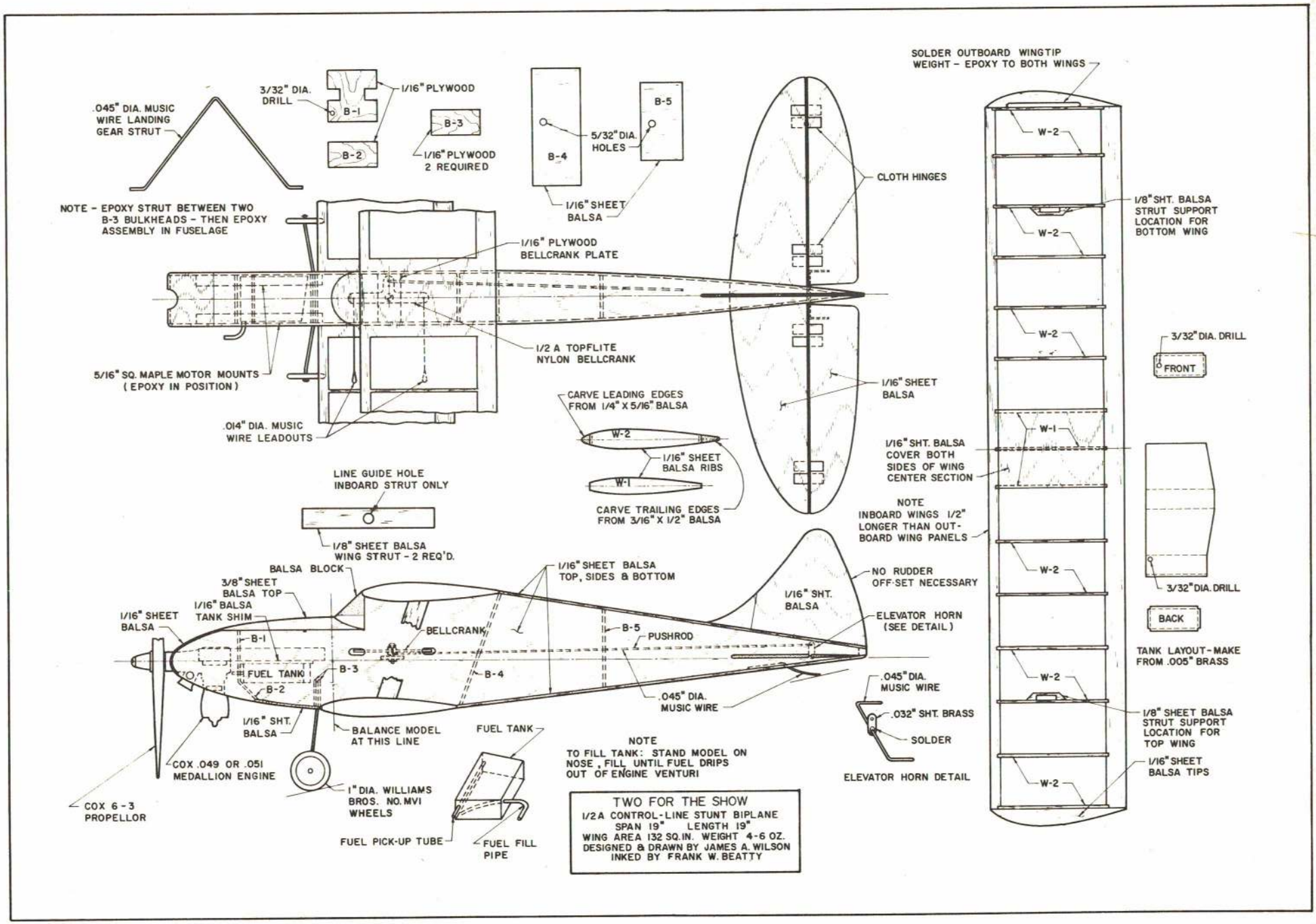
Sand the entire airplane with 320 wet or dry, followed by 400—use both dry, of course. Next, give all wood two coats of clear dope. Jap tissue should be used as the covering material for a very smooth and very lightweight job. Cover the top of the bottom wing, and the bottom of the top wing, then add the wing struts. Cover the rest of the wings. Water should be lightly brushed or sprayed on to tighten the covering. Give the wing covering three or four coats of clear dope. Color dope the fuselage and tail with your favorite colors. Bend the fuel filler forward, add the wheels and engine, and you are ready to fly.

Flying should be done on .008" solid wire lines about 35 to 40 ft. long. Don't use thread or dacron lines, as they are dangerous and cause too much drag. Thimble Drome red can fuel, and their 6-3 grey plastic prop are recommended.

The following procedure should be used for starting and adjusting the engine. Use Nitro X or some other "cool" fuel for priming. To help prevent over-priming, put some in a small plastic squeeze bottle. The engine can be started in the inverted position quite easily. Cover the exhaust with piston before priming. Put three or four drops in the exhaust and start the engine. Adjust for peak rpm, then richen just enough to cause a slight drop in rpm.

Takeoff should be made with the wind at your back, and neutral elevator. You'll like the performance of "Two For The Show." It looks good from outside the circle, too—but we've already said everybody loves a biplane.

For its intended performance, a good engine mounted on a lightweight and clean airframe is necessary. No doubt a large version could be flown CL or even RC. Perky looking plane.


.045" DIA. MUSIC WIRE LANDING GEAR STRUT
3/32" DIA. DRILL
B-1
1/16" PLYWOOD
B-3
1/16" PLYWOOD 2 REQUIRED
B-2
B-4
5/32" DIA. HOLES
B-5
1/16" SHEET BALSA
NOTE - EPOXY STRUT BETWEEN TWO B-3 BULKHEADS - THEN EPOXY ASSEMBLY IN FUSELAGE
1/16" PLYWOOD BELLCRANK PLATE
1/2 A TOPFLITE NYLON BELLCRANK
5/16" SQ. MAPLE MOTOR MOUNTS (EPOXY IN POSITION)
.014" DIA. MUSIC WIRE LEADOUTS
CLOTH HINGES
1/16" SHEET BALSA
CARVE LEADING EDGES FROM 1/4" X 5/16" BALSA
W-2
1/16" SHEET BALSA RIBS
W-1
CARVE TRAILING EDGES FROM 3/16" X 1/2" BALSA
LINE GUIDE HOLE INBOARD STRUT ONLY
1/8" SHEET BALSA WING STRUT - 2 REQ'D.
SOLDER OUTBOARD WINGTIP WEIGHT - EPOXY TO BOTH WINGS
W-2
1/8" SHT. BALSA STRUT SUPPORT LOCATION FOR BOTTOM WING
3/32" DIA. DRILL
FRONT
1/16" SHT. BALSA COVER BOTH SIDES OF WING CENTER SECTION
NOTE INBOARD WINGS 1/2" LONGER THAN OUT-BOARD WING PANELS
NO RUDDER OFF-SET NECESSARY
ELEVATOR HORN (SEE DETAIL)
3/32" DIA. DRILL
BACK
TANK LAYOUT - MAKE FROM .005" BRASS
BALSA BLOCK
3/8" SHEET BALSA TOP
1/16" BALSA TANK SHIM
1/16" SHEET BALSA
1/16" SHEET BALSA TOP, SIDES & BOTTOM
1/16" SHT. BALSA
BELLCRANK
PUSHROD
FUEL TANK
.045" DIA. MUSIC WIRE
.032" SHT. BRASS
SOLDER
ELEVATOR HORN DETAIL
1/8" SHEET BALSA STRUT SUPPORT LOCATION FOR TOP WING
1/16" SHEET BALSA TIPS
1/16" SHT. BALSA
BALANCE MODEL AT THIS LINE
COX .049 OR .051 MEDALLION ENGINE
COX 6 - 3 PROPELLOR
1" DIA. WILLIAMS BROS. NO. MVI WHEELS
FUEL PICK-UP TUBE
FUEL FILL PIPE
NOTE
TO FILL TANK: STAND MODEL ON NOSE, FILL UNTIL FUEL DRIPS OUT OF ENGINE VENTURI
TWO FOR THE SHOW
1/2A CONTROL-LINE STUNT BIPLANE
SPAN 19" LENGTH 19"
WING AREA 132 SQ.IN. WEIGHT 4-6 OZ.
DESIGNED & DRAWN BY JAMES A. WILSON
INKED BY FRANK W. BEATTY

Isn't it time for school?

by BILL HAYWOOD

Students of the world's first, club operated, radio control school have completed their studies and the Birmingham Radio Control Association, Inc., has passed another milestone in its long history of leadership in the sport of radio control modeling. Success of the undertaking exceeded the most optimistic forecasts. Student attendance was three times the number expected and community interest was heartwarming. Results clearly illustrate that the school filled a need that has long been neglected.

Strange as it may seem, this school project was inspired by a crash. The "happening" occurred on one of those beautifully bright spring days, with the usual crowd of club members gathered at the Rock, the club flying field of the Birmingham RC Association. The clear blue sky was filled with pattern and sport ships, as well as a few high wing trainers. The concrete ramp on the field was a beehive of activity, with modelers busily doing their "thing" with transmitters, chicken sticks and broken props. The roar of muffled engines, the shouts of fliers and the smell of burning nitro and castor oil filled the air.

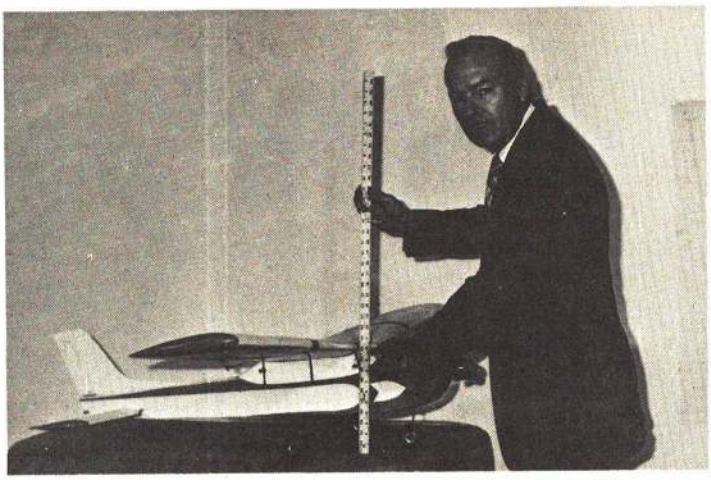
Suddenly all activity and noise went quiet as the high pitched scream of a diving engine was quenched by the sound of an explosive impact upon the hard surface of the Rock. The silence which followed was broken by a loud raucous laugh echoing across the field. Every eye swung from the wreckage toward the sound. Crash Allthumbs stood with his lethal thumbs resting on the twin sticks of a transmitter recently purchased by the new club member standing in a state of near collapse beside him. "It's all part of the game," shouted Crash. "Better luck next time," he said, as the transmitter was thrust jauntily into the numbed hands of the stricken beginner, with Crash beating a hasty retreat.

Of course, Crash Allthumbs is a fictitious name, but most clubs have such a character. Readers will recognize the type–the guy who talks a great RC game but can't get more than one or two flights out of his models, as he has never managed to find the courage to accept help and can't learn to fly without assistance. Since he desperately wants to fly RC, this fellow will gladly volunteer to teach newcomers because they usually build the trainers he wants to fly. The inevitable crash is almost always the first step in discouraging the new modeler, in addition to being one of the most dangerous practices common to our hobby today.

Unfortunately, most clubs minimize the dangers involved in allowing unprepared, untrained beginners to fly improperly built and trimmed models from crowded club fields. This practice is tantamount to carelessly leaving a bottle of nitroglycerin lying about. An uncontrolled airplane on its way to a crash is completely unselective in choosing its final landing site. It is because of this hazard that club efforts must concentrate upon minimizing the number of crashes–especially during periods of peak activity.

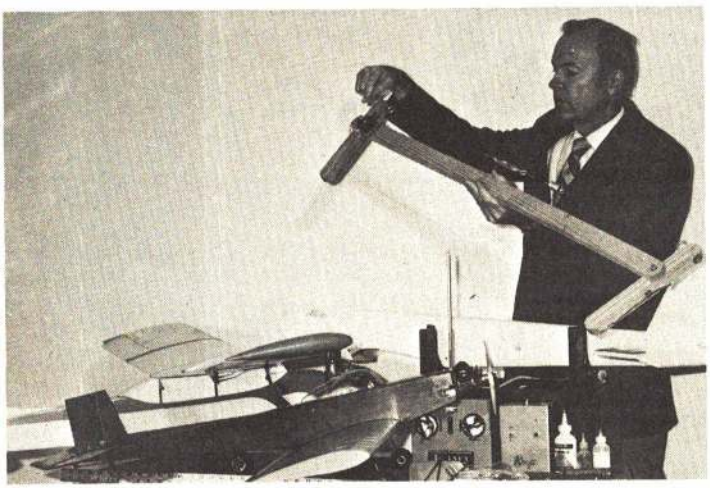
The sight of Crash laughing, and of that crestfallen modeler picking up the pieces of his once beautiful model, stuck in my mind; before I left the Rock I had decided that a solution must be found for the beginner's problems. When the thread of an idea finally congealed, I wrote an article for the club newsletter entitled "Isn't It Time For School?" in which I proposed the following idea.

AMBITIOUS PROJECT BY BIRMINGHAM RC ASSOCIATION INTRODUCES MODELING TO MANY NEWCOMERS THROUGH OPEN-TO-THE-PUBLIC CLASSES AND FLIGHT INSTRUCTION.



Author and eventual teacher, Bill Haywood with wife on top of the *Birmingham News* offices for a publicity photo which brought in the students.

From classroom to successful and safe flying. Jimmy Littleton tries landing approaches under guidance of instructor Rheubin Scott.



Pre-flight trim was emphasized by showing how to measure wing incidence and what it means.

Glues, airplane types, radios and construction methods were explained. Here instructor shows a hot-wire foam cutter. Most students did not know models were sometimes made of plastics.

Why don't we provide a flying school for inexperienced club members and new fliers outside our club?

It's true we will be pioneering, but the pioneer spirit has long been part of our American heritage. Our hobby would never have reached its present state without pioneers. Outstanding men who paved the way by combining two hobbies—ham radio and model airplane flying—evolved a composite hobby so fascinating and inspiring that a new industry sprang into existence. That industry has elevated radio-controlled equipment and the controls themselves to a state of sophistication requiring technical know-how to install and maintain them. Flying the models also requires a high degree of skill which comes to a few who haven't had some training. Whether that training is by a skilled instructor, or is self-taught, is not relevant. The fact that training must be obtained in order to fly today's models is self-evident.

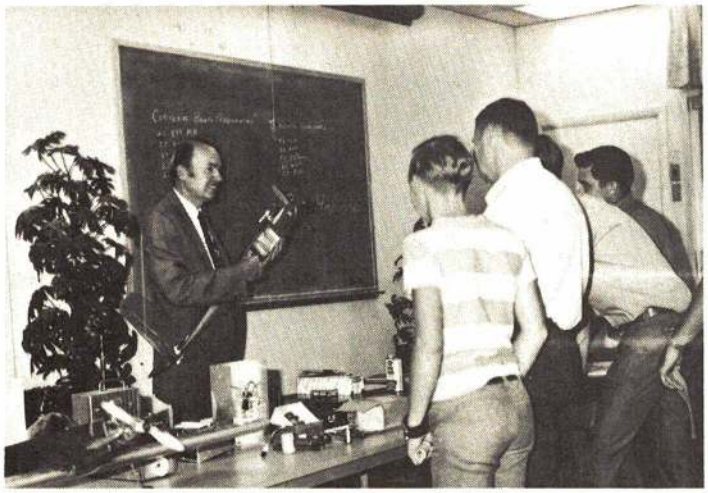
Consider the obstacles facing a newcomer today. Instead of hand launching single-channel models from grassy fields as we once did, new fliers visit a field leased by a club and watch expert fliers shoot landings and do more with their models than contest winners could match just five years ago. That experience alone is a tremendous psychological "put-down." The complexity of the gear and the enormous selection of hardware and equipment is enough to complete the discouragement of the hardiest.

Since no flight school is available today, the beginning flier must become a pioneer, find a grassy field to cushion those inevitable rough landings or build and crash plane after plane while developing proper skills. Unless the newcomer is very gifted, he tries and fails and finally decides that RC isn't such a good hobby after all. Only those with a great deal of perseverance, some technical ability, and a measure of dexterity survive the ordeal. Those who could have become good sport fliers and who would gladly devote themselves to the hobby and club work are lost to us forever. We can respond to their unspoken cries for help with only a little effort. After all, almost every other hobby group does as much. Amateur radio, knitting, ceramics, sewing, gardening and painting are a few of the hobbies offering classes to newcomers. It seems that it should be possible to do the same in RC flying.

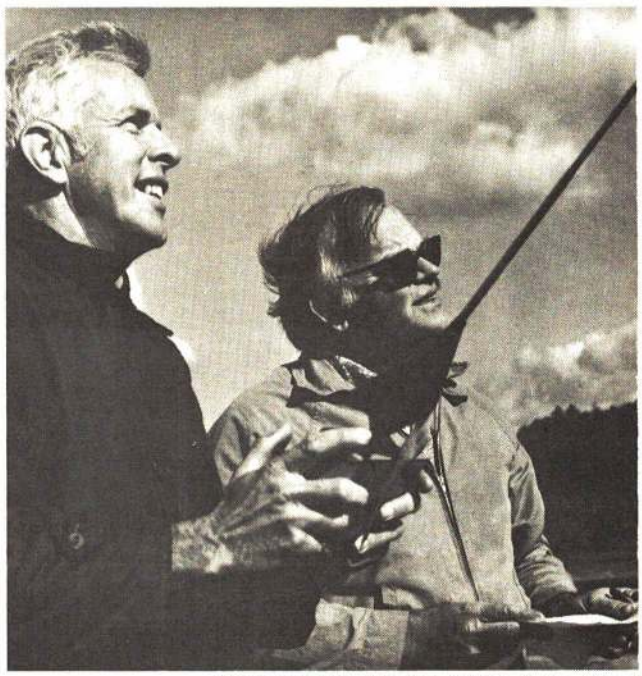
Equipment for a well-rounded training course is easily obtainable and reasonably priced. Student transmitters are obtainable for use in dual instruction, while flight training is in progress, and competent instructors are in abundant supply.

Let's see how we would go about starting a program such as this. The school would begin with publicity—announcements on local radio and TV stations, in newspapers and the club newsletter. The first ground school would consist of three two-hour classes which would cover a period of three weeks. One or more club members would conduct classes using modern teaching techniques including photographic slides and films. Hardware, engines, completed ready-to-fly aircraft and even one or more complete RC systems would be used in classroom instruction. Flight training would be held at the club field on Saturday morning, or at a time when flying activity would be at a minimum.

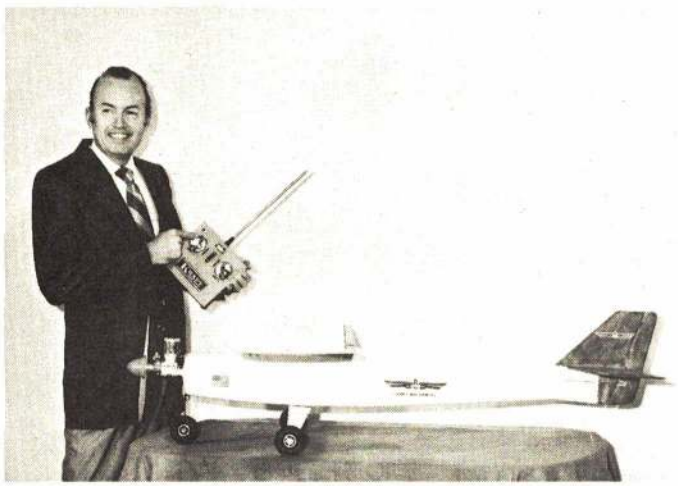
Why the flight school? It would serve a multifold purpose. First, it would develop skilled RC fliers who would swell our ranks, strengthening our already strong organization.



Eager modelers stayed after class every evening asking more about subjects covered in class. Author shows his radio installation to answer a student.



An instructor earns his rating. Dave Davies qualifies under examination by Bud Caddell, the Club's President.



"Here's what happens when you push this lever." This plane and radio were used for basic flight training with a buddy box transmitter system.

Second, it would promote safe flying because all new fliers would be taught safety. Third, untrained fliers who had not yet earned their wings would be restricted to flying only if an instructor was assisting during the flight.

The article in which all these ideas were presented was submitted to Bo Thomas, chairman of the Club board of directors and Club newsletter editor, who included it in the next issue of the "Birmingham RC News." Publisher Arnold Williams had the paper off the press in time for the next club meeting, at which time President Bud Caddell suggested that the Club sponsor such a school, the membership voted overwhelmingly in favor of the project.

A classroom was obtained—the American Red Cross auditorium. The facility was generously made available on three consecutive Tuesday evenings. Letters were mailed to five carefully selected members of the hobby industry with a full description of our project, requesting training aids for our school. Large posters were painted announcing the classes on Basic Radio Control Flying and were displayed in four hobby shops in the area and on bulletin boards on the Birmingham campus of the University of Alabama. Two telephone numbers were placed on the posters, and all club members were asked to pass the news on to RC beginners.

Having been appointed the school committee chairman and designated classroom instructor, preparation of the curriculum was largely my problem. Surprisingly, the most difficult task was limiting the scope of material to be covered. Since RC modeling is such a broad subject, only the basics could be discussed in such a short school session. Eleven experienced modelers served as an advisory group and before I went into the first classroom session I was armed with fifty copies of "Experts Available For Outside Instruction."

At last all was in readiness for the opening class with one horrible exception. After almost three weeks of prominent display, the posters in the hobby shops had not produced a single phone call. The University of Alabama posters provided only one possible enrollment. Telephone solicitation had produced six. Five days before the first scheduled class, the school committee, which included Dave Davies, Bud Caddell and myself, held an emergency meeting. We were in the embarrassing position of having received sizeable donations from a generous hobby industry, including an ARF Sportsman, a Supertigre G-60, classroom training aids such as nylon snap links, catalogs, flight training sheets and other hardware. We now found ourselves faced with the possibility that there would be so few students that the school would be a farce. We had prepared for about ten or twelve students and now it seemed we would be very lucky to have as many as six. Obviously additional students would have to be recruited, and so we turned to the newspapers.

A phone call to the sports editor of *The Birmingham News* produced a polite but firm, "Sorry, but we don't consider model airplane flying a sport." He suggested that the city editor might consider our school to be a news item. One more phone call and a skeptical city editor suggested that we bring one of our models to his office to discuss the possibilities of an article. That was exactly what I wanted to hear. Good salesmanship would do the rest for me.

(Continued on page 76)

HERE'S HOW TO TAME AN ALL-OUT RACING ENGINE SO IT WILL IDLE RELIABLY, AND SLOWLY WITHOUT AFFECTING HIGH SPEED PERFORMANCE.

RPM Control

by HARRY HIGLEY

As control-line Navy Carrier is my chief interest, this article is directed to those with a similar interest, but much of the information may be applicable to all throttled engine operation. This article will present a somewhat new approach to the problem of speed control on high performance engines.

The term "speed" or "rpm" control is used instead of the term "throttle" which implies only control of the fuel/air mixture; there are other factors that contribute to effective low rpm operation–exhaust backpressure, combustion chamber geometry, number and type of glow plugs, fuel formulation, timing and porting. There are undoubtedly additional factors, but these are characteristically random or not easily changed (weather and friction, for example). Before we explore two of these factors, let's look at the conditions under which a speed control system must function to obtain maximum power at high speed.

The engine in a Navy Carrier plane is typically a racing engine operating with a pressure fuel system and high nitro fuel. A high performance engine is ported so that fuel may enter the cylinder for a longer period of the stroke than a standard RC engine. The pressure fuel system delivers too much fuel at low rpm. Furthermore, the crankcase volume is minimal. These factors contribute to the major causes of throttle failure or wash-out–the plug becoming fouled or the combustion chamber being cooled below the flame point. This failure may occur with almost any engine regardless of what proportion the fuel and air are mixed. It seemed that maybe this ratio would be less critical if some of the other factors could be changed.

Considering two of these factors–the number of glow plugs and crankcase pressure–the plug can be examined first, since this produced only a slight improvement. Contrary to popular belief, it is probably not a sustained incandescent glow of the plug that causes combustion after the battery is removed. Rather, this element is a catalyst for the burning. In this context, a catalyst may be thought of as a substance whose presence causes a chemical reaction to occur under less favorable conditions than are normally required. The catalyst does not enter the reaction in the sense that it is not consumed. The glow plug element is a platinum alloy–a catalyst for many types of chemical reactions. By using two plugs, the catalytic area is doubled. This should help prevent a wash-out. I was unable to get a Supertigre 65 to recover from idle. By switching to a two plug head, the engine worked marginally well. On a K&B 40 it did not seem to have any effect.

A more significant factor is the crankcase pressure. The crankcase of the engine serves as a pump that draws the mixture from the venturi and pushes this into the combustion chamber. Generally speaking, the less crankcase volume, the more efficient the pumping action. This gives more power at high rpm, but at reduced speeds may put too much mixture in the combustion chamber and cause a wash-out.

It seemed reasonable that letting the crankcase leak slightly at low rpm might reduce volume of fuel entering the combustion chamber and thus prevent a wash-out. A system was designed with the following objectives: (1) No cutting or drilling of the engine permitted; (2) both high and low speed mixture settings were to be independent and adjustable from outside the airplane with the engine running; (3) crankcase pressure would be adjustable at low rpm; (4) the system would be as light as possible.

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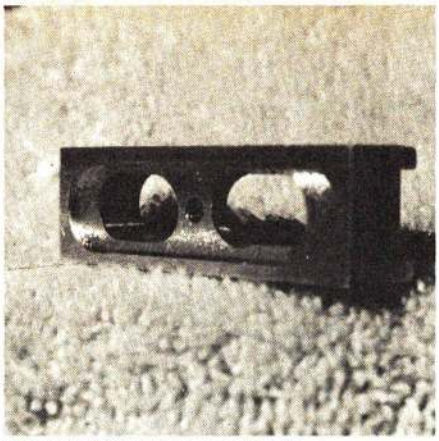


Exhaust slider block for STG40.

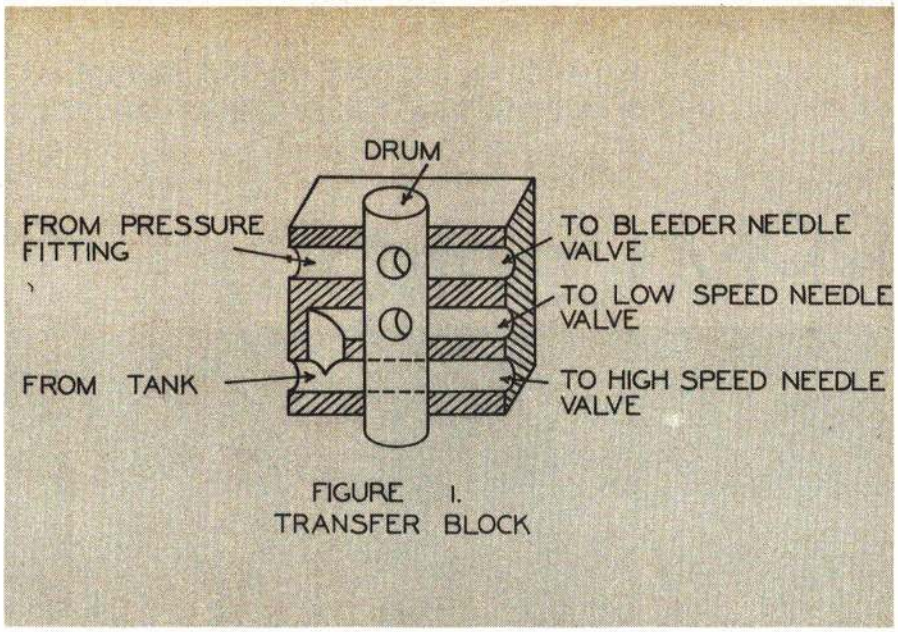


FIGURE 1.
TRANSFER BLOCK

Fuel and pressure transfer block.

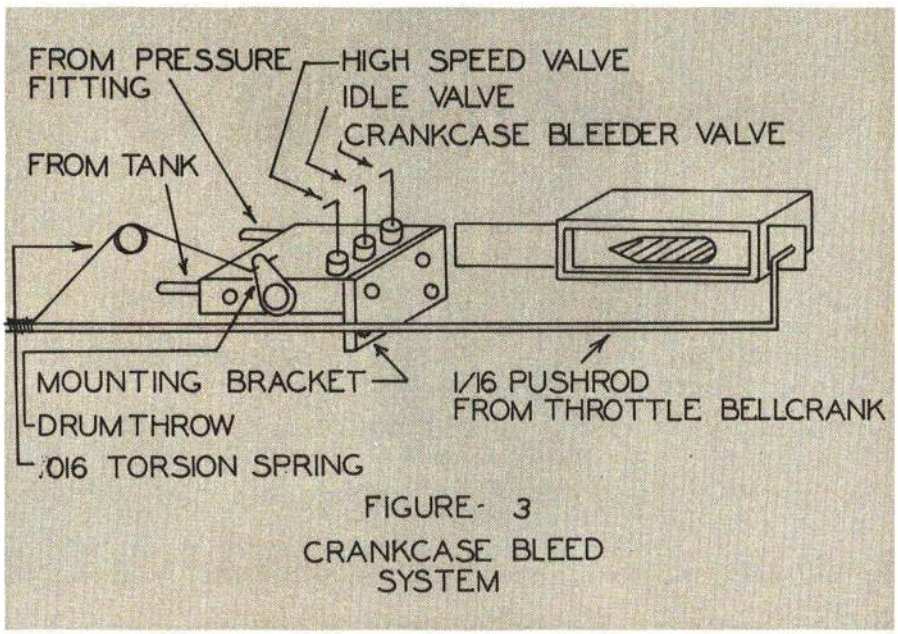
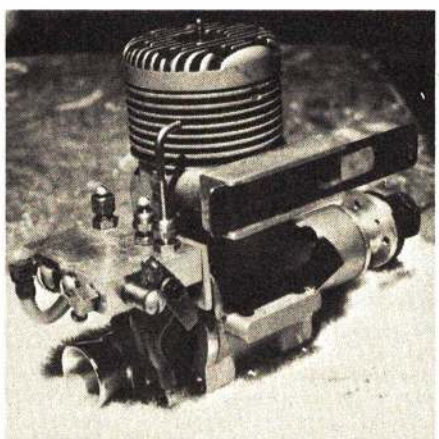
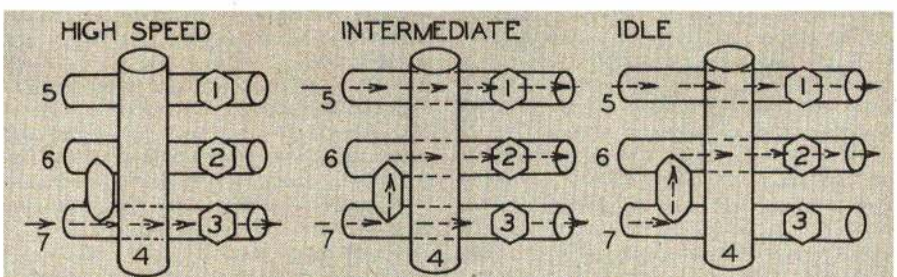


FIGURE- 3
CRANKCASE BLEED SYSTEM



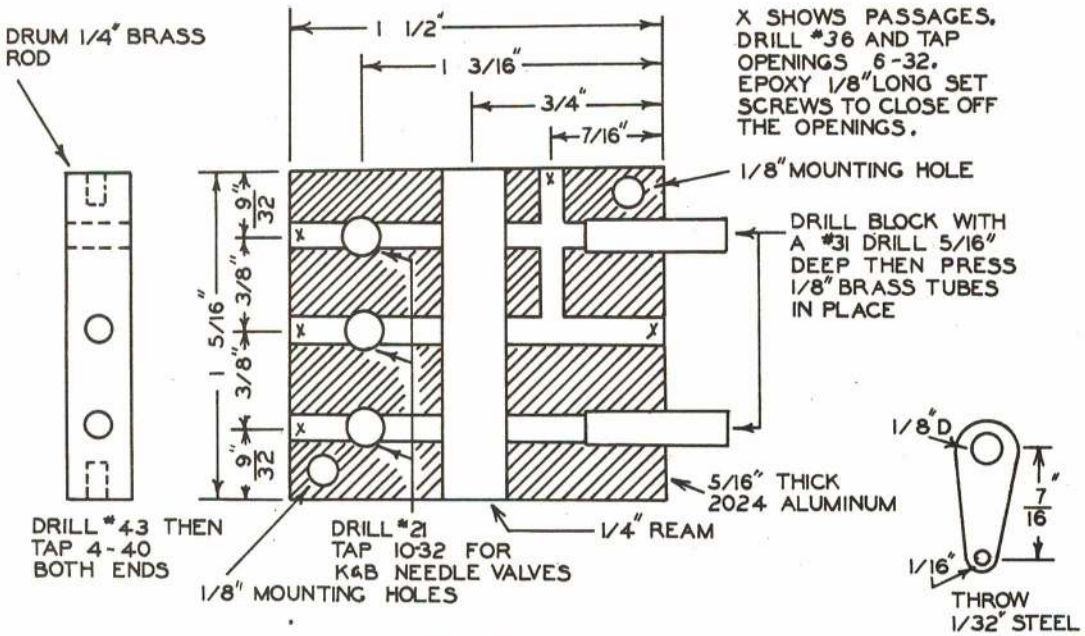
A tamed ST65 with all fittings.



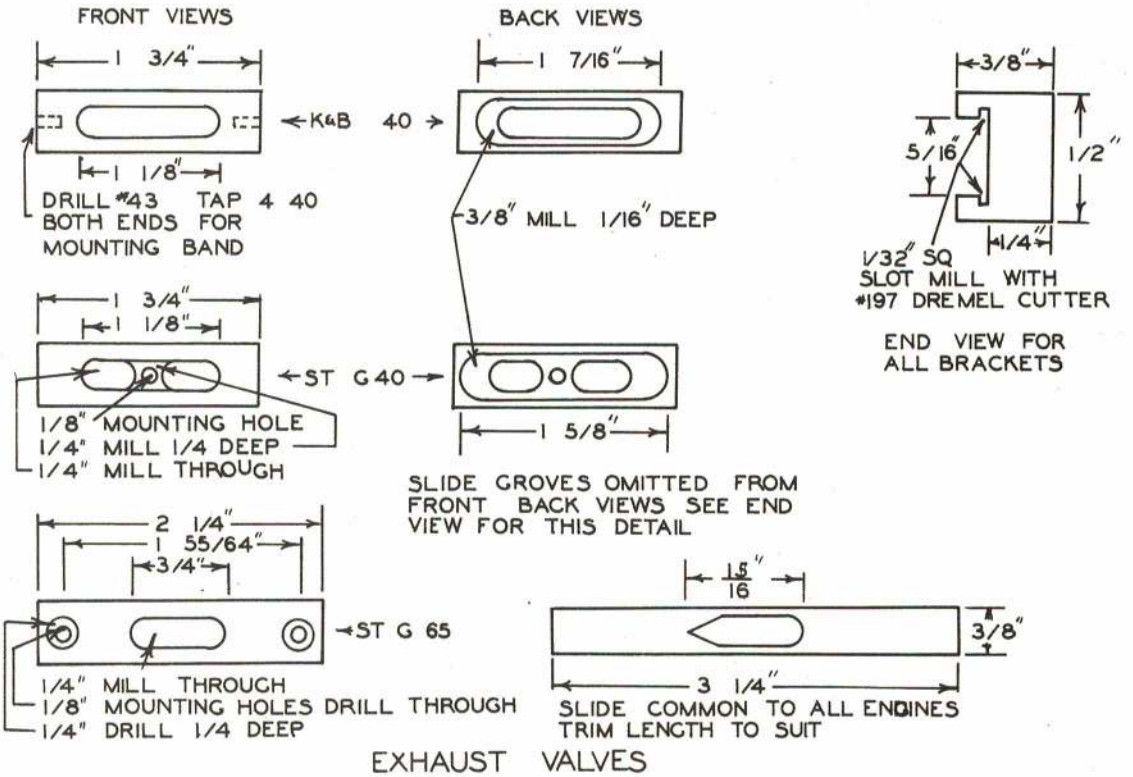
CODES

1. CRANKCASE BLEEDER NEEDLE VALVE
2. IDLE NEEDLE VALVE
3. HIGH SPEED NEEDLE VALVE
4. DRUM
5. FROM CRANKCASE PRESSURE FITTING
6. PLUGGED END
7. FROM TANK

FIGURE- 2
FLOW DIAGRAM



TRANSFER BLOCK



EXHAUST VALVES

Mustang

by DON BERLINER

Sometimes other people really do know what's best for you. Take the Mustang, for example. North American Aviation designed and built it, but the U.S. Army Air Corps wasn't especially interested until the Royal Air Force ordered a batch of them and we decided we ought to take a more serious look at the airplane. And thus was born perhaps the greatest prop-driven fighter plane of all time.

The British named it "Mustang," but we initially called the P-51 an "Apache." It was powered by the same Allison V-12 engine that was going into the Bell P-39 Airacobra, the P-38 Lightning and the early P-40 Tomahawks and Kittihawks. The Airacobra was a great anti-tank plane, but wasn't much good at altitude; the Lightning needed two Allisons to get its performance, while the P-40 was outclassed almost everywhere it appeared.

