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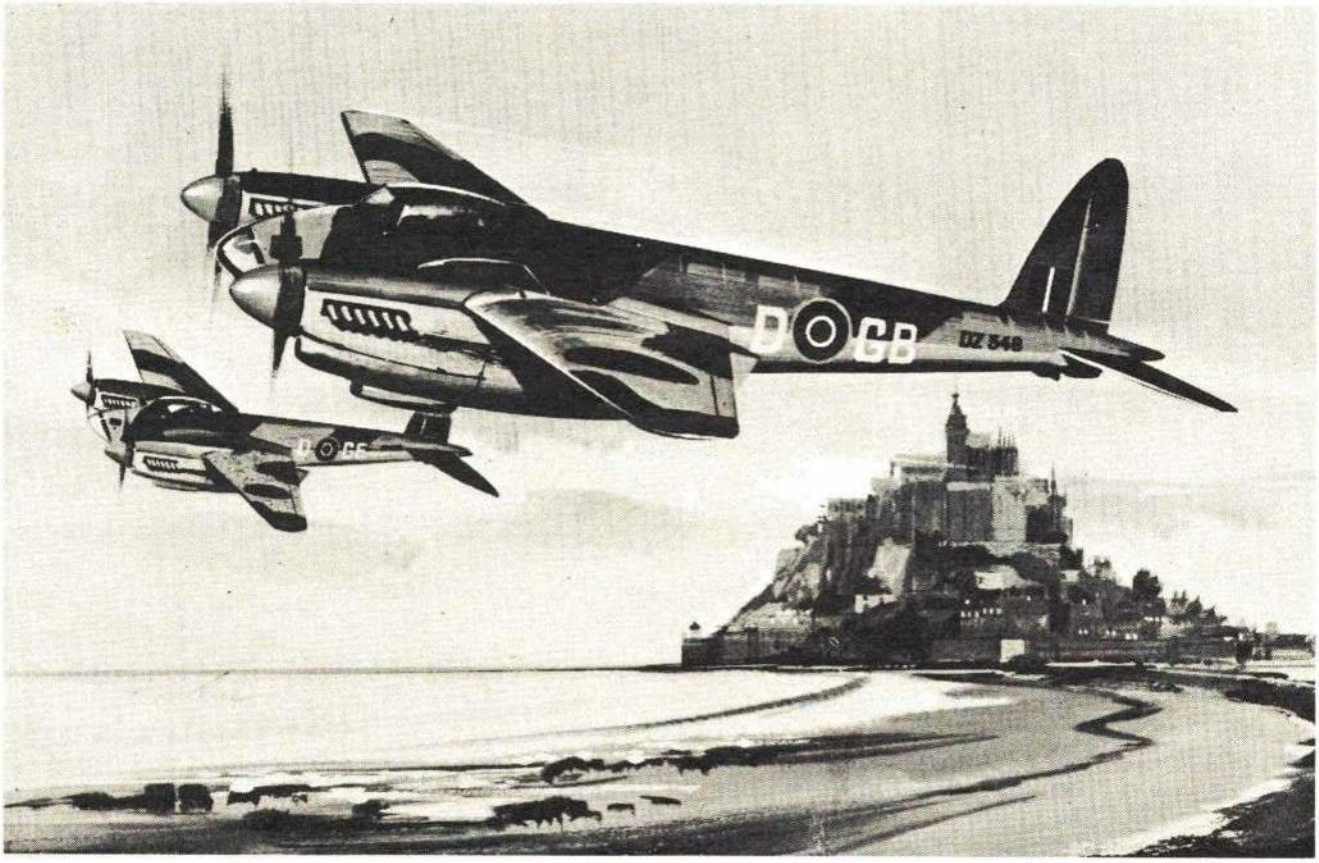

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VOLUME 67, NUMBER 2 **AUGUST 1968**

COVER PHOTO: Once the headline pursuit plane of the old Army Air Corps, the immortal Boeing P-12B is this month's painting by Bjorn Karlstrom. Scale fans will find it makes a stable, realistic flying model.

WILLIAM J. WINTER — EDITOR AND PUBLISHER

Edward C. Sweeney, Jr., Associate Editor **Harry E. Harps**, Assistant Editor

Sally Barry, Production Editor

Articles:

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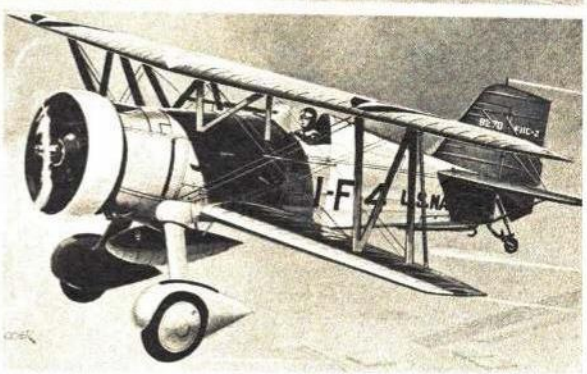

Here are three new models to delight the modeler and collector and a million fanciers of aircraft of other days. They're colorful, with jewel-like quality. Completely detailed including painting guide lines and the sag between the ribs. Upper wing struts and landing gear struts are molded on fuselage halves for perfect alignment and easy assembly. Display stand in each kit. At your favorite store now.

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STRAIGHT AND LEVEL

Between the high-performance free-flight contest model and the kids' gliders and ROG's there is a wide gap to bridge.

THESE are troubled days for the free flighters. Who is a free flighter? To many magazine readers he is a dedicated expert who specializes in an increasingly rare form of modeling they don't dig. To the guy whose idea of heaven is a ready-to-fly radio model, the confirmed free flighter, who aims for eliminations and international team places, is a cross between a violin maker and a championship skier.

But free flight is a lot more than that. It is rubber-powered, indoors, Nordic gliders, gas models — anything that does not fly on wires or by pushbutton and control stick. It is even more. It is every one of the million balsa gliders and ROGS, by Testor, Pactra, Guillow, North Pacific and the others. It is Guillow's little scalers — one of the most successful and long-lived concepts around. Many firms move scads of free flight models in some form — Comet, Scientific, Midwest, to name a few. Free flight happens to be the beginning point for most modelers. When you get into small things, free flight is even more convenient than control-line. You can toss a glider anywhere, or let an ROG flit across the lawn or street. Kids who start this way are as numerous as the plankton in the sea.

All that our free flight "dilemma" requires is a hot psychiatrist. There is a gap as wide as the ice age between the offhand fool-around stuff — which should, and often does, teach useful fundamentals — and the contest model. Who knows how many youngsters know more about the business of what makes an airplane fly, and how to adjust it, than many so-called experts. We are reminded of a group of R/C friends who, sitting out a high wind, fell to talking aerodynamics. One of the better known explained how an airplane stalls, like this: The center of pressure moves forward on the wing and when it falls off the leading edge, the ship stalls. Heads nodded with this new found knowledge. If you aren't horrified, you better buy a few all-balsa novelties and practice.

Why this gulf? Surely, the hard-core free flighters have battled the mags to give expanded coverage to this ancient and honorable field, which will always be with us. They have formed a Free Flight Society — and you should join if your heart is in the distilled beauty of flight. They just love their newsletters in which they tell each other about the latest super technicalities. And there they hide everything from the world. Even more so than an R/Cer who builds his ship and gear from scratch, they have no time to create simpler stepping-stone things to bridge the balsa-glider-super-FAI gap. No one bothers about designing for small flying sites. Mention a city where avid contest-types travel 100 miles for practice sessions, someone always points out with pride that he goes 450 miles. Think of it! The thought boggles the mind. And you can be sure he loves it — even if he drives all night to stagger into work on Monday morning.

Must every free flight model at the magazine level be a moon-orbiter? The audience waits, and waits, and waits. Sure, a few hundred readers — out of more than 80,000 in our case — are pleased when they see some appropriate hot-rock plan. Do they build it? Of course, not. At this level, you build your own, and wouldn't be caught dead with another guy's design — unless he beats your brains out at contests and you elect to join 'em if you can't beat 'em.

Free flight at the advanced level is limited to an Indian reservation. It may be loved by its addicts, but for the sport flyer, the R/Cer out for some side-line pleasure, just anyone really, it is as way out as four-wall handball. It happens that free flight gave the writer many of his most treasured experiences. But this doesn't blind us to its present ills. What we have now we must hang on to. But those who can lead the way, don't. Broad design talent is all but vanished. The expert cannot design a simple model; he designs a "simple" model for himself. It has Rube Goldberg wire bends. And the control-line guys are just as bad. A beginner's profile may require bending and making from sheet metal an elaborate motor mount. Why can't we think simple?

Your publisher has spent months in friendly eye-ball to eye-ball discussions with zealous-type free flighters who won't take no for an answer. We have refused to publish anything which is not truly advantageous to the reader, or which we do not think is absolutely tops. So finally, there is a growing backlog of excellent designs scheduled for publication in near future issues. These include a Coupe d' Hiver rubber job by Dave Linstrum, a high-thrust line FAI job by Earl Thompson (and credit Jerry Nelson for that deal), Louis Garami's famous Strato Streak — a model then a generation ahead of its time — updated by expert Frank Heeb. Both versions are to be printed. And an .02-powered Delta Dart — inspired gassie called the Oily Bird, for youngsters of all ages. Things are really looking up! And it is high time they did.

WE are pleased to report that during the last 60 days American Aircraft Modeler has gained almost 2,000 new outlets, including hundreds of supermarkets, notably in California; national drug chains, the New York subways, turnpike restaurants, etc. Already the largest airplane hobby magazine in the world — despite all the baloney you read and hear — we can report, thanks to you, that all systems are go. Advertising support, of course, marches forward in step with such tremendous circulation gains. The nice thing about all this is that every cent goes back into making the magazine better and better.

The policy that makes this work is simple. We firmly believe that all modelers are interested in all kinds of models all of the time. You prove it every month!

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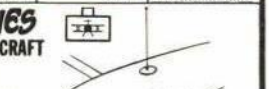

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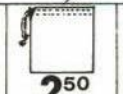

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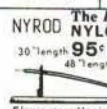

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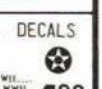

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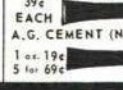

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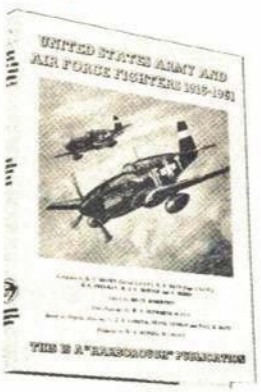
A.M. Reviews

STANLEY M. ULANOFF



United States Army and Air Force Fighters 1916-1961, compiled by K.S. Brown, E.F. Heyn and others and edited by Bruce Robertson, 256 pgs., $10.50. Published by Aero Publishers, Inc., 329 Aviation Road, Fallbrook, Calif.

AN unusually fine and thorough work, this is another British "Harleyford" publication — now being published in the United States by Aero Publishers. The book covers the period of development of American aircraft from the Curtiss S-3 to the Convair F-106A. It records the research, production, armament, tactics and strategy of the fighter planes as well as an account of the men who flew them.

Following the narrative of this development, the photograph sections should be of particular interest to modelers. The first of these sections contains over 250 photographs including three-view tone paintings of 70 aircraft. Thirteen occupy double-page spreads. All these paintings are in the same scale ($1/72$).

Another section contains 44 photographs of the lesser-known and experimental types of fighter aircraft.

Following this is a 12-page section in which the Squadron Badges of 333 Fighters, Fighter Interceptors, and Fighter Bombers are reproduced.

The final section contains a listing of 430 aircraft types, subtypes and experimental designs, with the names of the firms which produced them, crew members, significant date of delivery, type and horsepower of engine, maximum speed, wing span length, loaded weight, quantity produced and their serial numbers — together with remarks containing other interesting information.

AAA News, January-February 1968, 40 pgs. Subscription $6 per year. Published by Antique Airplanes Assoc., Route 5, Industrial Airport, Ottumwa, Iowa.

THE official publication of the Antique Airplane Association is a magazine "The News," published six times a year. In it will be found a complete summary of the current antique airplane activity throughout the country on a national, regional and local level. In addition The News contains a calendar of events, a page devoted to rare items wanted for purchase, sale or exchange, and also several feature stories.

Modelers will find this publication quite useful. A sample copy of The News is available for 50c.

Hollywood Pilot: The Biography of Paul Mantz, by Don Dwiggins, 249 pgs., $6.50. Published by Doubleday & Co., Inc. Garden City, N. Y.

THE biography of Paul Mantz written by his close friend, Don Dwiggins, a flyer with years of experience of his own, is the story of one of aviation's most versatile figures. A stunt flyer, Bendix Air Trophy winner, barnstormer and movie pilot — Mantz led a whirlwind life until he was killed, at the age of 62, in the crash of a makeshift plane used in the movie "Flight of the Phoenix."

As a movie pilot, Mantz spent over 30 years making planes go through suicidal stunts before the motion picture camera. It is estimated that he made more money with an airplane than any other pilot in the world. Some of his pictures included "The Spirit of St. Louis," "Twelve O'Clock High," "Men with Wings," and "Blaze of Noon."

During World War II, as a lieutenant colonel, Paul Mantz was officer-in-charge of the Army Air Force First Motion Picture Unit, which turned out some 300 training films plus exciting documentaries like "The Memphis Belle" and "Target Tokyo."

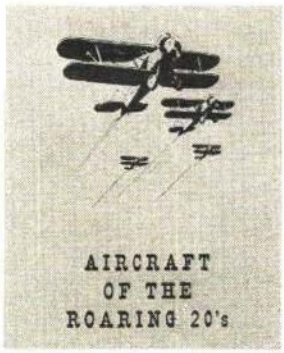
Hollywood Pilot makes exciting reading about an exciting flyer.

Night Fighter, by C.F. Rawnsley and Rober Wright, 319 pgs. Paperback 75c. Published by Ballantine Books, Inc., 101 Fifth Ave. New York, N. Y.

IN Night Fighter is a first-hand account of the night aerial tactics used by the RAF in World War II. C.F. Rawnsley flew combat operations during virtually the entire war, first as a gunner, then as a radar operator and lead navigator in the night

fighter squadrons. Throughout this period, his pilot was the most famous of all the RAF night fighter pilots — Group Captain John Cunningham.