The Mustang was a more modern design than any of those, having the first laminar-flow airfoil on a production airplane and clean lines throughout. But its performance at high altitude was not what it should have been, so the British began looking for a better engine. The search didn't take very long, for they were already banking heavily on the Rolls Royce Merlin for their Spitfire and Hurricane, with extensive development going into it. There were high altitude versions and low altitude versions and middle altitude versions. With the air war changing almost daily, there was a need for engines that would outperform the enemy's under all conditions.

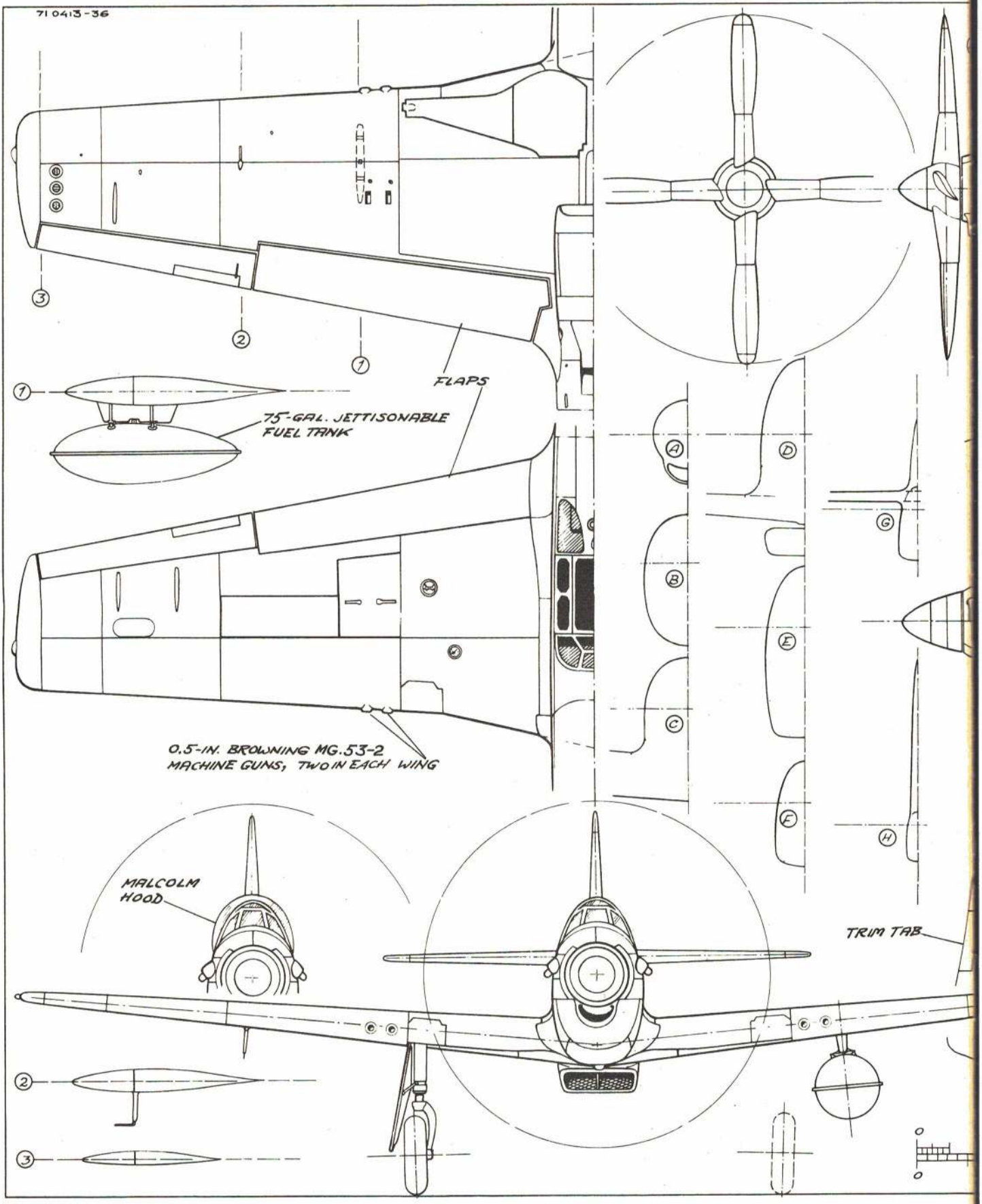
When the British first tested the Mustang on its arrival, they were pleasantly surprised, as it more than lived up to its promise. Earlier imports, such as the P-39 and P-40, had been disappointing. However, the sleek Mustang I was a full step ahead of their latest Spitfires, even with its Allison engine, and so, it was thought, should be more than a match for the Messerschmitt Bf-109's that were giving them fits.

But the Germans were constantly improving the '109; there was a great need for an airplane that would leap far ahead of it. Thus the plan to put the Rolls Royce Merlin V-12 into several Mustang I's was originated to see if it could boost their speed enough to make the changeover worthwhile. On June 8, 1942 the performance of the first Mustang X was reported: 400 mph at 18,600', using an interim Merlin 20 engine. This was not much faster than the Allison-powered version. But the Merlin 61 was coming, and it offered 1500 hp and a two-speed supercharger. Engineers estimated it could push a Mustang along at close to 440 mph.

The first Mustang X with the new engine (actually a Merlin 65) flew in October 1942, and clocked 427 mph at 21,000'. In the next few months, four more X-models were extensively tested, but it was already apparent that the airplane was destined for greatness. Soon after the British began converting their Mustangs, the USAAF decided to try the same thing. A pair of P-51A's was given Packard-built Merlin 61 engines (called the V-1650-3 in the U.S.), and they, too, were highly successful. However, the response to the first British tests had been so enthusiastic that more than 2000 were ordered even before the first U.S. conversion flew.

The American-built Rolls/Mustangs were first called the XP-78, but this was soon changed to XP-51B. They differed from the

(Continued on page 89)


71 0413-36
FLAPS
75-GAL. JETTISONABLE FUEL TANK
0.5-IN. BROWNING MG.53-2 MACHINE GUNS, TWO IN EACH WING
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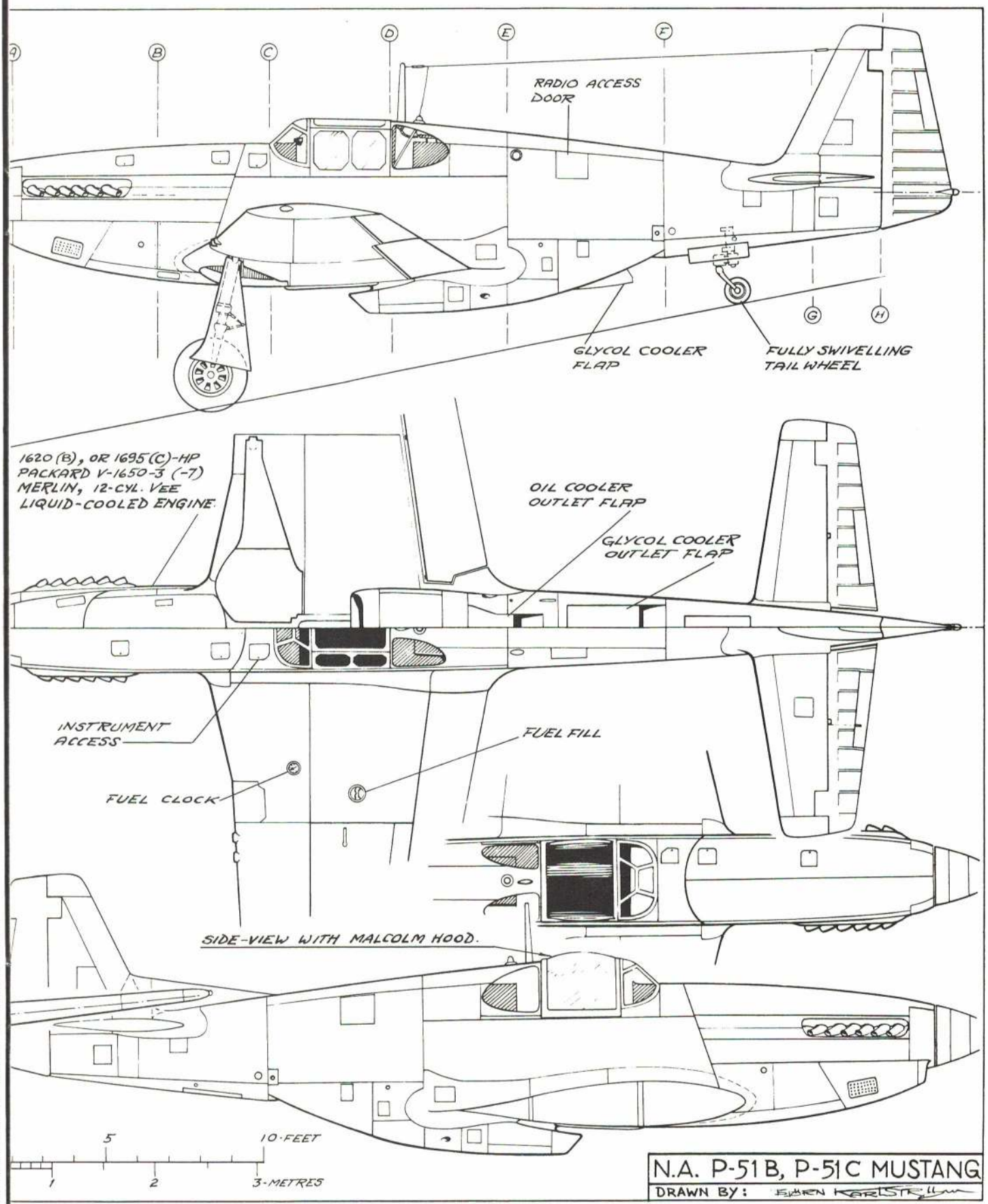


new products check list

Davis Model Products/Utility brushes. Next to razor blades, the handiest thing you can have around your shop. "Six-Pack" of steel-handled brushes, ideal for one-shot applications of hard-to-clean materials like epoxy, resin, etc. Also great for cleaning with strong solvents, anything else where you need a clean, fresh, disposable brush. 59 cents for pack of six. Davis Model Products, Box 161, Glen Ellyn, Ill. 60137

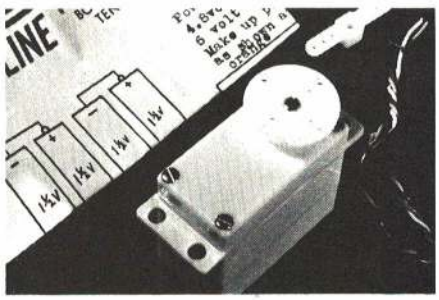
Bob Holman Plans/C.A.P. plans. Line of English "Complete-A-Pac" plans provides detailed instructions for building scale RC models, many of which are not available elsewhere. Some available plans: Royal Navy's Swordfish (shown), DeHavilland Comet, Siemens D-VI, Sopwith Snipe, many others. Most of a size to permit good full-house operation if desired. Also, ABS plastic formed parts for certain kits, available as extra option. Prices average $3 to $5. Write for complete listing to Bob Holman Plans, Box 741, San Bernardino, Calif.

Wing/Aluminum control rods. Quality and precision finish are evident in these 23" gloss black extruded aluminum alloy control rods. Plastic-coated to eliminate metal-to-metal contact. Accept all standard 1/16" threaded end rods. $2.98 a pair. Wing Mfg., Box 33, Crystal Lake, Ill. 60014

Midwest Products/New CL models. Midwest's new line of Fabulous Fifteen profile scale models are the younger brothers of the present .35-size series. Bf-109, shown, is forerunner of series of WW II kits to be released in future. Kits will feature die-cut parts, formed wire accessories, full-color decals. For 15 to 19 power, $7.95. Midwest Products Co., 400 S. Indiana St., Hobart, Ind. 46342

Davis/Glow plug caddy. Works great on old ignition spark plugs too! Holds one dozen plugs safe and secure in holes in durable molded rubber block. Ideal field kit accessory to prevent contamination, lost or damaged plugs. 98 cents. Davis Model Products, Box 161, Glen Ellyn, Ill. 60137

Edmund Scientific/Fish glue. Specialized glue made from codfish skins has several properties adaptable to modeling. Water soluble, good adhesion to most surfaces, better initial "tact" than most casein glues, nonflammable, heat-resistant. Excellent as gasket cement, for example. Two 4-oz. squeeze bottles, $2. Edmund Scientific Co., 555 Edscorp Bldg., Barrington, N.J. 08007

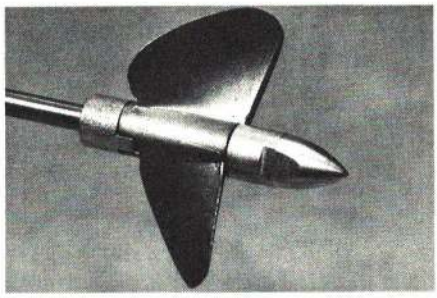


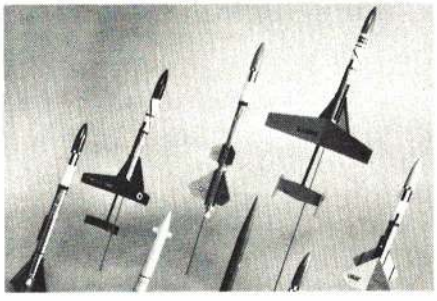
Jetline/Retract servo. Intended for use with mechanical retract gears, servo provides 180-degree throw. Designed for operation with throttle control, eliminates need for extra channel. Over four lbs. static thrust. Power: 4.8V NiCads or four AA Pencells. $19.95. Jetline Products, Box 22, Bellevue, Tenn. 37021

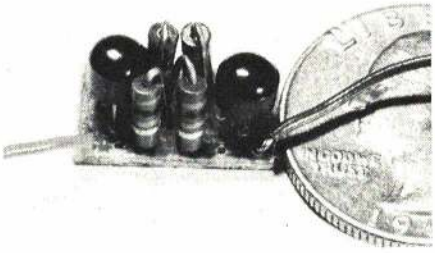
Heathkit/Five-channel RC system. New "flyweight" system uses Heath sub-miniature digital-proportional servos, each 1-7/8 in. long and 1.25 oz. System consists of four servos, receiver with three IF stages, high-output transmitter with Kraft sticks, recharger for transmitter and receiver NiCads, choice of frequencies. GD-19S system, $224.95; extra servos, $24.95. Heathkit, Benton Harbor, Mich. 49022

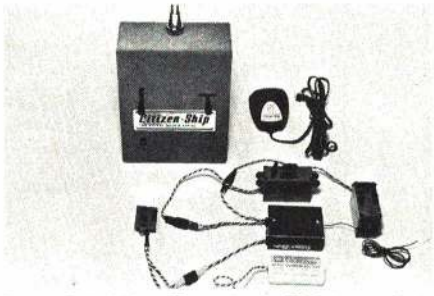
Miller Racing/Latex driver model. In 1/8 scale, authentic-looking driver can be flexed to fit desired driver's position. Realistic Nomex suit, crash helmet—all made of crash-proof Latex Neoprene. Can be finished with Dupli-Color or other lacquer-based paint for high gloss on helmet, flat color on suit. With transparent helmet visor, sandpaper, full directions. Write: Miller Racing Driver, 1360 Sandburg Ter., Apt 304C, Chicago, Ill. 60610

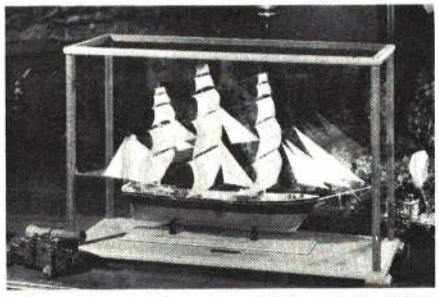
by FRANK PIERCE











Williams Bros./Engine kits. Series of basic scale engines may be used for display models or for scale rubber-powered airplanes. 5-, 7- and 9-cylinder models available in 1/2, 3/8 and 3/4" scale. Price range from $1.49 to $2.49. Williams Bros., 181 B St., San Marcos, Calif. 92069

Ace/Foamwing glider. Ace-High glider uses both straight and tapered form wing cores to make 70" span single-channel RC aircraft. Pre-cut parts, built-up fuselage and power pod for 049 engine are other features. Ideal for beginning RC fliers. $14.95.

Ace/"Drain-Brain." Fits easily between pulse receiver and actuator and provides increased battery life by switching each pulse output over the entire length of actuator coil rather than over only half of coil. Increases efficiency of actuator. One-gram PC board can be mounted directly on actuator. $3.75. Ace Radio Control, Inc., Higginsville, Mo. 64037

Arco/Publishing/*Forgotten Fighters.* Outstanding 80-page reference book on U.S. Naval aircraft—some well-known but most in the almost-made-it category. This first book covers the Hall Aluminum XFH-1, General XFA-1 and other unusual test and prototype aircraft, even a tail-dragger Bell Airacobra. By Peter M. Bowers. $3.95. Arco Publishing Co., Inc., 219 Park Ave. South, New York, N.Y. 10003

Hobby Lobby/4-channel digital proportional system. Consists of two stick, four-channel transmitter with rechargeable NiCad, integrated receiver-servo amplifier unit, four "super-mini servos" of only one oz. each, and airborne 4.8V NiCad battery pack. Maker claims high degree of reliability, competition-quality flight characteristics. $199 for 27 MHz system, $209 for 72 MHz; extra servo, $12. Hobby Lobby, Rt. 3, Franklin Pike Circle, Brentwood, Tenn. 37027

Citizen-Ship/Two-channel RC system. Model CDS-712 is low-priced quality system for boats, planes or cars. 400 mw output, total airborne weight 11 oz. Rechargeable NiCad airborne battery pack with isolated charger, system price $169.95. Also available as individual components which can be used with other Citizen-Ship gear for maximum system flexibility. For details, write Citizen-Ship Radio, Box 297, Westfield, Ind. 46074

Octura Models/Boat propeller. Model 2250 beryllium copper propeller is designed for 40-powered surface prop hydroplanes. 2" diameter, 4-1/2" pitch, .189 diameter bore, slotted to fit Octura drive dog. Left-hand pitch. $5.50. Octura Models, 8148 N. Milwaukee Ave., Niles, Ill. 60648

Estes Industries/New line of cold-propellant rockets. Shown are units from "cold propellant" model rocket line, using RP-100 propellant, a gas which is nontoxic, nonexplosive, nonflammable. No odor or heat is produced, allows pre-flight checkout, indoors if desired. Further information is in Cold-Propellant Rocket Catalog, availabe from: Estes Industries, Box 227, Penrose, Colo. 81240

Scientific Models/Display case. Display your prized model to best advantage. Mahogany display case comes ready to assemble, consists of furniture-grade woods, beautifully beveled, brass screws, pads, frame routed for standard-thickness glass. Three sizes: 16 x 5-3/8 x 12", $19.95; 27½ x 8½ x 19", $29.95; 31 x 8½ x 20½, $34.95. (Glass not included.) Scientific Models, Inc., 340 Snyder Ave. Berkeley Heights, N.J. 07922

ALMOST GLIDER-LIKE FLIGHT POSSIBLE WITH THIS 049-POWERED TRAINER. IT WAS DESIGNED ESPECIALLY FOR THE POPULAR TWO-CHANNEL RADIOS.

2T

by RON JACOBSEN

Photos by Roy Inman

"What we need is a simple model plane that is easy to build, goes together fast, takes hard knocks–yet flies with the best of them." That was the observation of Ken Wilson, the owner of the hobby shop where I am employed in Shawnee, Kansas.

"It should be something we can recommend to the many new customers who are buying two-channel bricks or single systems," Ken went on. "They want something easy to build and fly. When they buy a simple rig, they aren't expecting flaps, retract-gear and so on. They *do* want something that will fly stably and yet be responsive. This model should be a box with simple lines, built of fairly hefty balsa for strength, and ample area for good flight and glide characteristics, *and* take an 049 engine for economy."

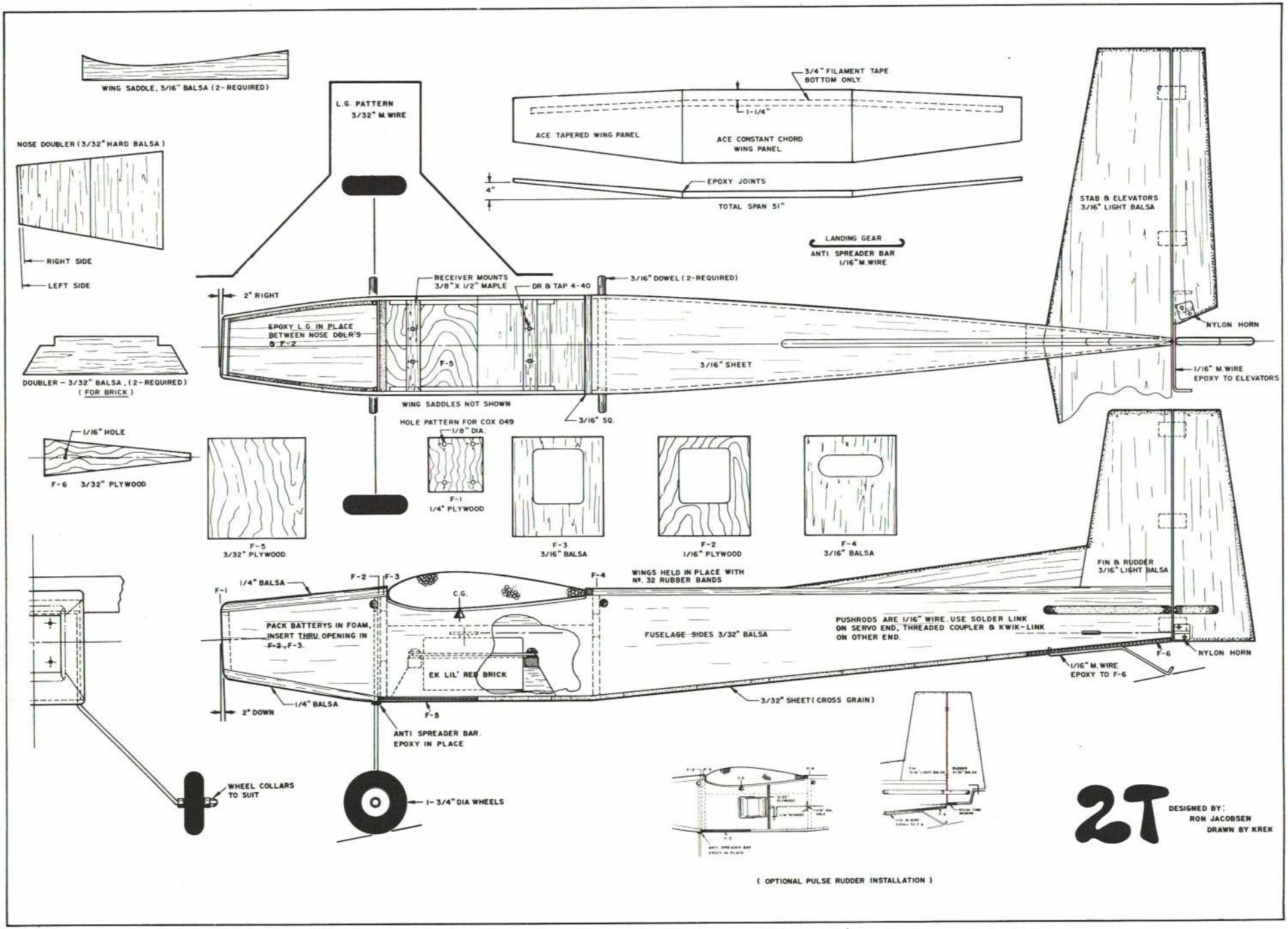
I suggested that we could use some Ace foam wings to get over the hardest hurdle a beginner has–building wings without a warp. "Right," the boss said. "How about taking just one section of the constant chord wing, both sections of the taper? Let's leave the center flat, and put the dihedral on each of the taper tip sections. That would give us about 258 sq. in. with a span of around 50 in."

I had pulled out some paper while he was talking and made some rough sketches. "It's going to be boxy and ugly as sin," I said, "but I believe it will really fly–it just looks like it will!" I took my rough sketches and drew up full-size plans, checking all dimensions as I went. (I like to build from full-size plans, as it makes everything much easier.)

I made notes of materials I would need–some I had to get out of stock, others I had in my scrap box. Included on my list were: two sheets of 3/32 x 3 x 36" balsa; two sheets of 3/16 x 3 x 36" balsa; one sheet of 1/4 x 3 x 36" balsa (just 9 needed for one plane); one 3/32 x 6 x 12" ply; one 3/16 x 12" dowel; one 1/16" music wire; one 3/32" music wire; and one pair of 1 3/4" wheels. I also needed a 1½ x 1½" section of 1/4" ply and a 2½ x 2¾" piece of 1/16" ply, but I had these in my extras. The choice of hinges and linkage and other hardware could wait, as any of the hardware made by all of the top manufacturers would work.

I decided I might as well get enough wood for two planes, so I doubled up on some of the materials. Generally, when I build from scratch plans or from magazine plans, I like to build two, especially if it is as simple as this job promised to be. By cutting two sets of parts, time is saved in the long run. I gathered my long steel rule, double-checked my X-acto knife blade, and made sure I had plenty of 5 minute epoxy. I also got out my sanding block. On the back of the bench I had containers of pins, rubber bands and some masking tape. I would use these to hold things together as they dried. My triangle was also in its place–I wanted my angles just right, and not so-so.

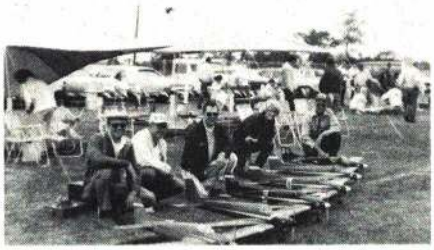
(Continued on page 72)



FULL SIZE PLANS AVAILABLE—SEE PAGE 70

WHERE THE ACTION IS

RADIO CONTROL



Six Don Lowe Phoenix's flew at the Pontiac, Michigan pattern contest. Groovy.

Electronic scoring machines on table indicate maneuver performance immediately and sum of points during the fight as it progresses.

DON LOWE
SPORT AND PATTERN

Contest Scene: The '71 contest season was most satisfying and fun for me and also for you hundreds of others who tried it this past year. There is absolutely nothing in RC modeling to compare with the charge that you can get out of competition. The really great spinoff of the contest scene is the opportunity to see what is happening with other fliers and to exchange ideas. I noted a number of good ideas being used in contest management.

Do three Mach I's make Mach 3? You figure it out. Anyway, here's Norm Page's pattern design.

One neat idea for easing the judges' scoring problem and manpower requirements was observed at the second annual Pontiac Mall Airplane Clubs' meet in Pontiac, Michigan. Each judge is provided with a switch which operates an electronic counter located at headquarters. The judge simply clicks off points from zero to ten for each maneuver and it is automatically recorded and totaled. This makes the score immediately available. In addition, the judges are provided two-way phone communication with headquarters. A variation of this would be a large-size electronic scoring board for display to the spectators—this would really heighten spectator interest. We hope to give you a more detailed description of the Pontiac system at a later date.

Another very nice technique for pattern scoring was observed at the annual meet put on by the FORKS of Lancaster, Ohio. Each judge is provided with a set of cards numbered zero to ten. On each maneuver he simply flashes the appropriate card and the score is recorded by a separate recorder sitting in back of the judges. These cards are large enough so that spectators can observe the scoring. It was also interesting to observe the increased interest on the part of the other contestants since they could see how their competition and buddies were doing. An added spinoff for the contestant is the opportunity to observe what the judges like or don't like about individual maneuvers in order to improve their own scoring! We understand that a card scoring system similar to this is planned for next year's Nats. We also understand that Al Dupler volunteered to make the cards—attaboy, Al.

In the hand of each judge is a button to trip the electronic scoring box back at the tent.

Trouble with Meeting Attendance?: Is your club plagued with the problem of getting members out to the regular meetings? This appears a fairly common complaint and I'm sure there are many reasons for it. Basically, we must make the meetings interesting and informative so that members will want to attend. Beyond that, however, some clubs use various incentive plans to twist the arm a little bit.

A common complaint in most clubs is the fact that a small percentage of the membership is active, attends the meetings and carries the load. We realize that there are bound to be diversified interests, all the way from an individual's interest only in having a place to fly, to the activist who likes to be involved in everything. You also have the lazy type who doesn't even want to take his turn at cutting the grass. Communication in a club is certainly made more difficult with poor meeting attendance and it is almost impossible to reach a majority decision on issues without the majority being present to vote!

Jim Slater of the Lancaster FORKS described the technique that his club uses to encourage attendance. They use a plan which provides incentives and penalties. It must be successful, as Jim reports 100% attendance at times and very high percentages as a norm. In essence, they award points for meeting attendance and other club activities. A minimum number of points are required per year just to remain a member! In addition, extra points earned are used to determine recipients of yearly monetary awards given to the most active members. Of course, special allowance is made for those members who simply cannot attend meetings or assist at times for reasons of health or job interference. Sounds like a good idea to me. How about other clubs? Any ideas on this that you would like to pass along? Let me have them and we'll try to get them into print.

Those Plastic ARFS: Most active RC modelers have by now been exposed in one way or another to the "rubber ducks," "clorox bottles" or, more technically described, ABS plastic "almost-ready-to-fly" airplanes produced by a variety of manufacturers. In my own experience, and that of many modelers around the country with whom I have discussed the issue, these craft represent a study in contrasts.

Without question they provide the quickest way possible to get an airplane together and into the air. But, on the other hand, the life expectancy is on the average very short and fraught with much time devoted to patching and repair work. As one modeler observed, "It seems that a model requires a given amount of total time to construct and maintain for many flights assuming no major bashes. You either invest a short time putting together an ARF and work interminably repairing it, or you spend more time building a conventional ship and much less time in repair work." I must agree with that observation since I have not owned an ARF yet that was not plagued with cracking, engine mount failures, wings folding, landing gear loosening or other such problems.

The most basic problem seems to rest with the ABS plastic used by most manufacturers. This material is sensitive to vibration fatigue cracking and is attacked by high nitro fuels. I realize that it is easy to work with and assemble, but isn't there something better that will add life? Various attempts at reinforcing have been only marginally successful. Wing skin materials are a headache also, since it appears difficult to find one that is cheap, strong, reasonably hard and will remain adhered to the foam wing core. Installation of engine mounts and landing gears needs improving to prevent loosening. What say you modelers and the industry? Surely a product as potentially useful and expensive can be made better!

Gimmicks and Gadgets: Cary Trestyn of Flushing, N.Y. improves wheel collars in a simple way. He removes the allen set screw, which is difficult to get really tight without stripping the head, and replaces it with a short straight length of a 6/32 screw which is slotted at one end for an ordinary screwdriver. Another idea that I have used so that you can really torque down for critical applications is to cut off a hardened allen head 6/32 screw and use it to replace the one furnished. The basic idea is to provide for higher screw torqueing without stripping.

Cary also reports that contact shelf paper is great for trimming and other purposes. This material is available at many variety stores in lots of colors at about 50 cents per sheet, measuring 18 x 36". Cary uses the material for covering pushrod exit holes by cutting a triangular piece and trimming off the backing paper around two edges. When applied over the hole it sticks around the edges but not to the rod—neat, eh?

New Ideas: I really would like to hear from you guys (and gals) out there in RC modeling

land about ideas in this column and any other ideas that you might want to pass on to others. The easiest way is to write me directly at 3491 Clar-Von Dr., Dayton, Ohio 45430.

HOWARD McENTEE
GLIDERS AND FAI

Mod-Pods Galore: Apparently much taken with this northwest design, Jack E. Sayer of Nassau, Bahamas has built the original plus many variations as shown in the picture. Among his variations is a six-ft. span T-tail design with fiberglass fuse, boom and rudder, and foam stab and wing. Jack has varied so much from the Mod-Pod original that only the boom and fuse remain. Incidentally, he makes these parts himself.

Plastic Sun Shade: Last spring Fred Collins showed us a sun shade intended to clip on the transmitter antenna made of thick green plastic. Since then, he has found a 6 x 6" plate much better and this is now his standard model. Those interested may purchase one of these plates for $1.49 postpaid. The address is 29 Stewart Ave., Pittsburgh, Pa. 15227. He is using the name Vu-tru for this unit. Fred has several versions of fiberglass glider fuselages.

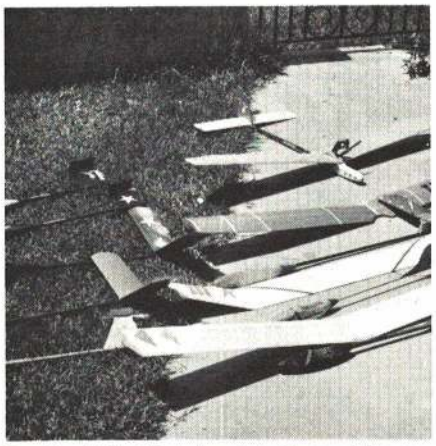
Annual Cumberland Fly-In: About 65 fliers were present at this year's meet, some coming long distances. Saturday was a poor day for soaring since there was no wind, but it was warm and pleasant. Sunday was windy and cold, but the soaring was excellent. Many gliders would climb rapidly to as high as 3500 ft. performing as though they were engine-powered. The heavier 10 to 12' span gliders did the best, as the small and light ones could not penetrate. There was only one crash during the weekend—something of a record! Our thanks to Ray Smith (DC/RC) for this short rundown. Incidentally, Ray has already won three of the six scheduled ECSS meets for the 1971 season, with good scores for two others. He appears well on the way to the 1971 ECSS championship.

1971 LSF Tournament: This huge affair, considered a great success with some 120 registered contestants, was held at Hummingbird Haven, Livermore, California. The weather was sunny for the two days, August 28 and 29, but it was also very windy. The meet was sponsored by the North Bay Soaring Society and the Harbor Soaring Society.

Tournament Director, Bob Andris and Manager, Curtis Cristen, had expected to beat the 1970 record of one sailplane launched every two minutes throughout two 9-hour days, but unfortunately the wind prevented any such schedule, with drifted, overlapped and snarled lines sometimes bringing action to a complete halt. As usual in LSF meets, several "tasks" were selected. Despite the gusty weather, numerous fliers scored full points in several "tasks."

Top Scale honors went to John Donelson, President of the Harbor Soaring Society; Col. Robert Thacker was second in the scale category. Donelson's scale Phoebus C featured an all-flying T-tail, operating wheel brake, and full cockpit detailing, while Thacker's WIK Kestrel also had full cockpit details with coupled ailerons and rudder. In third place was Bob Andris with his colorful 1/6 scale Slingsby T-53B. Due to the weather conditions the speed task was cancelled leaving only precision, distance and duration.

The duration tasks and all the others were harassed by dust devils and difficulty in tow-line release. However, five of the 103 duration contestants were able to tie together maximum flight times with full landing points. A five-way fly-off was set up to determine the actual winner. Unfortunately this resulted in a two-way tie between Donelson and Mark Walters. In the sudden death fly-off Donelson experienced equipment problems and so Walter's White Trash was the final winner. The distance category was won by George Steiner. Since Walters won both the duration and precision tasks he was declared the over-all meet winner.



Gaggle of Mod-Pods by Jack Sayer of Nassau, Bahamas.

Contest officials felt that frequency pile-ups were the main problem other than the weather, and it appears that future major RC sailplane contests must consider frequency distribution even to the extent of limited entry of each available RC spot.

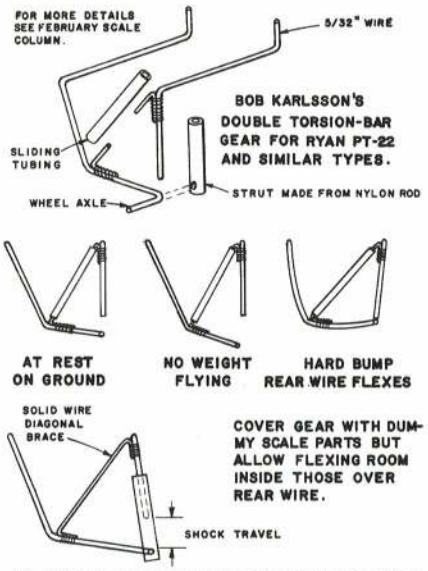
CLAUDE McCULLOUGH
SCALE

Meet the RC Scale Team: Refining a proven model paid off for John Roth when his second Volksplane won a spot on the U. S. team with a third at the 1971 Nationals, coming up from a fifth at the 1970 meet. Continuing the process, he is now building yet another further improved version of the popular home-built for his entry in the 1972 Scale World Championships. This one will even be built of scale thicknesses of plywood to duplicate more precisely the construction of the full-size prototype. As the first two, it will be powered by a Ross Twin 60.

John, who lives in Smithtown, N.Y., has been building models for 30 years—18 of them in RC work. Starting in RC scale in 1969 with a Bucker Jungmeister and a Fairchild 24, he has made a remarkable record in a short time. His other interests include amateur radio, building a 27' sea skiff and constructing and racing stock cars. But he doesn't get very far away from planes—he works for Grumman Aerospace Corp. in Flight Operations.

You Gave at the Office?: AMA reports that the Scale Team Fund is the "poor boy" of the lot with even Indoor having much greater support. Some small swell of support may be in the making with recent newsletter reports listing the Greater St. Louis Modeling Association contributing $100 and the all-scale Flightmasters in California, $75. How about that scale groups? And attention clubs of general RC interest who did so well in lending a hand to the successful promotion of the World RC Aerobatic Championships in Doylestown—wouldn't a fund raising effort for the Scale team be a good project for 1972? Every individual scale fan ought to be able to spare a buck to see that we are properly represented. Send all contributions to the Scale Team Fund, Academy of Model Aeronautics, 806 15th St. N.W., Washington, D.C. 20005.