Much different than daytime combat, nighttime war demanded absolute reliance on the radar operator, superb nerves and the ultimate in flying skill. The night fighters pursued the enemy in the dark skies of England, seemingly against hopeless odds, until the scientific and tactical miracle of radar which led to final victory in the air.



Aircraft of the Roaring 20's, an AAA Aviation Specialty Publication, 36 pgs., $1.50. Published by the Antique Airplane Assoc. Route 5, Industrial Airport, Ottumwa, Iowa.

THIS booklet contains the technical descriptions of 34 aircraft of the "roaring twenties." These descriptions are reprinted from "Aero Digest" magazine — a famous name in aviation publications during the 20's, 30's and 40's. The planes — some well known, others obscure — were designed, built and flown mostly from 1927 to 1930. In these three years from Lindbergh's solo flight across the Atlantic until the stock market crash, there was a tremendous development of aircraft that has not been equaled, not in terms of unit production but in numbers of designs.

This booklet should be an important contribution to collectors of aeronautica.

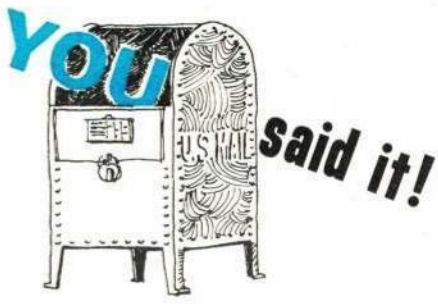
Aircraft of the World, by Angus Mackenzie, 70 pgs., $4.95. Published by Follett Publishing Co., 432 Park Ave. So., New York, N. Y.

IN this handsomely bound book, profusely illustrated with bright full-color photographs and drawings, is a collection of the typical aircraft of the world. Beginning with the first balloon ascent in 1783, the Cayley glider in 1804 and the Wright Brothers' biplane of 1903, it proceeds, in short sketches, to the aircraft of World War I, the civil aircraft between wars, the World War II planes, the jet aircraft including the commercial transports and the military transports and fighter bombers, the modern reconnaissance aircraft, the helicopters and auto-giros, the VTOL (vertical take-off and landing) and STOL (short take-off and landing) aircraft, and finally the Supersonic aircraft—the Anglo-French "Concorde" and the Boeing 747.

There is also a section devoted to airports — both present and future; a section devoted to an explanation of the theory of flight; and in the appendix is a table of notable dates in the history of aviation.

This colorful book, measuring approximately 10 x 12", should find a place in the aviation fan's library — not so much for technical content as for its art work.

Continued on page 72



Need plans in Vietnam

We are serving with the Third Marine Regiment, Third Division, at Cua Vet, South Vietnam. Although there is much going on all about us, we have decided to use what limited free time we have to build a model airplane.

Since both of us are electronics technicians, our choice is R/C scale. Our original intention was to build a Lockheed P-38 Lightning. We have developed a reliable, steerable, retractable landing gear, bearing real resemblance to those used on full-scale aircraft. We have also been concerned with reliable means for controls and strong construction methods, since our desire is to build a model large enough to accommodate the use of two Veco 61 engines for power.

So far, our only real problems have been the availability of materials and actual construction plans for the Lockheed P-38. The materials for construction we can have sent from home; but the plans we cannot. A search for such plans in our own publications has proved fruitless, even to companies from which they can be obtained. Even good pictures would help, since we could enlarge on them. We simply do not know where we can get any sort of material on a Class C, R/C model of the aircraft.

Sgt. Floyd E. Sherrill and Cpl. Vito Macionis
So. Vietnam

Walter Musciano had a good plan of a control-line P-38 in this magazine quite some time ago. You can get plan from Hobby Helpers. Their catalogue costs 15 cents. Plan can be developed. Ed.

Just assemble and fly?

Having been out of the model airplane field for a few years, I looked forward to picking up a copy of American Aircraft Modeler. This is my favorite magazine. However, I must take issue with the Straight and Level editorial in the February, 1968 issue.

I have always derived my enjoyment from model airplane building and flying by either improvisation or a shop-talk session with interested friends. The main complaint seems to be a lack of getting-started articles. All one has to do is stop in at a public library and hash through some old model magazines. Or (as advertised on page 8 of the Feb. A.A.M.) one can send for just such a book as Lopshire's book for beginners.

I read with disappointment an ad in a recent model magazine about, "no modeling necessary, just assemble and fly." It seems to me that this is what the complaint in your editorial should have dealt with. My advice or help to novice modelers is to try until you find the solution, giving them the basic information only, and letting them do it themselves. I do agree with one point brought out in that editorial. Many hobby shop dealers are of no use whatso-

ever to a modeler. They simply sell the product without realizing the importance of understanding it.

D. D. Gaunt, Iowa City, Iowa

Explaining anything is an art. One has only to attempt putting together any one of thousands of manufactured products — bicycles, cribs, lawnmowers — to experience the urge to strangle the copy writer. Model airplanes are uncommonly difficult to describe meaningfully. Any model author knows how frustrating it is to tell a boy how to fly and adjust his free flight model. However well we do, it isn't half good enough. Ed.

Help support juniors

I am 11 years old and in the sport of Radio Control.

I am disturbed about the junior program and I wish you would devote more space to simple kits, airplanes and plans that are easy to build and fly. Here is the reason: In our room there are 30 children, two of which are airplane fans, counting myself. About 15 are car crazy.

You cannot go through a day without hearing words like: mags, sliks, race, speed, etc. So help support the junior program.

Dean Giacopassi, Hartford, Conn.

Beginner series in booklet form?

Have been following with great interest Howard McEntee's series of articles for beginners in radio control. I think it would be very fine if you were to reprint this in booklet form. It would then be available through the hobby shops to help introduce modelers to R/C and provide them with basic instructions. Clubs, youth groups, and school classes could also find good use for such instruction.

Bruce E. Conway, Cincinnati, Ohio

Will get around to it. Ed.

Notes AMA coverage

Have enjoyed A.A.M. during the last few years. Noting the recent change since AMA has taken over — congratulations!

Charles Uht, New York, N. Y.

Oh, boy! But many thanks. Ed.

An idea for junior program

I was quite gratified in reading your recent editorials concerning youth, particularly the February issue. In the past year, I have been introducing my boys to gliders, control-line, free flight, and single-channel radio control modeling. Since I am a beginner myself, we run into many problems that an experienced modeler could easily answer, but few of the answers are found in the model publications.

It seems that the majority of articles in these magazines are aimed at the more experienced (I am tempted to say "professional") modeler. One exception to this is "Getting Started in RC."

I would like to bring to your attention a possible suggestion to make your publication more appealing to youth. It comes from the English magazine, Aeromodeller, and is called the Golden Wings Model Club. Each month they publish letters from young modelers with specific questions concerning modeling. They usually include a free plan for a simple model and a modeling tip.

It seems to me to be one way of encouraging youth to participate in the hobby.

Edward S. Puffenbarger, New York, N. Y.

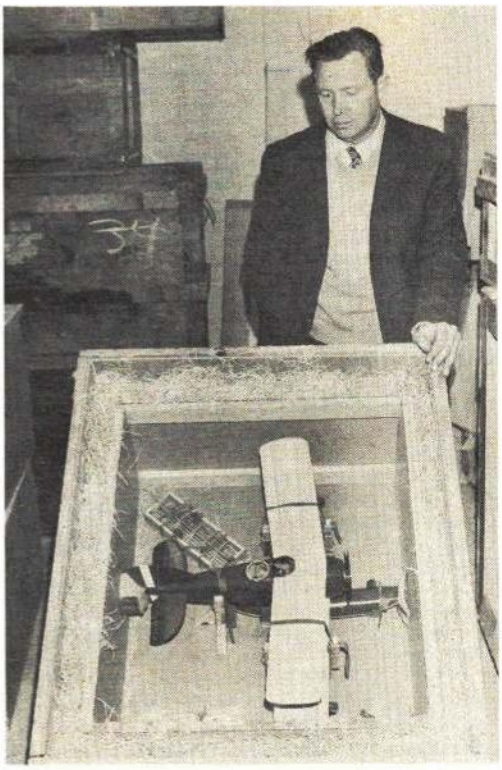
Continued on page 74

Italian school boys share project of rare Farman Boxkite to relive the old days

This model, a non-flying reproduction of the French Farman Boxkite of 1909, was built by the students from Arquata School, Novi Ligure, in Italy. The students, however, prefer to call it a Bristol Boxkite. The latter aircraft was virtually a copy of the Farman, and was used in the movie "Those Magnificent Men," where unfortunately it was referred to as a "Curtiss Pusher!" The young lad holding our Farman Boxkite is 12 years of age and, to quote his teacher, Mr. Piero Romagno, is "one of the most enthusiastic of the school." The model is constructed of balsa with metal fittings. The dummy engine is complete with valves, magneto, radiator, spark plugs, and exhaust pipes. Quite a project!

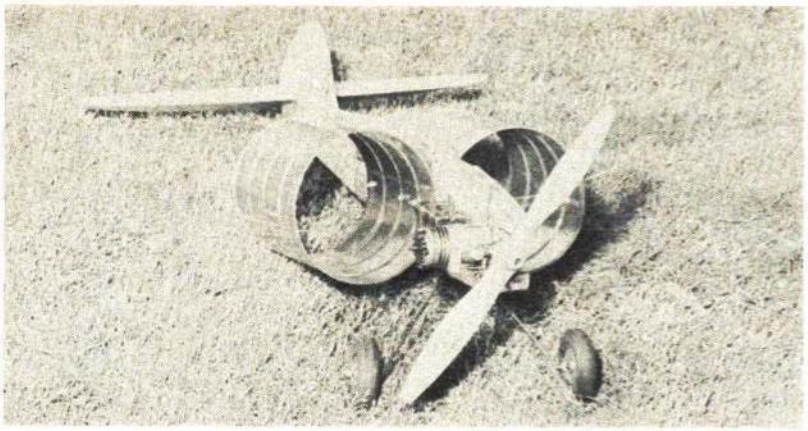
Third East Japan R/C contest near Tokyo saw 103 registrants and simple rules

With a little coaching by his father, 11-year-old H. Hiruma managed a nice pattern but did not place at the 3rd East Japan R/C Contest on March 20, the Japanese Memorial Day. Held near Tokyo on a windy day so dusty the meet looked like a scene from a desert movie. Of 103 registrants, only 31 scored points. After hand launching, models flew upwind to a flag placed 100 meters away, returned to takeoff, then landed in 30-meter circle. Scoring was distance from spot times a "K" factor for perfect landing, fair, or nose-dive type! Time allowable was four minutes, two of these for engine starting. Alternated were 27 and 40 mc equipment, so final approaches coordinated with next man's takeoff.



Smithsonian's rare models from worldwide sources

Famous collection of scale model aircraft so painstakingly assembled by the Smithsonian Air and Space Museum (see Foremost Scale Model Collector, March issue) includes projects procured from professionals all over the world. Shipment and storage are real problems, as this double-boxed Navy Curtiss HA suggests. Eventually, a new air museum building will be available; meanwhile many rare items are warehoused. Paul Matt made this model, using nylon, metal, fiberglass. Paul's plans are familiar to scale fans.



Empty coffee cans on Navy promotion-model fine under power, but oh, that glide

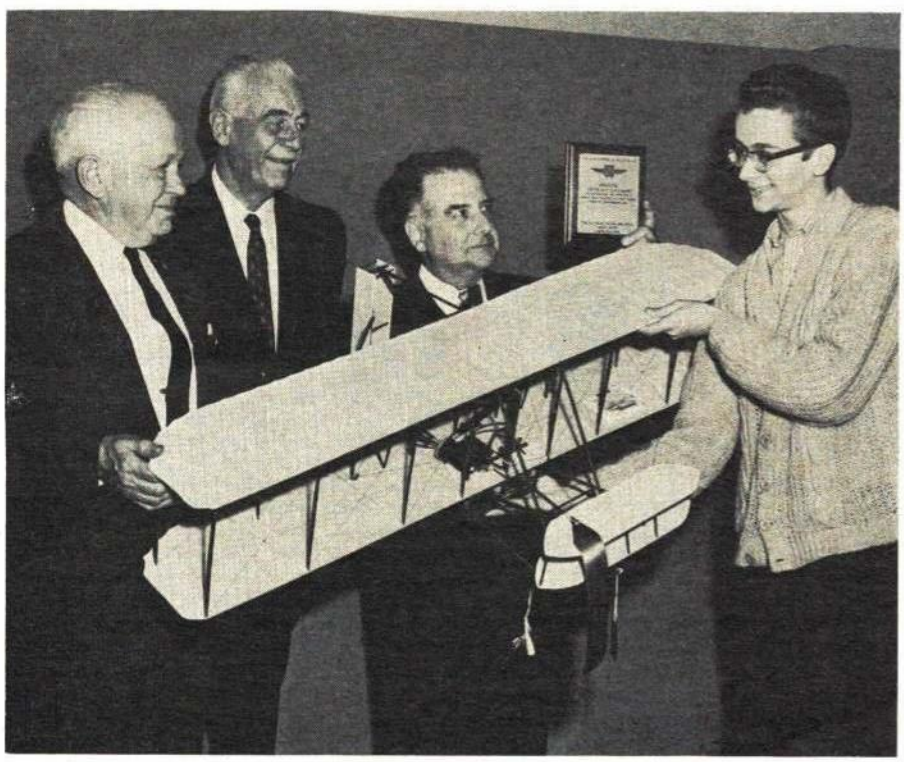
Plane without wings is a hot flyer concocted by Lieut. (JG) Gene A. Frame, officer in charge, NASNOLAMAT (Naval Air Station, New Orleans, La. Model Airplane Team). A conversation piece to promote interest in last Nats, it used two 2-lb. coffee cans instead of wings. Poor glide, needs tough landing gear!

What they won't do to be different. Good glide, but

Miss Terri Green, of Santa Maria, Calif. holds aloft a rather wild all-sheet-balsa design which sprang from the fertile mind of Terry Aldrich. In fact, this is a conservative concept—you should see the ones that got away! Called the Mighty Atom, it is an 049-powered enlargement from an 010-engined plan which appeared in an English mag. A really crazy thing in the air, says Terry. It has a good glide but, when overpowered, has a tendency to loop the loop. Well, what is so bad about that? It's one answer to the small flying site problem! An interesting coincidence is that a generation ago, the English aircraft firm, Westland, had experimental aircraft on the same order. The basic idea, has in fact, appealed to a number of the British big-plane builders through the years. Loops? Why not raise the thrust line? That should stop nosing-up.

model world

...on the international scene



Early Birds view great model of most famous aircraft—Wright Flyer

After Doug Ingell's fine two-parter about the Wrights in the April and May issues, many readers expressed interest in a model plan of the Wright Flyer. So here's a revealing shot of a championship rendering of history's most famous aircraft. The work of Tom Zubek, a Cleveland high school boy at the time the pic was made, the model won first prize at the National Plane and Space Model Show, Cleveland, and the Annual All-Scholastic Aircraft Show, St. Edward High, Lakewood, Ohio. Left to right: Ernie Hall, oldest instructor; Gen. E. H. Zistel, WW I ace; Dr. Paul Garber, curator National Air Museum. Zubek's model was best in Early Bird classification, at Cleveland. Early Birds are pilots who soloed before 1915. Zistel flew Camels and SE-5's to nine victories. Early Birds plaque awarded by Garber is provided annually at the National Plane and Space Model Show, co-sponsored by Air Foundation, Cleveland Chamber of Commerce, and The Cleveland Press. Cleveland is nation's leader in such promotions, The Cleveland Press supplying the spark.

The author, a three-time winner of the Mulvihill trophy, flies what he preaches. At each Nationals this trophy is given for the highest time in any outdoor rubber event.

DESIGN AND FLIGHT
RUBBER POWERED MODELS

Most challenging, the Wakefield class restricts the size of model and motor. Model must also meet a minimum weight; efficiency and reliability — prime design requisites.

This sensible approach to design ends at the winner's circle. First of two parts.

FRANK HEEB

WHEN you see a contest rubber model punch up through the ground turbulence and climb to a good altitude, with a transition to a soaring glide, you can be sure that a lot of thought, careful design and construction, and testing went into the model. There are no secrets involved in achieving good flight performance; rather, lots of patience, work, and testing are required.

General design: A model design of average proportions; i.e., no extremes of aspect ratio or tail areas or moments, usually is the best approach. Average means: 8 to 10:1 wing aspect ratio, and stabilizers of 20 to 35% of the wing area, 5 to 7:1 aspect ratio, located 4 to 7 wing chords aft of the wing. Some super designs with 14:1 wings and small stabs with very long moment arms may out-perform all others in evening air or calm days or California early mornings. But for all weather conditions, which we must face sooner or later, average proportions will pay off in the long run.

The model should be as large as the rules allow. Wakefields should be close to 294.5 sq. in. total projected area; so I use a 235 sq. in. wing and a 49 sq. in. stab. I go for the big ones in unlimited also — 299 sq. in. wing and 90 sq. in. stab. Gollywock and Wake-size airplanes are all right, but there is nothing, even a giant C gas job, that can equal the performance of a big unlimited with a lot of rubber. I like Al Vela's gas model design philosophy in which he designs the model around the engine/prop combination. This concept will work for unlimiteds; the model size should be determined by the length and number of strands that you want to use and are able to wind.

It's important to design the unlimited model strong, light, and clean, in this order of importance. Obviously, the model must have enough structural strength to last a few seasons through all weather conditions. But it's poor design to have a weight penalty because of overstrength components; and streamlining, although important, should be traded for weight saving. Thus a compromise of these factors is apparent. It's hard to build a Wakefield overweight, so maximum streamlining, combined with an adequate structure, is possible.

Aerodynamic design: I've found extra stability is obtained by locating a polyhedral wing some distance above the fuselage. This height may be ¼ to ½ wing chord, and the parasol effect is really helpful. In the old days when we used powerful brown-rubber motors, our models would blast up into a half loop during the first burst of power. The high wing location always helped generate a rolling upward turn (Immelman) without lost altitude. This maneuver wasn't the most efficient climb pattern but high power was controllable that way. This stability helps in windy weather also.

I prefer a single fin mounted topside on, or in front of, the stab. Twin fins, subrudders, tip plates, etc. all do the job but I've found nothing to be gained from them. And the single upper fin is lighter, simpler and less vulnerable to landing damage.

A long clean fuselage, with smooth curves and no abrupt section changes or steps combined with minimum cross-sec-

tion and a low drag wing mount, is necessary. The side view should be laid out carefully with French and ship curves. Balsa strips can be used as splines to trace around. The cross-section is dictated by the size motor used; maximum inside dimensions of 1⅜-inch square or 1½ diameter are ample for a Wakefield. The sheet-balsa twin-pylon wing mount is the best I've found — light, strong, simple, clean.

Books could be written about airfoil sections for models. Every contest builder has his favorite section — usually learned from personal experience, trial and error, contest wins, etc. We really don't have much accurate low-speed wind-tunnel data for model application, so we must rely on recommendations and hearsay from others. The NACA series has always proved reliable and dates back to 1933 when NACA Report No. 460 was published. NACA 6409 has been one of my favorites; 6309 and 4409 are also good. The last digit (9) denotes maximum thickness (9% of chord length), and any thicker section might have excessive drag. A 6% thick section, such as 6306 or 6406, may have superior aerodynamic properties but must be built carefully, since these sections are very thin and lack strength, unless full-depth spars are used.

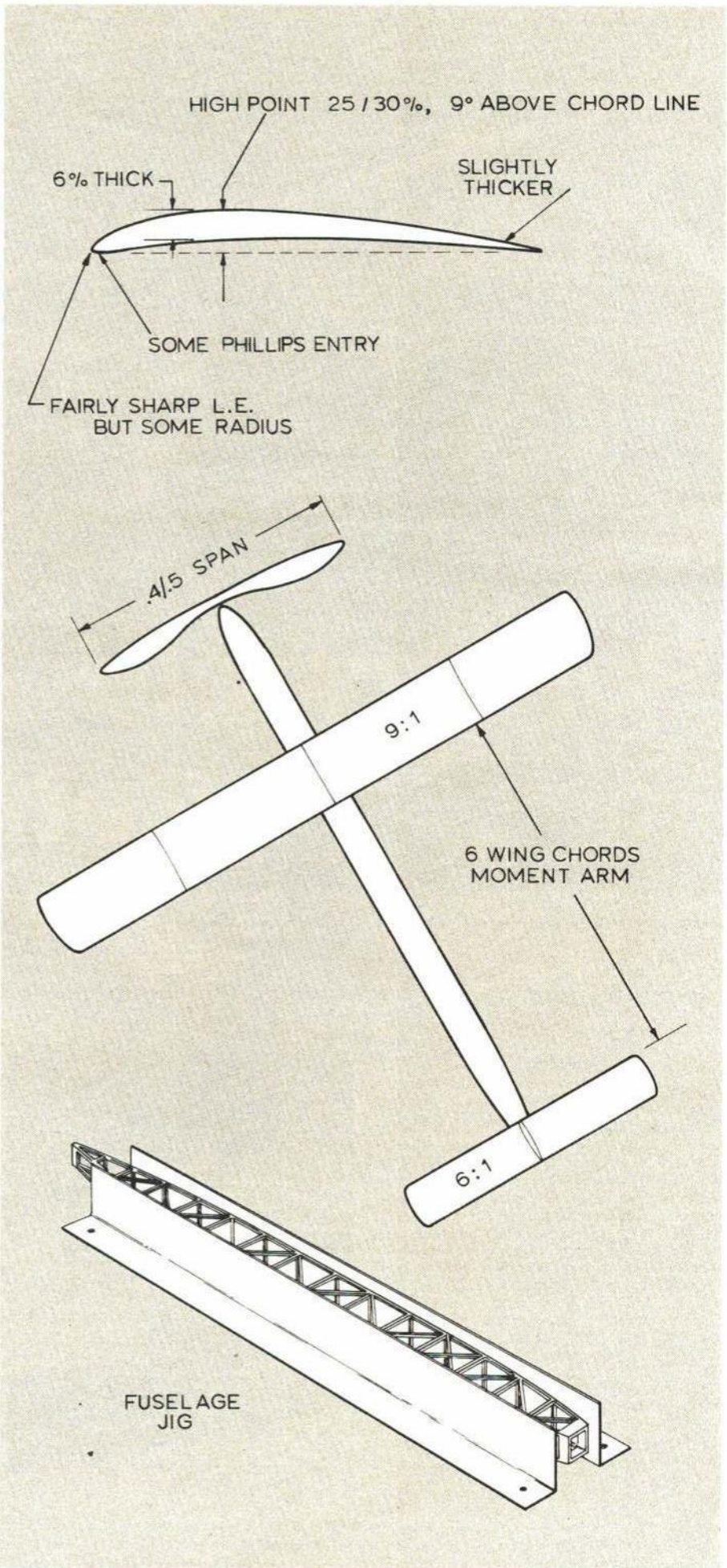
European-developed airfoils have seen the most world-wide use. The Eiffels of the 1930's were superseded by the Goettingens; then came the MVA's and lately the Benedeks. These Benedeks, which have been used by the majority of the Wakefield (and Nordic) finalists for several years now, must be good, and I have had limited favorable experience with the B-6356-b. The MVA-362 has proved consistently good also, and my next model probably will use a combination of these two.

Of course, the best method is to use a proven section, and if you aren't satisfied with its performance, modify it until it suits you. The series of articles by Gerry Ritz, written several years ago, gave us some common-sense airfoil design information. Larry Conover's article in the 1961 American Modeler Annual also presented a wealth of information. Ordinates of all the popular European sections were tabulated, and this is the only US published data I have seen lately (6 years ago!). A designer certainly has quite a selection from which to choose; there is no one outstanding.

Sections carefully laid out with a French curve can be designed, and probably are as good as any. I use a small leading edge radius with a bit of Phillips entry; this is the convex curve, just aft of the leading edge underside, that raises the leading edge slightly. This curve is blended into the undercamber. The airfoil high point located 25 to 30% aft of the leading edge, with a 6 to 9% maximum thickness, should give good results. Generally, thicker sections with a lot of undercamber have more lift at lower speeds and should be used on higher drag and higher wing loading models. Lighter and cleaner models do not require as much lift, so less thickness and little or no undercamber are desirable.

Sometimes slimming down an airfoil with a French curve may prove beneficial; this has been done to the NACA 6409 nose from the high point forward. I usually lay out an airfoil to the exact chord length, then I thicken the aft part undercamber, with a French curve, so that a standard size trailing edge can be used. Most newer sections T.E.'s are so very thin that wings would be extremely difficult to build accurately at chords of 5-inches or less, and a warp-free thicker TE is better. Since the air probably is turbulent aft of the airfoil max camber point, a blunt TE should cause

Continued on page 59



Porterfield Collegiate

The last Porterfield manufactured and sold — in 1941 — was the CP-75. Here the prototype makes a trial run over Kansas City, Mo.

Popular for training and cross-country, the Porterfield was a rival to the Cub.

DON PRATT

IN July of 1931, Ed Porterfield sold his controlling interest in the American Eagle Aircraft Corp. He had been its founder, president, and general manager. He had watched it grow from a meager one-airplane beginning in the spring of 1926 to where in 1929, it stood as the third largest manufacturer of nonmilitary aircraft in the World. He had planned, struggled, and hoped in vain as his brainchild became another victim of the great depression of the 1930's.

Ed stayed on with American Eagle as Sales Manager through 1931. Looking out through the glass door of his office into the plant area he watched as the workbenches were vacated one by one. Then finally, the assembly line stopped moving and half-finished airframes stood in forlorn silence in the darkened factory. American Eagle closed its doors forever in the early summer months of 1932. Embittered, Ed Porterfield went into retirement and swore never to build another airplane.

Two years later a set of circumstances involving 16 high-school students, an unemployed engineer, and an unsuccessful

With a WW I surplus J-1 Standard trainer, Ed Porterfield learned to fly in 1925; he founded American Eagle Aircraft in 1926.

3-cylinder gasoline engine would cause Ed to re-enter the airplane business, and to produce and sell another 1,067 airplanes under his own name, and to build another 1,000 under subcontract for Waco.

Noel Hockaday had been American Eagle's last designer, and was the one responsible for the remarkable Eaglet ultralight monoplane. He would later design the famous Rearwin Sportster, Speedster, and Cloudster monoplanes, and all models of the Porterfields. However, in 1933 Hockaday was unknown, and for most part unemployed.

Doing odd welding, drafting, and mechanical jobs during the day to make ends meet, Noel worked nights designing an ultralight high-wing monoplane envisioned as an improved Eaglet. The airframe was designed to be fitted with a 3-cylinder 40-hp radial engine created by another unemployed engineer named Guy Poyer. Poyer had several prototypes of his engine built and running, one of which was undergoing tests for government certification.