Prop Producers: Bob Lewis is a schoolteacher and as a sideline carves props. He has the usual regular styles and specialty types such as laminated scale vintage beauties and hard-to-find extra large diameters. They are works of art and come appropriately protected in a felt cover. The product is popular, particularly among scale builders, and the sideline threatens to overwhelm him. Bob struggles valiantly to keep up but there is a big demand



VARIATION FOR RYAN STA AND OTHER CONFIGURATIONS HAVING FAIRINGS THAT RESTRICT MOVEMENT.

for his service, so be patient if your props get backordered. The address is Woodcraft Model Products, P. O. Box 119, Big Rapids, Mich. 49307.

Robin Lehman's huge and beautiful DeHavilland Twin Otter. Model was used in an aeromodeling documentary film. Fine flying combination.

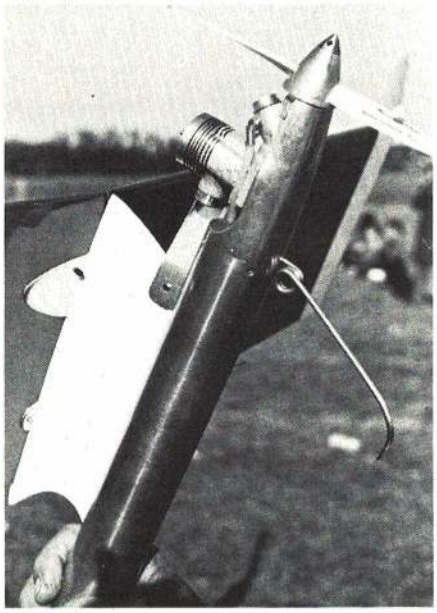
Scale Data Sources: As previously reported here, the FAA Flight Service Stations have the owners and addresses of all registered aircraft listed by "N" number. In cases where the "N" number is not known, the FAA Aeronautical Center (Box 25082, Oklahoma City, Okla. 73125) will provide facsimile copies of pages of listings by aircraft type. About 30 to 40 aircraft of one specific type and their current owners are listed on a page at a cost of 50 cents per page, $1.00 minimum order. Since most antique and classic aircraft only run into numbers of 100 or so at the most still registered, a complete listing of all examples in the country can be had for a very reasonable sum. Even for aircraft that still exist in large numbers the chances are good if a certain number of pages are ordered that a specimen located near your home will appear. State exact aircraft name and designation and the maximum number of pages wanted.

FREE FLIGHT

BOB MEUSER
SPORT

Jim Taylor's FAI-Power Fuselage: This is one of the neatest front ends in the business. We doubt many of you will dash out to the

foundry for a carbon copy of Jim's cast engine pan, but aside from that and the lathe-turned rear plug, the rest is strictly hand-work—sawing, drilling and tapping. There are a whole bucketful of nifty details in Jim's front end; we leave it to the boundless ingenuity of the individual free flighter to adapt them to his own capabilities and requirements.



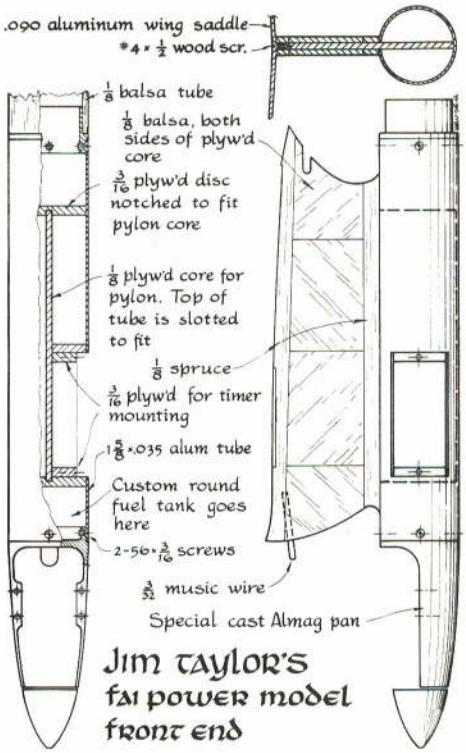
Neat looking mostly-aluminum front end on Jim Taylor's model. Note exhaust deflector which replaces a curved extension. FAI judges thought it was a power booster, so Jim fitted the plate seen here.

An aluminum alloy tube is the main element, and the plywood core of the pylon is firmly anchored into it. Jim finishes the pylon completely (balsa facings, wing saddle, silk covering and all) before installing it into the tube. Then the completed pylon and the notched plywood discs are epoxied into the tube in one operation. Both the tailboom and the engine mount may be removed by taking out the four screws at each end. The tailboom is molded one half at a time. Soak the 1/8-in. balsa sheet in hot water for 15 min. and bind to a properly shaped form with an Ace elastic bandage. Each half is reinforced with fiberglass on the inside at high-stress points—particularly near the front and rear of the stabilizer. The two halves are trimmed to match, then fitted over a vertical 1/8-in. sheet crutch shaped to match the side view of the inside of the boom. This is a lot of work, but the result is an almost indestructible fuselage.

If you didn't know, Jim was top man at the FAI team selection finals at Albuquerque, and topped the USA team score at the World Championships. If you get stuck, maybe you can talk him into selling you some parts. Contact him at 9608 Parsifal Pl. N.E., Albuquerque, N. Mex. 87111.

Nordic Airfoil: In the 1971 NFFS Symposium, Don Monson presents the finest paper on airfoils ever to appear in American model literature. As a result of his laboratory flow measurements, literature research and computer calculations of the pressure distribution around existing airfoils, he has designed an airfoil that is markedly different from those in vogue.

This new airfoil is patterned after the inboard section of the wing of a Red-Tailed Hawk that Don has measured, but the surfaces are carefully shaped to produce a particular pressure distribution. At first glance, the new section reminds us of the C. H. Grant



Jim Taylor's FAI power model front end

MONSON M-4 Airfoil Coordinates, %

Station	Upper	Lower
0	1.00	1.00
1	3.75	0.00
4	6.73	0.33
8.5	8.90	1.24
14.5	10.25	2.45
22	10.35	3.70
31	9.63	4.72
40	8.50	4.50
50	7.04	3.80
59.75	5.70	3.00
69	4.40	2.25
77.5	3.25	1.57
85	2.26	0.96
91.5	1.37	0.40
96	0.77	0.23
99	0.40	-0.15
100	0.25	-0.25

Nose radius. 1 %

"G-sections" of the mid-thirties, but in detail it is vastly different. Most airfoils have a very high peak in the negative pressure, or suction, on the top surface near the leading edge, causing the laminar boundary layer to become detached. The boundary layer then becomes turbulent and reattaches itself to the surface, leaving a small bubble of stagnant air on the surface between the points of detachment and reattachment. On Don's airfoil, the flow accelerates very gradually over the top surfaces to the point of maximum velocity (also the point of maximum suction) and the negative pressure is not allowed to exceed a specified value.

The airfoil has not yet been tried, but several are under construction. The structural design suggested by Don is shown. The leading edge is spruce over balsa. The 1% radius on the lower front corner must be carefully maintained; that is less than a 1/16-in. radius for a 6-in. chord, and it is easy to sand off too much. The trailing edge can be thickened without hurting the performance. If it is as thin as it is shown, it had better be spruce. Alternatively the trailing edge piece may be carried forward to the 50% chord point where it is still less than 1/4-in. thick, to avoid the problems associated with such shallow ribs. Sig 3-in. tapered sheet is just about right for the trailing edge.

The small turbulator spars are 1/16 hard balsa or spruce, and the main spar is 1/8 by 1/4 spruce. The lower surface is 1/32-sheet-covered to preserve an accurate profile, which should help maintain low-drag laminar flow. The 1/32 shear web joining the main spar to the lower surface is inserted between the ribs. Additional turbulators of some sort may be required if the turbulation provided by the surface spars is insufficient. After you build one, let us know how it works out.

Better Than Balsa?: A new material has appeared on the market possessing some characteristics superior to balsa. It is a sheet foam material from 1/32 to 1/8 thickness and density from four to seven lb. per cu. ft. It is weaker than balsa is with the grain, but stronger than balsa across the grain; as it has no grain it does not split.

It appears to be an ideal material, for example, for the formers of scale model fuselages having an oval cross section. When formers are made of balsa sheet they are easily broken at the top and bottom where the grain runs the wrong direction. One can use laminated balsa plywood, but it is a lot of work and the glue adds considerable weight. Another application, particularly for the thinner and lower density materials, might be for the curved fuselage skin panels—again the lack of grain would be a great advantage. The material is easily cut with a razor and can be shaped by sandpapering. Marketed by Lancer Industries, Box 445, 6315 E. Coast Highway, Carpinteria, Calif. 93013, it is sold under the name "Floaters," and is probably available in your hobby or toy shop. A box of Floaters contains a dozen 8 x 20 sheets of various thicknesses, in addition to plans, clay, and adhesive joiners sufficient to make 65 small hand-launch gliders of various designs.

BOB HATSCHEK
POWER

OPINION:

RC is Dullsville!: That's right. Flying radio-controlled models just plain lacks excitement. And RC competition flying is a bore—almost as big a bore as control-line speed or stunt.

Now that everybody's awake, alert and probably mad as blazes, let me step out of the conventional constraint of the editorial "we" and stress that the above statements are highly personal. This is your free flight power correspondent talking, and no one else.

There's a point to be made: Free flight—especially free-flight competition—is the most exciting, the most intellectually stimulating, the most challenging, and the most satisfying phase of the model aviation sport. It is also the most diversified and educational and requires the highest degree of skill and craftsmanship. It is the fountainhead from which all other phases have sprung; it has produced the highest type of sportsmen in the world. What I'm saying is, free flight turns *me* on!

Before you non-free flighters dismiss this as the rantings of a completely closed mind, let me state that in my 35 years of modeling I have built and flown both control line and RC. But after a few years of each, the boredom set in and I went back to the thrills of free flight.

What got me angry was the following statement in the Official Program for the RC World Championships: "Radio control is the

most exotic of all categories of aeromodeling and possibly the most fascinating of any hobby-sport."

As a free flighter, I object to the arrogance of this statement. About a dozen years ago, when RC enthusiasts were just beginning to get interested in the idea of international competition and I had just returned from the free flight world championships with a Russian model I had swapped mine for, I was invited to speak on the subject of international aeromodeling before a local RC group. They were a good audience and asked many intelligent questions. Afterwards, one of them flatteringly asked me why, since I already knew all about free flight, I didn't step up to RC. I explained to him that I didn't understand as much as I wanted to about hand-launched gliders (the simplest type of free flight I could think of). I didn't tell him I had already quit RC because it was too dull. Despite the innocence, good will, and flattering nature of this question, it was another manifestation of the same arrogance.

As a free flighter, I'm tired of being looked down upon from an overelevated RC nose. I do *my* thing because that's what I like, not because I'm incapable or can't afford to do something else. I'm tired of people who couldn't fly a model without continuous control, derogating as inferior what is to me the most perfect form of model aviation.

Backing off to a point of more rational perspective, each phase of this hobby is great—if it's your thing. Stamp collecting, model railroading, and even painting by numbers all have their attractions as well. Just don't knock it if you don't understand it. Remember, in the outside world where they know nothing of the beauties of RC, control line or free flight, they all too often consider a model airplane to be a child's toy. We know better, so let's have a little more consideration for the other fellow.

BUD TENNY
INDOOR

Prop Pitch Choice: The indoor novice often wonders which prop size to use *next* time (after flying his first model successfully). Generally, indoor models use props with diameter about 60% of the wing span. However, the prop pitch is another matter and should be determined by test flying. If the pitch is too low, the motor will unwind sooner than necessary. If the pitch is too high, the model may have trouble climbing properly, and will land with many turns left in the motor.

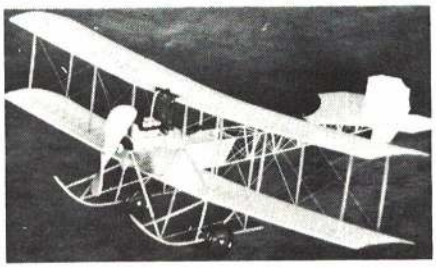
Count the RPM: Fly the model with enough power to climb about 15 ft. high, and count the rpm right after the model stops climbing. The best way to check rpm is to measure the time for the prop to make ten revolutions (a typical time might be nine seconds). Divide the time into 60 and multiply by 10. For example: 60/9 x 10 = 67.5 rpm.

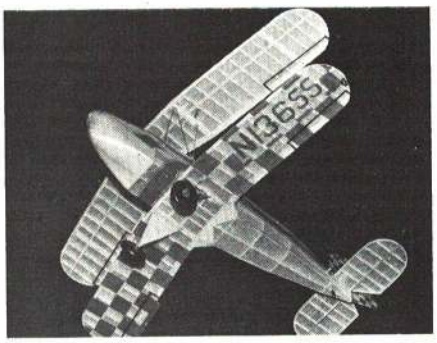
Test Flying: Make several test flights with different wing incidence (make tiny changes each time) and check the rpm on every flight. Begin with low incidence and increase incidence until the model either stalls or flies erratically. Pick the incidence setting with the lowest rpm that permits the model to fly smoothly. Use this incidence and rpm to compare results with flights on other props. Change to props with slightly lower and higher pitch (all test props should weigh the same) and make more test flights. Study the performance with each prop to make the final choice of proper pitch. Test fly at high power to make sure the prop or model doesn't stall. If the model lands with too many turns, shorten the loop of rubber or make a similar loop of wider rubber. In final trim for low ceiling, the model should land with few turns and the rpm should be the lowest during all the last of the flight.

Community Service: Model fliers often find they have an image of "kids playing with toys." One of the ways a club can overcome this problem is to seek out opportunities for service. The Model Manglers of Iowa put on an indoor flying demonstration for patients at the Younker Memorial Rehabilitation Center of the Iowa Methodist Hospital in Des Moines. After the demonstration, which featured Easy B's, AMA Cubs and Scale models, hospital authorities expressed surprise over the "workmanship and skill involved" in building and flying models. An outcome of the demonstration is the possibility that some form of modeling will become a part of the hospital's rehabilitation program.

WALT MOONEY
SCALE

New Additions to Peanut Scale Models: Rubber-powered Peanut scale models are becoming more popular all the time. Most of them are small, cheap and relatively easy to build. Some of the models even have pilots these days. We've seen a Fokker D VI with a pilot sporting a monocle; Bill Hannan's latest sports a well-endowed aviatrix with auburn (or was it maroon?) hair streaming in the slipstream. Now Frank Scott has a real Peanut pilot to stand beside his excellent Hanriot. The effect of installing a pilot on any open cockpit is quite gratifying. I cast my vote for requiring a pilot in all scale models.





Another nice model is Frank Noll's A.V. Roe biplane. With all the bracing it makes a very realistic appearance. A pilot would look great behind that radiator.

N.C. Getzlaff of Cleveland is another Peanut scale enthusiast who likes his models to have scale rib spacing and scale color schemes as on his Bucker Jungmeister.

Camouflage Technique: Have you ever wondered how to get that German mottled camouflage effect on one of your small scale models? Frank Massare (Stamford, Conn.) has come up with a simple device that will enable you to do a nice job with a minimum amount of effort and equipment. It essentially consists of a paper cone through which the camouflage paint is sprayed. The size of the opening in the apex of the cone determines the size of the mottles, so experiment on a piece of newspaper until they are the right size. With careful handling, it won't even be necessary to mask the model as it is being camouflaged. Frank cautions not to do too many mottles in a hurry because the excess paint collected on the inside of the cone can run out of the end and drip on the model if the cone isn't allowed to dry from time to

time. Looks like this idea could be used on plastic models as well as FF scale jobs.

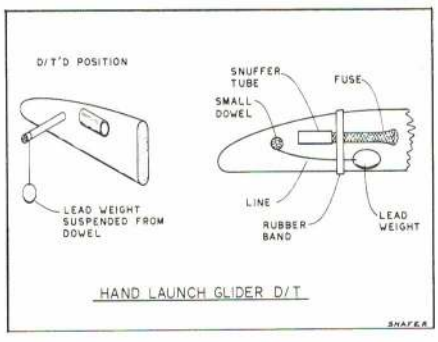
San Diego Annual Meet: On November 7th the San Diego Orbiteers had their annual scale contest. Rather than report the results, the more spectacular items will be mentioned. CO 2-powered models were out in force, with most of them doing very well indeed. Several were putting in flights of well over two minutes and a couple were seen to put in flights of over four minutes. This gets a little scary, considering how hard these small models would be to find if they landed far downwind.

Bill Brown's little engine is a real masterpiece. It makes a small scale model sound and fly authentically. Propeller sizes varied from three to six in. in diameter, which allows a lot of variation in model scale.

Ernie Wrisley's large gas-powered Taylorcraft was flying very well as was Dick Castle's parasol-winged Wibalt. Both of these models were very consistent flyers and reflected the amount of test flying done by both of these modelers over the previous weekends. Somehow there is never a good substitute for practice.

BOB STALICK
GLIDER AND RUBBER

One More Time Hand-Launch Glider DT: An offering this month from Les Craft is a variation on the swinging weight theme with the weight tied to a dowel stuck out the front side of the fuselage—the fuse burns through the retaining rubber band and out goes the weight to spin the glider in out of that hairy thermal. The only thing to be careful about with any swinging weight type is the tendency of the weight to come loose under a hard launch.

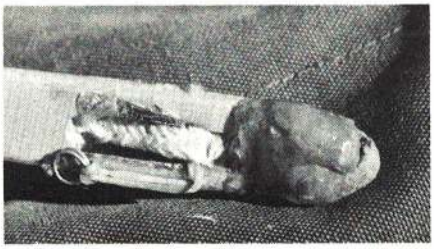


Borrowing from the example of its larger brothers is our second offering—the pop-up stab. With the fuse mounted up front and a line running from there to the hinged rear portion of the stab, Tom Hutchinson's HLG is dropped to the ground by a 45 degree pop-up angle. One side benefit to this system is the ease with which stab incidence may be changed.

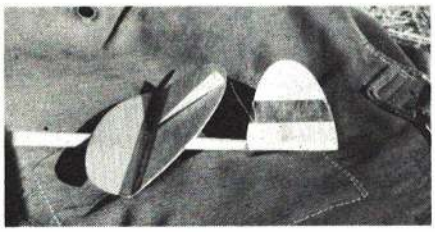
Gluing Part "A" to Part "B" Dept.: Questions are raised periodically about what kinds of adhesives are best to use for specific functions. Many of us who have been at this game

for awhile take for granted the uses and the method of using the available adhesives. However, beginners will use whatever they have for all purposes.

Generally, model adhesives fall into three distinct groups: epoxies (two-part); aliphatic resins (TiteBond, SigBond); acetate cements (Ambroid, Testors, Aerogloss). Each has desirable characteristics and undesirable ones for modeling use. Let's take a look at them.



Conventional DT system on Hutchinson's HLG photographed by Bob Meuser. Fuse burns through rubber band releasing the ring.



Line released, stab pops up.

Epoxy: a non-shrinking, very strong, somewhat heavy adhesive that is good for use on any structure that is prone to warpage and where weight is not a significant factor. It can be used for bonding different materials—metal, hardwood, balsa, many plastics—to one another or for bonding like materials to each other. It is fuelproof, but doesn't sand too well. It can be used on nearly any joint that doesn't meet the surface of the structure. It is waterproof, so is excellent for seaplanes, pontoons and the like.

Aliphatic resins: negligible shrinkage, strong, reasonably light, not waterproof, but fuelproof. It is a good general structure adhesive for bonding hardwood to balsa and balsa to balsa, but cannot be used where metal is in the joint. It can be thinned with water to penetrate the wood pores more easily. Such glues are good for sheeting and can be used for surface joints where light sanding is needed.

Acetate cements: waterproof, reasonably fuelproof, high shrinkage, very sandable. It is a good general structure adhesive as long as the balsa is not too thin so that it can warp. It can be used on some metal to balsa joints with reasonable success. It is best used for field repairs of ripped tissue, where its shrinkage can be used to pull the ripped portions together. On balsa to balsa joints, its best adhesion can be obtained by pregluing all contact surfaces, letting them dry, then regluing them before joining together.

In summary, keep in mind that acetate glues are the lightest to use, then aliphatic resins, and finally, epoxies. Strengthwise, the order is directly the opposite. Best results with any adhesive come from a clean gluing surface, uniform application over the entire joint area, and clamping or not moving the glued surface until cured.

Some other useful adhesives often used by modelers are the new heat glues and contact cements. Although less versatile than the above three, there are specific applications for which these can be used. A parting thought—a good glue joint is as strong or stronger than the materials joined.

CONTROL LINE

BILL BOSS
SPORT AND SCALE

Retracts Can Make the Difference: Perhaps the most difficult and hazardous operational feature in a scale model is retractable landing gear. Most scale builders shy away from this feature because of the usually complicated mechanisms required. However, at the 1971 Nats Malvin Meador demonstrated with considerable ease that it can be done; it made the difference in points that put him in first place. Retraction of landing gear is worth 25 points in the flying portion of scoring and was enough to push Meador to a 517 point total, just 15 more than Ralph Burnstine amassed for his excellent AO-1 Mohawk.

A Bill Johnson CENTRAK landing gear retract system is used in Malvin Meador's Spitfire. This is his '71 Nats winning flight.

The gear retraction system used by Meador, called CENTRAK, uses the centrifugal force created by the plane as it picks up speed after takeoff causing the gear to retract. As long as the plane is kept at or near top speed the gear remains up. As you throttle back to slow the plane down for landing the gear comes down—a relatively simple device but very effective. CENTRAK is manufactured by Bill M. Johnson, 6328 Jackson, Berkely, Mo. 63134. Bill will send anyone interested in the device a technical data sheet that includes more detailed explanation and cost data. It's not strictly a scale item—even sport planes look good with their gear up.

Battery Charger Fuse Protection: Here is an item which can be used by all modelers that use rechargeable type batteries for engine starting and powering RC gear. Because of their design, wet cell batteries and NiCad packs must be charged for long periods of time unattended. The majority of chargers

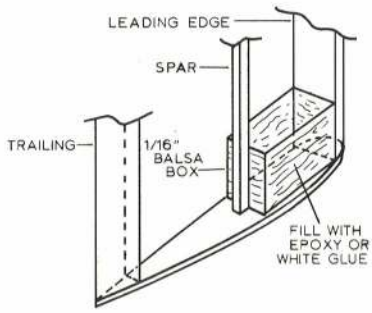
Meet the Scarborough Model Aircraft Klub of Ontario, Canada. Great range of interests.

used do not employ circuit breakers or fuses in their circuitry, therefore the only protection afforded in the circuit is the large 10-15 ampere breaker or fuse in the house circuit. A short somewhere in the equipment being charged could lead to severe damage of that equipment before the household protector device is activated.

Bob Aberle suggests the installation of a Fused Plug on the end of the charger's cable in place of the usual 115 VAC plug. The fuseable plugs are manufactured by the Elmenco Corp. (and others) and are available at most electronic parts supply stores for approximately fifty cents.

The replacement procedure is simple. Cut off existing plug, separate zip cord wire for approximately 1½" from end and remove ¼" of insulation from each wire. Tin ends of wire with solder. Next, disassemble fused plug and solder tinned wires to plug terminals, then reassemble plug. Install Little Fuses (also available at electronic parts stores) in the plug choosing a size in accordance with the current rating of your charging device. This small investment will result in peace of mind knowing that your expensive equipment is well protected.

Wing Tip Weight: What to use for weight in the outboard wing and how to install it can be a problem. Items used for this purpose might be washers, nuts, bolts, molded lead weights, etc., with most of them being glued to the wing ribs, spars or tip block. The majority of these installations prove unsatisfactory over periods of time as hard landings and aging of



WING TIP WEIGHT

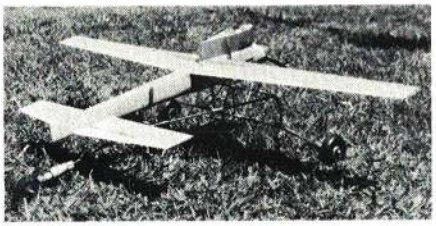
the glue causes the weight to come loose. Not only can the plane's balance become upset, but a loose weight can break through the wing covering on a hard landing. Capt. James Winchel suggests a solution that looks like a cure-all for this problem. Construct a small box of 1/16" balsa inside the wing at the tip. The box is then filled with an amount of epoxy or white glue equal to the desired weight. If done properly you would have to destroy the wing before loosening the weight; there is no fear of the weight coming through the wing to spoil that fine finish.

JOHN SMITH
SPEED AND RACING

Around the World with **AAM**: Pictured are the FAI Speed model and the Class C model of Australian M. N. Bell. An S.T. G15 makes the FAI job go, while an S.T. ABC RV 60 sits up front on the C model. They fly Proto "Down Under" on two wire, FAI fuel—rest of rules are same as ours. Bell holds the record with a 112.1 mph run. He's looking for a Hustler Proto kit, manufactured by Eliminator Model Co. Anyone who can help him out can write him at 17 Erskine St. Dubbo, NSW Australia, 2830.

From Canada: The Ontario Scale Racing Association held their final racing meet of the year Sept. 26th. Sponsored by the Kitchner Prop Busters, 14 heats, a semi-final, and a 200 lap final were held. Robinson and Kelly topped the finals with a 9:56.5 time. Best 100 lap time was 4:43.7 turned by Dave Kelly, Max Brigade Club of Niagara Falls, Ontario. Scale Racing is picking up all over the country. The Nats turn out this year in the U.S. was spectacular, to say the least.

Fernando Teixeira, Chairman of the Aero



The "C" speed model by Bell and his FAI job.

Club De Portugal, has sent me two drawings—one of their FAI Speed model, the Velocissimus, and the other of the Portugal FAI TR, Icarus. Both these models are championship quality with many features such as ball valve on the tank fill, their own circular bellcrank, machined engine mounts. They are both beautiful airplanes. For you FAI types, contact Fernando at the Aero Club De Portugal, Membro Da Federacao Aeronautica Internacional, Avenida da Liberdade, 226, Lisboa-1, Portugal.

Rat Racers Cut Displacement: I have received letters and club papers from many parts of the country indicating a trend towards cutting Rat displacement to 15 size in their local meets. All have reported an increase in participation, especially in the Junior turnout. Most report that fun has returned to the event. It would be a natural thing to advance to Goodyear or Scale Racing from a 15 Rat event, only needing a new airplane to compete. The same arguments have been heard in the Speed circles too, the biggest concerning the future of Class C Speed (60 size).

Some fliers, including name competitors, have expressed concern over the high speeds in C, and the resulting high pull of the airplanes. Contestants who are on the small side have had trouble staying with them while flying at the higher speeds. People who have been flying C since way back when have grown used to the higher pull as speeds have increased through the years, but the new flier who has flown only Rat or Scale sometimes gets the thrill of his life when getting a good hot C ship on the lines for the first time. Sometimes this "thrill" even extends to those outside the circle as the flier is flown by the airplane. Everybody agrees something must be done. The contest bull sessions bring this fact out, but no one seems to want to be the one to make the first move. The soap box is yours—let's hear from some of you.

HOWARD RUSH
COMBAT

More on FAI Combat: FAI Coordinator Maynard Hill reports that there's new interest in FAI Combat in the U.S. and that the AMA would support a proposal to make Combat an official international event. The U.S.S.R., incidentally, is very enthusiastic about Combat and is tentatively scheduled to organize the 1974 CL World Championships; this makes a World Championships for Combat a possibility for 1974. A U.S. team selection would have to be made next year, giving us a year to learn to handle the new size equipment. Keep us informed of FAI activity in your area by writing to me in care of **AAM.**

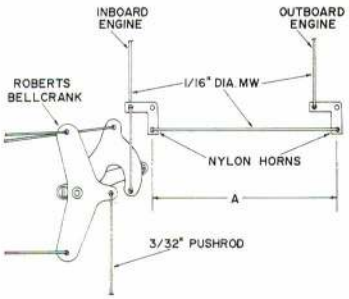
FAI Fuel Systems: Ron McNally of the Purdue Aeromodelers, Lafayette, Indiana, found that some latex-filled baby pacifiers contain the bonus of an FAI-size latex fuel tank inside the standard pacifier. Ron uses the smaller tank in a compartment made from a 2½" length of paper mailing tube. A pen bladder-type, 15-size tank can be made by tying a knot in one end of a piece of latex surgical tubing. The same piece is used for both tank and fuel line. By holding the open end of the tubing while filling the tank the first few times, it can be trained to inflate only at the knotted end. Model rocket body tubing running spanwise in the wing makes a dandy compartment for this tank.

Guess who won this combat match? The six-year-old. Dominic Servizzi challenged and won over (or under?) Bill Keller. Scene at Dayton meet.

Slow Combat Rules: Slow Combat has been increasing in popularity and now draws almost as many contestants at meets as the standard AMA event. The idea is to have an event where folks can enter their old sport planes and do their dueling at a leisurely pace, having plenty of time to think up foxy tactics. It's a lot of fun, but it's hard to find a set of rules which keeps the planes slow, yet simple and reliable. Riley Wooten proposed that any plane and engine be allowed, but everyone has to use an 11-4 prop. This slows things way down and still permits the use of conventional Combat planes, which are easier to build than planes with fuselages and wheels. What rules have worked best for you?

JOHN BLUM
CARRIER AND STUNT

Dual-Throttle Sport: From Edmonton, Alberta, Canada, comes a sport model by George Covlin. The picture shows model based around the Midwest P-51 Mustang. The original fuselage was used as a pattern for the second fuselage from ½" balsa. A 13" wing center section of constant cord was added to produce a 61" span F-82.



DUAL THROTTLE SETUP BY GEORGE COVLIN

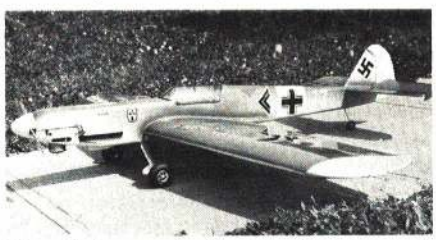
Throttled twin is F-82 by George Covlin. It is based on the Midwest P-51 kit(s).

The sketch shows the throttle linkage for dual engine hookup, to permit operation of both engine throttles from one J. Robert's bellcrank. The bellcrank and horns are shown in the high speed position. As the throttle is actuated from the handle, the pushrod from the bellcrank creates movement of both horns. Using engines of the same type and size with like throttle linkage produces a dependable system. The horns are nylon—the type used in RC. Pushrod lengths must vary depending on model size. Dimension "A" is dictated by the fuselage spacing.

George relates a very stable and maneuverable aircraft powered by two Enya 35 engines. Sport flying is greatly enhanced by throttle, and twin-engine aircraft are crowd pleasers.

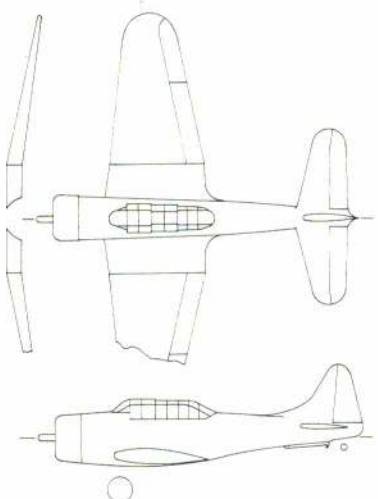
Pit scene at recent Troy, New York stunt meet.

Carrier Help Wanted: Roy Mytiner writes from AMA District I seeking modelers in his district interested in the Navy Carrier event. He wants to form a special Navy Carrier group. You can reach him by writing 25 Renfrew Ave., Middletown, R.I. 02840.



Fine flying semi-scale ME 109 by Jack Sheeks.

Safety Cable: Safety precautions are always a good investment. With the increased speeds in Navy Carrier, the stresses on the model structure are greater and keep growing. Also, arrested landings promote more shock to the Scale Carrier model than most modelers will



DOUGLAS SBD DAUNTLESS

admit. All of these elements work against you and, in a manner of speaking, are constantly tearing your model apart. Coupled with resulting engine torque through the various speed runs usually results in the joint at the junction of the wing leading edge and fuselage being the first to fail. Thus, fuselage nose, including engine and tank, separating from the balance of the aircraft must be recognized as a possibility.

A safety cable made of 0.030 in. dia. control cable with one end attached to the bellcrank mounting bolt, and the other end attached to the engine back plate or mounting bolt is an excellent safety measure. Should the fuselage fail in flight, none of the structure will leave the flight circle.

Dauntless Views: This month's two-and-a-half view of the Dauntless presents another in a series for use in Carrier model aircraft comparison. For the anticipating competition flier, first glance is appealing for ample wing area with wide root cord. The fuselage, although round in shape, offering more construction difficulties, doesn't appear prohibitive. However, note that the nose and tail moments are not as desirable as compared to the Guardian or Mustang. Those built in the St. Louis area in the early 1960's were potent machines of only mild success, due mainly to the short nose moment—another element in the selection of the ultimate machine.

special interest

FRED MARKS
AERODYNAMICS, ELECTRONICS

Calculating Glider Performance: We recently presented a brief empirical method for approximating powered RC model speed developed by Jack Burns of the Aero Telemechanics RC Club. Since then, he has developed a combination of theoretical and empirical techniques for approximating glider performance. In the interest of keeping within the confines of this brief column, we shall present pertinent data, thus will not quote verbatim.

There are two primary measures of glider performance: sink rate or glide ratio and penetration. The first is what determines whether we have a soaring plane or a glider. Technically, a glider only descends from the end of tow; a soaring plane can ascend. The second is important in moving from one lift or thermal area to another and in returning from downwind or for slope soaring.

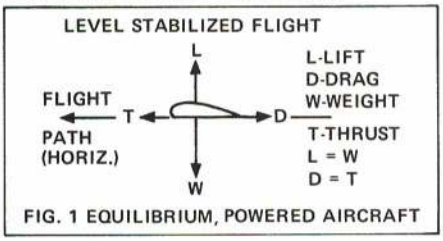


FIG. 1 EQUILIBRIUM, POWERED AIRCRAFT

Figure 1 shows the basic forces on a powered plane. Since the glider has no thrust, it must derive its forward velocity at the expense of altitude (the forces are shown in Figure 2). The glider is effectively diving at all times; however, in the presence of vertically moving air (thermal), the soaring plane ascends because the sink rate is overcome. The formula for calculating sink rate is also

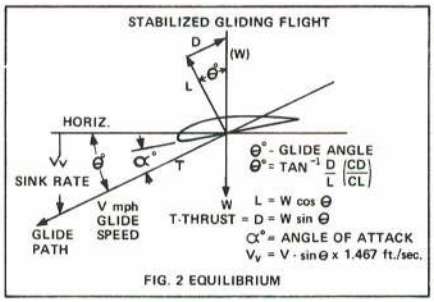
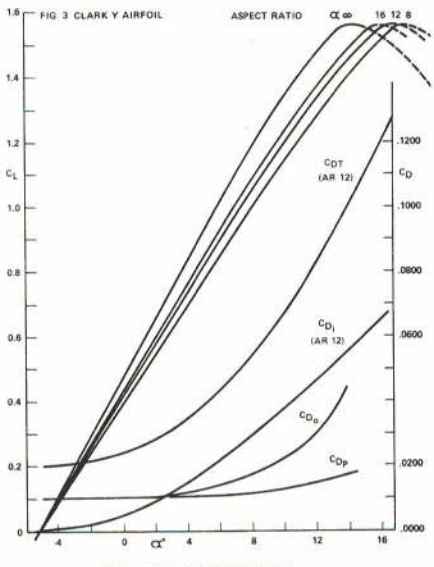
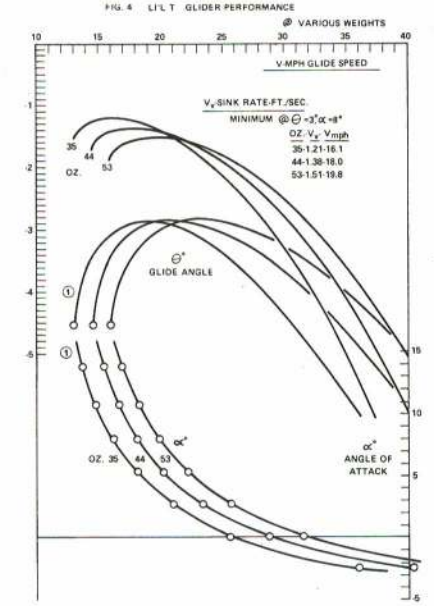


FIG. 2 EQUILIBRIUM

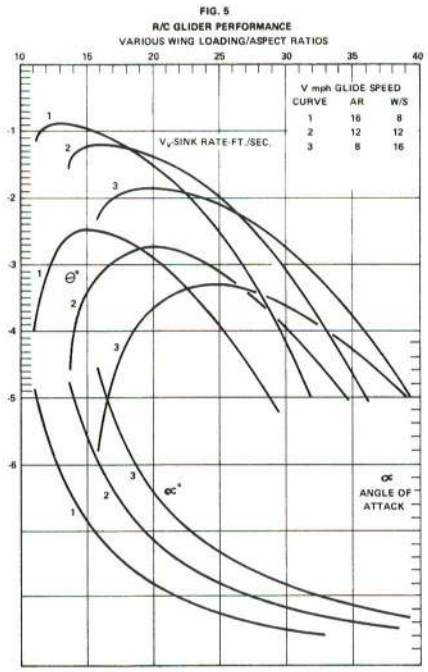




shown in Figure 2. Control position determines angles of attack (α), and each α has a lift coefficient, C_L, and drag coefficient, C_d, resulting. The glide angle, (Θ), is a function of lift to drag ratio, i.e., Θ = arc tan of (C_d divided by C_L).