At about the same time, Hockaday finished the detail design work on his tiny airplane, the Aviation Club of Wyandotte High School in Kansas City, Kan. began casting about for a suitable design airplane

1940

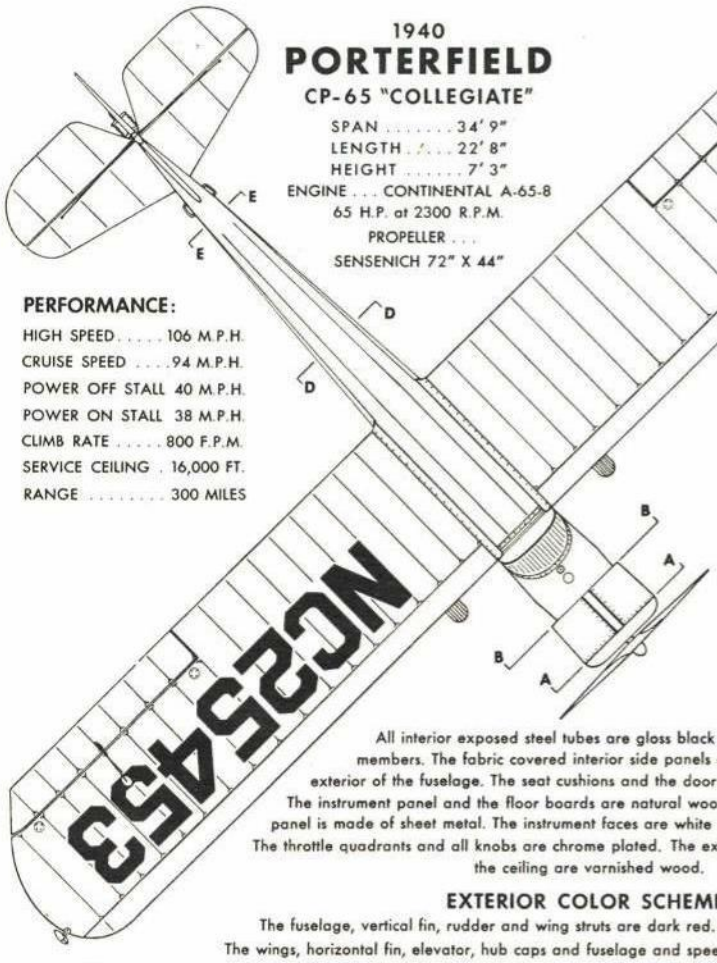
PORTERFIELD

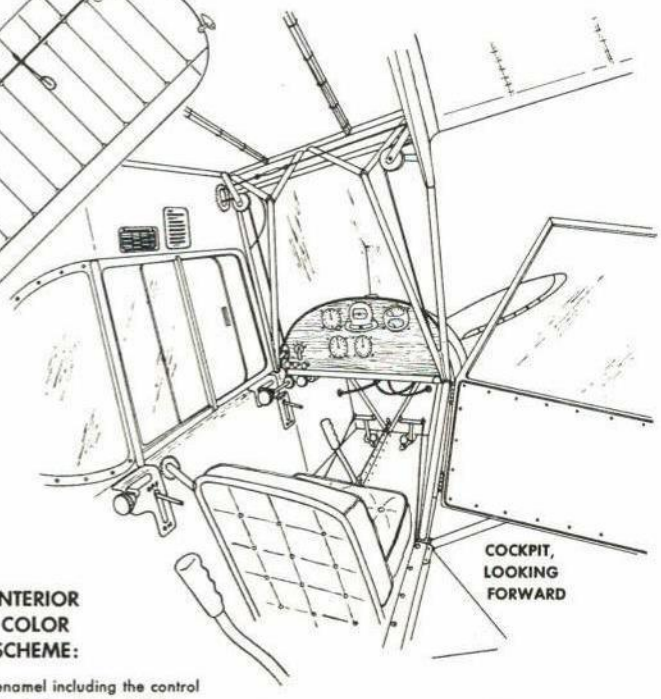
CP-65 "COLLEGIATE"

SPAN . . . . . 34' 9"
LENGTH . . . . . 22' 8"
HEIGHT . . . . . 7' 3"
ENGINE . . . CONTINENTAL A-65-8
65 H.P. at 2300 R.P.M.
PROPELLER . . .
SENSENICH 72" X 44"

PERFORMANCE:

HIGH SPEED . . . . . 106 M.P.H.
CRUISE SPEED . . . . 94 M.P.H.
POWER OFF STALL 40 M.P.H.
POWER ON STALL 38 M.P.H.
CLIMB RATE . . . . . 800 F.P.M.
SERVICE CEILING . 16,000 FT.
RANGE . . . . . 300 MILES



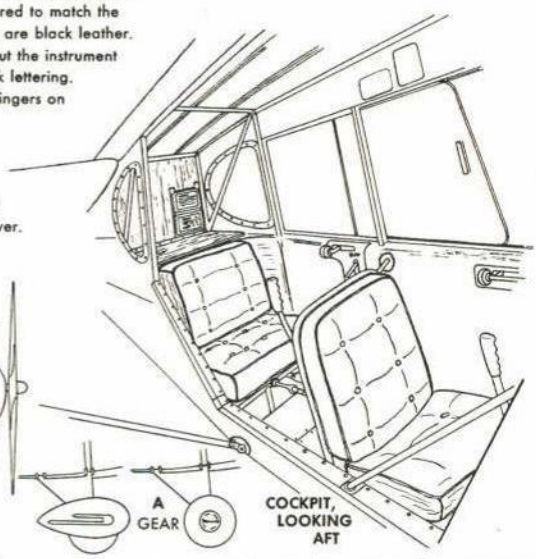


INTERIOR COLOR SCHEME:

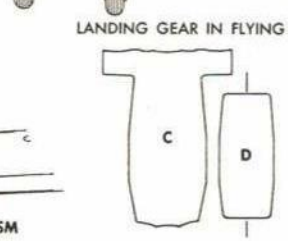
All interior exposed steel tubes are gloss black enamel including the control members. The fabric covered interior side panels are dark red to match the exterior of the fuselage. The seat cushions and the door paneling are black leather. The instrument panel and the floor boards are natural wood color but the instrument panel is made of sheet metal. The instrument faces are white with black lettering. The throttle quadrants and all knobs are chrome plated. The exposed stringers on the ceiling are varnished wood.

EXTERIOR COLOR SCHEME:

The fuselage, vertical fin, rudder and wing struts are dark red. The wings, horizontal fin, elevator, hub caps and fuselage and speed fairing trim are silver. The numbers on the wings are black. On the tail they are silver.



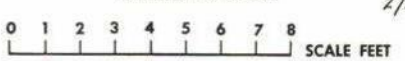
REAR COCKPIT FLOOR SHOWING TRIM ADJUSTMENT MECHANISM



LANDING GEAR IN FLYING POSITION

VERTICAL FIN DECAL

Don Pratt
2/20/68



The "Wyandotte Pup" became the first Porterfield, Model 35. It was certified with several engines — one of which was the 5-cyl., radial LeBlond. This Model 35 appeared at the 1966 fly-in held by the National Antique Airplane Association at Ottumwa, Iowa.

When 40 to 50-hp, 4-cyl., flat opposed aircraft engines, such as the Continental, became available, the Porterfield Model 35 was redesigned and designated the CP-50. Later, as horsepower went up to 65, this designation changed to CP-65. A CP-65 is shown.

to be built in the school manual training shops. Fate took a hand and brought the two together. During the 1933-34 school year, the Hockaday airplane took shape in a converted maintenance shack at the edge of the high school playground.

In May of 1934 the Hockaday Monoplane, now christened the Wyandotte Pup took to the air for the first time. One of the interested bystanders was Ed Porterfield. Ed was sufficiently impressed with the performance of the "Pup" to offer to buy it, and the rights to its manufacture, right on the spot. The deal was made and the Pup became the first Porterfield, the prototype of the model 35.

Before the model 35 could be marketed, more development was needed. The plane was stable, responsive, and pleasing to control, but terribly underpowered. Guy Poyer's engine would have to go. A 3-cylinder Szekely radial engine was fitted in its place but little improvement in performance was attained. Next, a 40-hp 9-cylinder Salmson radial was installed in the 35. The little kite still played land-lover. Finally, a 50-hp Velie 5-cylinder radial engine from a wrecked 1928 Monocoupe was mounted. Success!

During certification tests the improved 70-hp Velie became available and this powerplant was substituted for the original 50-hp model. The 35 also was certified with the similar 60-hp LeBlond in 1934, and later in the fall of 1935 with the 90-hp Warner.

Despite the lean airplane market of the great depression of the 1930's, the Porterfield became an immediate sales success. By mid-1936, three airplanes per week rolled out of the modest factory building in Kansas City, Mo.

No small part of the sales success of the Porterfield 35 was due to the installment purchase plan offered by the factory. At a time when most airplane factories sold their products on a cash basis only, a Porterfield 35 could be purchased for as little as $495.00 down and $96.00 per month.

Judged against its contemporaries, the model 35 was a good airplane. But Porterfield was not satisfied. His aim had always been to produce airplanes ideally suited for the training role, but a training plane must have safety as one of the prime considerations. In 1936, airplane engines were unreliable. Valves failed, connecting rods broke, engines stopped oiling and seized for no apparent reason. Venturing out of gliding distance from a flat open field was taking a long chance. By early 1937, Ed Porterfield had decided to start development of an airplane engine on his own. This action became unnecessary as a new generation of engine manufacturers stepped in and solved the riddle with a totally new design layout, the flat, opposed 4-cylinder aircooled engine.

In the early spring of 1937, Lycoming, Franklin, and Continental came to the rescue of the light aircraft industry. They introduced 40- to 50-hp, 4-cylinder, flat-opposed engines, making them available economically in large quantity. Porterfield ordered the Model 35 redesigned to take the new engines. Thus, the prototype of our feature model was born.

The redesigned 35 became the CP-50 with the 50-hp Continental installed. It became the FP-50 and the LP-50 with the Franklin and Lycoming engines respectively. Later, in 1938, when 65-hp versions of the same engines became available, the airplanes became CP-65, FP-65, LP-65. In 1941, just before World War II terminated civilian aircraft production, a deluxe 75-hp version of the CP-65 was developed and a few sold. This model was known as the CP75.

Ed Porterfield went into semi-retirement at the end of World War II. He had spent the war years building Waco CG-3 troop-carrying gliders for the U. S. Army Air Corps. in plants at Kansas City, Kan., and

Continued on page 65

R/C COUPLED FLAPS

SCEPTER

With flaps and elevators coupled — stunting is smoother, landings slower, and square maneuvers are possible.

Chuck Hayes holding the Scepter. This remarkable plane foreshadows a trend design in which the airplane and the control system are engineered as an integrated unit.

BY CHUCK HAYES as told to Glen Spickler

SCEPTER has been flown and developed to its present, refined state over a five-year period by servo man Chuck Hayes. At first glance Scepter may appear to be "just another shoulder wing multi," but take a closer look and read on.

Chuck is the type of flyer who likes to do Immelman turns on take-off and outside square loops with the bottom leg about 3 ft. off the ground. It goes without saying, that even if we assume that the flyer is qualified, it takes a model somewhat better than average to perform consistently in this manner. I will cover some of the important points of this design and attempt to explain their functions.

The most obvious feature of Scepter is the use of flaps. Contrary to normal R/C practice, these are coupled to the elevator as per U-control. This coupling gives more benefit than might be appreciated at first. An obvious ability to perform good square maneuvers is only of secondary interest in this arrangement. Picture a force setup with full symmetrical surfaces and no decalage; now to fly, this will require slight up trim which, in turn, gives down flap trim. The net result is washed-out wing tips. Turn the model upside down and the identical condition will exist. This condition will also exist, only to a much greater extent, in both inside and outside loops. Now let's imagine a landing approach. As the model slows down, more and more up elevator is used; the washout in the wing tips increases proportionately and allows full aileron control to be maintained right up to almost zero flying speed. This must be seen to be truly appreciated. On take-off there is less apparent zoom as the decalage change, due to flaps, allows the fuselage to remain more nearly parallel to the ground. The climb angle will be the same but will appear much less.

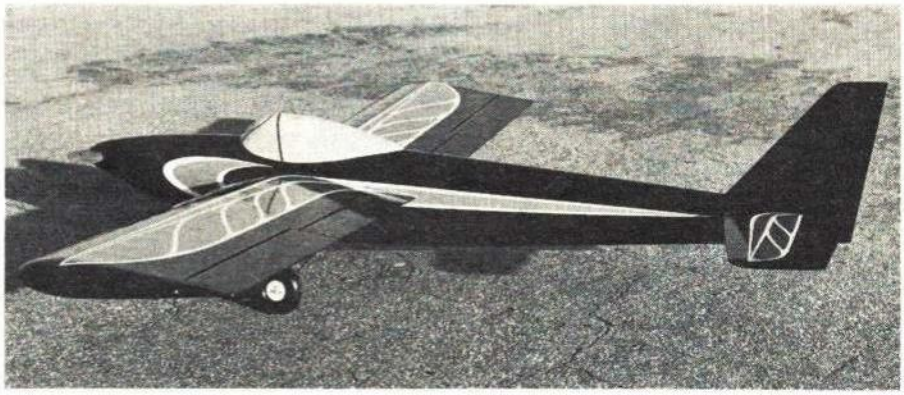
One last feature, while the flaps provide exceptionally square maneuvers when required, there is almost no increase to control sensitivity around neutral. In fact, Scepter is very docile anywhere close to neutral.

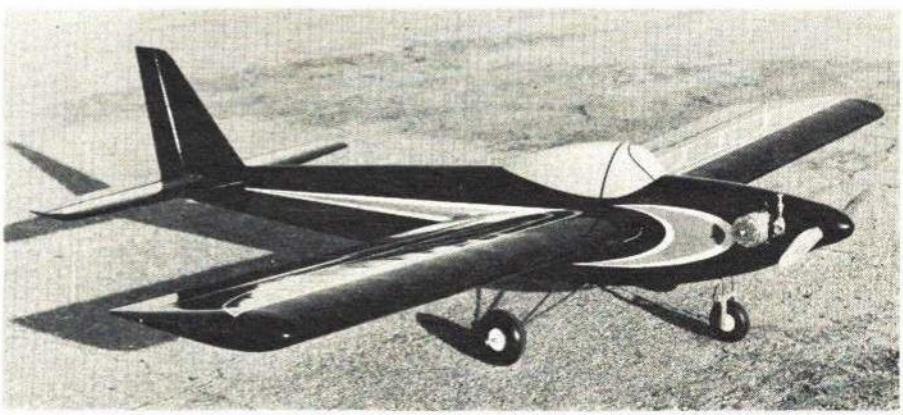
Scepter, instead of being a shoulder wing, is a true mid-wing. If the wing with dihedral (5 degrees per panel) were drawn on the side view, it would show the thrust line passing through the center of the ailerons. This feature, coupled with an airfoil that has short CP travel (airfoil is from a series by the author); thick, symmetrical vertical and horizontal stabilizers; no aileron differential (differential reverses when inverted) and no engine offset, provides axial rolls that make the model appear to be flying on a wire. Very little elevator movement is necessary to maintain a level, rolling attitude.

The Scepter also has a relatively large amount of lateral area near the CG. This helps in four-point rolls and knife edge flight. Placing the battery and radio above the wing in the canopy raises the CG and helps to keep the nose up in a turn. This also helps make the rolls axial.

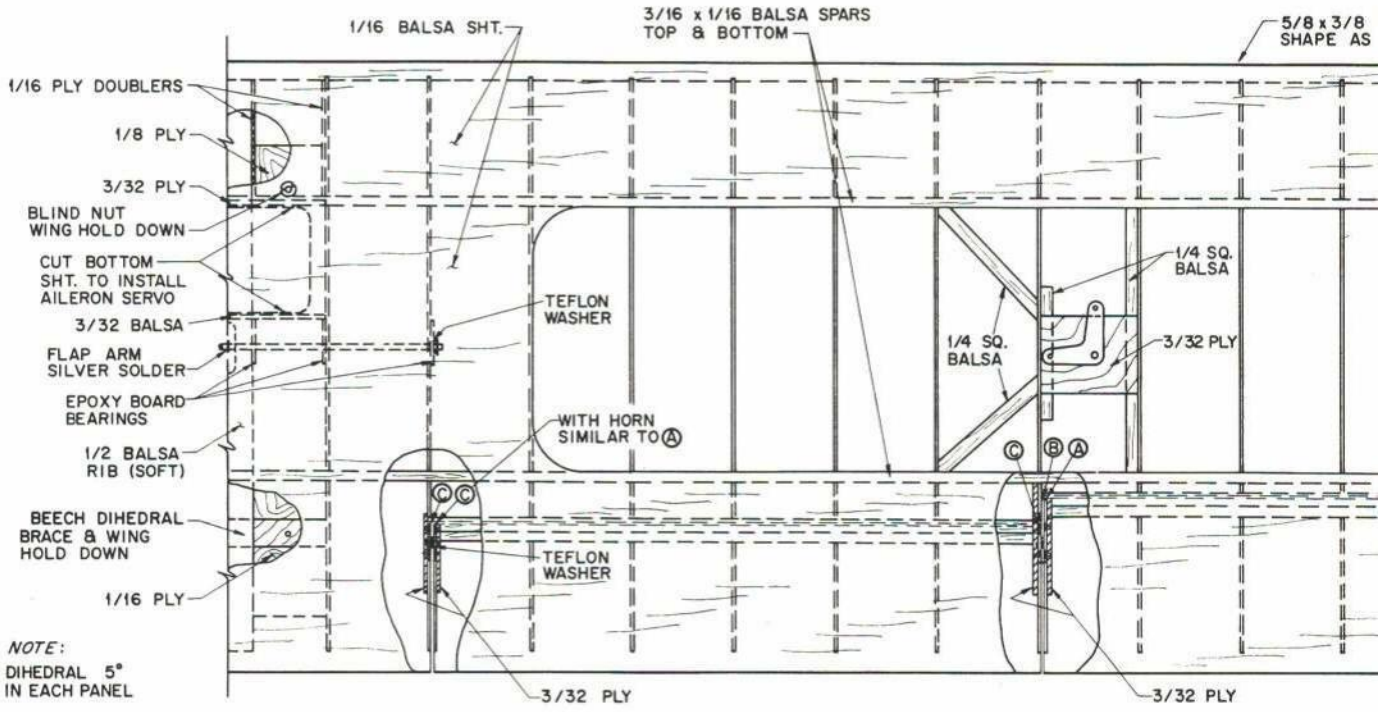
This is not a model for the beginner. Consequently, I will only touch on the high points of construction. The fuselage is not too different, so it is enough to say, "build it light." The balsa sheet should be approximately 6 lb. B or C grain. The block balsa should be as close to 4 lb. material as you can find; stringers and di-

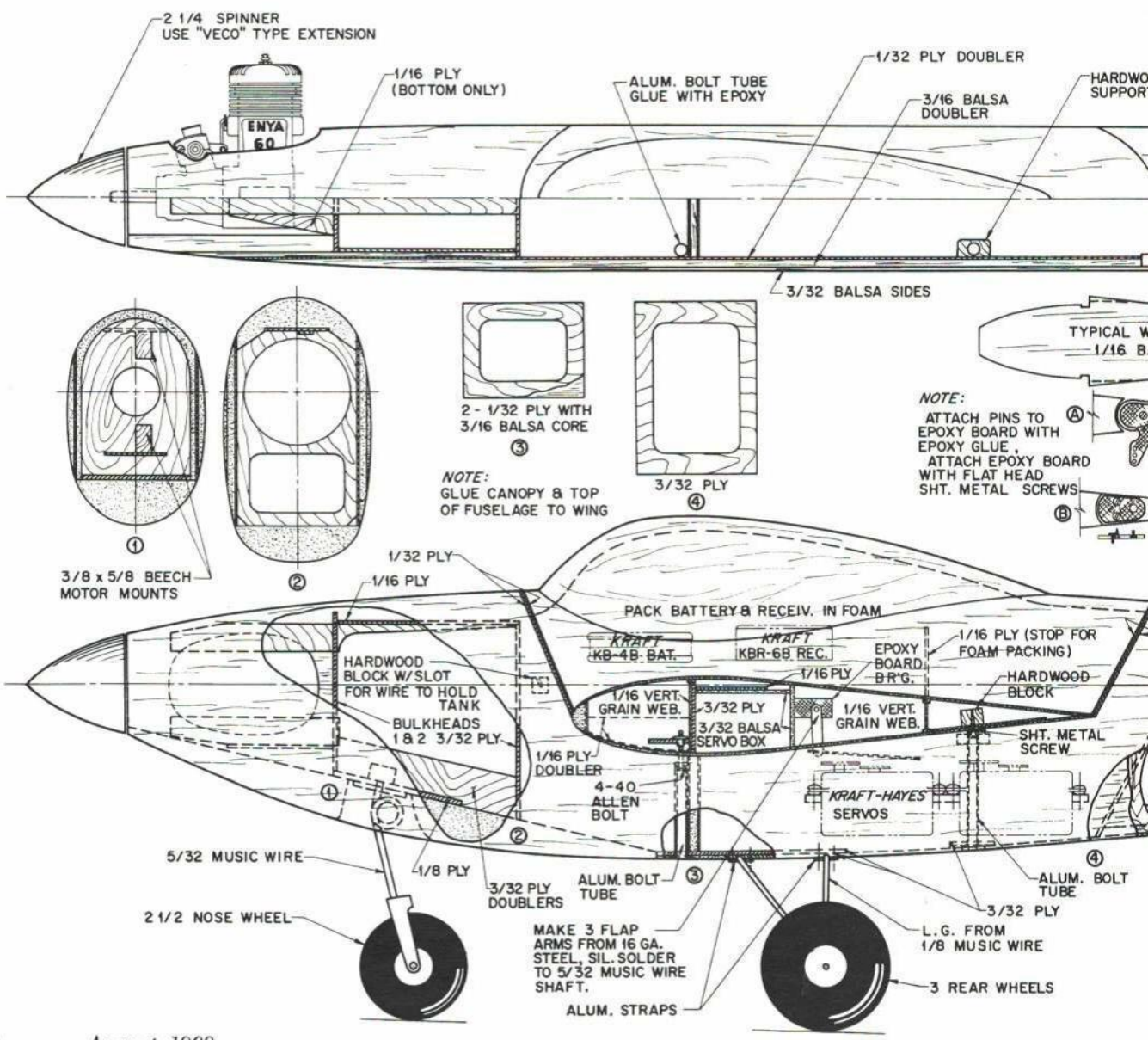
Continued on page 57

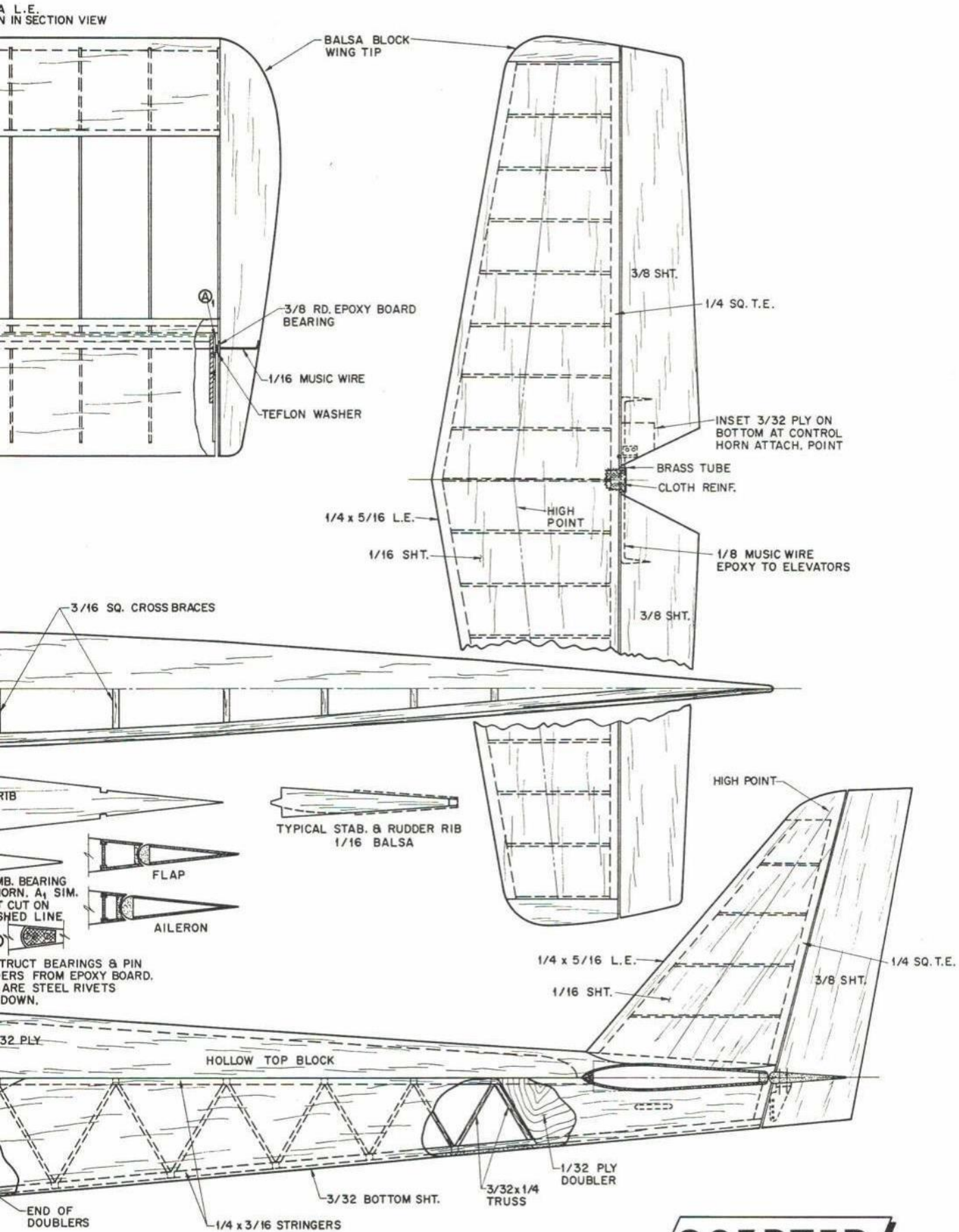




These views of the midwing demonstrate how flying and control surfaces are symmetrical about the thrust line. Coupling the flaps produces more stable and powerful pitch responses without making elevator control more sensitive. Carved canopy area provides increased lateral area and houses some radio weight to raise CG location.


1/16 BALSA SHT.
3/16 x 1/16 BALSA SPARS TOP & BOTTOM
5/8 x 3/8 SHAPE AS
1/16 PLY DOUBLERS
1/8 PLY
3/32 PLY
BLIND NUT WING HOLD DOWN
CUT BOTTOM SHT. TO INSTALL AILERON SERVO
3/32 BALSA
FLAP ARM SILVER SOLDER
EPOXY BOARD BEARINGS
1/2 BALSA RIB (SOFT)
BEECH DIHEDRAL BRACE & WING HOLD DOWN
1/16 PLY
TEFLON WASHER
WITH HORN SIMILAR TO Ⓐ
TEFLON WASHER
1/4 SQ. BALSA
1/4 SQ. BALSA
3/32 PLY
3/32 PLY
3/32 PLY
NOTE:
DIHEDRAL 5° IN EACH PANEL


2 1/4 SPINNER USE "VECO" TYPE EXTENSION
1/16 PLY (BOTTOM ONLY)
ENYA 60
ALUM. BOLT TUBE GLUE WITH EPOXY
1/32 PLY DOUBLER
3/16 BALSA DOUBLER
3/32 BALSA SIDES
2 - 1/32 PLY WITH 3/16 BALSA CORE
③
3/32 PLY
④
NOTE:
GLUE CANOPY & TOP OF FUSELAGE TO WING
TYPICAL W
1/16 B
NOTE:
ATTACH PINS TO EPOXY BOARD WITH EPOXY GLUE, ATTACH EPOXY BOARD WITH FLAT HEAD SHT. METAL SCREWS
Ⓐ
Ⓑ
①
②
3/8 x 5/8 BEECH MOTOR MOUNTS
1/32 PLY
1/16 PLY
PACK BATTERY & RECEIV. IN FOAM
KRAFT KB-4B BAT.
KRAFT KBR-6B REC.
1/16 PLY (STOP FOR FOAM PACKING)
EPOXY BOARD BR'G.
1/16 PLY
HARDWOOD BLOCK
HARDWOOD BLOCK W/SLOT FOR WIRE TO HOLD TANK
1/16 VERT. GRAIN WEB.
3/32 PLY
3/32 BALSA SERVO BOX
1/16 VERT. GRAIN WEB.
SHT. METAL SCREW
BULKHEADS 1 & 2 3/32 PLY
1/16 PLY DOUBLER
4-40 ALLEN BOLT
KRAFT-HAYES SERVOS
5/32 MUSIC WIRE
1/8 PLY
3/32 PLY DOUBLERS
ALUM. BOLT TUBE
③
④
ALUM. BOLT TUBE
2 1/2 NOSE WHEEL
3/32 PLY
MAKE 3 FLAP ARMS FROM 16 GA. STEEL, SIL. SOLDER TO 5/32 MUSIC WIRE SHAFT.
L.G. FROM 1/8 MUSIC WIRE
3 REAR WHEELS
ALUM. STRAPS