Knowing glide angle and the lift and drag coefficients as a function of angle of attack, glide speed and sink rate may be calculated. The aerodynamic coefficients and glide angle may then be plotted as a function of glide speed. The results are useful for trimming the model for differing air conditions.

To illustrate the method, the Clark Y air-



foil was selected, as it is used on the Lil-T glider which was used to check empirically. Figure 3 presents the lift and drag coefficients as a function of angle of attack. We are interested in using C_{DT} which is the sum of C_{D_o}, C_{D_i} and C_{D_p}. C_{D_o} and C_{D_p} are functions of aircraft configuration and airfoil shape and may be estimated, but usually are determined from wind tunnel measurement. C_{D_i} is calculable from the following equation: C_{D_i} is equal to C_L^2 divided by πAR, where AR equals aspect ratio and π equals 3.14.

Flight speed may be calculated from:

$$V_{mph} = 19.8 \sqrt{\frac{W}{S} \times \frac{1}{C_L} \times \cos \Theta.}$$

However, at the small angles involved, cos $\Theta \approx 1.0$ and V_v(ft/sec) = 1.467 x V x sin Θ. Induced angle of attack, α_i, may be calculated from:

$$\alpha_i = \frac{18.24\ C_L}{AR}$$

The total angle of attack α may be calculated from $\alpha = \alpha_o + \alpha_i$ where α_o is the point at which $C_L = 0$.

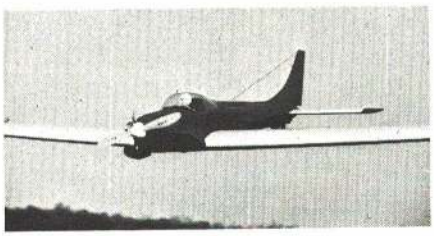
Jack constructed a table to perform the calculations. By substituting other airfoil data, the same type table can be used to calculate the performance of gliders other than Lil-T. Set up a table with C_L in the first column running from O downward to C_L max (the point at which C_L vs α "breaks" or stalls). The second column displays C_{D_o}. Jack estimated C_{D_p} since he had no wind tunnel data:

CL	.8	1.0	1.2	1.4	1.5	1.56
C_{D_p}	.0100	.0106	.0110	.0130	.0150	.0160

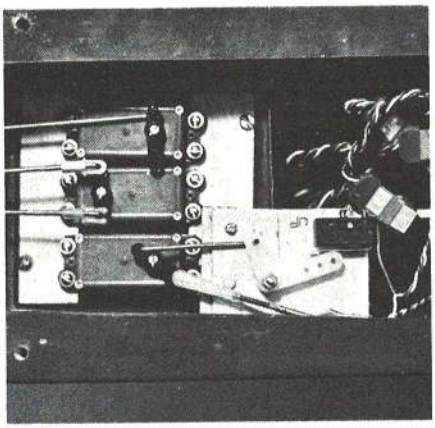
Calculate and tabulate C_{D_i} and Θ from the formulas given. Calculate and tabulate the corresponding V and V_v. We should now have on one table all the data to be used for plotting. Note from Figure 3 that the effect of aspect ratio, AR, is included; curves for other airfoils would have similar shapes but different values.

Curve 1 of Figure 4 shows the performance of Lil-T at a nominal 35 oz./ft.^{2} loading at AR = 11.5. The effect of increasing loading shows that there is a crossover region at $\Theta \approx -3^o$ or about 20 mph which would fit most conditions. Figure 5 shows the effect of introducing changes in aspect ratio as well as wing loading.

The conclusions Jack has drawn reflect largely what most glider designs show when thermal soaring or slope soaring. He con-



Simulated flight photo of the Colt in this issue's Blue Ribbon Review. Looks nice with modification for retracts.



If you want to slave retracts or flaps from the throttle servo, here's one successful way to do it. Microswitches tripped by throttle servo movement with trim.

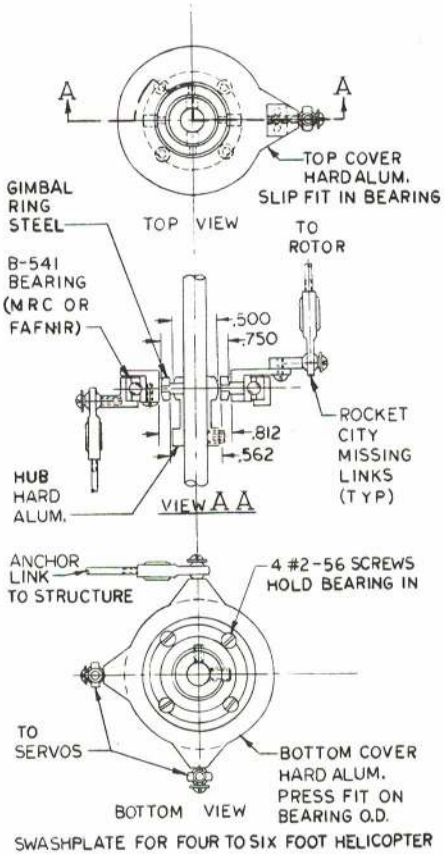
cluded that adding weight increases the required glide speed, and thus provides better penetration—not necessarily at greater sink rate however, as shown by the crossover in Figure 4. Aspect Ratio (AR) has a significant effect and the soaring plane will generally seek the maximum AR permitted by efficient structural design. However, note the reduction in glide speed at high AR. Perhaps the optimum approach for all wind conditions would have an arrangement for ballasting, removable panels for changing AR, and flaps to provide variable airfoil geometry.

The preceding is not a rigorous treatment; if interested in pursuing further, a simple text on basic aerodynamics at the local college library will help.

JOHN BURKAM
HELICOPTERS

French Helicopter Activity: In 1965 Jean-Marc Geiser flew the first radio-controlled helicopter in Europe for four minutes, 26 seconds, using the throttle control only. Then in 1967, M. Claulin surpassed the record with a 9 min. 36 sec. flight, flying a free-flight helicopter having two blades and an engine and propeller on a boom perpendicular to the blades.

The most prolific chopper modeler is undoubtedly Georges Chaulet, who has built over 500 successful rubber and engine-powered helicopters since 1947. Recently he has been experimenting with different kinds of rotor drive systems, such as air turbine behind the propeller, compressed air tip jet drive (called cold cycle drive in this country), and flat rubber belt drive. Gear drives seem frightening to one who doesn't have a machine shop. But using a catalog from Plastock, Inc., 1 Station Plaza, West Nyack, N.Y. 10994, one can start using miniature timing belts and plastic pulleys and solve the drive problem. Two more sources of small timing belts and pulleys, gears, bearings, etc. are Browning Manufacturing Div., Emerson Electric Co., Maysville, Ky. 41056, and Stock



SWASHPLATE FOR FOUR TO SIX FOOT HELICOPTER

The aluminum turbine was driven by prop wash and geared 3-1 to drive the rotor. Anti torque by blowing on fin. Did not develop enough lift for French designer Georges Chaulet. More facts in text.

Drive Products, 55 So. Denton Ave., New Hyde Park, N.Y. 11040

RC Helicopters at the '72 Nats: Now that RC helicopters are a fact, it has been suggested that those interested in such an event at the '72 Nats discuss it at the Toledo RC show. Signs will be posted on or near any helicopters exhibited telling where and when to meet. If you can't make it to Toledo, be sure to write me your ideas.

Pre-flight Experience Helpful: Those who have flown RC planes before flying RC helicopters say that the airplane experience didn't help them in flying the copter. Maybe the experience doesn't help much in hovering, but take it from one who has never flown RC planes, many is the time I have given it foward stick instead of aft when it was heading towards me, with disastrous results. It all comes down to which is easier to repair time after time until you are well oriented. Would you rather crash a $30 airplane or a $500 helicopter?

Swashplate Design: One of the most difficult parts of an RC helicopter is the swashplate, which connects the lower or non-rotating controls with the rotating or upper controls to the rotor. Gene Rock contributes this design, suitable for a four- to six-foot model. Diameters of the center ball and gimbal ring were chosen to make the four hinge pins alike. The washers on the outside of the RC Missing Links insure that they cannot slip off the balls in flight. Only one pushrod is needed for the Hiller rotor.

BOB BECKMAN
RC CAR RACING

1972 Rules: The ROAR Competition Committee is in the last stages of preparing the 1972 ROAR Competition Regulations. The ROAR Constitution provides for a Competition Committee responsible for the generation, dissemination and enforcement of competition rules and regulations. This includes car specs, track specs, procedures, sanctioning, etc. In July 1971 the new ROAR President, Larry Robbins, appointed Bob Beckman as chairman of the Competition Committee. Bob then asked the following men to serve as committee members: Luis Del Rosario, New York; Wendel Green, Virginia; Gene Husting, California; Roy Moody, Illinois; Dave Palmeter, Indiana; Joe Sullivan, Texas; John Thorp, California; and Gary Walker, Massachusetts.

With the 1971 rules as the starting point, the committee quickly concluded that the car specifications needed only minor modifications and some clarification, and those areas such as track specifications, race procedures, sanctioning, etc. required the major effort at this time.

Dave Palmeter, who compiled the 1971 car specs, was asked to do the necessary touch-up in that area after taking ideas from other committee members into account. The rest of the committee started digging out suggestions and opinions on everything from a glossary of terms through how to start a heat and to how to determine the winner when it's all over. From the list of committee members you can see that there should be knowledgeable representation from all parts of the country. Everything went to Beckman who tried to boil it all down and combine it into a coherent whole. This was then fed back to the committee for comment and further suggestions.

All of this takes time and lots of correspondence. The people involved all have full-time jobs or businesses to run. Even in a group this small you find the full range of time consuming things like new babies, new jobs, moves from one state to another, illness in the family, etc. The committee deserves our thanks for even trying.

The stated objectives of the committee's efforts are: (1) To strengthen and stimulate the growth of ROAR as a national organization. (2) To establish easily understood and applied rules and procedures that can be used by any group anywhere. (3) To establish rules and procedures that will be used at the ROAR Nationals and other ROAR sanctioned events. (4) To provide a viable base and change procedure for the continued development of Competition Rules and Procedures. It is not likely that everyone will love the final results; however, if everyone can use these regulations for meaningful and enjoyable competition in 1972, these objectives will have been met.

Remember, if you want to see changes in the rules, the best way to get them is to volunteer for next year's committee.

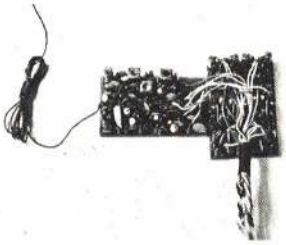
Series 71 East: The WRCRA Mini-Enduro was also the finale for Series 71 East. Lenny Sabato has been leading the Series all year with Gary Walker and Bob Beckman hot on his heels. It ended up with Sabato in first, Beckman second, and Bob Emmot (who won the Mini-Enduro) tieing Walker for third. Matt Sullivan of Sullivan Products Co. donated a very handsome set of trophies all the way down to tenth place.

(continued from page 18)

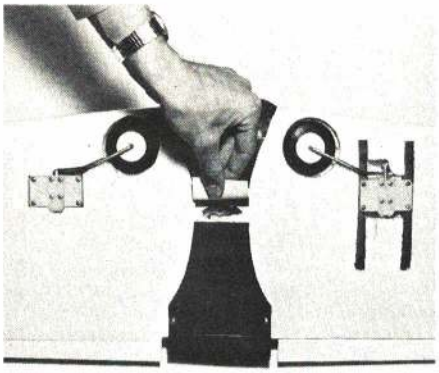
The RF board is unique by virtue of its small size, the use of tiny molded inductors throughout, and a master oscillator which requires no tuning. The set tested was on 72.4 MHz; the system is available on both the 27 and 72 MHz bands. The modulator shapes and stretches the output pulses to a width of approximately 300 micro-seconds. A heat sink is used on the single output transistor and showed no excessive heating.

The receiver pack is unique in that all the airborne electronics is contained therein. The receiver and decoder are located on the upper deck. The lower deck contains the four servo amplifiers required. It is of interest to note that both the transmitter encoder board and the decoder board provide for two additional channels. However, there are no such provisions on the servo amplifier board. The decoder output is a positive going pulse and, for those who will inevitably write to inquire, the decoder outputs are probably compatible with many existing servos (which have a built-in amplifier) and, yes, the tinkerer might add the components for a fifth and sixth channel if he knows what he is doing. One word of caution: the warranty will be void and the technician who might have to service it won't be very happy! The plastic case which houses the electronics measures 2½" long by 1-5/8" wide by 1¼" high. Mounting tabs to accept grommets protude 5/16" from each end of the case.

The servos are the EK MM-3 mechanism which measure 1¾" long (including the mounting lugs), by 1-5/8" high (including the rotary output disc) by 3/4" wide. Since the electronics are contained in the receiver case, the servo contains only the feedback pot and the 16 mm Furuichi motor used. Five wires are used to the servo—two for the motor and three for the feedback pot. The use of this scheme has a distinct advantage: one may purchase extra servos for about one third the cost of a servo which has a built-in amplifier. Conversely, it has one distinct disadvantage: failure of one servo amplifier means the entire system must be returned for repair.



Case houses complete receiver/decoder/amplifiers for all four channels.



Lanier wing with retracts shows location of bearers which fit between main spar and fixed-gear mount. Plastic flap exposes linkages.

Electronically, the receiver is quite standard. A double tuned front end is used, followed by the normal 455 kHz IF, detection, AGC and pulse amplification and squaring. Each stage of the decoder contains a two-transistor shift stage; the outputs are fed to the servo board. The servo amplifier design is for a center-tap battery pack. Each consists of eight transistors: two for the reference generator, four for the pulse stretching and amplification legs and two for output.

The system was bench tested at 0°F, room temperature and 150°F. Operation was satisfactory over the temperature range. Servo output thrust averaged three lb. at a radius of 5/16 in. for a torque of .94 in-lbs. Transit time is about 0.9 seconds, end-to-end. System resolution was plus and minus 1 degree as measured by hysteresis at the center. Note that we said system resolution. Most of the dead-band is contributed by a rather significant amount of play in the stick assembly, measured to be 3/64" travel at the top of the sticks.

During our flight tests, we were a bit concerned because glitches were encountered on two successive flights. We checked the ground range and found that it was about 60 ft. with the antenna removed from the transmitter, and in excess of 3/8 mi. on the ground with the antenna mounted and extended. This corresponds to an airborne range of more than a mile, so it was concluded that interference had existed at our field, which has experienced it rather heavily recently. A check with a spectrum analyzer determined that there was unidentifiable interference in the 72 MHz band and subsequent flights showed no recurrence.

In addition to the Hobby Lobby radio, a number of interesting new items are involved in this review. These include a Lanier Colt ARF, Goldberg retracts, the HP 40-FR engine, and Jetline Products' 180° servo. The marriage of the above into a total package was a most interesting project for Duane. He had never built an ARF nor put retracts into any airplane. Further, this installation was to be in a plane which was not designed for them, and, since the radio has four channels, extension and retraction were going to have to be commanded by one of the primary functions.

The Lanier Colt is the latest of the Lanier line of ARF's and incorporates some welcome improvements. The fuselage is reinforced with plywood to give greater strength and rigidity. The method of engine mounting is unique in that a vertical "crutch/motor mount" is used which extends back to the trailing edge of the wing at the top of the fuselage and also serves as the wing mount at the leading edge of the wing on the lower fuselage. This concept prevents installation of a nose gear retract.

The Goldberg retracts are functional, rugged and dependable; best of all they are reasonably priced. Only the main gear could be used in this airplane but the nose gear has been checked and appears to have all the attributes of the mains.

The Jetline 180° servo incorporates the World Engine S-5 servomechanics with a

(continued on page 96)

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Steerable nose gear.

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ENGINES: .40 to .50
WING AREA: 740 Sq. In.

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Molded Canopy
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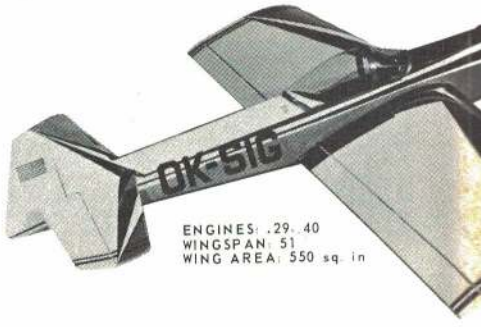
AKROBA

Designed and Flown by Mike Sto

EASY ACCESS TO ENGINE, BELLCRANK AND CONTR



ENGINES: .29-.40
WINGSPAN: 51
WING AREA: 550 sq. in

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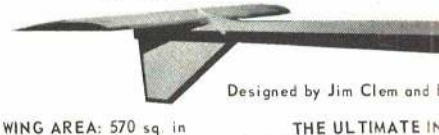

Designed by Jim Clem and

WING AREA: 570 sq. in
WEIGHT: 22-28 oz

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WINGSPAN: 49½"
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EL CHEAPO

Caption error in Cheechako article last month said to glide test with motor installed—**DON'T**. Motor ejects after burn-out in flight.

LAST MONTH YOU MADE CHEECHAKO, A ROCKET/GLIDER MODEL. HERE IS A LAUNCHER FOR IT.

by LARRY RENGER

Last month's Tenderfoot article was "Cheechacko," a simple boost-glide rocket model. This month we will make a launch system for it. This launcher represents the absolute minimum cost electrical launch system with interlock and spring-off firing button. Naturally, commercial launch systems such as the "Porta-Pad" and "FS-5 Launch Control" from Estes Industries or similar systems from Centuri or Cox are more convenient.

Most of the required materials are easily obtainable. Needed are two pieces of 18 x 2 x 1" pine, seven paper clips, six small 3/4" screws, 12 ft. of zip or lamp cord, 12V lantern battery, three ft. length of 1/8" welding rod or spring wire and one piece of 6 x 2 x 1" pine.

The first step is to construct the launch stand. In measuring the two boards for the interlocking notches, check the true width of the board. Most one in. wood is really between 7/8" and 3/4". Make the two vertical cuts halfway through each board. A sharp rap should cleanly break out the scrap. Carve the joint surfaces smooth if the boards do not slip all the way together.

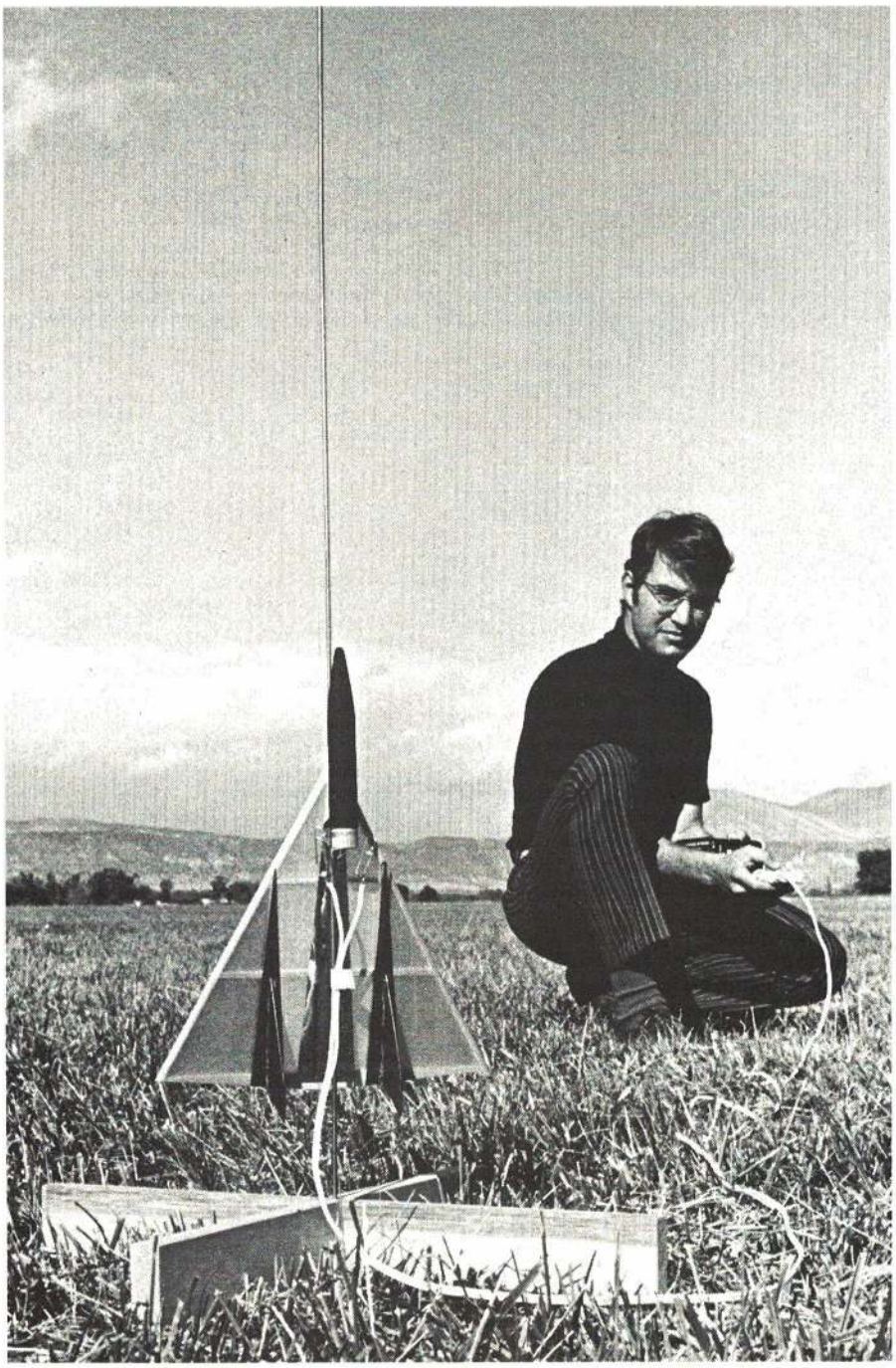
Carefully drill a hole for the launch rod through only the top board. This launch rod can be a very carefully straightened coat hanger wire. The launch control is a little more difficult Drill appropriate size pilot holes for the screws you have at the locations shown on the "Switch Block." Bend the paper clips as shown: two interlock contacts, a lower contact and an upper contact. Screw all the clips in place. The upper contact end should be 1/8" to 1/4" above the lower contact; they must not normally touch.

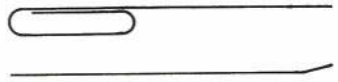
The wiring should be soldered to the switch and contact clips to assure the full current flow required for ignition of the model rocket engine.

On to flying! Your Cheechacko may be hand launched, rubber band launched, or of course, rocket powered. First powered flights should be with a ½A6-2 engine–a relatively small engine for use in small fields. Use some masking tape around the launch rod to support the glider and use tape to support the ignition power leads.

Insert the igniter according to the instructions supplied with your engine. Check the fit of the engine in the model's pod. If it is easy to shake out, put small strips of tape on the engine casing to tighten the fit.

(Continued on page 68)

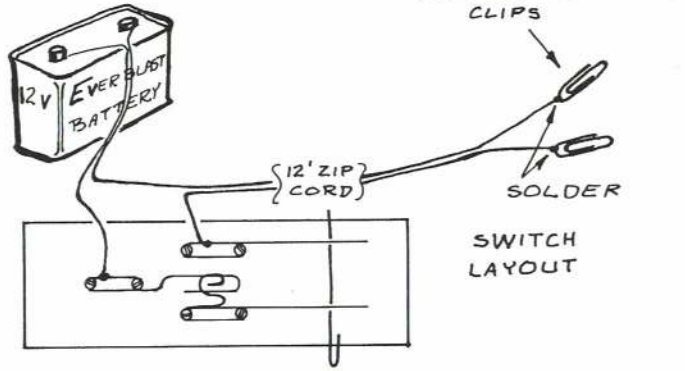


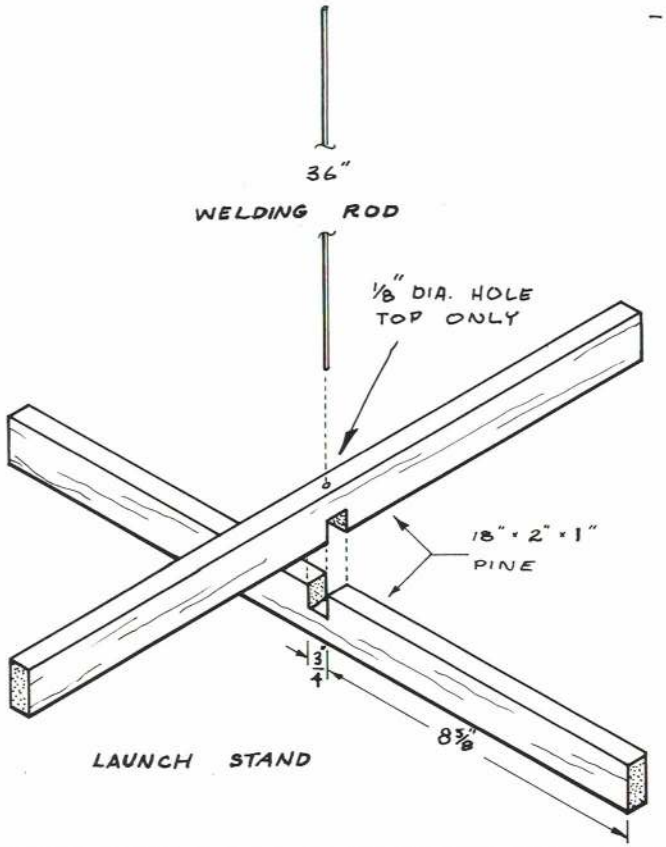


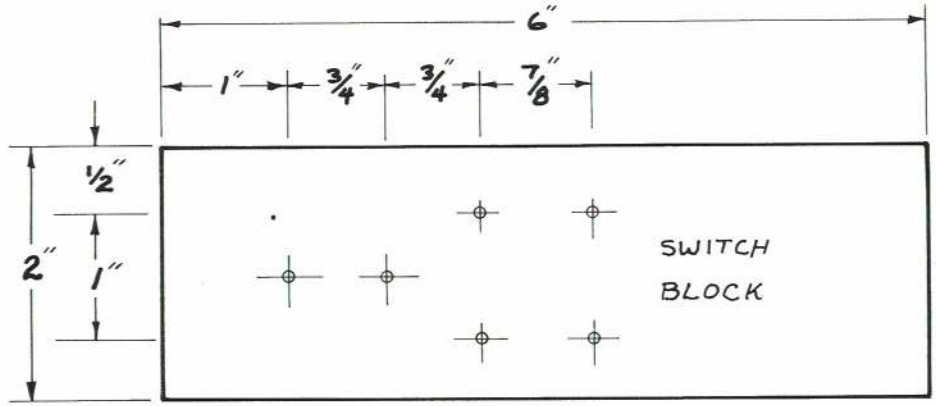
INTERLOCK CONTACT
2 REQUIRED

SWITCH CONTACT
- LOWER

SWITCH CONTACT
- UPPER







"El Cheapo"

ROCKET LAUNCH SYSTEM

BY THE LONE RENGER

On The Scene

(continued from page 12)

year and showed up with about the nicest batch of microfilm-covered models you would ever want to see. Dad, presumably with Terry's help and encouragement, is building an RC model.

Jim Richmond, relatively new at indoor flying, put up a rather tired old FAI model for flights of 35 and 22 min. to win the FAI event, at the same time setting new records in both FAI and Stick for that ceiling-height category. (The 96-ft. ceiling height of the Cow Palace limits flight times to considerably less than the ultimate.) He later flew his record-breaking Paper Stick model for 20 min. 20 sec.–the highest time for that class ever made in the Cow Palace. After only three years of indoor modeling, Jim took top spot at the 1967 U.S. Indoor Team selection finals. He went on to win the World Championship in 1968, again placed first at the 1969 team selection finals, and a day later made a virtual clean sweep of the Indoor events at the Nats.

Jim does everything just a little differently. He winds his motor on a torquemeter, then transfers it to the model. He somehow builds his models just a hair lighter. Before flying he spent half an hour scanning the ceiling with binoculars for hanging strings from long-dead baloons and the like that might snare his models. Seeing him now, in this slow-motion world of indoor modeling, it is difficult to visualize him as winner of the Control-Line Jet Speed event at the 1949 Plymouth Internats.

Clarence Mather test-hops with a motor only a third as long as his regular ones. The other two-thirds is replaced by a stick having a hook at each end and weighing the same as the missing rubber. This allows him to make full-power test flights in only ten minutes, without danger of going into the rafters.

Joe Bilgri, whose list of achievements in modeling would fill this page, spent most of his time ironing out details of the coming World Championships–he is U.S. Team Manager.

Bob Gibbs and his 17-year-old son Bill did much fine flying and took home four trophies between them. Brian Donn, whose Wakefield Band Wagon and Nordic glider Lady Maxley have been featured in **AAM**, was there flying, timing and helping wind motors. Carl Rambo, after wrecking a model getting it out of the box on Saturday, came back on Sunday to win the Stick event. Jerry Powell, who put up his Paper Stick model after a year of hard work for more than 22 minutes at the '67 Nats to take second place, found himself in tough company and was able to place only third at the Cow Palace.

Pretty serious business this indoor flying, but it had its lighter moments too. Like when Clarence Mather tried to fly with his wing on backwards; or when Carl Rambo made a mad scramble to get an official flight off before the end of the contest, only to find later that he had already completed his allowed three flights; or when Jim Richmond's four-blade prop suddenly converted itself into a three-blader in mid-flight. He hadn't planned it that way–a repaired spar un-repaired itself.

Heathkit R/C gear ...out front in value & performance!

Find out how you can get top mileage from your R/C dollars with pace-setting Heathkit products . . . like miniature & sub-miniature servos, 24.95*; 3-channel propo rig, 129.95*; 5-channel system, 224.95*; "Spectre" R/C Car, 29.95*; Servo Simulator, 19.95*; "Thumb® Tach," 19.95*. Fill out the coupon, today!

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Address _____
City _____ State _____ Zip _____

*Mail order prices; F.O.B. factory. Prices & specifications subject to change without notice. GX-238

Introducing
New Silk-Spun Coverite

(a polyester with quik stik iron on adhesive)

Finishes light as silk . . . but 10 X stronger! specially formulated for:

1. **all free flight models**
2. **small gas RC models**
3. **all rubber band models**
4. **all gliders**

New SILK-SPUN COVERITE is not as strong as SUPER COVERITE. Repeat: not as strong as SUPER COVERITE. But SILK-SPUN is still 10X stronger than silk; 50 times stronger than tissue; many times stronger than any other covering. SILK-SPUN goes on just like its big brother SUPER: drum tight, wrinkle free with an ordinary household iron. And, like big brother SUPER it finishes with a minimum of paint making it 50% cheaper than silk. Only $1.95 per yard. Pick it up at your dealer or use the coupon below (your dealer will get credit).

Silk-Spun meets every test

Shrink test: with household iron, shrinks 20%, or stretches 80% for easy compound curving
Abrasion test: withstood 3600 cycles on Taber abrader (500 gram load)
Sunlight test: 6 months under glass exposure in Florida sun, retained 4X more original tensile & tear strength than silk
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Chemical test: virtually impervious to engine fuels
Rot & mildew test: buried in soil 8 weeks without change

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Please rush me_____paks of Silk-Spun Coverite @ $1.95/pak. Available in white only.

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Editor:
Carl Wheeley

MODEL AVIATION

Official magazine

A.M.A. NEWS

Academy of Model Aeronautics • 806 Fifteenth Street N.W., Washington, DC 20005

Hall of Fame Award to Howard McEntee

Howard G. McEntee, Ridgewood, N.J., has been named to the Model Aviation Hall of Fame by the Council of Past Presidents of the AMA. This is the first and only award to be announced for 1971.

McEntee was unanimously voted into the Hall of Fame as a result of a long and brilliant career as a writer, magazine editor, model aircraft and electronic circuit designer, and flyer of radio control aircraft. His career began in high school during the 20's and has continued almost unabated until just this past year when illness has forced a rest and hospital treatment.

During WW II and up to 1950 McEntee was editor of Model Airplane News. Since then he has been a feature writer for American Aircraft Modeler and many other publications in the model aviation, science and electronics fields. He was also a principal reporter of national and world championships, best known for his RC expertise, although his interest spans all aspects of model aviation. He and his wife, Elinor, have been familiar participants on the scene of most major RC competitions and other events of the past 20 years.

The 1971 Model Aviation Hall of Fame award is the first to be administered solely by the Academy of Model Aeronautics.

Howard McEntee, right, was the only one named to the Model Aviation Hall of Fame for 1971—shown with Dr. Walter A. Good who previously was named a member. Other Hall of Famers are Walt Billett (deceased), Will C. Brown, Carl Goldberg, Charles H. Grant, Dick Korda, Al Lewis, Jim Walker (deceased), Bill Winter and Frank Zaic.

PRESIDENT'S MEMO

AMA'S ELECTION RESULTS. The slate of excellent officers who served the AMA membership the past very successful year will continue to serve through 1972! It is a great tribute to the progressiveness of the Academy of Model Aeronautics that those officers who had already served one term or more were asked to be considered again, and all received the hearty endorsement of the membership's vote.

Being human we are all prone to forget to thank those who serve us, but a successful election vote is a form of thanks and our re-elected officers should feel thusly thanked and proud.

From my viewpoint as president I am pleased to see these re-elections. The Executive Council can continue its progressive constructiveness without interruption or a "get acquainted" period.

My congratulations to the re-elected officers!

At the same time I want to offer my thanks to those who offered their names and services for consideration, but were not elected. The very fact that they volunteered means that they are exceptional people and will certainly be fitted into the AMA pattern of service to the membership.

FOR YOU TO BE PERSONALLY REPRESENTED, examine the structure of AMA and become acquainted with your "channels". The area in which you live is primarily represented by a district vice-president. There are eleven of these, and one of them is YOUR PERSONAL REPRESENTATIVE to the AMA governing body, the Executive Council. When you have problems or suggestions contact your district vice-president (don't forget, he ASKED to work!) or write AMA HQ and it will be channeled to him.

YOUR RESPONSIBILITIES AS MEMBERS. The simple payment of your dues annually DOES NOT end your responsibilities. It contributes toward organizing the total activity of air modeling, but it leaves you with the responsibility of conduct of yourself and your model aircraft within the community. The CONTINUATION OF PRIVILEGES of sharing the use of the air and ground is a direct responsibility of you, yourself! It IS a privilege and we must protect it.

You are probably already recognizing good safety practices, since you are an AMA member, but don't stop there. You can contribute a great service (to your own selfish interests, as well) by becoming an AMA SALESMAN and showing the newcomer or "loner" the wisdom of joining a service organization like the Academy of Model Aeronautics which provides safety guidelines to its members and education to the public concerning model aviation activities. In doing this AMA is protecting your right to fly!

If you DON'T belong, JOIN UP! If you DO belong, be proud, because you belong to one of the world's finest sporting organizations!

John E. Clemens
AMA President

NEW LOOK FOR 1972

All of the accessories that have been coming from Ace Radio under various names such as More-Craft, Rand, Goodies, and under our own label now will appear with the new card header as shown above. These should be on your dealer's shelves soon. If he doesn't have them, advise him that his distributor, who is up to date with the latest in R/C accessories, is stocking them. These are proven accessories, and model builders everywhere are using them.

SWING-IN KEEPER

- Simple to connect
- Bend wire first—then

1 Insert

2 Swing

3 Snap

- No stress on installation
- Clevis type guide keeps wire from going too far into the hole

36L196—SK-Swing-In Keepers, pkg. of 4 .60

FIBERGLASS REINFORCING TAPE

These tapes, in three widths, are specifically for reinforcing wing center sections, nose sections, landing gear areas, and any other areas where extra strength is needed. Have interwoven edges to prevent unsightly unravelling.

36L193—FT15-Fiberglass Reinforcing Tape .75
1½" wide x 60"
36L194—FT3-Fiberglass Reinforcing Tape .90
3" wide x 60"
36L195—FT6-Fiberglass Reinforcing Tape 1.50
6" wide x 60"

VINYL TAPES

Just peel and apply.

All of the Ace tapes are made of closed cell vinyl by 3M. This means this is the best grade available. Will not discolor or absorb fuel. The strength of the adhesive improves with age.

Seating Tape

This is used for wing seatings and hatches. Great for waterproof ceiling and boats. Tape conforms easily to any contour.

36L191—ST838-Vinyl Seating Tape .70
1/8 x 3/8 x 36"
36L192—ST1614-Vinyl Seating Tape .60
1/16 x 1/4 x 36"
36L142—ST814-Vinyl Seating Tape .65
1/8 x 1/4 x 36"

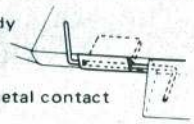
Double Coated Mounting Tape

Excellent for instant and positive mounting of servos in any variety of items. Absorbs vibration so installation is shock resistant.

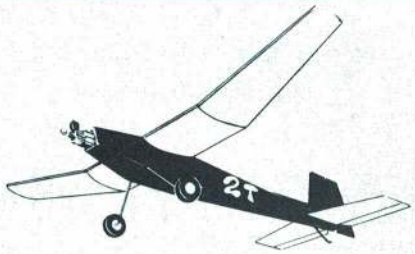
36L264—DT116-1/16" Double Coated .75
Mounting Tape, 1/2" wide x 36"
36L276—DT18-1/8" Double Coated .79
Mounting Tape, 1/2" wide x 36"

AILERON—ELEVATOR HORN BEARING

- Simple, neat, sturdy
- Reduces friction
- Avoids metal to metal contact



36L190—AEH-Aileron and Elevator Horn Bearing, pkg. of 4 .75



2T KIT

The 2T was designed by Ron Jacobsen of Ken's R/C in Shawnee, Kansas. The purposes: An airplane that a beginner could build easily; A relatively large plane using .049 for power, and yet have ample penetrating capabilities under fairly windy conditions; Prove docile in the hands of beginners--and with appropriate adjustments, maneuverable and rewarding in the hands of the expert. The 2T design meets all of these with room to spare!