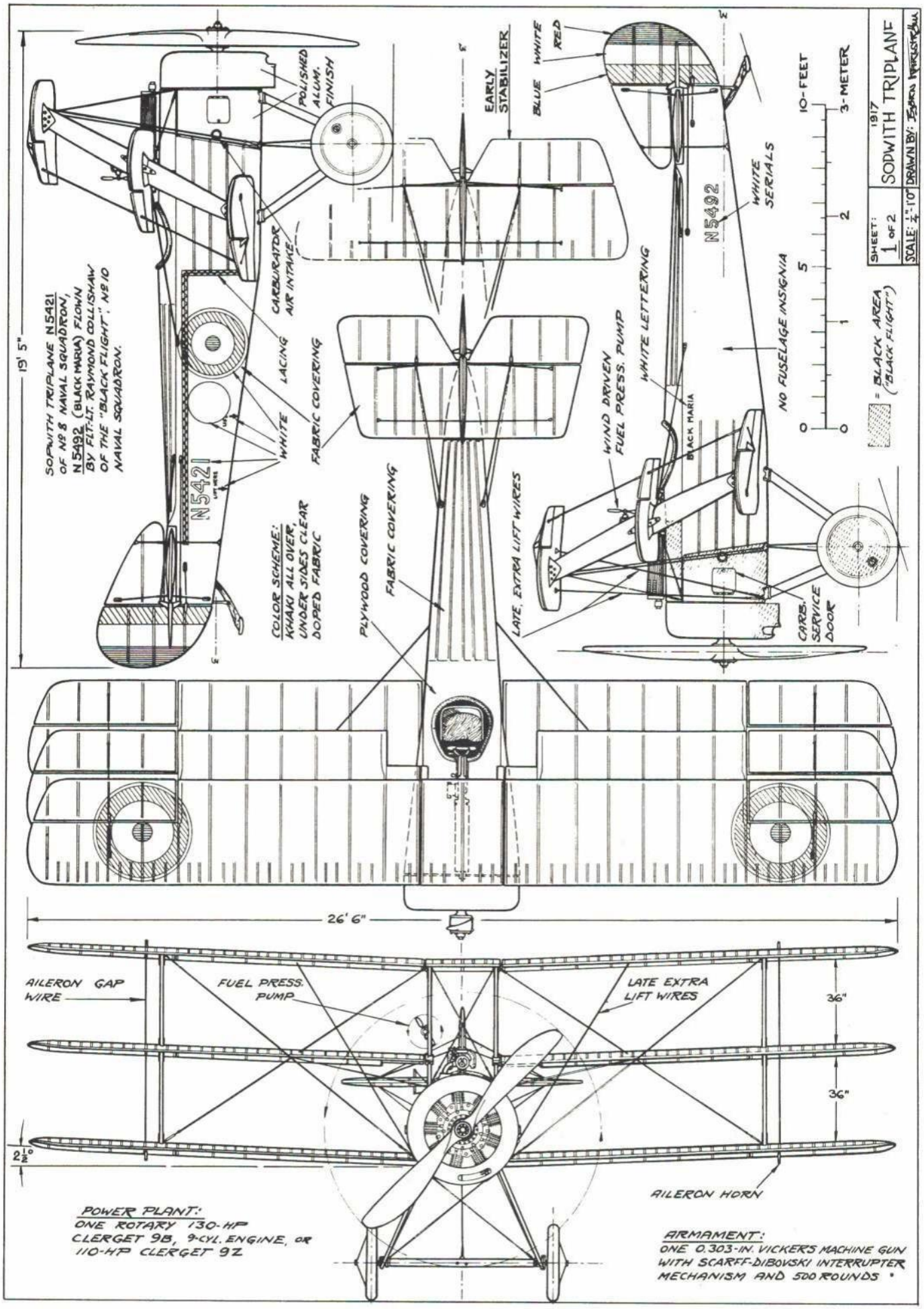


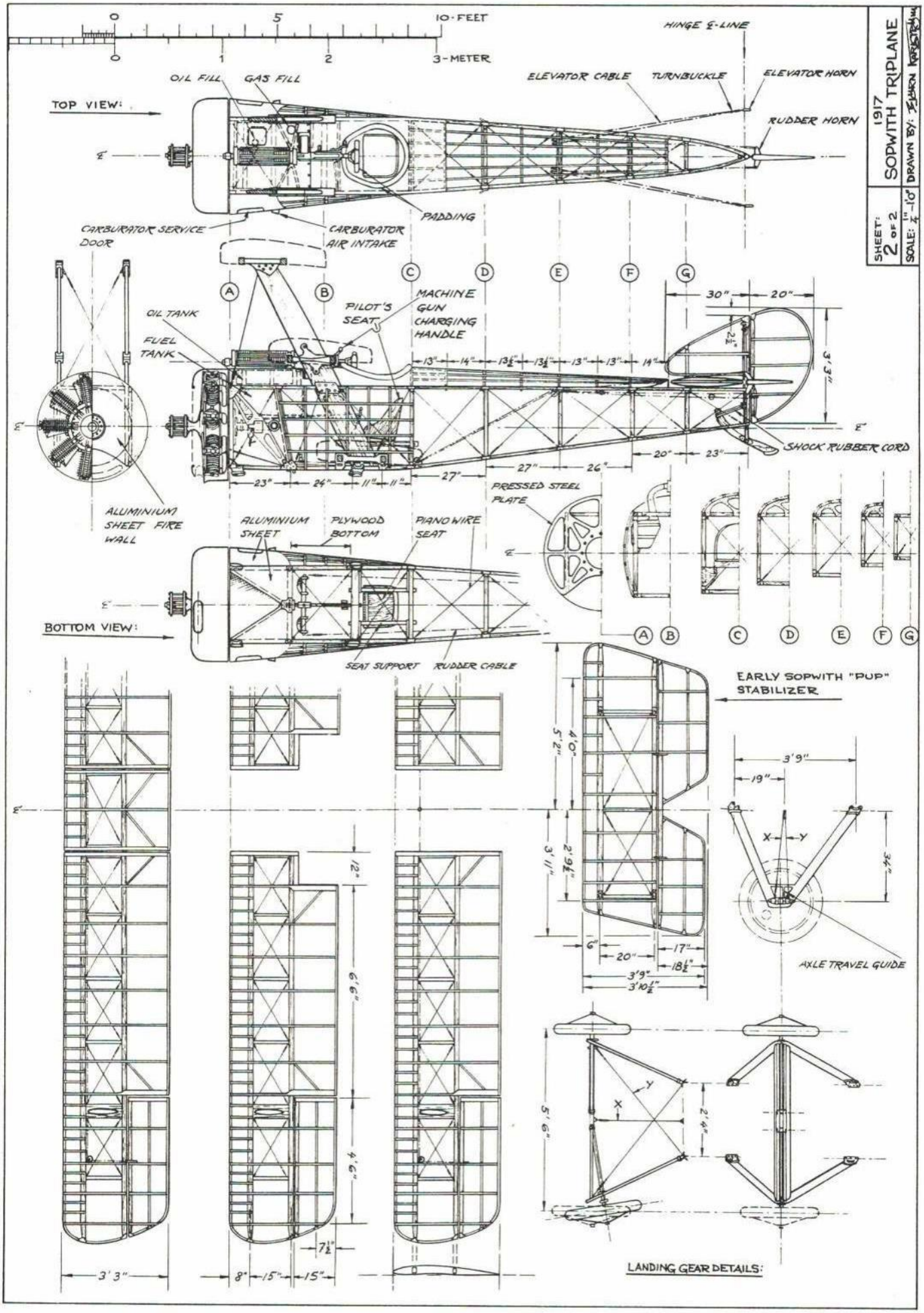
SCEPTER

DESIGNED BY CHUCK HAYES
DRAWN BY GLEN SPICKLER
DRAWN FOR A.M. BY FRANK PRZYBYLSKI

0 1" 2" 3" 4" 5" 6" 7" 8" 9" 10" 11" 12"
SCALE

FULL SIZE PLANS AVAILABLE — SEE PAGE 60


SOPWITH TRIPLANE N5421
OF No 8 NAVAL SQUADRON;
N5492 (BLACK MARIA) FLOWN
BY FLT-LT. RAYMOND COLLISHAW
OF THE "BLACK FLIGHT"; No 10
NAVAL SQUADRON.
19' 5"
POLISHED ALUM. FINISH
EARLY STABILIZER
BLUE WHITE RED
CARBURATOR AIR INTAKE
LACING
WHITE
FABRIC COVERING
N5421
N5492
WHITE SERIALS
NO FUSELAGE INSIGNIA
WIND DRIVEN FUEL PRESS. PUMP
WHITE LETTERING
BLACK MARIA
10-FEET
3-METER
= BLACK AREA ("BLACK FLIGHT")
1917
SOPWITH TRIPLANE
SHEET: 1 OF 2
SCALE: 1"=1'0"
DRAWN BY: JOSEPH HARRISBERGER
COLOR SCHEME: KHAKI ALL OVER, UNDER SIDES CLEAR DOPED FABRIC
PLYWOOD COVERING
FABRIC COVERING
LATE, EXTRA LIFT WIRES
CARB. SERVICE DOOR
26' 6"
AILERON GAP WIRE
FUEL PRESS. PUMP
LATE EXTRA LIFT WIRES
36"
36"
2½"
AILERON HORN
POWER PLANT:
ONE ROTARY 130-HP CLERGET 9B, 9-CYL. ENGINE, OR 110-HP CLERGET 9Z
ARMAMENT:
ONE 0.303-IN. VICKER'S MACHINE GUN WITH SCARFF-DIBOVSKI INTERRUPTER MECHANISM AND 500 ROUNDS


0 5 10-FEET
0 1 2 3-METER
1917 SOPWITH TRIPLANE
DRAWN BY: ERIK KARSTROM
SHEET: 2 OF 2
SCALE: 1" = 1'-0"
TOP VIEW:
HINGE ℄-LINE
ELEVATOR CABLE
TURNBUCKLE
ELEVATOR HORN
RUDDER HORN
OIL FILL
GAS FILL
PADDING
CARBURATOR SERVICE DOOR
CARBURATOR AIR INTAKE
OIL TANK
FUEL TANK
PILOT'S SEAT
MACHINE GUN CHARGING HANDLE
SHOCK RUBBER CORD
ALUMINIUM SHEET FIRE WALL
PRESSED STEEL PLATE
ALUMINIUM SHEET
PLYWOOD BOTTOM
PIANO WIRE SEAT
BOTTOM VIEW:
SEAT SUPPORT
RUDDER CABLE
EARLY SOPWITH "PUP" STABILIZER
AXLE TRAVEL GUIDE
LANDING GEAR DETAILS:

At the field, ready to receive its load of air mail for the night, our well-detailed Mailwing awaits action. The cover of the May issue shows a restored mint-condition Mailwing at Fredericksburg, Va. Authentic colors and some extra details were shown.

The Pitcairn Mailwing

Designed for night air mail in 1927 this plane brought reliability to the Air Mail Service. A control-line masterpiece for 35 power.

FRANK W. BEATTY

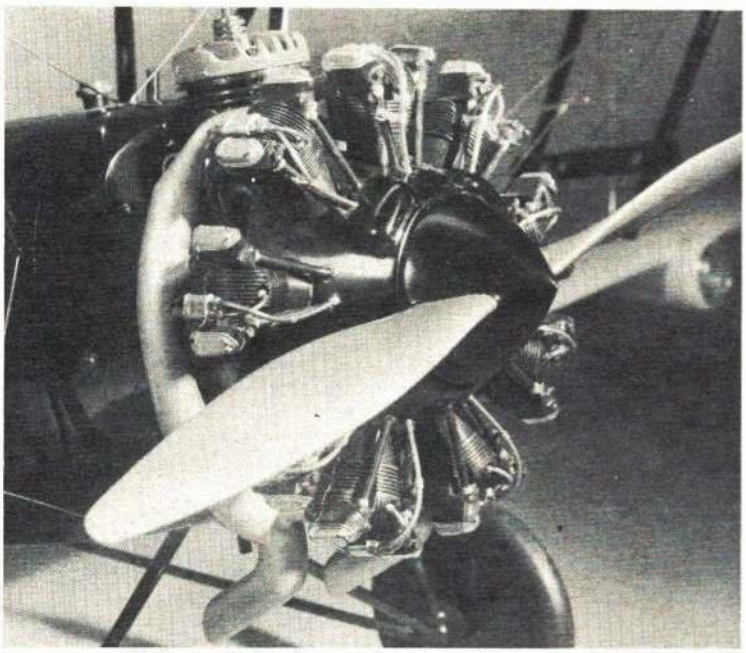
THE Pitcairn Mailwing was specifically designed in 1927 to be sold to contract mail carriers for night air mail runs. An immediate success, this craft which could carry 600 lbs. of mail at speeds up to 136 mph was being produced at the rate of one per week by the end of 1928. Many an airline that is world-famous today was equipped with Mailwings during this era.

Many Mailwings finished out their days as crop dusters and a handful of Mailwings are still flying today. Well preserved examples can be seen at the Tallmantz and Smithsonian Air Museums. For many aerophiles watching the TV late movies, the real star of *Blaze of Noon* is the Pitcairn Mailwing.

James Triggs' fine three-views which appeared in the January 1959 American Modeler and the Fall 1960 Air Progress were used in preparing the Mailwing working drawings. Mr. Triggs' drawings did not include coloring data, but replies to letters sent to Eastern Air Lines, Tallmantz Aviation and the Smithsonian Institution all verify that the plane was painted as described in this article. It was noted that if Mr. Triggs' three-views were to be enlarged four times, the Monogram Wright Cyclone Plastic Engine Kit would be exactly the right size for this model. The model has therefore been built to a rather unusual scale of $1\frac{3}{16}'' = 1'$ and has a 39″ wingspan and a 26″ length. The ship is powered by a McCoy 35 R/C engine with a Roberts bellcrank operated throttle and all up weight is some 51 ounces.

The model's high-gloss finish reflects prize-winning detail and workmanship. Lighting can be operative and the engine exhaust can be routed through the curvacious manifold.