Uses two sections of the Ace Mini Foam Taper Wings, and one Constant Chord section for a total span of 50 inches, 262 sq. in. Coupled with an .049, the 2T was designed primarily for the two channel Brick type digitals that are on the market, or two servos of any digital system.

Also, when constructed correctly, it performs exceptionally well on Rudder Only using the Commander Standard or Stomper. Motor control can be added to at a later date by using the KRD motor control.

Kit contains three wing panels, all balsa wood completely band sawed and precision sanded, bent landing gear, and miscellaneous parts. Is of the same general high caliber as previous Ace kits. Hardware for hinges and linkage and wheels is left to the buyer.

No. 13L106—2T Foam Wing Airplane Kit 14.75
No. 13L206—Three Foam Wing Sections For 2T 5.00

DICK'S DREAM KIT

Highly Recommended for Beginners

† 34" Foam Wing--Moulded sections
† Top grade die-cut wood parts
† For .020 engines
† Commander Baby or Baby Twin
* Owen Kampen design

No. 13L100—Dick's Dream Kit $5.95

ACE HIGH GLIDER KIT

† 70" Foam Wing -- Moulded sections
† Precision Machine cut and sanded wood
† For .049--Power Pod parts supplied
† Recommended for Rudder-Only Standard or Stomper Commander
* Owen Kampen design

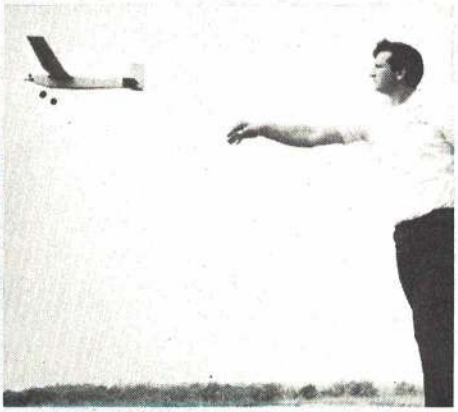
No. 13L104—Ace High Glider Kit $14.95

UPSTART 1/2A MINI-RACER KIT

† Midget Racing Just For Fun!
† 34" span, 6" chord, 200 sq. in. foam wing
† Top grade band sawed wood
† .049 to .051 Tee Dee Engine
† Two channel operation
* Owen Kampen design

No. 13L102—Upstart Custom Kit $10.95

ACE R/C INC.
HIGGINSVILLE, MO. 64037



Dear Friend:

Our lead picture shows designer Ron Jacobsen launching his 2T. Our kit will be ready by the time you read this. Full description elsewhere in this ad.

Originally this was designed as a 2 channel Trainer--hence the 2T. It is ideal for bricks and also two servos of a digital system.

BUT--further tests show that it works beautifully as a Rudder-Only job with a Standard or Stomper! And you can add a KRD motor control later if you wish, at a weight increase of only 1 1/8 oz.

So the 2T is a double barrel design!

Next in the 1972 line of Ace kits will be Owen Kampen's Skampy. We've had plans for this some time, and they have been great sellers--and requests have come in for us to make a kit available. The Skampy is a step up from the Dick's Dream. It is definitely hotter, but also has a glide that has to be seen to be believed. Designed for the Commander Baby or Baby Twin.

Our Commander '72 packages are winning hearty approval from modelers. As Russ Merrill of Hillcrest Hobbies in San Diego says, They are remarkable in that they really do not obsolete any of our '70 or '71 models. He says, you can easily add the Drain Brain yourself, go with the 2 pin connectors; if you want single axis bezel for your transmitter, it's available, too! Looks like R-O Pulse is going to really hit its stride in '72 with the Commander '72!

Several months ago we showed a picture of Bob May and his Mini Stik, which used either a Commander, or two digital channels. We were besieged by requests for plans. Bob has finally proven the design to his satisfaction, and he's making plans available direct.

Order Mini Stik plans direct from Bob May at 225 N.E. 21st Street, Moore, Oklahoma, 73060, and send $1.00. If you want airmail add 50 cents.

See you next month. Till then

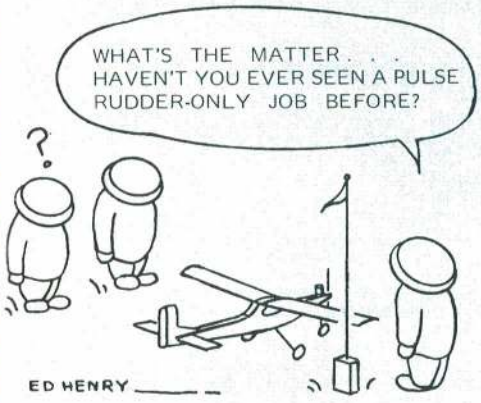
Keep 'em pulsing,

Paul

Paul F. Runge

ANNOUNCING... commander '72

NEW CONCEPT IN PULSE RUDDER-ONLY



For 1972 Ace is proud to announce the Commander '72. Continuing research in the field of pulse proportional rudder-only has produced several significant break throughs. These are incorporated in the Commander '72, resulting in the finest pulse proportional radio system to date.

An improved Drain Brain switching arrangement in the receiver reduces total battery drain which increases flying time from 50-80% per battery charge! Plugs are wired into the airborne unit which allows you to switch the receiver from plane to plane with an absolute minimum of effort! You can have as many different sizes and styles of models as you want with a minimum investment. COMPLETE Flite Pak weights--2.5 to 4.8 oz. The transmitter has increased output to overcome interference.

All of these '72 modifications give you a radio that you truly can be proud of and one that will give you FUN out of this hobby, whether you are a beginner or expert.

–FULLY PROPORTIONAL

Rudder follows directly the movement of your stick.

–VERSATILE

The same receiver and transmitter can be used with airplanes from 18" - 72" wing span.

–INTERCHANGEABLE

Plug-in wiring allows quick switching of receiver from plane to plane.

–LIGHTEST

Weights of 2.5 to 4.8 oz. include Nicad batteries and are COMPLETE weights.

–SIMPLE

Easy installation; actuator has only one moving part. Minimum maintenance.

–INEXPENSIVE

Initial cost of system, airplane, and engine is low; one transmitter and receiver can be used for many different styles and sizes of planes.

–IDEAL FOR THE BEGINNER

–GREAT FOR A FUN OUTFIT FOR THE EXPERIENCED FLYER

COMMANDER '72 R-O SYSTEMS

Completely wired and tested, with transmitter, receiver, actuator, nicad battery airborne pack and charger, switch and connectors. Transmitter battery not furnished.

10G15—Baby System '72	$69.95
10G15T—Baby Twin System '72	$72.95
10G16—Standard System '72	$71.95
10G17—Stomper System '72	$74.95

26.995, 27.045, 27.095, 27.145, 27.195
Please Specify Frequency

TOTAL FLITE PAK WEIGHTS

The Commander '72 units offer the lightest weight practical RC available. Weights given below are the COMPLETE weights, nothing need be added.

Unit	Grams	Ounces
Baby Flite Pak	70	2.5
Baby Twin Flite Pak	76	2.7
Standard Flite Pak	124	4.4
Stomper Flite Pak	135	4.8

'72 RECEIVER ONLY

Superhet with special new Drain Brain output for Adams actuator. Measures only 1 5/16 x 1 3/4 x 9/16". Weight less than 1 oz. Specify frequency.

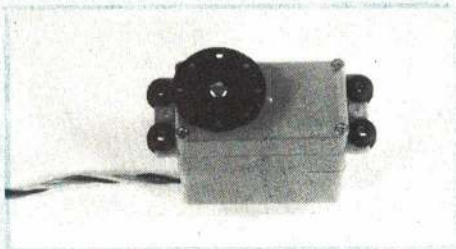
12K72—Commander '72 Receiver $29.50

ACTUATOR/BATTERY COMBOS

Here is what makes the '72 Commander so versatile. All you need to put in plane for extra installations. With connectors, so you just plug in receiver.

15K15—Baby/225 ma Batt.	$11.95
15K15T—Baby Twin/225 ma Batt.	$14.95
15K16—Standard/500 ma Batt.	$13.95
15K17—Stomper/500 ma Batt.	$16.95

Flite paks, extra chargers, actuators and parts, and batteries available separately.



KRD PULSE THROTTLE CONTROL

This is the KRD Motor Control which replaces the one by Ken's R/C,and is a considerable improved device. (Ken is still part of KRD!) Designed for high, medium and low throttle on rudder only pulse system, the control requires only a slight factory modification to the transmitter for a fast pulse button. Easy to hook up to the airborne rudder only packs of '72 models. Just three wires. Uses the same battery supply, and therefore amounts to a considerable saving in weight. Designed specifically for a Commander RO series of Standard or Stomper units.

Housed in an EK case, the unit is completely wired and tested.

Transmitter modification is simple, but we recommend that you allow us to do a factory conversion for the fast pulse button. This is a custom job, and generally shipment is made within 48 hours of receipt of your unit. See below.

Measures 1 3/8 x 1 3/8 x 3/4". Weighs 32 grams or 1 1/8 oz.

No. 14K69—KRD R-O Throttle Control Servo Ready for Installation $24.95

TRANSMITTER THROTTLE CONVERSION

We recommend that you allow us to convert your transmitter for fast pulse button to make sure it operates your motor control servo. Throttle control response is so fast that there is no interaction apparent, because you thumb the motor control button and get right off, and the KRD Throttle Control takes over.

No. 14E71—Factory Custom Installation of Fast Pulse Button in your transmitter. $6.00

COMMANDER DRAIN BRAIN

For owners of the older models of the Commander R/O systems (1970 and 1971), you can easily convert your DE receiver to the lower drain by installing a separate Drain Brain. Will add 60-80% flying time per charge. OR use Standard or Stomper with 225 mah batteries for almost the life you used to get with 500s!

Weighs less than a gram; small enough to fit on the actuator. Works only with DE receiver.

No. 14K53—Drain Brain assembled $3.75

2 PIN CONNECTOR

The Commander '72 uses 2 pin connectors. These are gold plated Deans units. Many R/C uses besides expandability of Commander Paks. With plastic tubing for insulation.

19L53—C2-Deans 2 Pin Connector .75

ACE SWITCH GUARD

This is switch guard used on the new Commander Transmitter. Of brushed aluminum, improves appearance in your installation, but most important prevents accidentally moving lever. Fits U.S. made Continental-Wirt switches as used in Commander Flite Paks. Also Ace 30K19 CW SPST Mini and 40L252 CW DPST Mini switches.

30L21—SG-Ace CW Switch Guard .39

SINGLE AXIS BEZEL

The Commander '72 Transmitter uses a single axis bezel on the stick assembly. If you'd like to convert your older model transmitter with one, we are offering them separately. Simple to do.

No. 15K20—Single Axis Bezel $1.00

R-O PULSE HANDBOOK with UP-TO-DATE CATALOG

Only $1.00 (Refundable)

New catalog is completely updated. Includes many items from major manufacturers.

Handbook has expanded data on How Pulse Works, Installation, How to Fly -- and much more. Most complete information on Pulse Rudder-Only available anywhere.

Price is $1.00 via THIRD CLASS BULK MAIL. Refundable on first order over $10.00. If you wish faster delivery, add 50¢ for FIRST CLASS.

ACE RADIO CONTROL, INC. * BOX 301 * HIGGINSVILLE, MO. 64037

NAME _____

ADDRESS _____

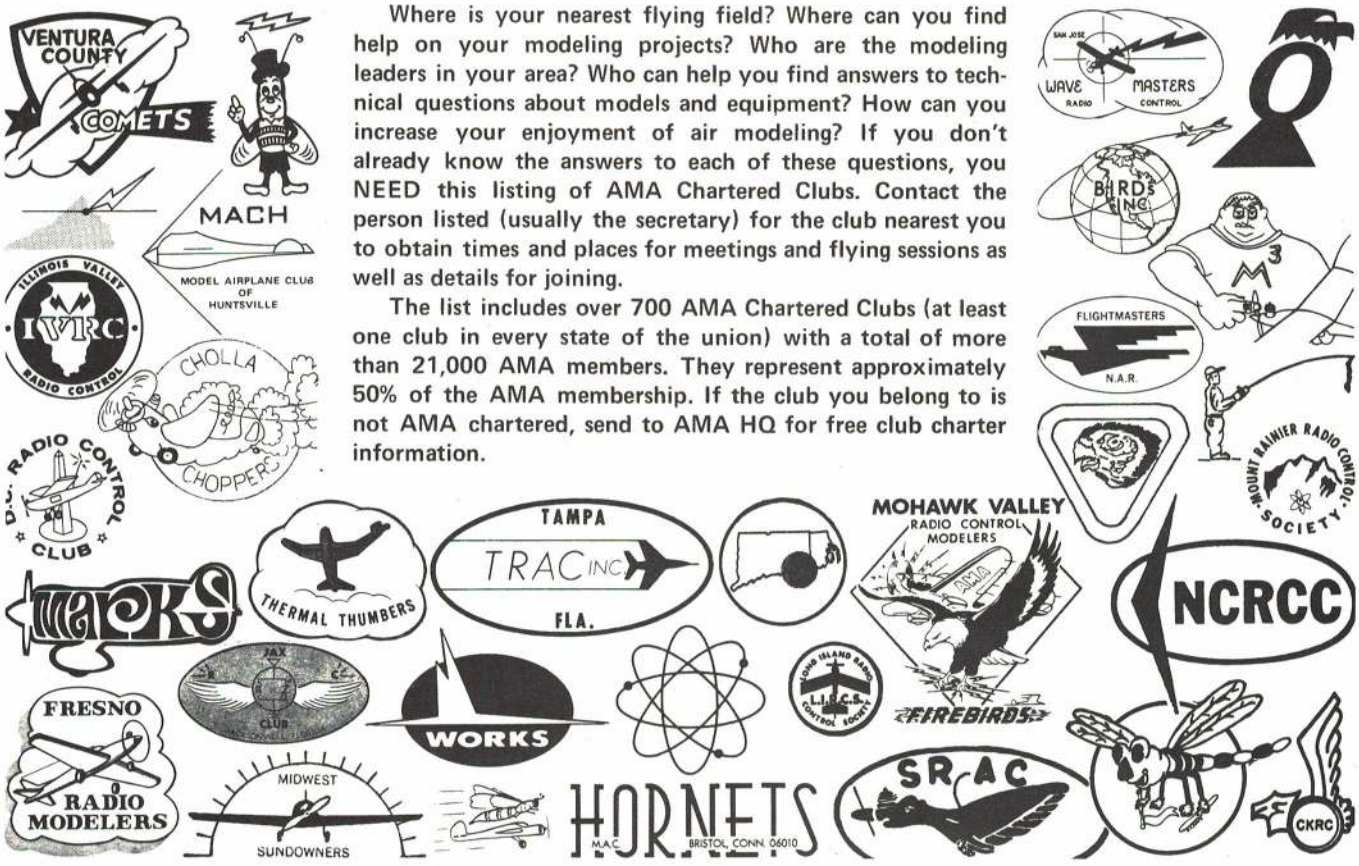
CITY _____ STATE _____ ZIP _____

QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

Master Charge or Bank Americard No.

Add $1.00 shipping-handling for direct mailorders except catalog

Academy of Model Aeronautics Chartered Clubs



Where is your nearest flying field? Where can you find help on your modeling projects? Who are the modeling leaders in your area? Who can help you find answers to technical questions about models and equipment? How can you increase your enjoyment of air modeling? If you don't already know the answers to each of these questions, you NEED this listing of AMA Chartered Clubs. Contact the person listed (usually the secretary) for the club nearest you to obtain times and places for meetings and flying sessions as well as details for joining.

The list includes over 700 AMA Chartered Clubs (at least one club in every state of the union) with a total of more than 21,000 AMA members. They represent approximately 50% of the AMA membership. If the club you belong to is not AMA chartered, send to AMA HQ for free club charter information.

ALABAMA

Birmingham RC Assn., David Davies
649 Winwood Dr., Birmingham 35226
Confed. Min. Air Force, Wm. Padgett
53 Hudgins Lane, Birmingham 35214
Decatur MAC, James M. Ray
1304 Fletcher SW, Decatur 35601
Ft. Rucker RC Club, William Polley
109 Magnolia Circle, Enterprise 36330
Gulf Coast RC Club, Dewey Brown
800 Graymont Dr., Mobile 36608
Huntsville Aero Modelers, James Davidson
1815 Melbourne Ave., N.E., Huntsville
MAC of Huntsville, Morris Penny
2105 Rosewood Cir., NW, Huntsville
Radio Aero Mod. of Montgomery, R. Miller
314 Spring Valley Rd., Montgomery
Rocket City RC, Luther E. Powell
9633 Dortmond Dr., Huntsville 35810

ALASKA

Capital City Radio Model Club, J. Chapman
603 West 12, Juneau 99801

ARIZONA

Air-Zona MAC, Joseph F. Valenta
3041 E. Shangri La Rd., Phoenix
Arizona RC Society, William J. Cranston
6823 N. 38th Dr., Phoenix 85019
Cholla Choppers, Ed Hagerlin
8331 E. 3rd St., Tucson 85710
Condors-Luke, Jimmie L. Jones
1574 Apache, Glendale 85301
Mesquite Modelers, Donald F. Mulligan
931 Cactus Wren, Sierra Vista 85635
Miniature Aircraft Pilots Assn., W. Still
1259 East Pebble Beach Dr., Tempe
Tucson RC Club, Paul C. Bohardt
710 N. Kent Dr., Tucson 85710

ARKANSAS

Fayetteville Aeromodelers, Al Maclean
Rt. 2, Box 168-A, Westfork 72774
Mid Arkansas RC Society, Wayne Sherill
7311 Fairways Dr., Little Rock 72204
Pine Bluff RC MAC, Norman H. Ross
1909 Edmar Dr., Pine Bluff 71601

CALIFORNIA

American Model Airport Assn., J. Keeshen
340 E. Hawthrone St., Ontario 91762
Antelope Valley Tailwinds, D. Harrison
38146 17th St. E., Palmdale 93550
B.A.R.K.S. Inc. Jerry Boyce
2625 Alder, Bakersfield 93301
Barnstormers of Southern Ca., M. Wilbur
6010 Vinevale Ave., Maywood 90270
Barstow Desert Cadets, R. Duane Sides
P. O. Box 654, Barstow 92311
BIRDS, Inc., C. B. Smith
4341 Graywood Ave., Long Beach 90808
Black Bart Flying Club, Leroy Still
150 Caldwell, Cloverdale 95425
Califas, Sandy Norton
1016 E. Mission, Pomona 91766
Calif. Expo RC Flyers, Charles Sala
5106 Cimarron Way, Sacramento 95842
Capitol Condors Inc., Ken Oliver
2213 El Cejo Cir., Rancho Cordova
Central Valley RC Club, Larry Guappone
93 N. Sinarle Pl., Porterville 93257
Conejo RC Modelers, Dan McCan
28 Wales St., Thousand Oaks 91360
Cordova Model Masters, Lee Helsel
4392 Dorking Ct., Sacramento 95825
Diablo Valley RC'ers, Dave Antkowiak
1597 Laverne Way, Concord 94521
East Bay Radio Controllers, D. Williamson
2856 Via Dominguez, Walnut Creek
Eastern Sierra Flyers, Wilson D. Rose
P. O. Box 77, Bishop 93514
First All Speed Team, T.G. Williams
181 B. Street, San Marcos 92069
Fort Ord RC Model Club, Stephen Paul
3263 DeForest Rd., Marina 93955
Fresno Gas Model Club, Ocie Randall
716 Waterman Ave., Fresno 93706
Fresno Radio Mod. Inc., Tom Ewing
5075 E. McKenzie, Fresno 93727
Harbor Soaring Society, John Donelson
16162 Littler Dr., Huntington Beach
King's County RC'ers, Donald M. Boaz
18135 Burlwood, Lemoore 93245
Marin RC Group, Ben Ostlind
19 La Crescenta Way, San Rafael 94901
Mendocino County RC Modelers, Ken Davis
P.O. Box 661, Willits 95490
Miniature Aircraft RC Soc., C.G. Comstock
834 E. Virginia St., Rialto 92376
Mission Bay Prop Twisters, C. Johnson
10375 Baron Dr., San Diego 92126
Modesto RC Club, Neal L. Starr
1628 Dwight Ln., Modesto 95350
North Bay Soaring Society, L. Whitehead
1923 Markwest Springs Rd., Santa Rosa
N.A.R. Flightmasters, Fernando Ramos
19361 So. Mesa Dr., Villa Park 92667
Northrop Modelers, Earl L'Homme
5006 W. 129th St., Hawthorne 90250
Oakland Cloud Dusters, John Kelly
704 10th Avenue, San Mateo 94462
Orange County Thunderbugs, L. Gerber
6602 Kiowa Rd., Westminster 92683
Palmdale Skymasters, Tony Brown
38367 17th St. E., Palmdale 93550
Penninsula Channel Commanders, J.E. Alley
1040 El Camino Real, Burlingame
Pioneer RC Club Inc., Floyd Carter
2420 Whitney Dr., Mountain View 94040
Polomar RC Flyers, Rex A. Raymond
629 Olinda St., Escondido 92025
Pomona Valley MAC, James J. Bissot
6890 Topaz Street, Alta Loma 91701
RC Bees of Santa Cruz Co., E. Pritchard
9, Debbie Ct., Boulder Creek 95006
Radio Control Bees, Inc., Ethan Marsh
2594 N. Torres, Orange 92665
RC League of Orange County, J. Eatherton
1609 East 15th St., Santa Ana 92701
Redding RC Club, Robert De Genard
6480 Berkeley Dr., Palo Cedro 96003
Redwood Modelers, Blaine R. Russell
5028 Maiden Lane, Santa Rosa 95404
Riverside RC Club, Lars Tenpas
5557 Chatham Dr., Riverside 92506
Sacramento Red Barons, John Sorenson
3610 Annabelle Ln., Roseville 95678
San Diego RC League, Francis Morris
3436 Elliott St., San Diego 92106
San Fern. Val. RC Flyers, Ronald Schorr
5224 Teesdale Ave., North Hollywood
San Fern. Val. Silent Flyers, R. McCrackin
28821 Wagon Road, Agoura 91301
San Gabriel Valley RC League, P. Remde
4426 La Madera, El Monte 91732
San Joaquin RC Modelers, Eugene Rhoads
9018 Hilary Lane, Stockton 95205

San Jose Wavemasters RC Club, J. Feeney
222 Thomas Drive, Los Gatos 95030
Santa Barbara RC Modelers, T. Newstetter
865 Windsor Ct., Santa Barbara 93105
Santa Maria Valley Flyers, Rudolph Taube
317 N. Western Ave, No. 4, Santa Maria
San Valeers, George Bahram
55517½ Clybourn Ave., N. Hollywood
SCAMPS, James E. Adams
2538 N. Spurgeon St., Santa Ana 92706
Simi Valley Flyers, Charles E. Becker
P.O. Box 3522, Simi Valley 93063
Sky Hoppers of Orange Co., Mel Schmidt
1140 Sturbridge, Lahabra 90631
S.L.O. Flyers, Harry E. Boller
1143 13th St., Baywood Park 93401
So. Alameda County RC'ers, Arvid Leary
33773 Syracuse Ave., Union City 94587
South Bay Soaring Society, H.I. Smith
P. O. Box 2012, Sunnyvale 94087
Southern Calif. Aero Team, R. Steckel
7437 Collett Ave., Van Nuys 91406
Southern Ca. Ignition Flyers, Phil McCary
9350 Wilshire Blvd., No. 328, Beverly Hills
Southern Calif. Skyburners, R. Hitchings
12459 East Cheshire St., Norwalk 90650
Speed Flying, Anyone?, Frank Kelly
7005 Spring St., Long Beach 90808
Stockton Gas Model Assn., Bruce Hannah
2518 Furmint Way, Rancho Cordova
Thermal Thumbers, Mike Keville
5407 Pimenta Ave., Lakewood 90712
Thunderbugs, Reid Libby
10201 Laramie, Chatsworth 91311
Torry Pines Gulls Glider Club, W. Pfeiffer
13453 Calais Dr., Del Mar 92014
Tracy Skyliners, Robert Holderbein II
124 Laguna, Tracy 95376
Tri Valley RC Modelers, David O. Jones
1364 Via Del Carmel, Santa Maria 93454
Tustin Model Club, Dave Smith
1892 E. Lemon Hts. Dr., Santa Ana
Vaca Valley RC'ers, Robert W. Knowles
255 Berryessa Drive, Vacaville 95688
Ventura County RC, Howard Neilson
132 Genive, Camarillo 93010
Willing Able Modelers, Myrtle B. Coad
228 Culp Ave., Hayward 94544
Wingbusters RC Club, Vahan Yeterian, Jr.
317 North X Street, Lompoc 93436
Woodland RC, Calvin Losh
1036 3rd Street, Woodland 95695
900 Club, Joseph S. Meckoli
119 Lockhart Lane, Los Altos 94022

COLORADO

Aspen Valley RC, Ken Shetler
P. O. Box 246, Basalt 81621
JEFCO Aeromodelers, A. Colton Park
5312 W. Roxbury Place, Littleton 80123
Magnificent Mountain Men, A. Gieskieng
1333 So. Franklin, Denver 80210
Mile-Hi RC Club, Herman Geller
6920 East Exposition, Denver 80220
Model Museum Flying Club, Wm. Baldridge
1464 So. Lafayette St., Denver 80210
Montrose Mini Flyers, Steve Hosner
Box 1174, Montrose 81401
Pikes Peak RC Club, John A. Schweier
212 North 18th St., Colo. Spgs. 80904

CONNECTICUT

Bristol Hornets MAC, John Scott
265 Witches Rock Rd., Bristol 06010
Central Conn., RC, Richard Coan
19 Saddle Hill Cir., Newington 06111
Connecticut Prop Jockeys, J. Candella
120 Hubbard Rd., Hamden 06517
Conn. Val. Barnstormers Assn., C. Hvshak
9 Sapphire St., Enfield 06082
Country Squire Modelers, Dixie Cutrone
Richards Ave., Norwalk 06853
Flying Aces Club, David A. Stott
66 Bankside St., Bridgeport 06606
F.L.Y. RC'ers, Christian Dascano, Jr.
5 Wheeler Drive, Danbury 06810
Middlesex Aero Modelers, R. A. Doak
389 Main St., Portland 06480
Northeastern Drone Society, R.E. Hamel
Star Route 6, Columbia 06237
Northern Conn. RC Club, Edwin Emmons
P.O. Box 205, East Granby 06026
Nutmeg RC Flyers, David R. Sandulli
Old Town Farm Rd., Woodbury 06798
RC Club of Conn., Arthur M. Fressola
265 Glenn Dr., Stratford 06497
RC Propbusters, Henry Struck
R.F.D. 2, Lyme 06371
SAM Chapter 7, John C. Whittles
43 Farview Ave., Old Saybrook 06475
Simsbury RC Club, H.S. Wainauski
38 Alder Rd., Simsbury 06070

So. Conn. Aero Modelers, Ronald Evans
83 Blake St., New Haven 06511
Trumball RC Club, H. Linley
2068 Huntington Tpk., Trumbull 06611
Valley RC Club, William L. Jensen, Jr.
192 Prospect St., Ansonia 06401
Wallingford RC Assn., James G. Malerba
38 Hill Ave., Yalesville 06492

DELAWARE

Chester County RC Club, J. Russell, Jr.
33 Marta Dr., Wilmington 19808
Delaware RC Club, Inc., Steve Szabo
509 Jackson Ave., Wilmington 19804
Dover Mosquitoes, George P. Durney
107 Silver Lake Dr., Dover 19901
Flying Blue Hens, Stephen J. Bailey
1125 Bardell Dr., Wilmington 19808

DISTRICT OF COLUMBIA

Charles County RC Club, Robert Perry
8703 Clarion Ct., Washington 20022
See also Maryland and Virginia listings.

FLORIDA

Aero Modelers of Perrine, E. Riggin
9022 Tiffany Drive, Miami 33157
Broward County RC Assn., James Maki
5241 SW 29 St., Ft. Lauderdale 33314
Daytona Beach RC Assn., Byron E. Trent
2261 Granada Dr., So. Daytona 32019
DMMMO Aeromodelers, K. Soloman
6971 SW 9th St., Pembroke Pines 33023
Elgin Aero Modelers, Donald J. Lemen
206 Bayou Woods Dr., Ft. Walton Beach
Ermac Eagles, John A. Krutz
76 Kenilworth Ave., Ormond Beach
Finger Crackers, Gerald M. Ross
1700 Pontiac Cir. So., Eau Gallie
Flying Piranaha's, Mrs. John C. Gilman
2380 Harrison Dr., Dunedin 33528
Gateway RC, Richard J. Mathieson
1914 Lake Shore Blvd., Jacksonville
Gulf Hawks MAC, Rogar A. Rowley
1515 26 Ave. N., St. Petersburg 33704
Imperial RC Club, Inc., Richard Meland
Department of Radiology
Lakeland Gen. Hos., Lakeland 33801
Indian River Kontrol Society, J. Swainson
727 Ryan Ave., Melbourne 32935
Jacksonville FF Team, Thomas E. Tibbs
8015 Parker School Rd., Jacksonville
Jacksonville RC Club, L.A. Symasek
1436 Murray Dr., Jacksonville 32205
Manasota RC Assn., Arthur Saxe
3024 Dividing Creek Dr., Sarasota
Miracle Strip Modelers, S. Niegowski
1267 Amherst Rd., Panama City 32401
Moonport Modelers, Robert W. Wunder
1319 Vista Terr., Titusville 32780
Naples Assn. Model Enthusiasts, F. Thurner
2777 12 St. N., Naples 33940
NW Florida RC Mod., Raymond L. Cella, Jr.
7734 Graves Rd., Pensacola 32504
Palm Beach Aeronauts, Dave Thomas
3482 Taconic Dr., West Palm Beach
The Pelican's MAC, Joseph Lima
6033 Ambassador Dr., Tampa 33615
Pensacola Aeromodelers, Tom McLaughlan
4140 Fern Ct., Pensacola 32503
Remote Control Assn. of Cen. Fla., D. Mott
122 Fairlane Circle, Sanford 32771
Sarasota Piston Poppers, Wm. Pennington
3926 S. Tamiami Trail, Sarasota 33579
Seminole RC Club, Nic J. Talantis
2411-93 Jackson Bluff Rd., Tallahassee
So. Aerobatic Kontrol Society, D. Baker
2226 11th Lane, Vero Beach 32960
Spaceport RC'ers Inc., Billy Warren
P. O. Box 3331, Cocoa 32922
Suncoast Aero Modelers, Peter Strayer
2337 Eastwood Dr., Clearwater 33515
Tampa Area Model Pilot Assn., D. Pemberton
5004 E. Colonial Dr., No. 11, Tampa
Tampa RC Aircraft Club, Phil E. Cota
4926 E. Broadway, Tampa 33605
Tropic Aero RC Club, M.D. Williams
1975 N.W. 36th St., Miami 33142

GEORGIA

Albany RC Club, Andy J. Barfield
1811 Greenvale Rd., Albany 31705
Atlanta RC Club, Bob Hewlett
4162 Indian Forest Rd., Stone Mountain
Coastal Empire RC Soc., Robert Cooper
105 W. Perry St., Savannah 31401
Cobb County RC Mod., Mickey Walker
3121 Northview Pl. SE, Smyrna 30080
Cobb County Skyrebels, Bob Stevenson
209 Sourwood Dr., Marietta 30060
CSRA Flyers, Edward H. Johnson
3330 Young Forrest Dr., Agusta 30906
Gainesville Hall MFA, Patricia Hulsey
Rt. 8, Box 298A, Gainesville 30501
Georgia Gnatz, James R. Wyatt
120 Vinson Dr., Warner Robins 31093
Golden Isles RC Club, Kenneth Knapp
311 Ellis Pointway, Brunswick 31520
Robins Model Flyers, C.J. Manspeaker
P.O. Box 546, Warner Robins 31093
South Atlanta RC Club, John King
3035 Park St., East Point 30344
Troup County MFC, Lawrence Denver Poole
120 North Page St., La Grange 30240

HAWAII

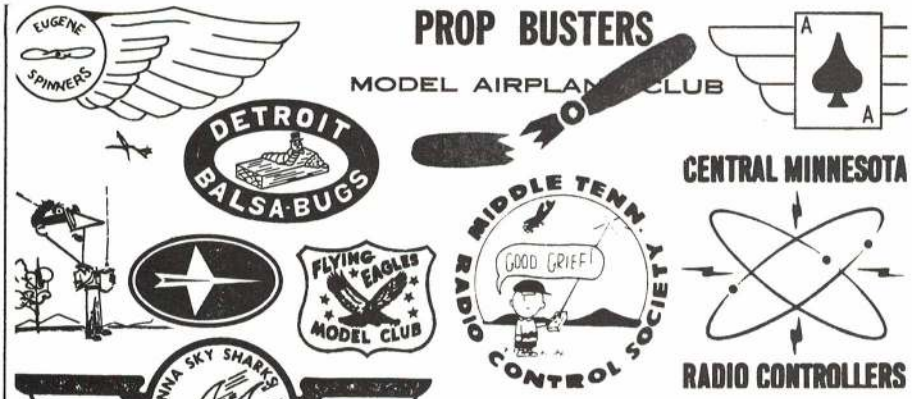
Aloha RC Club, Katie Lee
1407 Kewalo St., No. 26, Honolulu 96822
Big Island Modelers Assn., Gilbert Bugado
458 Mohouli St., Hilo 96720
Hanalike RC Club, Terry Machado
520 Kilauea Ave., Hilo 96720
Hawaii RC Club, Ashman Wakaki
1443 Kaumoli Pl., Pearl City 96782
Kapiolani RC Club, Edward Kuramoto
806 17th Ave., Honolulu 96816

IDAHO

Banana Belt Balsa Butchers, Donald Sump
1429 Grelle, Lewiston 83501
Boise A.R.K.S., Robert L. Seng
4101 Rosehill St., Boise 83705
Boise Model Airplane Assn., Tony Huber
4420 Bethel St., Boise 83704
Palouse Ridgerunners, Dick S. Jackson
2504 Deane, Pullman, WA 99163
Pocatello Glue Angels, Steven Misner
138 Delano, Pocatello 83201

ILLINOIS

Aero Angels Inc., Michael Wagner
4726 N. Olcott Ave., Harwood 60656
Aero Bats MAC, Billy G. Wells
308 East Elm, Salem 62881
Aero Sport RC Club, Joe Schilling
521 Sumac Rd., Highland Park 60035
Aero Telemechanics Club, J.I. Burns, Jr.
827 S. East Ave., Oak Park 60304
Belleville RC Flyers, James Dismuke
48 Villa Drive, Belleville 62223
Champaign County RC Club, T.M. Elssesser
608 W. Main, Urbana 61801
Champaign-Urbana Aeronauts, J.J. Fasimpaur
310 E. Benham St., Tolono 61880
Chicago Aeronuts, Peter J. Sotich
3851 West 62nd Pl., Chicago 60629
Chicagoland RC Modelers, Inc., Ed Wargo
3600 W. Fullerton Ave., Chicago 60647
Chicago Model Masters, Harry Higley
433 Aquila Drive, Glenwood 60425
Chicago Scale Masters, Calvin Shumate
14446 S. Oakley, Blue Island 60406
Decatur Blunderbirds, Theordore J. Baer
Box 56, Hoopeston 60942



DeKalb Cloud Dusters, Dutch Hess
137½ E. Lincoln, DeKalb 60115
East Side RC Club, Harry W. Ryks
23 Hampton Dr., Glen Carbon 62034
Flying Fools of St. Charles, E. Carlson
418 S. Harrison St., Batavia 60501
Freeport MAC, Inc., H. James Hainke
815 W. Hamilton St., Freeport 61032
Illinois Model Aero Club, Chuck Bedwell
228 Mayfair Pl., Chicago Hts. 60411
Illinois Valley RC, Eugene Phelps
1203 S. Park Ave., Mendota 61342
Joliet RC Club, Louis Grando
5 Sun Set Lane, Joliet 60435
Kankakee Valley MFA, Andrew G. Zoph
Rte. 1, Box 310, Kankakee 60901
Kishwaukee RC Flyers, Leonard J. Lynch
939 So. 7th Street, DeKalb 60115
Lakeshore RC Club, Vito Scaravelli
133 James Ct., Glenview 60025
Lily Lake Air Knockers, Wayne Morrison
R.R. 1, Box 218, St. Charles 60174
Northwest RC Club, C. G. Fredericksen
2004 Eastman Ct., Arlington Heights
Oakaw Valley RC, Fred Johnson
420 West Court St., Paris 61944
Palos Park RC Club, James F. Reis
6924 W. 114 Pl., Worth 66482
Plug Burners, James W. Jones
1202 Belt Avenue, Normal 61761
Prop & Wing Club, Kurt Sunderman
2303 Grand Ave., Waukegan 60085
Quincy Flying Falcons, Lloyd Boden, Jr.
705 Monroe Street, Quincy 62301
Rantoul Prop Busters, James L. Hilmes
31 Rose Drive, Rantoul 61866
RC Club of Chicago, G.F. Fish
17730 Cherrywood Ln., Homewood
Red Barons, William F. Manning
1005 Cottonwood Ln., Mt. Prospect
Rockford Aeromodelers, Philip Harter
8526 Terry Rd., Rockford 61108
S.K.A.T., Thomas R. Foster
1105 Big Oaks Rd., Wildwood 60030

Chartered Club officers who receive the AMA Monthly Mailing found out in January what was January's big modeling news. Did you? If not, ask your club officers why not!