It was originally intended that the Mailwing's construction would follow closely an old favorite sport scale model built many years ago — Chuck Hollinger's Fleet Biplane (Air Trails May 1951). Such a model would have gone together much faster and would have had some stunt capability. But as the drawings and construction proceeded, more details with their supporting structures and vast amounts of filler and dope were added until the model far exceeded its original proposed weight. The Mailwing's configuration is such that unless some care is exercised in keeping the model's tail as light as possible, ballast will be required in the model's nose. Having gone overboard on details and paint, the Mailwing required some 10 ounces of ballast in its nose; six to eight of these ounces being packed in the hollow plastic engine cylinders. Many of my scale models have had wing loadings of 20-25 ounces per hundred square inches of wing area, so this model which sounds brick-heavy at 51 ounces has a reasonable (for me) wing loading of 14.3 ounces per hundred square inches of wing area. It has flown and



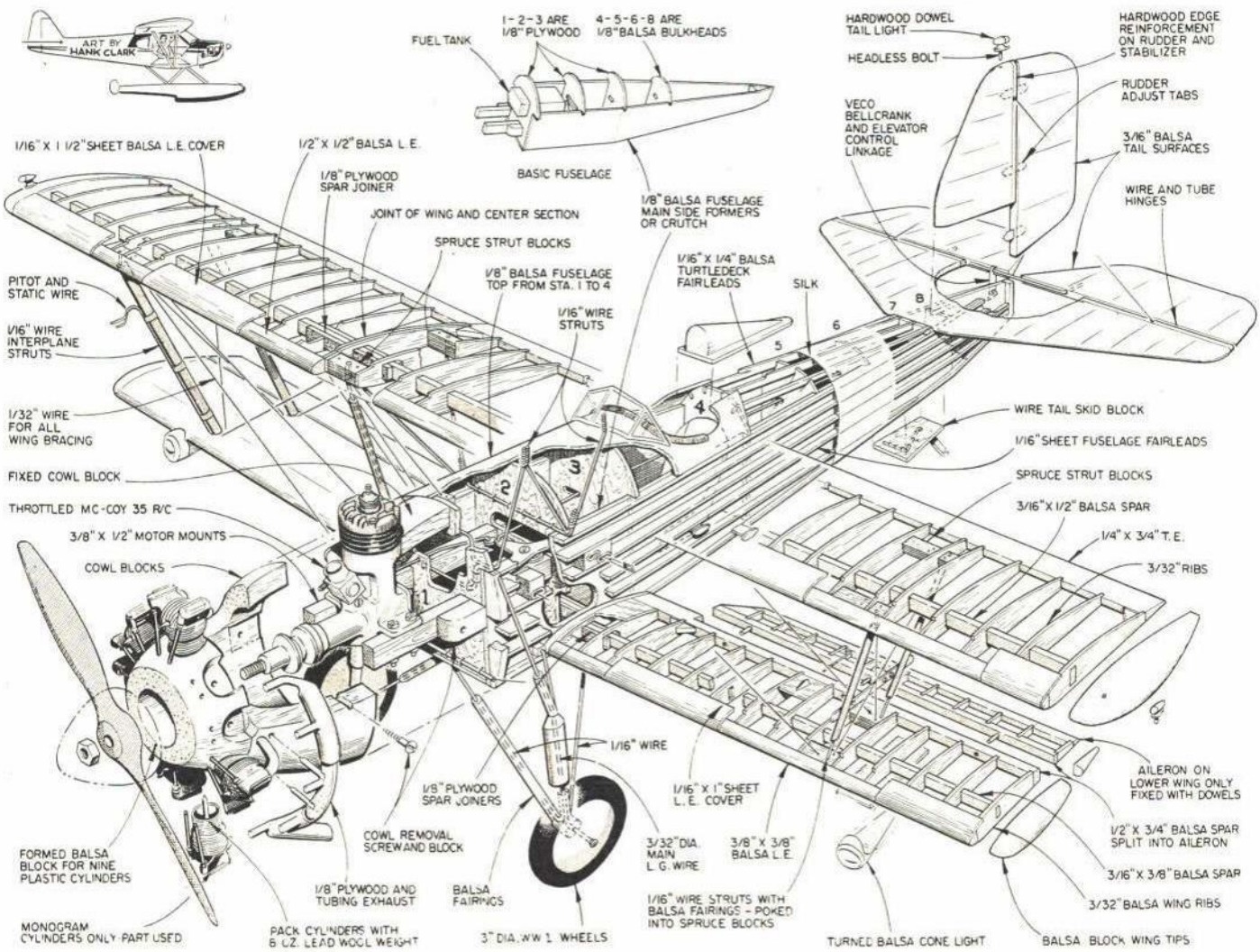
Monogram Wright engine kit was the source of the scale cylinders. They are mounted on a removable false cowl and are loaded with lead weight.

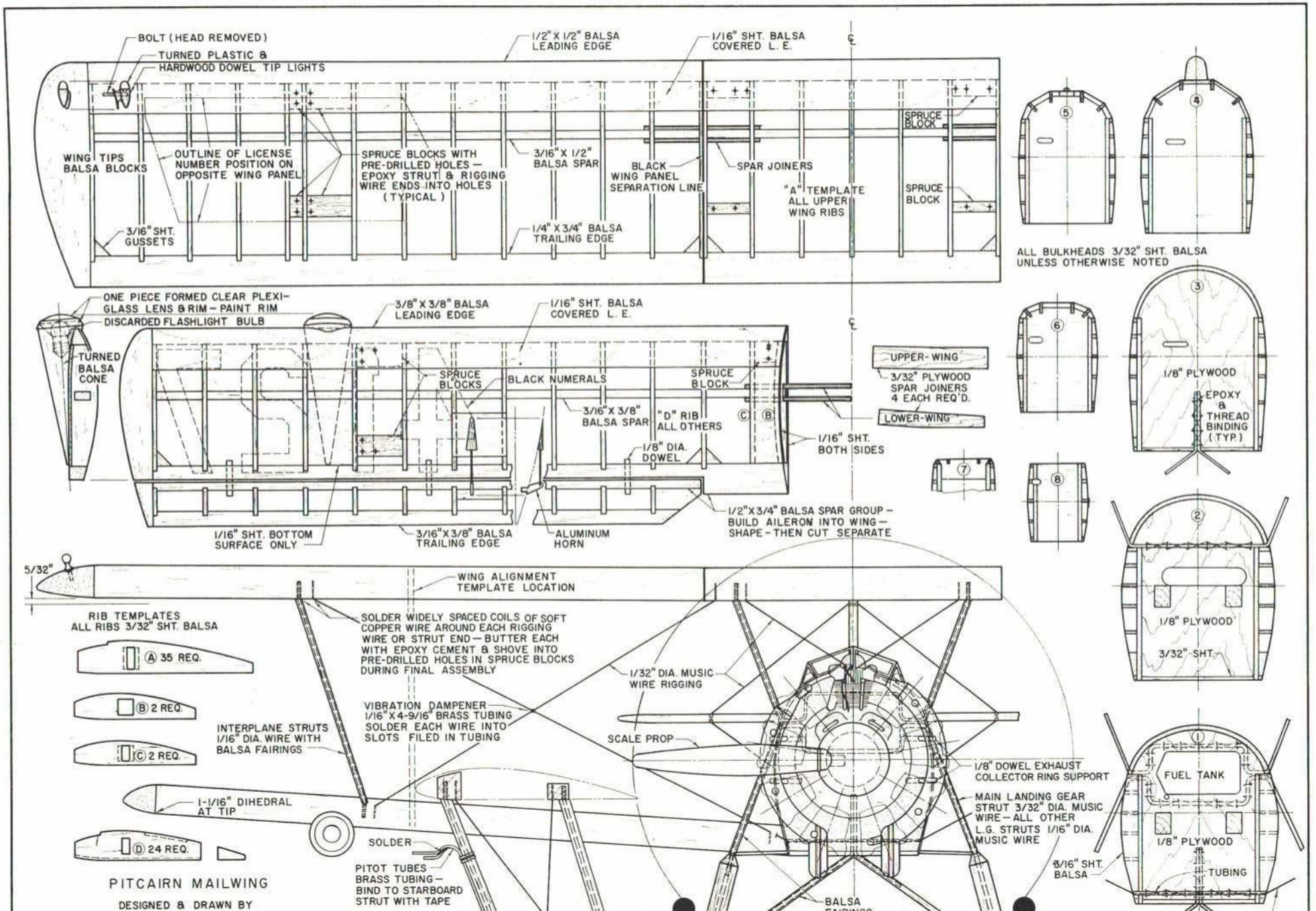
The "anti genius" fires up the McCoy 35 R/C. It is well built and not a light-weight, and is a realistic flyer.

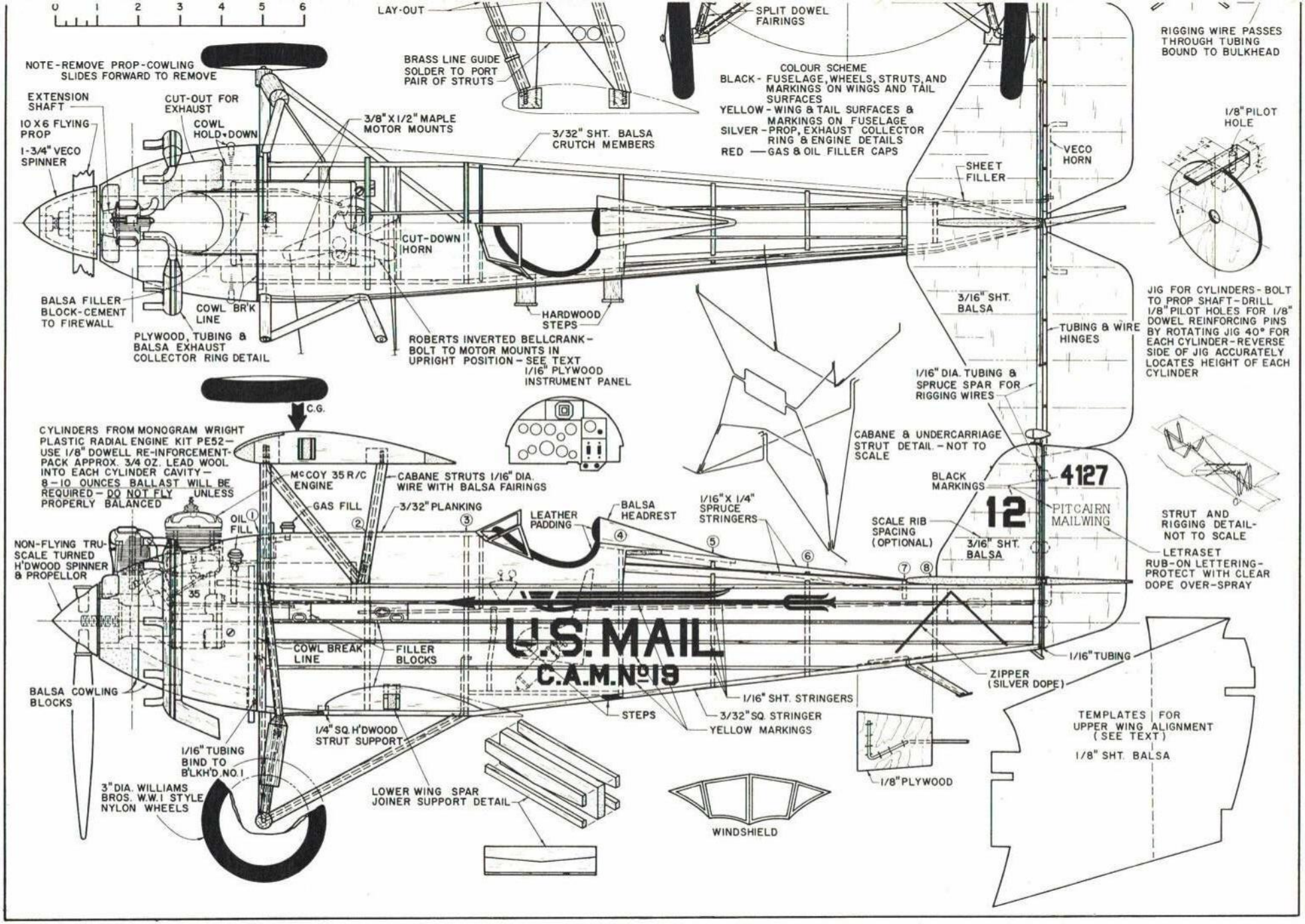
handled well, even in gusty-wind contest conditions. A model of 40 ounces or less could be a true week-end sport flyer, so build to suit your purposes, but DO NOT FLY your model unless balanced per drawings.

Wings: Cut out all ribs, spars, spar joiners and leading and trailing edges and cement these frames together. Shape the leading edges and then add all 1/16" sheet balsa panels and the tip fairing blocks. Epoxy all pre-shaped spruce strut and rigging blocks in position and then sand both wings to final shape. Drill the lower wing rear spar for the 1/8" dowel aileron supports before cutting ailerons separate. This assures that the aileron will mate perfectly with the wing on final assembly. Mark all strut and rigging wire locations on the

Continued on page 53




BOLT (HEAD REMOVED)
TURNED PLASTIC & HARDWOOD DOWEL TIP LIGHTS
1/2" X 1/2" BALSA LEADING EDGE
1/16" SHT. BALSA COVERED L. E.
WING TIPS BALSA BLOCKS
OUTLINE OF LICENSE NUMBER POSITION ON OPPOSITE WING PANEL
SPRUCE BLOCKS WITH PRE-DRILLED HOLES — EPOXY STRUT & RIGGING WIRE ENDS INTO HOLES (TYPICAL)
3/16" X 1/2" BALSA SPAR
BLACK WING PANEL SEPARATION LINE
SPAR JOINERS
"A" TEMPLATE ALL UPPER WING RIBS
SPRUCE BLOCK
SPRUCE BLOCK
3/16" SHT. GUSSETS
1/4" X 3/4" BALSA TRAILING EDGE
ALL BULKHEADS 3/32" SHT. BALSA UNLESS OTHERWISE NOTED
ONE PIECE FORMED CLEAR PLEXI-GLASS LENS & RIM — PAINT RIM
DISCARDED FLASHLIGHT BULB
3/8" X 3/8" BALSA LEADING EDGE
1/16" SHT. BALSA COVERED L. E.
TURNED BALSA CONE
SPRUCE BLOCKS
BLACK NUMERALS
SPRUCE BLOCK
3/16" X 3/8" BALSA SPAR
"D" RIB ALL OTHERS
1/8" DIA. DOWEL
1/16" SHT. BOTH SIDES
UPPER-WING
3/32" PLYWOOD SPAR JOINERS 4 EACH REQ'D.
LOWER-WING
1/8" PLYWOOD
EPOXY & THREAD BINDING (TYP.)
1/16" SHT. BOTTOM SURFACE ONLY
3/16" X 3/8" BALSA TRAILING EDGE
ALUMINUM HORN
1/2" X 3/4" BALSA SPAR GROUP — BUILD AILERON INTO WING — SHAPE — THEN CUT SEPARATE
1/8" PLYWOOD
3/32" SHT.
5/32"
WING ALIGNMENT TEMPLATE LOCATION
RIB TEMPLATES ALL RIBS 3/32" SHT. BALSA
A 35 REQ.
B 2 REQ.
C 2 REQ.
D 24 REQ.
SOLDER WIDELY SPACED COILS OF SOFT COPPER WIRE AROUND EACH RIGGING WIRE OR STRUT END — BUTTER EACH WITH EPOXY CEMENT & SHOVE INTO PRE-DRILLED HOLES IN SPRUCE BLOCKS DURING FINAL ASSEMBLY
1/32" DIA. MUSIC WIRE RIGGING
VIBRATION DAMPENER 1/16" X 4-9/16" BRASS TUBING SOLDER EACH WIRE INTO SLOTS FILED IN TUBING
INTERPLANE STRUTS 1/16" DIA. WIRE WITH BALSA FAIRINGS
SCALE PROP
1/8" DOWEL EXHAUST COLLECTOR RING SUPPORT
MAIN LANDING GEAR STRUT 3/32" DIA. MUSIC WIRE — ALL OTHER L.G. STRUTS 1/16" DIA. MUSIC WIRE
FUEL TANK
1/8" PLYWOOD
5/16" SHT. BALSA
TUBING
1-1/16" DIHEDRAL AT TIP
SOLDER
PITOT TUBES BRASS TUBING — BIND TO STARBOARD STRUT WITH TAPE
BALSA FAIRINGS
PITCAIRN MAILWING
DESIGNED & DRAWN BY