Skylarks RC Club of Ill., Richard Swindell
842-C Colonial Dr., Wheeling 60090
Springfield Propbusters, Mrs. J. Huddleston
911 Bryn Mawr Blvd., Springfield 62703
Springfield Sunday Fliers RC, A.C. Prince
2324 Bates, Springfield 62704
Suburban Aero Club of Chi., Ralph Skogh
170 Westwood, Park Forest 60466
Sundstrand RC Flyers, E. Kent Miller
508 27th Street, Rockford 61108
Thorn Creek RC Club, Richard Callen
16734 S. Evans Ave., So. Holland
Tree Town Modelaires Inc., John Talach
2245 Belleview Ave., Westchester 60153
Tri City Sky Steelers, Robert Myers
R.R. 1, Box 187, Granite City 62040
Tri Village RC'ers, Howard W. Garrison
7311 East Ave., Hanover Park 60103
Wayne Co. Flying 4-H'ers, John Trottes
502 W. Douglas, Fairfield 62837
West Suburban RC'ers, Robert Weiss
207 W. Potomac, Lombard 60148
Woodland Aero Modelers, Debbie Svoboda
2624 Jonquil Ln., Woodridge 60715
7th Realistic Comb. Combat Gp., H. Swanson
5304 Franklin, Western Springs 60558

INDIANA

Converse RC Flying Club, Jerome Rosman
226 East 50th St., Marion 46952
DeKalb Flying Models Club, Wm. Snavley
Lot 54 A.M.H.P., Auburn 46706
Eastern Indiana RC Assn., J. Fallon, Jr.
938 South 23rd St., Richmond 47374
Evansville, RC MAC, Carl R. Jarvis
1628 E. Blackford, Evansville 47714
Ft. Wayne Flying Circuits, W.W. Weber
2022 Kensington Blvd., Ft. Wayne
Griffith Barnstormers, Andriana Wright
231 N Jay, Griffith 46319
Hamilton Flying Modelers, P.D. Bennett
5745 Susan Dr., E., Indianapolis 46250
Indianapolis RC Mod., John R. Haartje, Jr.
4243 N. Kitley Ave., Indianapolis 46226
Indianapolis Westside RC Mod., E. Boos
4708 Orlando Ct., Indianapolis 46208
Kokomo Blew Angles RC Club, C.A. Weiser
824 S. Armstrong, Kokomo 46901
The Lebanon Aeronuts, Raymond Padgett
R.R. 2 Ratsburg Rd., Lebanon 46052
Loganport Thunderbirds, Eugene Hanawalt
3124 Fairview Ave., Logansport 46947
Madison County RC Flyers, Larry Dailey
R.R. 1, Box 169, Alexandria 46001
Maple City Modelers, Jerald Cooper
1537 Norman Ct., Elkhart 46514
Midwest Sundowners, Gerhardt Nordmann
380 W. Midway Dr., Valparaiso 46383
Monroe County RC Club, Dennis Friesel
R.R. 8, Shields Ridge Rd., Bloomington
Muncie Controliners, Dick Ramey
1007 W. Race St., Portland 47371
Muncie Skychiefs RC Club, Larry Smith
RR 13, Box 304, Muncie 47302
Northern Indiana MAA, Ronald Niepon
7410 W. 86th Ave., Crown Pt. 46307
Pelican Model Airplane Club, Jim Craig
8833 Kennedy Ave., Highland 46322
Screaming Eagles RC Club, David Bloomer
54 S. Cross St., Danville 46122
So. Indiana RC Mod., Ronald Howard
3303 Deerwood Dr., New Albany 47150
Tri County Aero Club, Tony Ray Barnes
Box 111, Edwardsport 47528
Tri Valley RC Club, Jerry Smith
16390 Chandler Blvd., Mishawaka
Warsaw Aero Modelers, Jerry Kay
903 E. Canal, Winona Lake 46590
Whitewater Valley RC, David W. Conrad
R.R. 3, Connersville 47331

IOWA

Balsa Busters, D.K. Hutcheson
317 Spencer Ave., Council Bluffs 51501
Black Hawk RC Pilots Inc., Wayne Boots
791 Russell Rd., Waterloo 50701
Davenport MAC, Inc., Richard A. Mairet
3009 Westmar, Bettendorf 52722
Des Moines Modelaires, James Bonanno
201 S.E. Rose, Des Moines 50315
Dodger RC Club, Ernest M. Milenberg
1278 7th Ave. N., Fort Dodge 50501
Hawkeye Model Aviation, R.D. Gehring
2401 Kilimanjaro Dr. NE, Cedar Rapids
Iowa City Aero Hawks, Terry Edmonds
Rt. 6, Box 194A, Iowa City 52240
Model Manglers of Iowa, Herbert Miller
2204 53rd St., Des Moines 50310
Muscatine RC Unlimited, Dan Knox
407 W. 7th, Muscatine 52761
Sky Kings of Newton, Larry D. Robson
602 E. 8th St. S., Newton 50208

KANSAS

Central Aeromodelers Society, J. Kraft
1707 Jenkins, Marysville 66508
Hi-Plains RC Club, Lester Rogers
Box 133, Jetmore 67854
Jayhawk Model Masters, Paul Erhart
1809 Mississippi, Lawrence 66044
Mid America RC Society, Wm. Soldner, Jr.
505 E. Republic, Salina 67401
Shawnee Mission RC Club, George Anderson
5645 Barkley, Shawnee Mission 66202
S.M. Cloud Busters, George Anderson
5645 Barkley, Shawnee Mission 66202
Topeka Parrots Aeromod., Jeffrey Thiele
1828 Oakley, Topeka 66604
Wichihawks, Larry Christie
809 No. Parkwood, Wichita 67208
Wichita RC Club, Michael O. True
1851 S. Ridgewood, Wichita 67218

KENTUCKY

Central Kentucky RC Club, H. Downing
2993 Montavesta Rd., Lexington 40502
Lexington MAC, William Richardson
1143 Centre Pkwy. No.21, Lexington
Paducah Aero Modelers, Robert Hobbs
3950 Phillips Ave., Paducah 42001
Southern Ky. RC Club, James W. Watkins
Rt. 8, Box 9, Somerset 42501
Syntonic Aero Club, Don Witt
141 Ohio Ave., Fort Thomas 41075

LOUISIANA

Acadian RC Club, James Molan
P.O. Box 52344, Lafayette 70501
Chalmette RC Flying Club, F. Mammelli
2708 Volpe Dr., Chalmette 70043
Dyna Soarers MAC, Vincent R. Burton
4658 Gawain Dr., New Orleans 70127
NE La. Radio Kontrol Soc., L.R. Stanley
1109 Lewis St., Winnsboro 71295
S.A.R.K.S., Joseph Greenwalt
214 Ave. A East, Barksdale AFB 71110

MAINE

RC Sport Modelers, Murlyn Greenleaf
173 Oak St., Bath 04530

MARYLAND

Aero Masters MAC, Tom Prentice
3021 Stranden Rd., Baltimore 21230
Baltimore Aero Craftsmen, Howard Weil
3606 Monterey Rd., Baltimore 21218
Chesapeake Bay RC Club, Inc., G. Chambers
1133 McHenry Drive, Glen Burnie 21061
Cumberland Aircraft Mod. Soc., D.S. Gish
117 N. Bel Air Dr., Cumberland 21502
DC Maxecuters, John R. Krouse
1124 Pipestem Pl., Potomac 20854
DC/RC Club, John Dryfka
4123 Warner Ave., No. C2, Hyattsville
Flite Streaks Model Club, Roy Hatch
4767 Shamrock Ave., Baltimore 21206
Fly Away RC Club, J.C. Solko
6307 Martins Terrace, Lanham 20801
Frederick MAC, Inc., Kenneth Ramsburg
RFD 6, Frederick 21701
Meade Modelers MAC, Walter J. Cislo
575 Rita Drive, Odenton 21113
Mid Atlantic RK Society, Paul Ennis
Rt. 6 Parker Rd., Box 88, Salisbury
Pegasus RC MAC, Jack Garrot
930 The Terrace, Hagerstown 21740
Prince Georges RC Club, Bob Turner
3410 Village Dr. N., Upper Marlboro

RC Modelers of Baltimore, Inc. J. Green
Box 116, Rt. 2, Phoenix 21131
Westminster Aero Modelers, C. Rudisill
69 Sycamore, Westminster 21157

MASSACHUSETTS

Berkshire RC Flying Club, J. Czarnecki
126 North St., Windsor 01270
Cape Ann RC Model Club, R.E. Gaerttner
9 Brookridge Rd., Peabody 01960
Charles River RC'ers, Douglas Allred
38 Summit Rd., Lexington 02173
Chelmsford RC Modelers, Fred Verderber
199 Concord Rd., Chelmsford 01824
Hampshire County RC, Richard Yarrows
5 Moody Bridge Rd., Hadley 01035
Lawrence Air-Istocrats, Richard LeClerc
14 Camden St., No. Andover 01844
New England Aero Team., F. Baptista
172 Coffin Ave., New Bedford 02746
New England RC Modelers, Bill Gagen
6 Plantation St., Worcester 01604
New England Wakefield Group, S. Colson
47 Sammet St., Everett 02149
No. Plymouth Balsa Bugs, Leo Wirzburger
92 Nicks Rock Rd., Plymouth 02360
Northshore MAA, David J. Reagan, Jr.
6 Ridgeway Ct., Lynn 01902
Pioneer Valley RC Club, Bruce Bentley
230 White St., Springfield 01108
Precision Modelers Assn., Norman Staples
101 Taffrail Rd., No. 1, Quincy 02169
South Shore RC Club, John Sullivan
22 Carl Ave., Brockton 02703
Springfield Area RC'ers, Wm. H. Sargent
288 Circle Dr., W. Springifeld 01089
Valley Thunderbirds, Bernard Gaudette
155 Elm St., E. Longmeadow 01105

MICHIGAN

Aero Radio Club, John A. Ibbotson
3502 Fenton Rd., Flint 48507
Ann Arbor RC Falcons, Thomas Mitchell
811 N. Mansfield, Ypsilanti 48197
Battle Cr. Balsa Bees MAC, John Watters
31 W. Minges Rd., Battle Creek 49017
Battle Creek MAC, Harold E. Lindsay
126 No. 32nd St., Battle Creek 49015
Cap. Area Radio Drone Squad., C. Spencer
236 Theo Street, Lansing 48917
Detroit Balsa Bugs, Inc., W.T. Hartung
14759 Kilbourne Ave., Detroit 48213
East Wings Model Club, Ronald Logghe
19402 Shadowoods Dr., Roseville 48066
Flying Robots RC Club, Ed Heiser
35485 West Chicago, Livonia 48150
Greater Det. Soaring & Hiking Soc., E. Pell
240 S. Rochester Rd. No.106, Clawson
Greater Flint RC Club Inc., J.E. Von Linsowe
4509 Thompson Rd., Linden 48451
Grimes, William Driftmeyer
1963 Galewood S.W., Wyoming 49509
Indian City RC Club, Albert Winters
15336 Grandville, Detroit 48223
Jackson RC Club, Manville Wilson
7146 Bayview Ave., Jackson 49201
Kent Radio Aero Modelers, Robert Kok
5186 Pleasant Cr., NE, Comstock Pk.
Lansing Flying Aces, Jon Fancher
1317 W. Saginaw, Lansing 48915
Livonia Rib Crackers, Robert Casler
11309 Blackburn, Livonia 48150
Michigan RC Society, Rex Rexin
21647 Chestnut, Farmington 48024
Midwest RC Society Inc., J. Wernersbach
21727 Valley Woods Dr., Birmingham
Mt. Clemens RC Club, Richard Myron
38937 Harper, Mt. Clemens 48043
Pontiac MAC Inc., John A. Frazer
1980 Beverly, Pontiac 48057
Radio Club of Detroit, Helen R. Brett
18864 Millar, Mt. Clemens 48043
Saginaw Sodbusters Model Club, D. Tait
118 S. Michigan, Saginaw 48602
Saginaw Valley RC Club Inc., D. Dobson
2310 Stone St., Saginaw 48602
Seaway RC Club, Russell R. Price
4725 Hts. Ravenna Rd., Fruitport 49415
Signal Seekers RC Club, Wayne W. Yeager
6323 N. Wayne Rd., Westland 48185
Stratmoor RC of Detroit, Leon Ryktarsyk
7787 Archdale Ave., Detroit 48228
UP Model Aeronautics Assn., D. Seagle
820 N. Third St., Ishpeming 49849
W. Godwin Hobbies Flying Club, F. Pulte
1545 Iowa St. S.W., Wyoming 49509
Whirlwinds of So. Mich., John Bloom, Jr.
3569 Arbor St., St. Joseph 49085
Wurtsmith-Oscoda RM, D.W. Anderson
1008 8th St., Wurtsmith AFB 48753

MILWAUKEE AREA RADIO KONTROL SOCIETY, INCORPORATED

MINNESOTA

Central Minnesota RC, Earl Kaeter
1117 21 Ave. N., St. Cloud 56301
Elk River RC Club, Don Horuath
1141 Nile Lane, Elk River 55330
Mankato Modelers, SFC Jerry B. Caldwell
702 E. Main St., Sleepy Eye 56085
Minn. Piston Poppers, Peter R. Simonson
2520 Parkview Blvd., Minneapolis 55422
Minneapolis MAC, Anthony Saunderson
5843 June Ave., N. Minneapolis 55429
Rochester Aero Model, W.S. Wentink
P.O. Box 6163, Rochester 55901
St. Paul Model RC Inc., James L. Brown
P.O. Box 33111, Minneapolis 55433
Twin City RC Inc., Jess Farkas
9749 Little Road, Minneapolis 55431
Twin Ports MAC, Frank A. Tahtinen
428 W. Cleveland St., Duluth 55811

MISSISSIPPI

Capital City RC Club, Mike Marshall
5906 Westmore Dr., Jackson 39206
Columbus Prop Busters, Donald O. Rich, Jr.
179 Hamilton, Columbus AFB 39701
Meridian RC Club, Julie M. Woods
Rte. 1, Scooba 39358

MISSOURI

Central City RC'ers, James Perkins
4271 E. 62 St., Kansas City 64130
Conductron RC Club, O.H. Stanton
5637 Hiller Place, St. Louis 63136
Freelancers RC Club, Robert E. Stagner
1838 Seifert Dr., Poplar Bluff 63901
Hot Heads MAC Inc., William J. Rech
10821 St. Xavier Ln., St. Ann 63074
Kansas City No. Knights, George Thompson
1114 E 44th St. No., Kansas City 64116
Kansas City RC Assn., Don Henry
3428 Oxford, Independence 64052
Kirkwood Thermaleers Inc., Robert Hotze
673 Craigwoods Dr., Kirkwood 63122
Lafayette Esquadrille, August Vogele, Jr.
703 Connie Ln., Manchester 63011
McDonnell Free Flight Club, J.H. Bennett
324 Helfenstein Ave., St. Louis 63119
McDonnell RC Club, Gene Jones
4829 Plumtree Circle, Hazelwood 63042
Mid-Missouri RC Assn., Jennifer Webb
Box 475, Columbia 65201
RC Club of Springfield, Frank G. Curtis
1523 S. Holland, Springfield 42535
Signal Chasers, Melvon G. Hart
936 Dontaos Dr., St. Louis 63131
Spirits of St. Louis RC MAC, P. O'Toole
130 Humes Lane, Florissant 63031
Springfield Balsa Busters, Michael Martin
1220 E. Portland, Springfield 65804
St. Charles Phantom Flyers, Edwin Gross
431 Vine, Ofallon 63366
St. Louis Yellow Jackets Inc., Art Schaefer
4206 Virginia Ave., St. Louis 63111
Sunchasers RC Club, Gilbert J. Frahm
6609 Quail Run Dr., Kansas City 64152
Thunder Birds, Lawrence Bush
4028 N. Newstead, St. Louis 63115

MONTANA

Big Sky RC Modelers, Richard Helgeson
612 3rd Ave. S.W., Great Falls 59401
Billings Flying Mustangs, Audrey Darnielle
3043 Bartonia Blvd., Billings 59102
Bozeman Air Tragedy Soc., Chas. F. Curtis
1202 Spruce, Bozeman 59715
Cut Bank Skyhawks, James W. Kruger
Box 364, Cut Bank 59427

Helena Flying Tigers, Dwaine Caussyn
410 Clinton, East Helena 59635

NEBRASKA

Cobra RC Club, Howard C. Hough
924 Ave. I, Council Bluffs, IA 51501
FreMAC's, Gary Hetrick
1615 N. Monroe, Fremont 68025
Hastings Skylarks, Marvin D. Bruntz
Rte. 2, Hastings 68901
Lincoln Sky Knights, William C. Bowlin
850 E. Sanborn, Lincoln 68505
Mid Nebraska Model Club, Richard Hansen
P.O. Box 373, Cozad 69130
Orbiting Eagles of Greater Omaha
T. Kirkpatrick, 71 75 N. 50th, Omaha

NEVADA

Reno RC Club, Inc., Fred Younker
12235 Brentfield Dr., Reno 89502

NEW HAMPSHIRE

Ashuelot Valley Flyers, William Sterling
Matthews Road, Keene 03431
Concord Aeroguidance Soc., N. Littlefield
Buch Street, Suncook 03275
So. New Hampshire RC Club, B. Fitzgerald
205 Wilkins St., Manchester 03102

NEW JERSEY

Atlantic County Sky Blazers
403 E. Redwood Ave., Pleasantville
Bergen Co. RC Club, Inc., Henry Stiles
185 Franklin Turnpike, Mahwah 07430
Berkeley Blade Busters, Fred L. Wolff
68 Berkshire Dr., Berkeley Hts. 07922
Burlington Co. RC Club, Jack Imhoff
56 Shawmont Ln., Willingboro 08046
Central Jersey RC Club, George Terwilliger
351 Main St., Metuchen 08840
East Coast Indoor Mod. Emanuel Radoff
61 Springbrook Rd., Livingston 07039

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Garden State Circle Burners, Michael Turo
43 Old Orchard Ct., Cedar Grove 07009
Jersey Aircraft Modeler, George Snyder III
283 S. Fellowship Rd., Maple Shade
Jersey Coast RC Club, Inc., Paul H. Hulse
198 5th Ave., Neptune City 07788
Jersey Tailwinds, George Drechen
120 South Jackson, Woodbury 08096
Lakeland RC Club Inc., Walter Castle
36 Shepherd Place, Kearny 07032
Mercer Co. RC Soc. Inc., Richard Moloney
210 Holly St., Delanco 08075
Middlesex Modelers, Inc., A.W. Koenig, Jr.
1613 Frase St., So. Plainfield 07080
Mis-Guided Missiles RC Club, E.S. Clement
7 Hitchner Ave., Bridgeton 08302
Monmouth MAC Inc., Joe Friend
62 Joysan Terrace, Freehold 07728
Morris Co. Aeromodelers, Thomas J. Blaney
13 Mohawk Ave., Rockaway 07866
North Jersey RC Club, Joseph Beshar
198 Merritt Dr., Oradell 07649
Oakland RC Club, William C. Stumpf
166 Beach Terrace, Wayne 07470
Ocean Co. Modelers, John L. Applegate
23 Monroe Ave., Toms River 08753
Rockaway Valley RC, Allen Esenlohr
Box 153A, Rd. 2, Newton 07860
Rockland Co. RC Club, L. Audino, Jr.
254 Glen Rd., Woodcliff Lake 07675
Roxbury Area MAC, Lee Markowski
7 Woodsedge Ave., Budd Lake 07828
Sky Furys Model Airplane Club, L. Peters
248 E. Howard St., Clayton 08312
So. Jersey Aeromodelers, Paul E. Haley
Braddock Ave., Rd 5, Hammonton 08037
S. Jersey Flyaways Inc., John J. Gamble
603 State Road, Mantua 08051
Top O'New Jersey RC Club, L. Fletcher
456 E. McFarlan St., Dover 07801
Tri County RC Club, Michael McCormick
112D Johnson Place, South River 08882
West Jersey RC Club, Alfred Langbery
Sherwin Rd, Rd. 2, Sewell 08080
W. Jersey Radio Flyers, Leigh Jezorek
1701 Oakwood Terr., Scotch Plains

NEW MEXICO

Alamogordo Model Aviators, S.C. Dodd
2508 Westminster, Alamogordo 88310
Albuquerque RC Club, Leo P. Navoda
6600 Natalie NE, Albuquerque 87110
Albuquerque Thunderbirds, Charles Sinclair
4312 Devita Rd. SW, Albuquerque 87108
Clovis Mads, Greg Harvey
Star Route Box 48, Clovis 88101
Hobbs Aero Radio Kontrol Soc., J.R. Cox
901 E. Michigan No. 42, Hobbs 88240
South West Aero Team, Wayne H. Sisk
6212 Katson NE, Albuquerque 87109

NEW YORK

Aeroguidance Soc., Inc., Robert Noll
96 Pine Knoll Rd., Endicott 13760
Aero RC of Syracuse Inc., R. Jaskolka
311 Riverglen Rd., Liverpool 13088
Bayside Wire Tappers MAC, C.F. Scalisi
35-02 203 St., Bayside 11361
Bethlehem RC Club, George Zautner
8 Groesbeck Pl., Delmar 12054
Blue Angels, Martin Meyer
79 Charles St., New Rochelle 10801
Flying Knights of Hamburg, Wm. Eberhardt
46 Ganymede Ln., Lakeview 14085
Flying Live Ones, Linda L. Gascon
P.O. Box 125, Atlanta 14808
Flying Rebels, Evert A. Ecklund
75 Benson St., Jamestown 14701
Flying Sparks Inc., Donald Jurusik
446 Welles St., Elmira 14901
Gee Bees RC Club, Martin Berman
2249 E. 28th St., Brooklyn 11229
Golden Knights, John Zugec
69 Maple St., Geneva 14456

(Continued on page 66)

PRESIDENT CALLS FOR POLL AMONG PARTICIPANTS FOR WC TEAM FINALS SITE

A plan for the location of Team Finals sites by a poll of participants was authorized by AMA President John Clemens following a November 3 meeting held in Washington with John Worth, executive director; John Patton, the president's FAI program delegate; and Maynard Hill, AMA-FAI coordinator and CIAM delegate. Team Finals are the last stages in programs to competitively select U.S. World Championship teams.

Until recently a single centrally located (within 600 miles of Kansas City) Team Finals was the concluding contest in each program, but the Indoor Team Program of 1971 did not have available a suitable central site, and it appears that the Free Flight Outdoor Team Program to be completed this year may not have a central Team Finals site available either–at least not for the dates originally announced. Considerable last-minute uncertainty surrounded the location of the Indoor Team Finals which was finally split into east coast and west coast sections. Also there have been a number of requests and proposals during the past two years for a return to the regional concept of Team Finals in the FF Outdoor Team Selection Program.

In that the AMA bylaws clearly give the president authority over FAI programs, the meeting was called to obtain recommendations concerning current and future operations of these programs–following which AMA President Clemens has authorized the following guidelines.

Future Team Selection Programs

1. Participants in the last team program will be polled to decide whether the finals in the next program will be at a single site (central or otherwise) or at two or more sites. This poll is to be made as soon as possible following the completion of a program, so that those planning the next program may have the benefit of maximum time to incorporate the results. For programs to be initiated in 1972 the poll will be taken prior to January 1 with announcement of results to be published immediately thereafter.

2. To decide the question of single or multiple sites a 60% majority of those responding must be in favor of the single site. Failure to achieve the 60% majority will automatically decide in favor of multiple sites. Whether two or three finals sites are to be used will depend upon site availability; such decision to be approved by the president after hearing recommendations from the program administrator, the executive director and others the president may choose.

3. On poll details other than site selection a simple majority vote by those responding will decide the issues.

4. If more than one flyoff site is available in a program, finalists may decide for themselves which site they will fly at, but they may fly at only one of the sites.

5. The above procedure applies to all team selection programs except those which depend heavily upon a judgment factor for determining winners, such as RC Aerobatics, CL Stunt, CL Team Racing. For such events a single flyoff site will be used, and the location will be decided by poll only if a reasonably central site is not available–the question of site location to be decided prior to the start of the program.

Current FF Finals

As authoirized by the president, a poll of qualified team finalists was in progress when this was written. A "central" site at Bryan, Tex., over the July 4 weekend (instead of the Labor Day weekend as the program details originally had announced) was up for consideration. Alternates up for vote in the event of unacceptance were (1) a single but non-central Team Finals and (2) regional Team Finals.

COLOR CODES FOR NEW RC FREQUENCIES

Ed Lorenz, chairman of the AMA Frequency Committee, has advised that the following are now officially recommended as color codes for the new RC frequencies:

72.16 MHz–White and Blue
72.32 MHz–White and Violet

These color codes follow the previous progression of colors in accordance with the code for electronic components. While the shade of blue is not specified for 72.16 MHz, a light blue would be helpful to better separate the color codes of these two frequencies.

AMA News Extra .....

MORE 1972 AMA RULES

Part of the new AMA competition rules, which became effective on January 1, 1972, were announced in this space last month. The remaining rules changes, with the same effective date, are summarized below. All are the result of votes by the appointed volunteer Contest Boards for Free Flight, Control Line, Radio Control and Scale. All areas of the country are represented on each of the 11-member boards.

General

National Champion Teams. The Contest Boards have accepted rules for the competition of such teams (made up of five modelers who are not all members of one AMA club--they may be from diverse locations, including armed services teams) at the National Contest. The accepted rules provide the same conditions previously used for National Champion Team Awards, but now on an official basis.

Team Entry Model Identification. This concerns jointly constructed models in accordance with rule book para. 1.9. The new rule waives the requirements for one-inch or one-third chord numerals in cases where more than two members' numbers must appear--if the Contest Director feels that these size requirements would lead to confusion in reading the numbers.

Classification of Sanctioned Meets. The criteria for Class AA and Class AAA meets was revised, but with effectivity in 1973.

Radio Control

Pattern. For all classes, engine mufflers are now required. Three new rules were added concerning engine stoppage: if the engine stops during the taxi demonstration, the takeoff is graded for a maximum score of five points; if after takeoff is announced, the takeoff score is zero; in either case the contestant may continue if he gets his engine restarted within the allowed two minutes. Added factors have been put into effect for several maneuvers: the taxi demonstration will not be considered finished until the contestant announces takeoff; in landing a dead-stick engine has been eliminated as a reason for down-grading, but any gear-up landing, no matter how well executed, will be scored zero as will failure of a landing gear during landing and before the plane completely stops; the figure M description is being reworded to eliminate ambiguaties. The Class B schedule of maneuvers has been revised to (1) takeoff, (2) touch and go, (3) 3 axial rolls, (4) 3 inside loops, (5) 4-pt. roll, (6) spin, (7) horizontal eight, (8) Cuban eight, (9) 3 outside loops, (10) traffic pattern, (11) landing perfection, (12) spot landing.

Pylon. The engine specifications have been revised by the addition of the following statement: Engines may only be altered by removing parts of material from parts; no material or parts may be added. Another new rule allows a contestant to protest another's engine and, by posting a $25 bond, require the Contest Director to conduct an engine inspection; if the protested engine is found "legal", the owner keeps the $25 for his trouble; if found "illegal", the entry is disqualified and the $25 is returned to the protestor; the CD may also require an engine inspection at his own prerogative without posting a bond. A new system for handicap judging was adopted: all entries are lined up in highest to lowest order, and each is assigned a consecutive number starting with one; this number determines the starting position in each race.

RC Gliders. The rules put forward by the League of Silent Flight have been adopted as provisional AMA rules. A feature is the "task" concept in which two or more judging aspects may be combined to make a single contest event.

Free Flight

Gas. A new flyoff procedure was also adopted for Category I events (new Cat. II procedure reported last month). After three five-minute flights have been obtained, the engine run is progressively reduced, while the max flight remains five minutes, and only hand-launching is permitted. For the first flyoff (the fourth flight), maximum engine run is 10 seconds; for the second to final flyoff, the engine run maximum is eight seconds. (The Contest Board did not accept the proposal to allow two attempts for each flyoff.)

Control Line

Two additional rules are in effect which were not reported last month. Both are applicable to all Control Line classes with but a single exception which is noted.

Crimped-Tube-Type Line Connections. Line terminations using the crimped tubing type of construction, as are supplied on commercially available ready-to-use control lines, are acceptable in all Control Line events (except Speed) on multi-strand (commonly called stranded) lines only. Crimped tubing line terminations constructed by the modeler (i.e. not commercially available) may also be used on multi-strand lines, provided they are made using soft tubing material such as is supplied with commercial line sets and provided they are made according to instructions provided with commercial line sets. It is mandatory that three line thicknesses pass through the tube before crimping. It is recommended that such terminations be carefully inspected on a regular basis. Crimped tubing terminations are not permitted on single-strand (solid) lines.

Line-Clip Connectors. Each load bearing line connector shall have a test rating equal to at least the total pull-test required on the model; i.e. if the model requires a 40-lb. pull-test, the connectors will have to be test-rated at a minimum of 40 lbs. each. The burden of proof of the test-rating of line connectors shall be the contestant's responsibility. Test ratings on factory-packed connectors will be considered as acceptable proof.

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

Green Bush Pilots, Jean E. Hultberg
RFD 1, Box 140, East Nassau 12062
Hudson Valley RC Inc., Fred A. Bange
64 Farm Rd., Briarcliff Manor 10510
Island Model Plane Society, Robert Steele
23 Raynham Dr., Syosset 11791
Kingston Aeromodelers, Robert P. Curry
Coopers Lake Dr., Bearsville 12401
Long Island Aero Radio Soc., Ira Jersey
10 Walnut Rd., Rockey Point 11778
Long Island Drone Soc. Inc., J. Holmes, Jr.
216 Sherman St., Westbury 11590
Long Island Fly Together Soc., L. Pfeifer
475 N. Putnam Ave., N. Lindenhurst
Long Island RC Soc., F.G. Nesbitt, Jr.
125 President St., Hempstead 11550
Meroke RC Club Inc., Charles Robinson
2513 Wilson Ave., Bellmore 11710
Mid-Hudson RC Soc. Inc., Joseph J. Miller
18 Tor Rd., Wappingers Falls 12590
Midstate Modelers, Dennis Mead
Box 35, Casenovio 13035
Modelers of Binghamton, J. Michael Bishop
P. O. Box 51, Conklin 13748
Mohawk Valley RC Modelers, Dennis Flack
103 Henry St., Herkimer 13350
Niagra Co. RC MAC, Inc., Richard Danilowiez
3245 Creek Rd., Youngstown 14174
Niagara Sunday Flyers, Don Cameron
420 12th St., Niagara Falls 14303
Onondaga MAC, Carl Crownhart
5419 Loretta Ln., Clay 13041
Oswego Valley Modelaires, Joe Sczupak
RD 3 Jacksonville Rd., Fulton 13069
Pan American MAC, Donald A. Wansor
514 Beach 45 St., New York 11691
Penn Ave. RC Soc., Bernard Sanders
14 Arrowwood Ln., Huntington Sta.
Queens County RC, Pat Ludovico
75-46 168th St., Flushing 11366
RC Club of Rochester, Roy A. Walder
129 Westmoreland Dr., Rochester 14620
RC Pulsers of Western N.Y., John Feld
28 Asbury Pl., Depew 14043
RC Soc. of Marine Park, Martin Berman
2249 E. 28th St., Brooklyn 11229
Richmond MFC, Inc., Ludwig V. Hollwitz
1736 Madison Place, Brooklyn 11229
Rochester Aero Mod. Soc., Inc., C. Smith
334 Dickinson Rd., Webster 14580
Saratoga Co. Aeromodelers, Guy Cannon
322 Ard No. 2 Traver Rd., Gansevoort
Sky Rovers Finger Lakes RC, Ron Lukowski
Rd. 2, Rt. 89, Romulus 14541
Sky-Scrapers, Ed Fronczek
34-14 Broadway, Long Island 11106
Squadrone Escarole Inc., John A. Sbare
3240 Barker Ave., Bronx 10467
Suffolk Falcons, Eugene W. Rogers
11 Sound View Drive, Shoreham 11786
Suffolk Wings RC MAC, Ray Swanson
P.O. Box 133, Port Jefferson 11777
Sullivan County RC, Sy Appel
59 York Ave., Monticello 12701
Syracuse Thunderbirds, James Magistro
8335 Dorren Ave., Rd. 4, Clay 13041
Thundervolts RC Club, Hilvan Finch
75 McClellan St., Schenectady 12304
Westchester Radio Aero Mod., R.W. Ehrlich
40 Sommis Lane, White Plains 12180
Wingmasters MAC, Robert A. Sylvia
28 Holiday Park Dr., Hauppauge 11787

NORTH CAROLINA

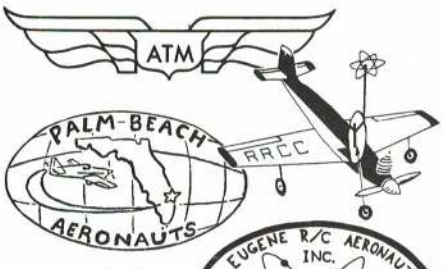
Coastal Carolina RC Club, Robert Myers
165 Cherry Circle, Havelock 28532
East Carolina RC'ers, Richard A. Proseus
Route 3, Box 405, Goldsboro 27530
Fort Bragg MAC, William Davis
600 S. Main St., Hope Mills 28348
Gastonia RC Club, Reid Sipe
1710 Wildwood Rd., Gastonia 28052
Greensboro Radio Mod., J.E. Bartlett III
4202 Hampshire Dr., Greensboro 27405
Hickory RC Prop Twisters, Shirley Teague
625 5th Ave. S.W., Hickory 28601
Kinston Aeromodelers, Charles L. Buchanan
404 Edgehill Ave., Kinston 28501
Monroe RC Club, Carl Whilden
4735 Emory Lane, Charlotte 28211
Montgomery Randolph RC Club, J.C. Pugh
RFD 1, Box 455, Franklinville 27248
Morganton RC Club Circle, W.H. Shytle
Rt. 2, Box 4, Connelly Springs 28612
Prop Twisters MAC, John Comerford
3611 Hobbs Rd., Greensboro 27410
Raleigh Durham RC Club, R.L. Isaacks
810 Faircloth St., Raleigh 27607
The Shelby MAC, Donald K. Greene
1005 W. Warren St. Ext., Shelby 28150
Wenoca RC Club, C.R. Brown
1300 Lockland Ave., Winston Salem
Western NC RC Soc., Inc., Frederic Lewis, Jr.
422 Hidaway Cove, Hendersonville 28739
Wilmington MFC, Marvin E. Stokely
Rt. 3, Box 302 BB, Wilmington 28401

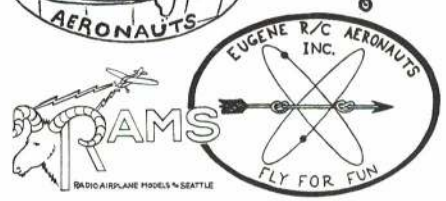
NORTH DAKOTA

Red River RC Club, Charles E. Orange
1701 University Ave., Grand Forks 58201
F.M. Skylarks, Lonnie Kroeber
1754 South 9th, Fargo 58102
Valley RC Flyers, Inc., James J. Joyce
410 22 Avenue North, Fargo 58102

OHIO

Alliance Balsa Bees MAC, Carlton Topel
1705 Western Ave., Alliance 44601
Capital City Controlliners, C. Hemmerly
5607 Sandalwood Blvd., Columbus 43229
Centaur RC Club, Wilson A. Esken
712 West 9th St., East Liverpool 43920
Central Ohio FF Club, Floyd Miller
1313 Brookridge Dr., Columbus 43220
Cincinnati Aeromod. Inc., Gerhard Vogeler
2873 Carroll Ave., Cincinnati 45211
Cleveland RC'ers, Paul W. Salisbury
21430 Morris Ave., Euclid 44123
Darke Co. Aeromod. Assn., Daniel H. Weaver
222 Markwith Ave., Greenville 45331





Dayton Buzzin Buzzards, Ralph Hoebner, Jr.
337 Murchison La., Dayton 45431
Dayton Wingmasters, Martin Richardson
7130 Claybeck, Dayton 45424
Electronic Flyers, Harvey W. Mace
1697 Kenmore Dr., Mansfield 44906
Flying Aero Sport Team, Gerald Peters
12450 Amity Rd., Brookville 45309
F.O.R.K.S., Leslie Anthony
Rt. 7, Lancaster 43130
Goodyear MAC, Bill Peel
116 Donovan Ave., Mogadore 44260
Hubbard Valley Flyers, John Swindell
1224 Carnegie, Akron 44314
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4818 Maplecrest Ave., Parma 44134
Lakewood Flite Masters, Robert Ivey
5010 Longwood Ave., Parma 44134
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Mahoning Co. MC, Inc., J. Fred Baun
18 Clyde St., Poland 44514
Mentor Area RC Society, Robert Boone
575 Magnolia Dr., Painesville 44077
No. Ohio FF Assn., Rudy Kluiber
2021 Lakeland, Lakewood 44107
The Oak Hills Dragon Flies, Gary Hoffman
629 Taylor Dr., Cincinnati 45211
Ohio Flying Aces, Richard A. Smith
4122 Kirk Rd., Youngstown 44511
Portage Aero Modelers, Edward W. Burdge
2921 14th St., Cuyahoga Falls 44223
Prop Busters MAC of Lake Co., C. Ziehlke
5215 Harmony Lane, Willoughby 44094
Queen City UC Flying Club, Wm. Messerly
1122 Eight Mile Rd., Cincinnati 45230
RC Short Circuits Club Inc., H.E. Hanser
4283 Maureen Dr., Youngstown 44511
RC Thermaliers, James Parlin
Rte 1, Box 85A, Wheelersburg 45694
Ridge Road RC, R.A. Sommer
563 Adelaide NE, Warren 44483
Shoo Flyers MAC, Stephen Stanford
602 Woodlawn Rd., Ohio City 45874
Skyhawks RC Club, Sam Barbone, Jr.
R.D. 1, Box 504, North Jackson 44451
Skylarks, J.W. Stidham
6067 Sherwood Dr., N. Olmsted 44070
The Skyliners, Craig Testruth
5263 Homewood, Maple Heights 44137
Southern Ohio Aeromodelers, J.H. Sanders
6170 Maffey Rd., Goshen 45122
SW Ohio Free Flighters, G.M. Pharr, Sr.
7936 Mitchell Farm Ln., Cincinnati
Thumbull County RCM, Robert A. Rufener
1104 Buena Vista NE, Warren 44483
Tri-State RC Club, H. Stanford Edwards
610 Washington St., Coal Grove 45638
The Weak Signals RC Club, Don Belote
1834 Brame Place, Toledo 43613
Western Ohio RK Soc., Donald Kabel
827 Antioch School Rd. Vandalia
Winton Woods Flying Club, Robert Oehler
2003 Sundale Ave., Cincinnati 45239

OKLAHOMA

Okla. City Controliners, Bob Brewer
1424 NW 44th, Oklahoma City 73118
Ponca City RC Modelers, Norman Barnes
1712 Potomac Drive, Ponca City 74601
Ponca Pivot Pilots, Mark Whitney
711 Edgewood, Ponca City 74601
SPADS, Ronald A. VanWelden, Jr.
1619 South Jackson, Enid 73701
TORKS, Red Callaway
4505 N. Utah, Oklahoma City 73112
Tulsa Glue Dobbers, Inc., James F. Ewers
4107 E. 59th Pl., Tulsa 74135

See April issue (next month) for clubs in Oregon, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont, Virginia, Washington, West Virginia, Wisconsin, Wyoming, APO & FPO.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

FEB. 6—LOS ANGELES, CALIF. (A) Racing CL Series. Site: Sepulveda Basin. J. Plaunt CD, 909 S. Second St., Apt. I, Alhambra, Calif. 91801.

FEB. 6—GREEN BAY, WISC. (A) Polar Bear FF Meet (Cat. I). Site: Frozen Green Bay. R. Cowles, Jr. CD, 2424 Ducharme Ln., Green Bay, Wisc. 54301.

FEB. 12—ALBANY, ORE. (A) February Indoor Contest (Cat. II). Site: South Albany H.S. Gym. B. Stalick CD, 1120 Shady Ln., Albany, Ore. 97321.

MARCH 5—LOS ANGELES, CALIF. (A) Racing CL Series. Site: Sepulveda Basin. J. Plaunt CD, 909 S. Second St., Apt. I, Alhambra, Calif. 91801.

APRIL 8-9—NEW ORLEANS, LA. (A) 1st Annual New Orleans Spring Fiesta RC Scale Invitational Meet. Site: Crescent City RC Club Flying Field. A. Wiltz CD, 3231 47th St., Metairie, La. 7001.

APRIL 9—LOS ANGELES, CALIF. (A) Racing CL Series. Site: Sepulveda Basin. J. Plaunt CD, 909 S. Second Street, Apt I, Alhambra, Calif. 91801.

APRIL 15-16—MONROE, N.C. (AA) MR/CC RC Air Races I. Site: Monroe RC Club. V. Helms CD, 800 Tyvola Rd., Charlotte, N.C. 28210. Sponsor: Monroe Radio Control Club.

APRIL 16—PHOENIX, ARIZ. (AA) Spring FF Contest (Cat. I). Site: 35th Ave. & Pinnacle Peak. W. Morris CD, 7422 E. McKinley St., Scottsdale, Ariz. 85257.

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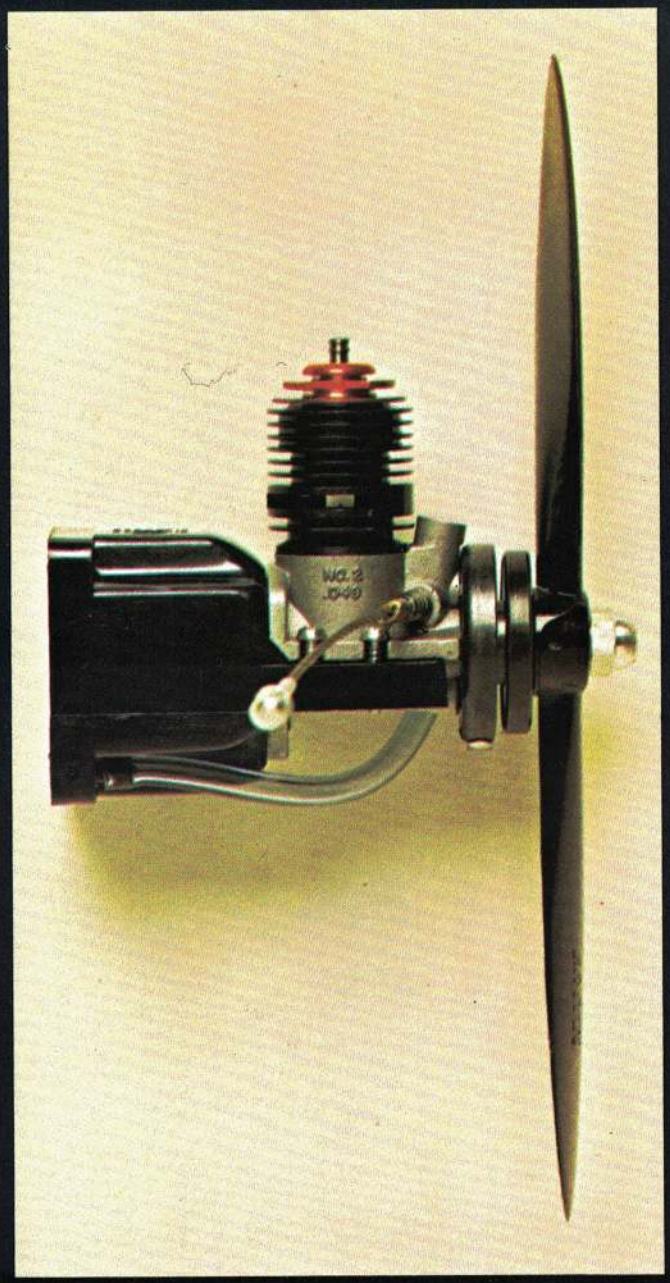

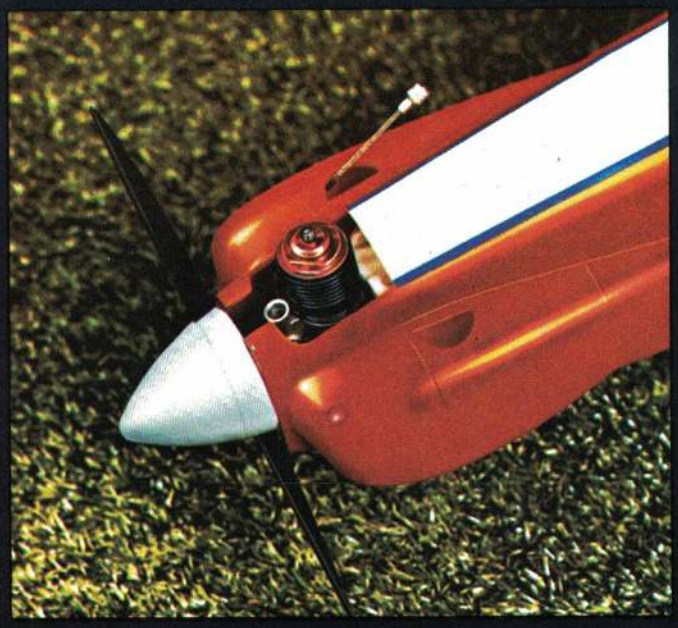

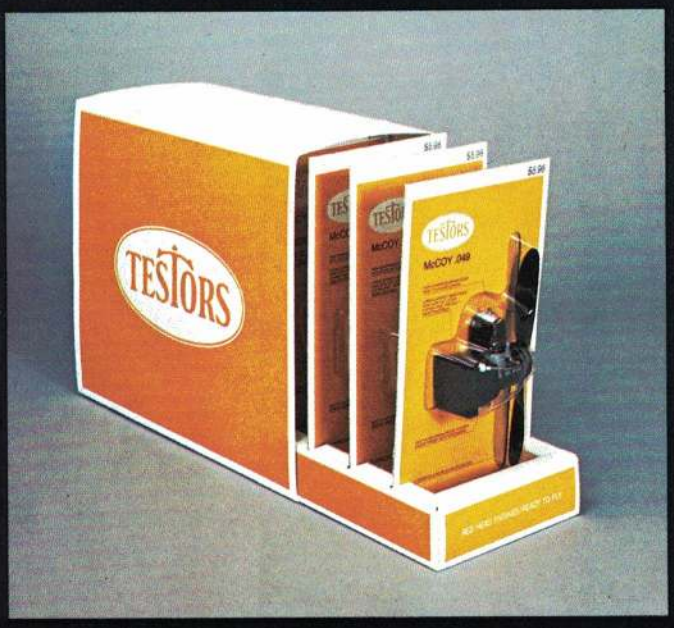

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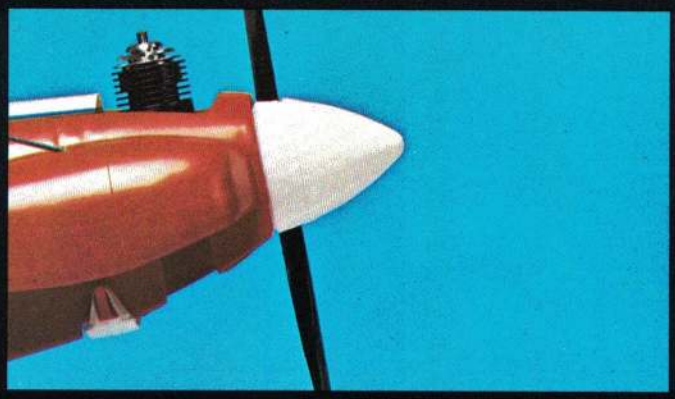

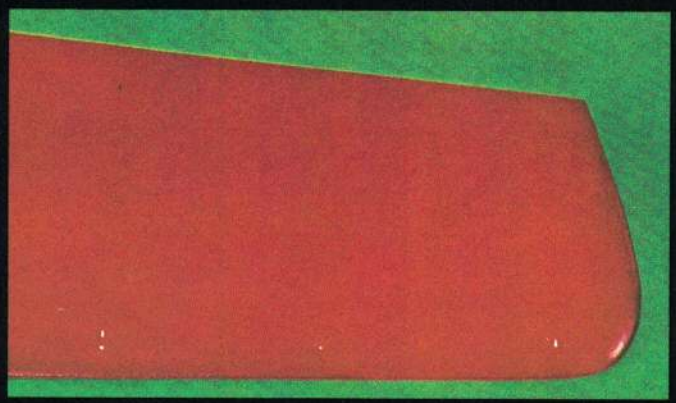

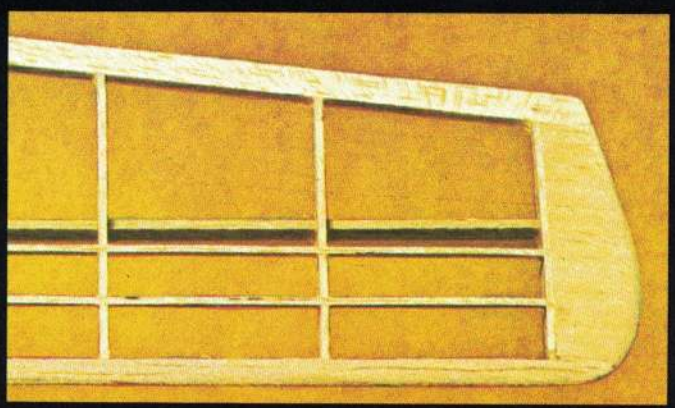

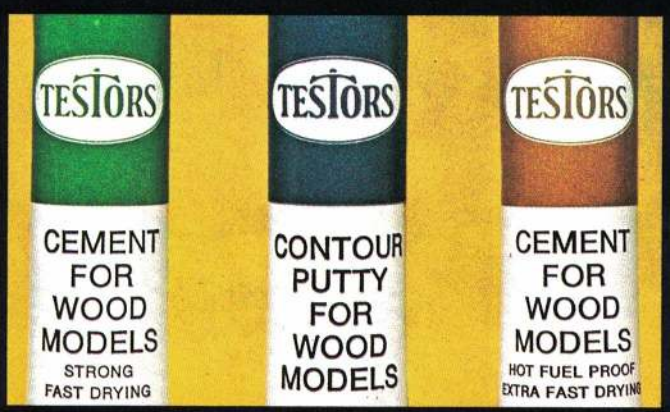

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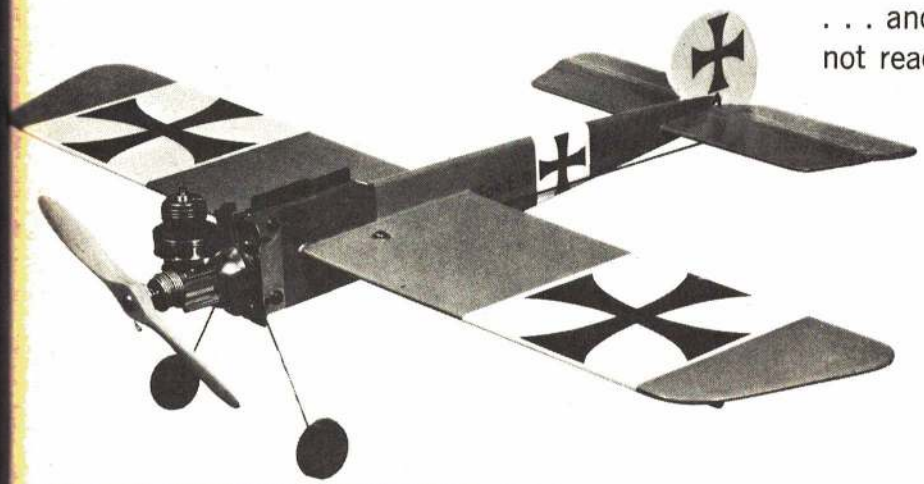

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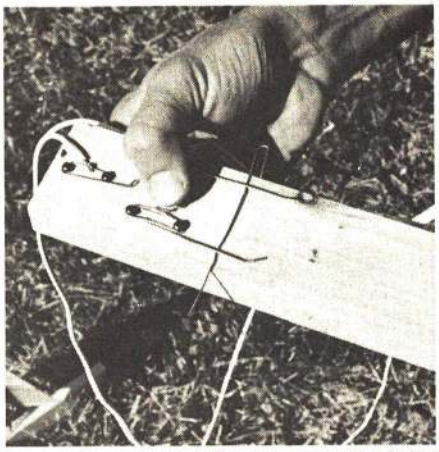
(continued from page 52)



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1959	X	X	X	X	X	X	X	X	X	X	X	X
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1969	X	X	X	X	X	X	X	X	X	X	X	X
1970	X	X	X	X	X	X	X	X	X	X	X	X
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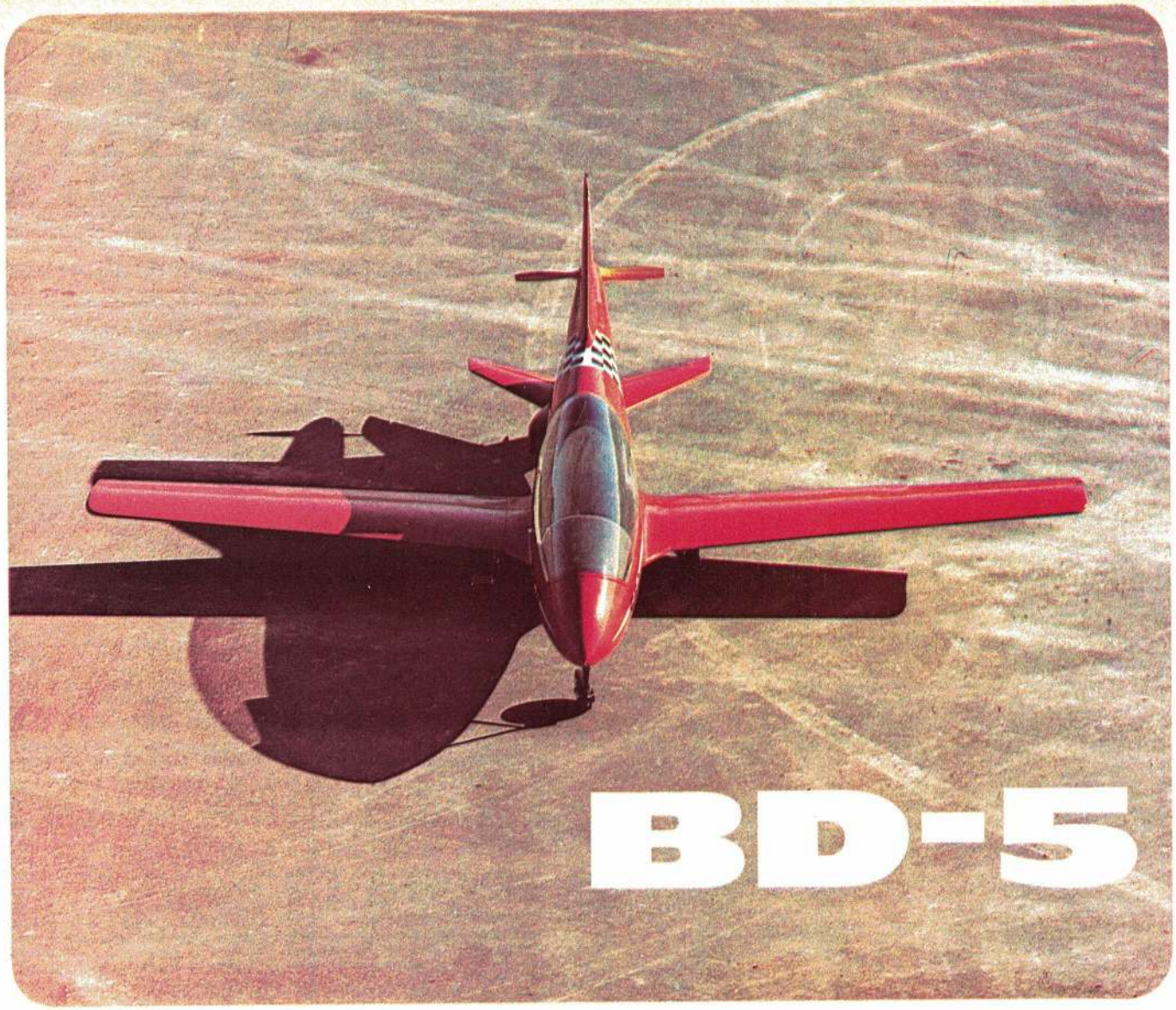

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No. 0324, 2T—ACE-foam-winged RC trainer for 049 power carries 2-channel bricks with case. Ample wing area for long glides too. $2.00

2 T

(continued from page 38)

Begin construction by first cutting out all parts using the plan as a guide. Some modelers cut the plan and rubber cement it to the balsa wood. This is helpful, since it does let you make economical cuts and save wood. The rubber cement just peels right off and cleans up easily. Double-check fit all parts now. With everything set, and using 5 Minute Epoxy throughout, laminate F2 and F3. Next, glue the laminated formers to the right-hand fuselage at right angle using square; glue left-hand fuselage side to F4 and to laminated F2-F3. (Double check this for right angle.) Cement plywood plate F5 to bottom of fuselage. Pull tail together and cement after visually double checking alignment, then position landing gear against F2-F3 and epoxy.

Now epoxy nose doubler sections inside the nose, making sure that shorter doubler is on the right. Position blind nuts on back of firewall for engine and cement. Cement firewall to sides using masking tape or rubber bands to pull sides together. (Give firewall plenty of epoxy.) Let dry thoroughly, and then give firewall and landing gear another generous dose of epoxy.

Cement top and bottom 1/4" nose sheets in place. Install the landing gear anti-spreader (really protects on landings). Plank bottom of fuselage with cross grain sheet, except for plywood tail skid mount where plywood is used. Cement stabilizer, checking for square and alignment. Cement tail skid and mount to bottom. Install wing dowels. Cement rear top to fuselage. Next, cement fin and dorsal, checking alignment. Join elevator halves using 1/16" music wire bent as shown. Then, install elevator on stab using hinges of your choice, and then install rudder.

Sand entire fuselage and surfaces smooth and finish as desired. Simply dope to color wanted, or cover with silkspan, or TopCotE, MonoKote, or any method you choose.

For the wing, a constant chord panel and both taper panels of the Ace foam wings are needed. (We understand Ace will make a

UPCOMING SHOWS and COMPETITIONS

HIAA TRADE SHOW, Conrad Hilton Hotel, Chicago, Ill.
February 6-9, 1972

18th ANNUAL TOLEDO R. C. CONFERENCE, Lucas County Recreation Hall, Maumee, Ohio, February 26-27, 1972

ELECTRONIC FLYERS ANNUAL MODEL STATIC CONTEST & SHOW
Mansfield YMCA, 455 Park Ave., W., Mansfield, Ohio, March 12, 1972

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Kent, Ohio, March 25-26, 1972

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DIAM.	PITCH	PRICE
8½"	8-8½-9	90¢
9"	8-8½-9	90¢
9½"	8-8½-9	90¢

SUPER M PROPS

MADE FROM ROCK HARD MAPLE

TOP FLITES

9"	6	75¢
10"	6	80¢
11"	6-7-8	85¢
12"	6	95¢
14"	6	$1.25

POWER PROPS

11"	6-7-7½-8	85¢

NYLON PROPS

DIAM.	PITCH	PRICE
5¼"	3-4	30¢
6"	3-4	35¢
7"	4-6	50¢
8"	4-6	65¢
9"	4-6-7	85¢
10"	3½-6	85¢
11"	4-6-7-8	$1.00
12"	6	$1.50

POWER PROPS

5¼"	3-4	30¢
6"	3-4	30¢
7"	4-6	40¢
8"	4-5-6	45¢
9"	6-8	50¢
10"	6-8	55¢
11"	4-6-8	65¢
12"	4-5-6-8	70¢

TOP FLITES

DIAM.	PITCH	PRICE
6"	3-4-5	30¢
7"	3-4-6	40¢
8"	3½-5-6-8	45¢
9"	4-5-6-7-8	50¢
10"	3½-5-6-8	55¢
11"	4-5-6-7¾-8-8¼	65¢
12"	4-5-6-8	70¢
13"	5½	80¢
14"	4-6	90¢

SPEED PROPS

6"	7-7½-8	60¢
7"	7½-8-9½-10-10½	65¢
8"	7½-8-8½-9	70¢
9"	7-12½-13-13½	75¢
10"	8-8½-9	80¢

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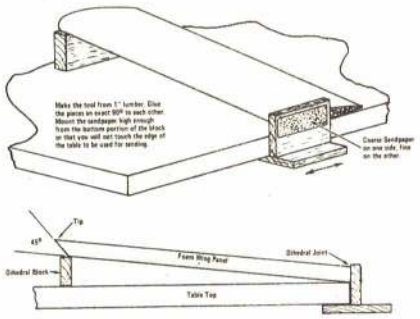
special package of the three sections available separately.) Sand off any flash on the wing edges. I left the tip of the taper sections square, since I did not take the time to round the tip or bevel the edge. I don't believe this helps performance, but it sure does help improve the appearance, so do it if you wish. Note there is a left and right panel on the taper sections. You will need to watch this in the next steps, since you want the entire front edge of your wing to be straight.

Sand the dihedral angle into each taper section. If you are doing only one wing set, a sanding block is alright—but do use a block. If you are planning to make several foam wings, the simple tool shown in the drawing and developed by Carl Mohs of Madison, Wisconsin is easy to make. It helps make this job a cinch and assures you the angle is right.

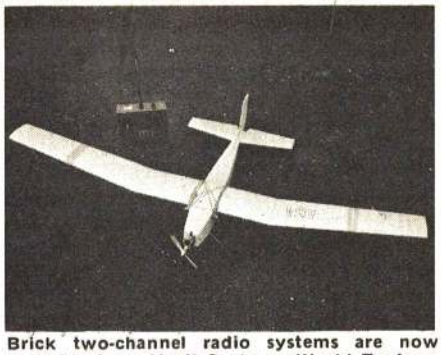


Block up the tip of one taper panel 4" from the workbench. Sand the edge of the wing right at the bench edge. Use sanding block to sand in dihedral angle. If bench is square, the block will assure you of a smooth and straight dihedral joint. Then follow the same procedure with the other panel.

Using weights, hold down center section. With block to give a 4" dihedral under each tip, epoxy one tip at a time. Use Saran Wrap between the wing and the bench to help take it off—no sense epoxying the wing to the bench! Make sure that the leading edge is straight. Note: Epoxy must be used for these joints—any other type of cement will melt the foam.

When thoroughly dry—you can wait a bit longer than five minutes—remove wing and double check alignment. If satisfactory, apply 1/2" to 3/4" Scotch filament strapping tape on the bottom of the wing as shown on the plan. This adds tremendous strength to the wing, yet it is still flexible. There is again a wide choice as to finishing. We have flown protos of the 2-T with absolutely no finish on the foam—just as they come out of the box—but they pick up dirt and fuel easily. For a more finished look, considerably more strength, and protection against dents, scratches and even "bending," TopCotE is recommended. If TopCotE is used, the wing should be sanded very smooth. The material is transparent, but may be colored with dope to any color desired. Two spray coats do a nice job. Decorations can easily be made from MonoKote Trim Sheets—just draw your patterns, cut out and apply. Mount the engine and prop and then install the wheels.

Now is the time to position your brick or radio. With the batteries in the forward compartments, find the proper position for the brick, so the plane balances at the CG as shown on the plans. When you're satisfied, epoxy the radio mount doublers and hardwood rails into position. Finish the rest of your RC installation at this time. Make cuts



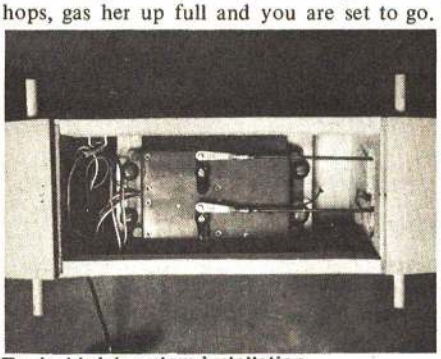
Brick two-channel radio systems are now available from Kraft Systems, World Engines, E.K. Products, and Cannon.

for the necessary pushrods and install horns, wheels, hardware, and all last-minute details. Double check for balance again. Minor shifting of CG can be done by moving the battery forward or backward. Use lead fishing sinkers in battery compartment if necessary. Use good foam rubber to wrap around the batteries and also to stuff in the front compartment. For test flights a 5½ x 4" prop was used.

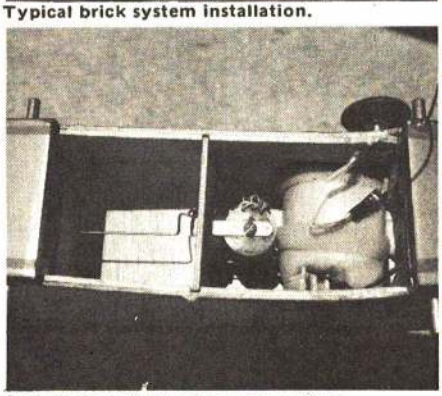
Your plane should go out of your hand with a slight push at a good *straight* glide forward without any tendency to stall or dive. Shifting of batteries for different CG may help if you experience any of these. Incidentally, with the wing on, always measure CG (balance point) at the fuselage, and not the tips. However, the CG shown on the plans should put you in business. When satisfied with the glide, fuel up but don't fill the tank—you may need to change either the right thrust or down thrust that is built in.

When the engine is running satisfactorily, and radio on (both transmitter and receiver), hand launch with a gentle shove forward and nose pointed straight ahead. The plane should want to fly right out of your hand. Watch for any tendency to turn or to stall or dive under power. These can be corrected if the thrust line of the engine is changed by adding washers where needed.

After you are satisfied with your test hops, gas her up full and you are set to go.



Typical brick system installation.



Installation of Ace RC pulse system.

Your 2-T should go up in a gentle climb, even in 10-15 mph wind (you may have to trim in a bit of down). As you become more familiar with it, you'll find that the 2-T will go almost anywhere you command. It has proven one of the most pleasing and easy to handle jobs we've ever flown.

If your experience is like Ken's and mine, you'll find all those cynics on the field who doubted before, leaving their ships, coming up and wanting a turn at the stick. They will want to make the 2-T or "Two-Channel Trainer" for their next project.

We gave Tom Runge some of the first 2-T plans and after talking to him, we agreed it should also make a good single-channel Pulse Rudder Only ship. Tom built it, using a Commander Stomper. It has proven to be an exceptional RO job. Tom used TopCotE both on fuse and on wings, and painted it a light green. He's calling his a 1-T.

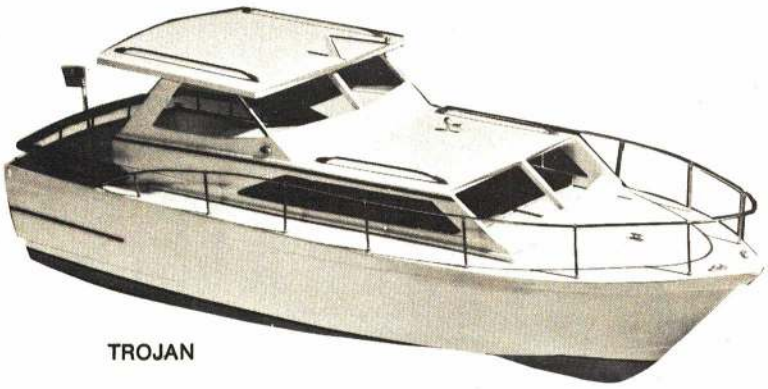
For the Rudder Only fans, here are a few hints: Cement the elevator on and make the rudder out of 3/32" balsa. For hinges, use "Figure 8" jobs sewn in with Button and Carpet thread. Installation is shown on the bottom center of the plan and is conventional rudder only torque rod using .045 music wire. Actuator is sewn on a 1/8" piece of ply cut to fit where shown. This may be glued in, although rails can be installed so actuator and plate are removable. Receiver is wrapped in foam and stuffed ahead of the actuator. Batteries are also wrapped in foam and with more foam are stuffed up front against the firewall. The linkage at the tail is a crank, with yoke on the rudder. The .060 ID plastic tube bearing is mounted as shown.

School
(continued from page 28)

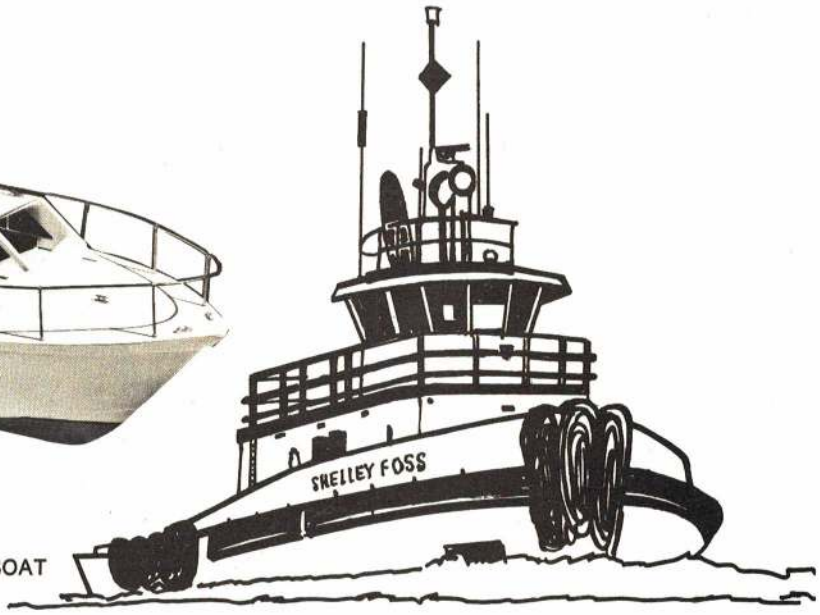
Loaded with a beautiful scale Sperry Messenger built by Fred Watkins and a 40-powered sport pattern ship of my own that fortunately had a mirror-like finish, my wife and I headed for the third floor of the Birmingham News Building. She kept saying something like, "I will not be photographed with a model airplane. . ." Five minutes later all work had stopped in the city room and a crowd of reporters ringed "those marvelous airplanes." The city editor, a private pilot, was on the sticks of my transmitter almost immediately while I "hangar flew" my gleaming red plane. After a simulated stall, a spin, and two tight turns we had a convert. A reporter and photographer were assigned to cover the story and the next day the Sunday edition of *The Birmingham News* carried a three column photograph of the planes, me, and, yes, my wife. The accompanying three column story ran almost half a page, which was exactly what we had needed. The next Tuesday evening the doors of the first Birmingham Radio Control School opened to admit a crowd that was unbelievable. More than 40 students were there to learn the fundamentals of radio-control flying. Ages ranged from 10 years to 65 years old, with only one lady in attendance. Students ranged in experience from those who had never built or flown a model airplane to a gentleman who was flying a hot stunter.

The course began with an introduction to RC flying which briefly covered the early

Quiet Beauty . . . with Dumas Scale Models



TROJAN



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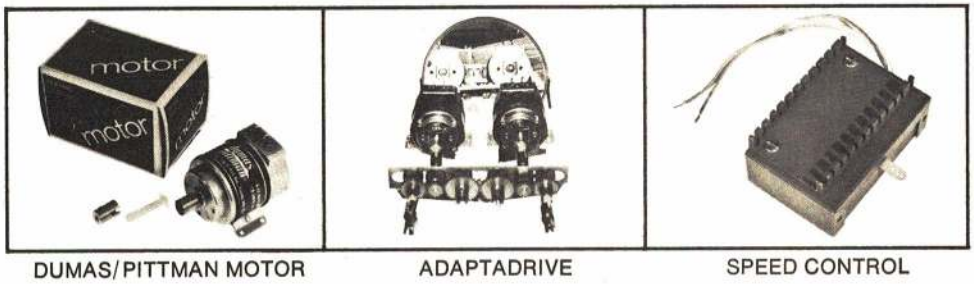
. . . and the accessories too!

PT 109 | COAST GUARD BOAT | SPORT FISHERMAN



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Whether you're a display model builder, a RC scale fan or want something for free running, here are two brand new models of brand new boats. The Trojan 31′ yacht model is in 1″ to 1′ scale right off the plans of the full size boat. Tough plywood construction allows installation of single or dual Dumas/Pittman motors, an adaptadrive unit, even a .19 to .35 engine . . . plenty of room for radio gear and batteries too! Then there's our new 90′ tug model . . . also right off the full size plans of the latest type tugs, but scaled down to 36″. The famous 33″ PT 109 with all mahogany construction, for electric or gas power; our two popular balsa kits; the 29″ Coast Guard 40′ utility boat and 1″ to 1′ scale Chris-Craft 35′ Sport Fisherman for electric power or display round out our most popular models. Our complete line of hardware: props, shafts, stuffing boxes, rudders, steering arms, and universals are available for gas engines or the Dumas/Pittman electric motors. The Adaptadrive transmission unit combines with our brand new proportional speed and direction control unit to provide all you need for operation of your electric model. Send 25¢, to cover postage and handling, for complete catalog.

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boats

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history of the sport and went on to local and national club organizations, a discussion covering sources of supply for radios, model kits and ARF's, hardware and tools. The next two sessions were devoted to engines, model building, covering, trimming and flight procedures. Of course, a portion of each class was devoted to safety. Safe conduct and safety at the flying field were stressed, as well as safety at home and in the workshop. Color slides were found to be extremely helpful classroom aids. Close-up shots of radio installations in various airplanes interested most students. Photographs of various kit planes and ARF planes suitable for a beginner were also high in interest value. Motors, models, and hardware pertinent to the hobby were also great teaching aids. Demonstrations of building techniques and methods of trimming models for flight were probably the the most intently followed topics. Question and answer discussion sessions were also popular.

Foremost in the minds of most students were four important questions. Which radio should I purchase? How much will it cost? From whom should I purchase my set? Where can I get it repaired? Each was seriously and fully discussed because we believed them to be extremely crucial to a beginner's success. We stressed availability and quality of repair service as being one of the most important considerations when purchasing a radio set.

Flight lessons using a 60-powered ARF are continuing. Many times crashes have been prevented because the trainer is equipped with dual controls. Allen Whitley, a generous club member, has donated the use of his radio sets for the flight trainer and with the ST-60 up front, power is available to rescue the plane

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KIT 303
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from almost any conceivable situation. Many instructors have passed a qualifying test authored by Bud Caddell and adopted by the club membership. Only those passing this test are allowed to teach beginners, so Crash Allthumbs is smashing his own planes.

Dr. Gerald Carlson used AV aids and text equipment to show how a radio works from escapements to multi digital.

You manufacturers of our radio control systems deserve credit for devising and marketing them. Without your equipment the hobby would still be confined to escapements and reeds. However, systems are a tremendous help to the student RC flier and his instructor. No one in the industry has manufactured a standardized system of buddy box connectors. Why couldn't you get together and make it possible to connect an Orbit to a Kraft or to a Pro Line, or a Pro Line to a Logictrol or any of the other fine systems you have engineered? You have given us standardized frequencies and color coding. Servos are fairly standard as are transmitter sticks, so why not go a little further and help us give the learning process a boost with interchangeable student-instructor systems?

Because out of our school project we have gained a new awareness of our responsibility to our hobby, club and community. We have a glowing feeling of self-esteem because we feel a real contribution has been made to each. The club has prospered because quite a few new members were added to our roster, even though this definitely was not a membership drive. Also, a new RC club has been organized in our area and we are proud of the fact that many of its organizers were students enrolled in our school. We know too that safety has taken a great step forward at our field and hope it has done so at all the other Birmingham flying sites. Many of our students have already been certified as competent fliers and are entitled to solo their planes unassisted. Others are approaching that happy state. We have a corps of instructors who are very serious about the teaching business. Crash is grounded, and probably most important of all, we have again demonstrated to our neighbors that the Birmingham Radio Control Association is indeed a responsible member of the community.

Is this type of endeavor solely restricted to radio control clubs? The answer is obviously no. Both free flight and control line groups may prosper in their community with an effort such as this. Many potentially great fliers are out there waiting for a helping hand to be extended in their direction. Won't you offer yours? It *is* time for school you know.

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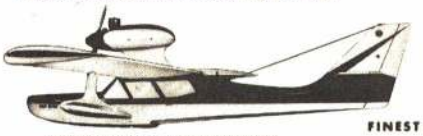

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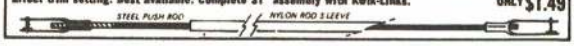

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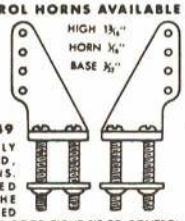

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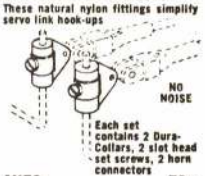

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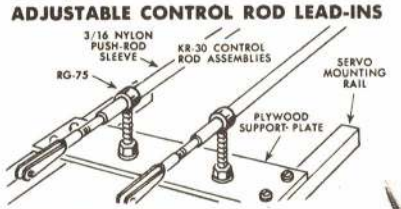

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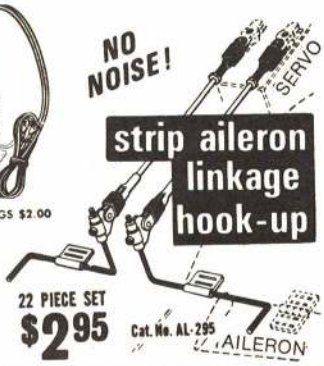

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RPM Control

(Continued from page 29)

A device was designed that would bleed the crankcase pressure on low idle. Two pressure fittings were used on the engine: the one on the back plate was used to pressurize the tank; the second is a backplate screw whose interior is exposed to the bypass area. This was connected to the bleeder needle valve inlet. The new system has two needle valves, one for high speed and one for low in addition to the bleeder needle valve. There is a period of time during the transition from high to low when both valves feed the engine. Both the high and low speed needle valves feed a common spraybar in the unmodified venturi. No other intake throttle of any type is used, which makes for a smooth transition from high to low.

Figure 1 shows a cross section of part of the transfer block and Figure 2 shows fuel flow diagrams for high, intermediate and low speeds. Figure 3 shows the linkage arrangement for this system. Since fuel flow is transferred from one needle valve to another, the block containing the three needle valves is called the "transfer block." This system func-

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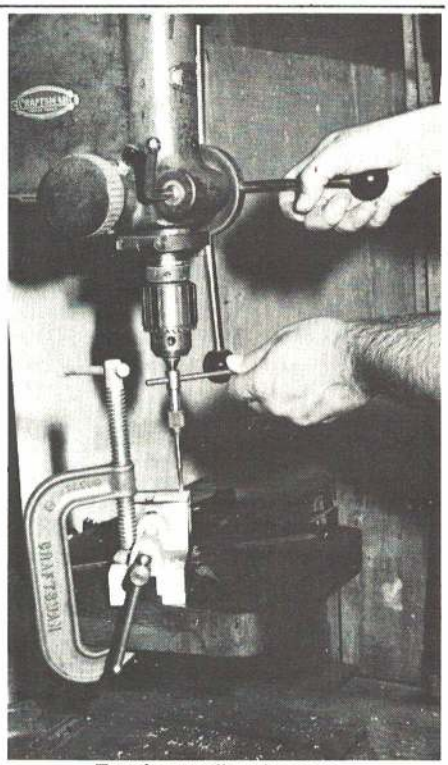
tions as follows: On high speed, fuel flows through the high speed needle valve. On low speed, the exhaust slide closes, fuel delivery is transferred from the high speed needle to the low, and the crankcase is allowed to bleed through the crankcase bleeder valve. This system worked exceedingly well and required only one glow plug.

The terms "high speed" and "low speed" are used simply because this is the name of the game in Carrier. There is a nice transition from high to low and any intermediate rpm may be used. In terms of performance, the ABC 65 would peak out at 14,800 to 15,000 rpm using 40% nitro fuel and a Rev Up 10-8 prop. Low idle was 3500 rpm. The engine was stock. Lower rpm are not needed for Navy Carrier, as the planes will literally fall out of the air at 4000 rpm. The G40 and K&B 40, with 9-7.5 prop, performed in a similar way though the rpm was higher under full throttle.

Making the parts for this system is not difficult, but it does require a lathe or drill press with a milling attachment. In addition, several size end mills and a 1/4" reamer are needed. I would estimate the price of having the parts made by a small machine shop at under twenty dollars. Should you wish to try it yourself, the following procedure will prove helpful.

Begin with the exhaust slide—made from .031 ground tool steel which may be obtained from an industrial supply house. It is rather expensive but does not warp when heated, as some lesser grades will. Lay out a strip about 4" long and 3/8" wide. This piece should be held in a vise with brass or aluminum jaw caps so as not to distort or mar the slide while



Tapping needle valve seats.

being cut with a hacksaw. Cut about 1/32" outside the layout and bring the slide to its correct size with a file. If a surface grinder is available, this would be an ideal application for it. The exhaust outlet is made by drilling

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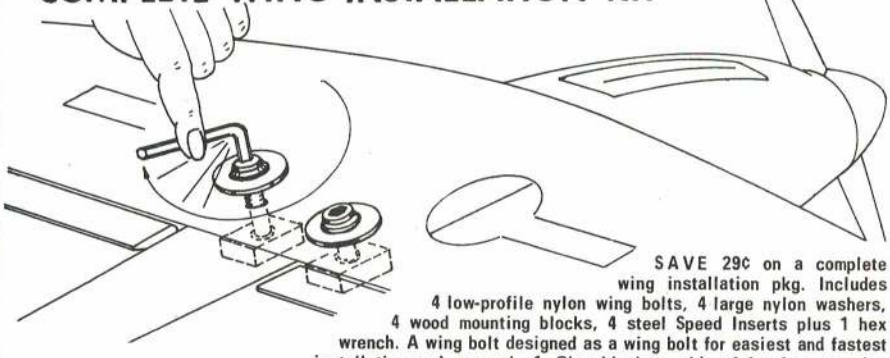
COMPLETE WING INSTALLATION KIT



SAVE 29¢ on a complete wing installation pkg. Includes 4 low-profile nylon wing bolts, 4 large nylon washers, 4 wood mounting blocks, 4 steel Speed Inserts plus 1 hex wrench. A wing bolt designed as a wing bolt for easiest and fastest installation and removal. 1. Glue block to side of fuselage at wing saddle. 2. Install wing and push nylon wing bolt thru hole in wing until it hits block. Mark center of this point and drill 3/8" hole thru block. 3. Screw in Speed insert. Make sure you screw it in straight.

(212) 17 Pieces. **$2.00 pkg.**

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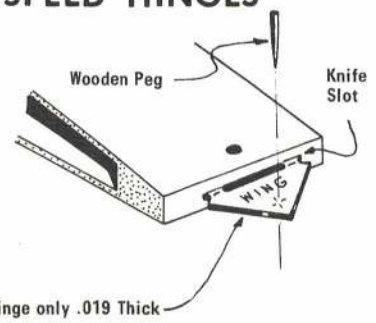


A totally new concept of hinge design. Gives more positive feel of control. Does away with the flip-flop control surface. Will not pull out, vibrate, or break. Fast installation – no messy epoxies.

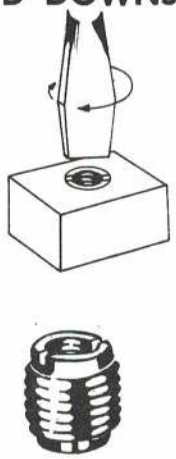
(213) 30 Hinges plus pegs. **$1.00 pkg.**

WING HOLD DOWNS

1. Glue hard wood block to side of fuselage at wing saddle.

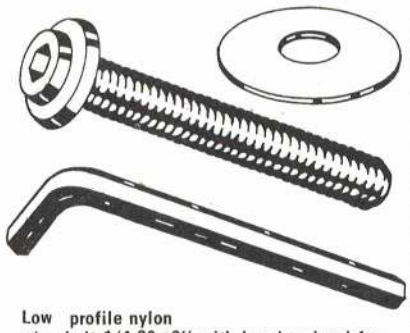
2. Install wing and push nylon wing bolt thru hole in wing until it hits block. Mark center of this point and drill 3/8" hole thru block.

3. Screw in speed insert. Make sure you screw it in straight.



(214) Four metal inserts and four wood blocks. **$1.00 pkg.**

NYLON WING BOLTS

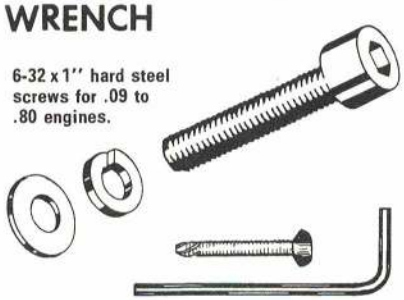


Low profile nylon wing bolt 1/4-20 x 2" with hex key head for fastest and cleanest removal of wing. Comes with allen wrench and nylon washers to prevent crunching when wing is bolted down.

(215) Package of 4 bolts, 4 washers & wrench 9 Piece set **$1.29 pkg.**

ENGINE MOUNTING BOLTS WITH TAP & WRENCH

6-32 x 1" hard steel screws for .09 to .80 engines.



Comes with tapping screw for undrilled mounts. Fits Tatone, Kraft, Du-Bro, etc. Just drill 7/64" hole and screw in tapper. Remove tapper and insert screws. Set includes 5 cap screws, 5 washers, 5 lock washers, tapper screw & wrench.

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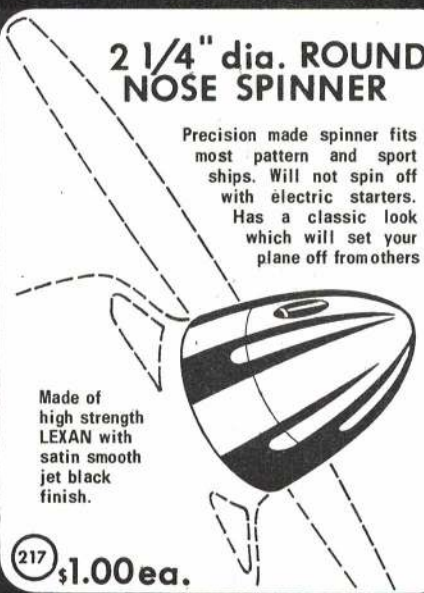

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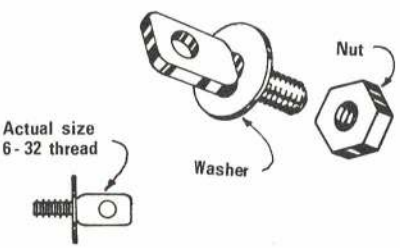


(218) 6 Sets per package 18 Pieces in all **$1.00 pkg.**

SCALE PLAN SETS with templates

Brilliantly executed plans with templates for all parts. Comes with large 16 page construction manuals for easy assembly. These planes have been flown both in contests and for sport.

(219) Martin A-30 WWII Bomber, 70" span for RC and UC. Flies on two .35s

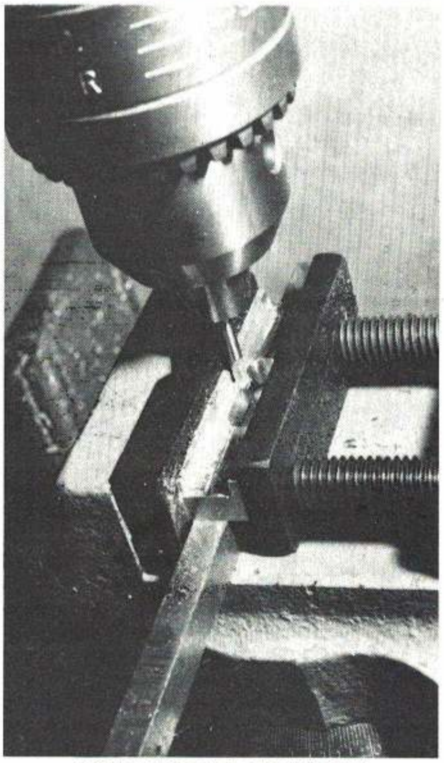
(220) Grumman Wildcat 58" span for RC & UC. **$2.00 ea.**

two holes and removing the metal between with a Handy Grinder equipped with a cut-off wheel. When grinding, be careful not to let the slide get red hot, as it will harden the steel to the point of making it unworkable. The "V" at the rear of the exhaust outlet is cut with a Swiss file. Polish the edges with emery cloth.

Exhaust brackets are shown for the K&B 40, the ST G40 and the ST 65, none of which require engine modifications. On the side of the bracket facing the engine, a recess is milled for the engine exhaust port on only the G40 and K&B to keep the bracket from rotating. The exhaust wiper mount in the G40 exhaust port is used to mount the bracket. A band around the cylinder is required for the K&B. The ST 65 has provisions for a tuned pipe. These are used to mount the bracket.

Rough a piece of aluminum to the size shown for the bracket being made; mill the recess for the engine's exhaust port if necessary. Next, mill the exhaust passage out followed by the recess for the slide. The 1/32" square slots the slide rides in are milled with a number 197 Dremmel cutter. The slide should work smoothly in its slots. If not, just working the slide back and forth will often wear it in correctly. Last, drill and tap whatever mounting holes are needed.

The transfer block involves just drilling some holes. When the hole for the drum is reamed, do not leave the reamer in the hole any longer than necessary, otherwise the hole may be oversized. Use the block as a drilling jig to drill the drum. Brass tubing is pressed into the inlet holes of the transfer block in a vise. Grind a taper at the end of these tubes to start them in their respective holes. The drum is held in the transfer block by the throw on one side and a 3/8" washer screwed to the other end.



Milling guides for exhaust slider.

New from Jerobee R/C!

From the people that brought you the sensational 1/12 scale McLaren and Porsche type racing cars . . .

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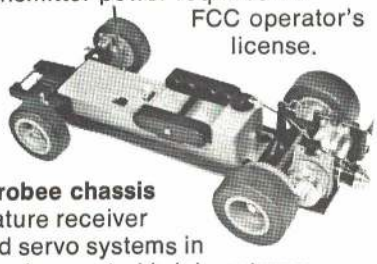
Precision engineered 1/12 scale Jerobee R/C cars come assembled and complete with engine and radio control system, less fuel and batteries. Every Jerobee car is constructed of the highest quality materials and pre-tested to aerospace standards.

Jerobee radio control systems are easy and fun to run. The Comando Duo-Servo system has fully proportional throttle and steering control; Bandero Uni-Servo has integrated steering and throttle.

Interchangeable crystals allow up to five cars on the track at once. Fail-safe system automatically puts car in tight low speed turn when control limit is reached. Control range is over 200 feet. Under-100 milliwatt transmitter power requires no FCC operator's license.



Jerobee chassis feature receiver and servo systems in shock mounted brick, antenna, high impact strength injected molded frame, "mag" wheels. Interchangeable Cycolac® bodies attach easily.

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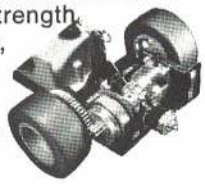

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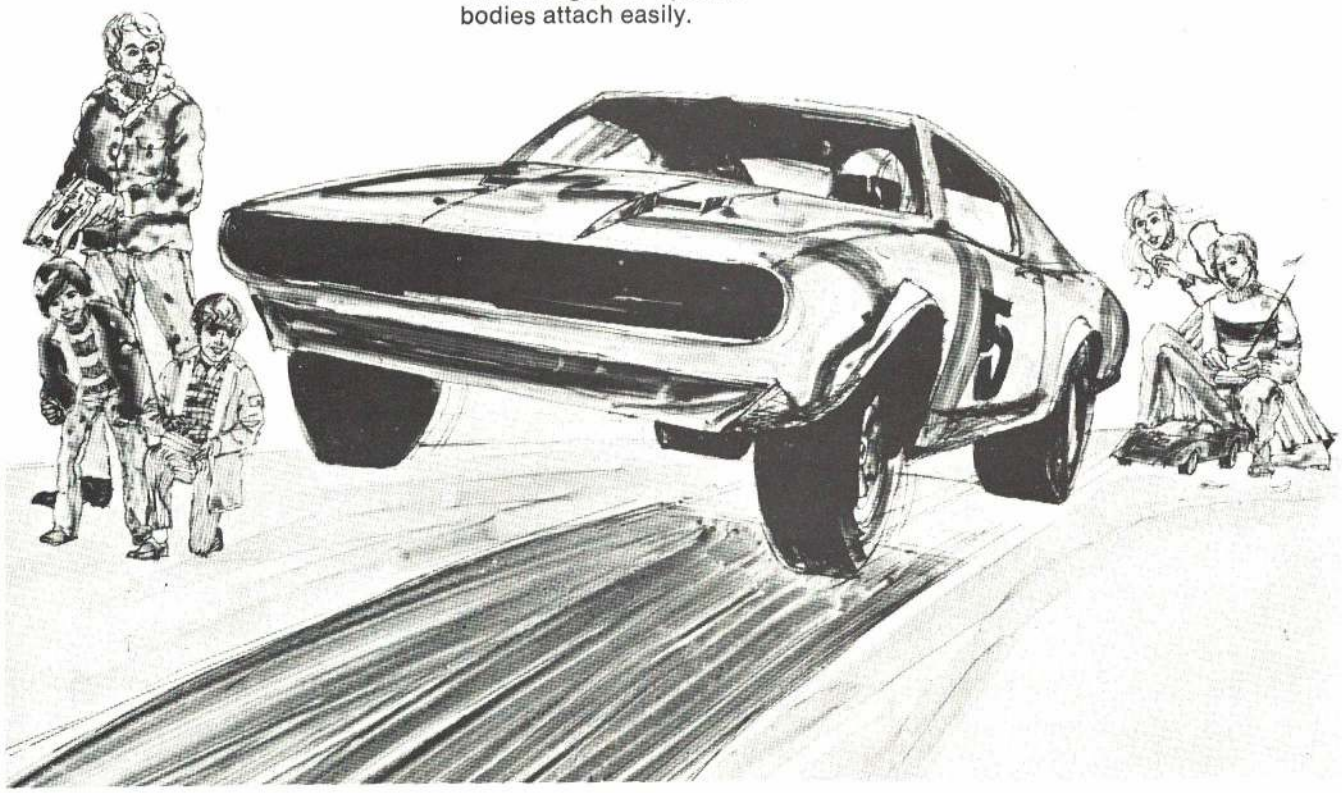
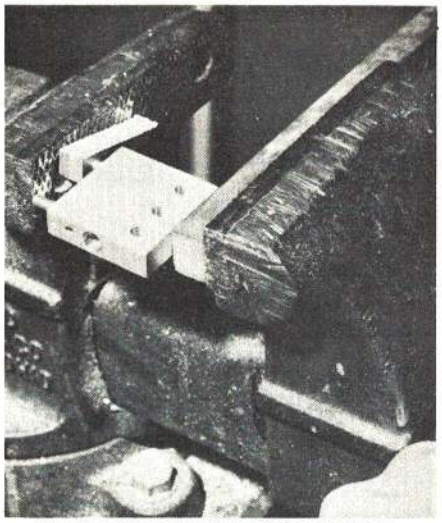




Pressing brass fuel line fittings in place.

The throw is made from the same material as the slide. No stops are shown to limit the drum rotation, as this is most easily accomplished by gluing small blocks of wood in the plane to limit the throw travel. The torsion spring moves the throw. The loop is about 5/16 in. diameter. This method of rotating the drum is preferable to a direct drive in that the drum rotation is independent of the exhaust valve travel. The spring absorbs any additional travel of the pushrod necessary to close the slide without moving the drum past its low speed position.

Originally it was suggested that the transfer block be attached to the engine backplate, however later experience indicates that it is probably better to mount the block on a piece of plywood that bridges the plane's motor mounts. This makes it possible to remove the whole engine.

In conclusion, it should be mentioned that I have not tried bleeding the crankcase with a suction system, nor have I tried it with a conventional carb. I would be very optimistic about such an experiment, however, and would appreciate receiving your comments. My address is: 433 Arquilla Dr., Glenwood, Ill. 60425.

Mustang

(continued from page 32)

Allison/Mustangs mainly in the look of the nose cowling: the general shape was slightly modified to fit the new engine, the exhaust stacks were different, and the air scoop on top of the cowl for the Allison's down-draft carburetor was moved to the bottom of the cowl and faired in better. This nose remained the same for the standard versions of the Mustang until the lightweight P-51H appeared near the end of the war.

The Rolls Royce Merlin made a great plane greater. Allison had scoop on top of nose.

With the rapid acceptance of the Rolls Royce-powered P-51, plans were rushed for production. Since North American was already busy building B-25 Mitchell bombers and AT-6 and SNJ Texan trainers, it was decided to split production of the modified fighter between the main plant in California and one in Texas. Though the airplanes are virtually identical, the former was called the P-51B and the latter was the P-51C.

The P-51B/C was in full-scale by the summer of 1943, and the first ones arrived in England for the U.S. 8th Air Force in December. On Dec. 13, 1943 they flew a long-range mission to Kiel, Germany escorting heavy bombers. For the first time the U.S. was in the battle with a fighter plane that was clearly ahead of all the rest. Using the first truly successful large droppable fuel tanks slung from their wings, the Mustangs steadily increased their radius of action until it was far beyond anything the Germans had expected. The crowning achievement came in March, 1944 when a flock of them escorted a swarm of B-17's and B-124's all the way to Berlin and back, signaling the beginning of the end for the Third Reich.

Tight fitting canopy of models through the C were changed to a bubble with the P-51D.

Where once bombers had only their own machine guns with which to fight off the attacking Messerschmitts and Focke Wulfs, now they had Mustangs to protect them on the long trip to the target—during the critical moments over the target when they had to fly straight and steady to drop their bombs, and then on the long grind back home when many of them were wounded and would otherwise have been sitting ducks for the Germans.

Of the 3700 built, over 900 P-51B and C models were supplied to the RAF as the Mustang III. While the British unhesitatingly praised the machine, its tight-fitting canopy proved unpopular, and so they developed a bulged one similar to the Spitfire's which gave better visibility. Most Mustang I's got the new canopy—called a Malcolm hood—and so did a few American P-51's.

Recognizing the need for even better visibility, North American went a step further and created one of the first bubble canopies. With this change, the P-51B and C became the P-51D, of which almost 8000 were built in 1944 and 1945. Speed dropped a little because of the increased drag of the canopy, but visibility was so much better that the Mustang's value as a combat airplane increased considerably.

Today, almost all of the 200 or so P-51's still flying are P-51D's. Not a single B or C model is known to be currently licensed, although at least two are in museums. The Smithsonian's National Air and Space Museum in Washington has, in storage, the P-51C "Excalibur II" (N-1202) which was raced to victory in the 1946 and 1947 Bendix Trophy Races by the late Paul Mantz and

then flown across the North Pole by Charles Blair. The twin to that airplane—N-1204—was used by Mantz to win the 1948 Bendix Trophy Race, and now rests in the Tallmantz Museum in Santa Ana, California.

(Note: Our special thanks to David Birch of Air Britain, whose research of the Mustang X was of immense value.)

Specifications: (P-51B-10, C-10 and later models, with V-1650-7 engine)

Dimensions

Length—32' 3"
Wingspan—37' ¼"
Wing Area—233 sq. ft.
Empty Weight—6985 lb.
Gross Weight—11,800 lb.

Performance

Top Speed 439 mph at 25,000'
Maximum Range—2400 mi.
Climb to 20,000'—3.1 min.
Service Ceiling—41,900'

Little Bird

(continued from page 21)

Because of the narrow fuselage, the radio installation can present problems unless the more recent equipment is used. Any of the RC gear made before 1969 probably will be too tightly cramped to allow a suitable arrangement, so for the best results, the smaller, more recent systems are recommended.

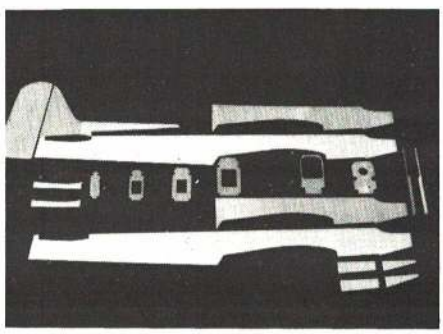
Construction

Carefully trace the fuselage sides onto 1/8" balsa with carbon paper, marking the former locations. Do the same with the 1/32" plywood doublers, making sure they follow the outline of the body sides, but end in front of former "C". Epoxy the plywood doublers in place, using a liberal amount to insure strength, then wipe away excess. Trace and cut out the body formers, the 1/16" balsa doublers that are placed beneath the motor mounts, the balsa stab saddles, and the motor mounts. Drill for and install nose gear mount to former "A" (firewall), and drill hole for throttle linkage. In one operation, epoxy in place the motor mounts and "A" and "B", holding the structure straight and secure with masking tape. Make sure motor mounts are at zero. After the assembly has set up, install the remaining formers "C" through "F" and add the floating former. Pin a piece of ¼" square balsa between butt ends of fuselage, checking for straight, true alignment. The ¼" square balsa is removed when the fin is installed.

After the structure has set up, install the ¼" square balsa stringers, the stabilizer saddles, and the 1/16" balsa doublers under the motor mounts. Install the fuselage sides and top. Cut out slots for elevator and rudder linkage exits, and make sure the pushrods will be able to work smoothly and freely. Install the rear bottom fuselage. Fuelproof underside of engine cavity area, and install bottom nose block. Build hatch block (plan isometric shows appearance). Install dowels for front of hatch block, and slot in the 1/16" plywood bearing plates (drill holes in them before gluing in place), and epoxy the plates to nose block. This operation is done coordinately, which makes sure of proper dowel alignment of hatch block.

Now fashion an appropriate engine cavity. Add 1/8" plywood hold-down plate to rear of hatch block, and laminate bottom and sides of hatch block with epoxy and cloth. Mark center of former "B", locate wing dowel entrance, and drill a ¼" hole for wing dowel. Have hatch block in place during this operation, so the hatch hold-down plate will also "catch" the drilling of this hole, thus insuring proper alignment. Razor plane and sand the

Fuselage is uncomplicated, quick to build.

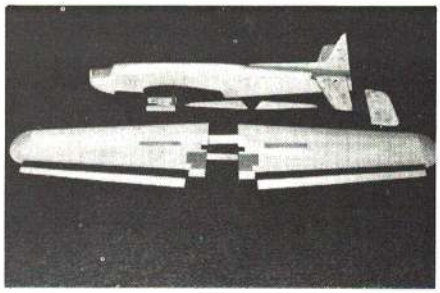


entire fuselage structure smooth, with hatch in place to insure a neat fitting.

Make accurate templates for root and tip of wing from 1/8" plywood, and sand edges to a very smooth texture. Cut foam wing cores. Locate and slot for 1/16" dihedral braces with a small saw blade. Glue on top skins with a good contact cement that will not attack the foam cores. Trim and carefully sand balsa skins (Sig skins recommended) at leading edges and all four ends. Do not yet trim trailing edges. Check for a straight, even-fitting leading edge on each panel, then glue on bottom skins. Make sure of firm contact of skins, especially at the leading and trailing edges. Trim bottom skins to match top.

Locate and dig out cavities for landing gear blocks and reinforcing dowels, then glue into place. When epoxy has set up, drill appropriate holes to accept the five 1/32" landing gear wire. Now is a good time to bend and properly fit the main landing gear wires. Carefully cut out ailerons, making sure the "cut" lines indicated on the plans are the lines that are followed. Reduce leading edges of ailerons by ¾". Contact glue 3/8" wide balsa strips to trailing edges of wing and leading edges of ailerons. Razor plane and sand to proper fit. Make template of actual aileron. Align and pin it to the aileron(s), and trace off and cut the ailerons to the proper shape. Reduce the ends to allow for the 1/16" balsa that seals off the small areas of exposed foam.

Laminate two ¾" thick balsa blocks together for the wing tips. Rough cut the wing tips to the proper size, hollow them out a little bit, and glue them to each panel. Shape them with the ailerons temporarily attached to the panels with masking tape. Cut or sand



Ready for final assembly and finish. Wing and stab foam cores available, see text.

proper dihedral angle. Slot out wing skins for 1/16" plywood wing bolt plate bearers and install with epoxy or contact cement. Then cut out servo compartment. Join wing halfs and make final wing sanding and cover. Slot out for aileron torque arms, then install them in a neat and straight manner, checking to insure free movement as epoxy sets.

Make templates for stabilizer airfoils out of 1/16" plywood, and cut the two foam panels required. Cover the top and bottom of each with 1/16" balsa, much in the same manner as the wing. Trim and sand the overlapping areas to correct size, and glue the two panels together. Add the leading and trailing edges and the tips. Rough sand to proper shape, being careful not to round off the trailing edge of stabilizer. This edge and the trailing edges of the wing and vertical fin are left flat so the respective control surfaces may "duck behind" them. Cut out elevators and sand to proper taper, which are 1/8" thickness at trailing edges. (All trailing edges of control surfaces and tips are 1/8".) Attach elevators to stabilizer temporarily with masking tape and sand entire unit until neat and uniform.

Next, trace and cut out vertical fin, dorsal fin and rudder. Make sure the bottoms of the fins follow the outline of the stabilizer on the plans. Glue dorsal fin to vertical fin. Sand to proper shape and contour, making sure of proper fit to fuselage when stabilizer is in place.

Cover fuselage and tail pieces and install the stabilizer. Insert the 1/8" plywood tailpost into the vertical fin. Lap each side of the tailpost that is inserted into the fuselage with 1/16" balsa to achieve a proper fit. The ¼" square balsa strip temporarily inserted at the

butt end of the fuselage earlier should have insured this proper fit. Install the vertical fin, making sure the dorsal fin is centered and straight. Fill the open gap at the bottom of the butt end of the fuselage with scrap balsa. This will allow easy slotting to accept the bottom hinge for the rudder later on.

Install wing bolt blocks. Locate and drill a ¼" hole in leading edge of wing for the hold-down dowel, however do not glue in at this time. Screw the wing bolts down through the hardwood blocks until flush, then place wing in the proper position and press down to get indentations from screws onto the wing. Drill ¼" holes at those two points. Now glue in the leading edge dowel and bolt down wing and let dry with hatch block in place. Build the fuselage bottom onto wing with wing fastened in place. Tack glue it only, and when finished and sanded to fit, remove it and cover. Cut holes for wing bolts, add doweling, then epoxy to wing permanently, holding down with weights if necessary. The wing bolts must be 1½" in length to properly secure the wing. Bend and install the elevator control horn wire behind the stabilizer. Add fillets and fairings to tail and wing areas and then paint the airplane.

Attach the control surfaces, being careful to insure they are all secured so they cannot come off during violent maneuvers. DuBro hinges, with six small holes drilled in each and secured with epoxy, are recommended. Install the radio gear, but use care. A plane this size with the large engines can quickly damage the radio equipment if it is not carefully buffeted against vibration. Do not balance the plane behind the CG specified on the plans.

Flying

It's a good idea to set the Little Bird up so that the initial flights are made with conservative aileron and elevator control. This will help desensitize the plane until its responsiveness becomes familiar.

If the recommended maximum size engines are used, it isn't necessary to go beyond a quarter to half throttle on the first few flights–unless the plane is flown off grass fields. Then full throttle will help get the plane quickly into the air. On asphalt or paved strips, half throttle will get the plane moving very quickly, and a slight amount of up will lift it off.

The quickness of the Little Bird makes it an exciting airplane to fly. It can do lengthened or tight maneuvers without any undesirable tendencies; yet if various high speed stalling and roll-out maneuvers are wanted, just cinch up on the control surface movements, and the plane will perform these as well, if the pilot wants to really push the sticks around. Recoveries from all maneuvers are immediate and resolute.

Landing the plane is no problem if the pilot gives it a chance to slow up before committing it to the final. A long, shallow approach allows very slow, docile landings. It is helpful however, to make sure a 60- or 71-powered Little Bird is allowed a slow idle from the engine, or else it has a tendency to keep flying because of its low-drag profile. Fortunately, the Perry carb has made this slow, dependable idle a reality, and a Perry should be used if possible. The Mag throttle that comes stock with the Supertigre 60's and 71's will also give a nice idle.

If ready-made foam wings and stabilizers, planked or unplanked, are wanted for the Little Bird, they can be purchased from Foam Flight, 628 West 6th St., Mankato, Minn. 56001.

I'd like to thank Mike Stott, Dr. Alexander McBride, and Larry and Jeff Jensen for their helpful contributions given to this project.

Blue Ribbon

(continued from page 48)

rotary limit switch, in place of the feedback potentiometer to limit travel. The output power is more than ample to operate the Goldberg main gear and should have no trouble actuating the nose gear simultaneously. Operation in this installation is from a center-tapped 4 cell nicad pack using 250 ma button cells. With steering diodes, a non-center tapped 2.4V source could be used too.

The HP 40 FR engine is most outstanding. The complete plane with fuel weighs 6 lb. 4 oz., yet the HP40 with muffler and an 11 x 6 prop hauls it around effortlessly. The throttle response and idle are superb. Regardless of main needle valve setting, the idle is excellent with no transition hesitation. The muffler is effective and does not reduce power output noticeably. Because the fuselage did not allow a retract nose gear, a taildragger configuration was required. This meant installation of the gear as near the leading edge as practical. The wing spar in the Colt is of 1/8" ply and nearly as deep as the wing is thick. In addition, it is right where retract assembly needs to go. The spar passes below the center of the retract unit and is cut about 1/8" for clearance. The main gear supports are 3/8" square hardwood and are notched to fit over the main spar and also to interlock with fixed gear blocks which are already installed in the wing as it comes. This interlocking (like Lincoln Logs), together with generous amounts of epoxy, provide a really rigid and extremely strong mount for the gear.

The Jetline 180° servo was mounted in an inverted position to provide a straight push-rod run from the servo to the retracts. This, together with careful alignment, balance and subsequent rigid installation, is the key to good retract operation, regardless of make. An access hole was left in the bottom of the wing should it be necessary to adjust servo

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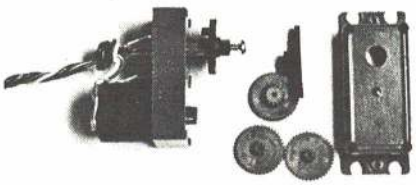

These little servos have no internal electronics, thus additional servos are quite inexpensive. Five leads go to the receiver unit through gold-plated pin plugs.

throw. The access hole is protected from the exhaust with a piece of plastic skin.

With the gear installed and operating freely, the next problem was how to control the retract gear. Full throttle plus full trim commands "gear down." Intermediate throttle position has no effect on wheel location. When it is necessary to extend the gear, move the throttle trim to full low and the gear will extend automatically when full low throttle is commanded. Cycling time is about one second.

Simple in theory, but it must be reliable and the mechanization simple. Micro switches were activated by the very small movement resulting from moving the trim lever. This small movement was amplified by use of a 90° bellcrank and differential arm lengths. The bellcrank will trip the appropriate micro switch which is in series with one side of the battery pack and the servo motor in the manner described above. The system has been 100% reliable to date.

The last item to note is the tail-wheel installation. This installation was made by assembling the entire unit, including pushrod, outside the plane and then installing it. The main support is a 3/8 dowel epoxied into the "keel" of the fuselage at the tail. A brass tube was inserted vertically to serve as the bearing for the tail-wheel strut/axle. This strut was bent in such a manner that one end attaches to the pushrod from the rudder servo and the other has the tail-wheel on it.

This particular project has been extremely interesting because of the variety involved. The reaction to the Lanier Colt by Duane and Ed Sweeney and myself is of interest. Duane is a relatively new pilot; to him the Colt seemed quite a handful, particularly in wind until the CG was moved further forward. Ed and I found it a very docile, relatively steady sport flyer. It seems that these reactions bracket the Colt. It is not a beginner's airplane, but is an excellent sport model for the Sunday flier unless a 60 is used, wherein it becomes a different airplane!

The Hobby Lobby set is considered an excellent system for the price., i.e., a reliable, good performance, four-channel set based on exclusive use of discrete components and backed by an unquestionable reputation for the dealer and for the service facility. There are a couple of mild criticisms, as always. The sticks have a bit more play in them than would be tolerable to the precision flier. Assembly of the receiver showed some carelessness as typified by an IF can not quite vertically lined up or a capacitor leaning over the edge of the board. These in no way detract from performance but do take a little away from the otherwise professional appearance.

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NEW — Dual conversion receiver which will operate reliably in areas where others will not. This, the most advanced receiver available for radio control, is optional at extra cost . . .

NEW — KP-2S single stick version of our highly successful 2 channel set . . .

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