0 1 2 3 4 5 6
LAY-OUT
BRASS LINE GUIDE SOLDER TO PORT PAIR OF STRUTS
SPLIT DOWEL FAIRINGS
RIGGING WIRE PASSES THROUGH TUBING BOUND TO BULKHEAD
COLOUR SCHEME
BLACK - FUSELAGE, WHEELS, STRUTS, AND MARKINGS ON WINGS AND TAIL SURFACES
YELLOW - WING & TAIL SURFACES & MARKINGS ON FUSELAGE
SILVER - PROP, EXHAUST COLLECTOR RING & ENGINE DETAILS
RED — GAS & OIL FILLER CAPS
NOTE - REMOVE PROP-COWLING SLIDES FORWARD TO REMOVE
EXTENSION SHAFT
10 X 6 FLYING PROP
1-3/4" VECO SPINNER
CUT-OUT FOR EXHAUST
COWL HOLD-DOWN
3/8" X 1/2" MAPLE MOTOR MOUNTS
3/32" SHT. BALSA CRUTCH MEMBERS
VECO HORN
SHEET FILLER
1/8" PILOT HOLE
CUT-DOWN HORN
BALSA FILLER BLOCK - CEMENT TO FIREWALL
COWL BR'K LINE
HARDWOOD STEPS
PLYWOOD, TUBING & BALSA EXHAUST COLLECTOR RING DETAIL
ROBERTS INVERTED BELLCRANK - BOLT TO MOTOR MOUNTS IN UPRIGHT POSITION - SEE TEXT
1/16" PLYWOOD INSTRUMENT PANEL
3/16" SHT. BALSA
TUBING & WIRE HINGES
JIG FOR CYLINDERS - BOLT TO PROP SHAFT - DRILL 1/8" PILOT HOLES FOR 1/8" DOWEL REINFORCING PINS BY ROTATING JIG 40° FOR EACH CYLINDER - REVERSE SIDE OF JIG ACCURATELY LOCATES HEIGHT OF EACH CYLINDER
1/16" DIA. TUBING & SPRUCE SPAR FOR RIGGING WIRES
C.G.
CYLINDERS FROM MONOGRAM WRIGHT PLASTIC RADIAL ENGINE KIT PE52 — USE 1/8" DOWELL RE-INFORCEMENT - PACK APPROX. 3/4 OZ. LEAD WOOL INTO EACH CYLINDER CAVITY — 8 - 10 OUNCES BALLAST WILL BE REQUIRED - DO NOT FLY UNLESS PROPERLY BALANCED
McCOY 35 R/C ENGINE
CABANE STRUTS 1/16" DIA. WIRE WITH BALSA FAIRINGS
CABANE & UNDERCARRIAGE STRUT DETAIL. - NOT TO SCALE
GAS FILL
3/32" PLANKING
LEATHER PADDING
BALSA HEADREST
1/16" X 1/4" SPRUCE STRINGERS
OIL FILL
BLACK MARKINGS
4127
12
PITCAIRN MAILWING
SCALE RIB SPACING (OPTIONAL)
3/16" SHT. BALSA
STRUT AND RIGGING DETAIL - NOT TO SCALE
NON-FLYING TRU-SCALE TURNED H'DWOOD SPINNER & PROPELLOR
LETRASET RUB-ON LETTERING - PROTECT WITH CLEAR DOPE OVER-SPRAY
U.S. MAIL
C.A.M. Nº 19
COWL BREAK LINE
FILLER BLOCKS
1/16" TUBING
ZIPPER (SILVER DOPE)
BALSA COWLING BLOCKS
STEPS
1/16" SHT. STRINGERS
3/32" SQ. STRINGER
YELLOW MARKINGS
TEMPLATES FOR UPPER WING ALIGNMENT (SEE TEXT)
1/8" SHT. BALSA
1/4" SQ. H'DWOOD STRUT SUPPORT
1/16" TUBING BIND TO B'LKH'D. NO. 1
3" DIA. WILLIAMS BROS. W.W.I STYLE NYLON WHEELS
LOWER WING SPAR JOINER SUPPORT DETAIL
1/8" PLYWOOD
WINDSHIELD

An editorial 'But for competition flying — could R C stunt be on the way out?'

WHILE looking over the latest list of AMA-sanctioned meets, it suddenly struck us — could we be seeing the beginnings of a rather radical change in the tastes of competition R/C flyers? And if we are . . . is this necessarily so bad? Stunt flying has been the core of AMA competition flying since pre-war days. Even as late as 1956, we had just stunt flying and nothing else. Of course, in the years right after WW2, the "stunt" flying was elementary — mostly a few gentle turns, and a "Straight Flight" upwind from the transmitter (1000 ft., if memory serves). The latter was a lot harder than you might think, especially if there was a wind! And 1000 feet was getting toward, or even beyond, maximum limit of the elementary equipment then in use — thus, it served as a flying range check!

Many feel that meet entries are dropping off, though we've seen no figures to prove it. But even if they just hold even, we are really losing ground in competition, for the number of R/Cers is growing at a rapid clip.

When AMA Pylon and Scale competition rules were added to stunt, more scope was given for diverging interests. The first few Pylon races brought new faces to competition, and much enthusiasm. But it didn't take many years for AMA Pylon to narrow down to one specialized type of model, the delta — or "flying diaper" as its disparagers had it. But by then, Goodyear Pylon had been started, and grew strong enough to take over in the pylon field. As always happens in every kind of competition, a few specialists topped AMA Pylon, year after year — and the number of entrants dropped steadily. Right now — especially in the southwest, Goodyear Pylon is the top competition craze. Yet it has failed to take hold at all in other sections. The present push behind the Continental (previously called the 600 sq. in.) pylon category may be the shot-in-arm needed in the "backward" parts of the country. We will soon find out, for there are a goodly number of Continental events scheduled this season, and more

RADIO CONTROL WORLD

A ROUNDUP OF LATEST NEWS

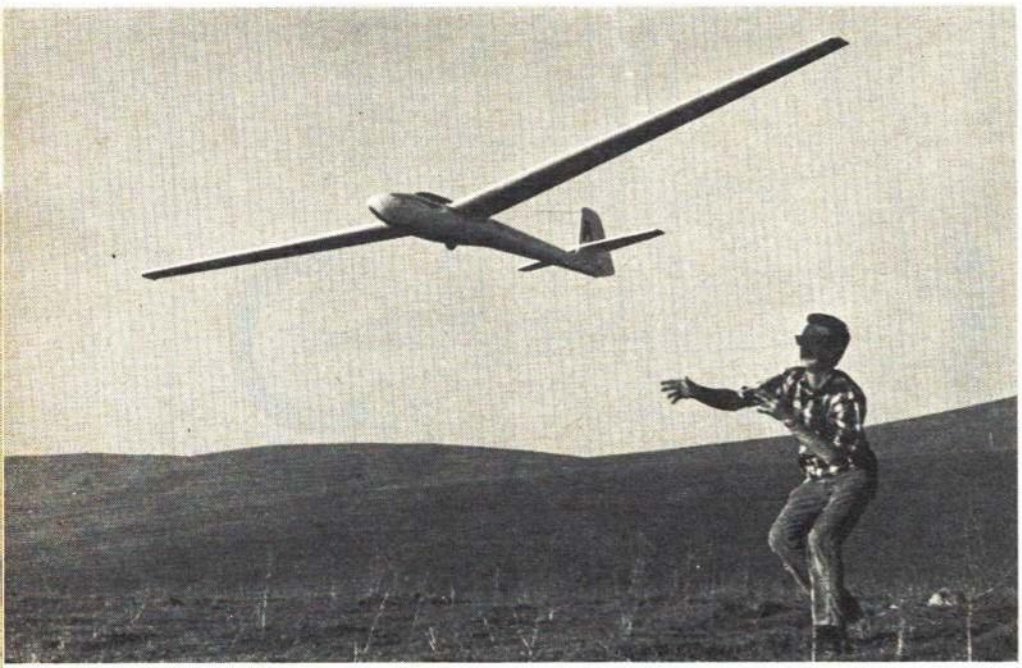
CONDUCTED BY HOWARD MC ENTEE

GRASSROOTS

"Human engineering"? Viewing a group of photos taken at the Nuremberg (Germany) Toy Fair got us to wondering if the overseas R/C makers might think a little more about how a flyer holds and handles his transmitter, than do manufacturers on this side of the ocean. Granted, our manufacturers do a top-grade job on electronics and mechanical construction, but there is little variation in the shape format. Most transmitters are in upright rectangular box, the only variety being whether you want one stick or two.

Among the German pix were several transmitters with entirely different shapes. We don't claim they are 100% better than what we have — but they might be! For example, the Graupner Varioprop transmitter hangs on a neck strap, with the "panel" horizontal; the antenna projects at quite a sharp angle upward, where it is much more efficient, and less apt to spear a fellow flyer. Most R/Cers have seen pix of the unusual Simprop transmitter, which has a rather large horizontal rectangular case with closed-in "hand-holds" at each side. Simprop apparently will also come out with a transmitter of the Graupner shape.

Still another transmitter (Dirigent 6) that hangs from a neck strap and is operated with case horizontal to the ground, has the antenna projecting vertically from the panel. This one apparently uses Kraft capacitor-feedback servos. Not too surprising, as another photo shows standard Kraft equipment, which is manufactured in Germany under license. The Digiprop transmitter also uses the Graupner transmitter shape formula, but hangs from a neck strap attached to two angular metal hangers, which again, hold the panel parallel to the ground — and the antenna pretty much vertical. Should our R/C makers experiment with this configuration?



Tim Stevens launches the beautiful, silent, scale Libelle sailplane by Seigelkoff. Most of these gliders, even the scale birds, are controlled with elevator and rudder only.

The PARCC launched: First meeting of the Palisades Assoc. of Radio Control Clubs was held on March 22, in Scarsdale, N. Y., with the Westchester Radio Aeromodellers hosting. If the large and enthusiastic turnout is any criterion, PARCC is already a going group. Over 100 modelers were on hand, and many brought planes to exhibit after the meeting was adjourned. Guest speaker of the evening was Harold deBolt, who brought with him many color slides. He fielded numerous queries in a Q&A session.

Officially attending were: Baychester RCC; Hudson Valley RCC, North Jersey RCC, Rockland County (N.Y.) RC, and the host Westchester group. The president of each club introduced his group, gave a

plane kits intended for this event (or easily convertible) are being marketed.

Despite AMA Stunt and Goodyear, more large meets seem to be adding non-official "fun" events. We had sort of thought Stunt and Goodyear were supposed to be "fun"! Anyhow, we see much activity in Open Pylon, Limbo, even Combat. So it's apparent that the strictly AMA events, as we have had them through the 1967 season, just weren't sufficient to fill the entry lists at many meets.

We have had AMA Scale for a number of years. The Scale entry at most meets has always been small, but has held fairly steady. The planes were always there — but at many meets the *flying* Scale results were dismal. Many Nats observers feel that the Scale event at this premier AMA meet of the season didn't really "come of age" until the 1962 Chicago Nats. Although the flying conditions there were rain and wind, some beautiful planes were on hand, and a goodly number of them *flew*.

Possibly the most successful R/C Scale event of all time was the WWI affair at Rhinebeck last fall. We'll doubtless get a dispute on this — many meets have had bigger turnouts, of both entrants and spectators. Many have seen more spectacular planes, multi-engine jobs, and such. But for the number of entrants (at what was expected to be a scale meet of very limited interest, and probably equally limited entry), the amount of highly successful flying done at Rhinebeck, and the extremely limited casualty list, doubtless set a record that may not be surpassed in years. With this background, WWI scale seems due for a boom, and again, we see several events for it in the AMA list — and more kit planes coming along for this category.

We see growing interest in other non-AMA competition flying. Quite a few glider events have been scheduled this season. This interest seems to be centered on the East and West coasts, so far. Several hydro meets have been held in the East. More are coming. There is much interest in several areas in FAI record flying. This diversification can be attributed to some extent to the growing numbers of R/Cers. We have come to feel, though, that many very competent stunt pilots have become bored with the old routine (even though periodic efforts are made to stiffen the stunt pattern, the new one this year being the most difficult ever), and are looking for new interests and challenges.

There is quite a furore as this is written over the fact that *only* FAI stunt flying will be scheduled at the Olathe Nats; the newly devised A, B and C stunt classes are not even to be flown. Even though this is to be a short meet — and the FAI team is to be selected at Olathe — we do feel that our new ABC setup should have had a fair shake in the R/C Nats flying. Be that as it may, perhaps we see more of what might be called "de-emphasis of AMA stunt" here, too. Could it be that in three or four years we won't even *have* any R/C stunt as such at the Nats?

It seems likely that we will have stunt planes with us for many years. They can be flown most anywhere, can be made in all sizes, can be flown by the beginner (the simpler types) or the guy who is a good enough pilot to really carve up the sky. The huge variety we find on the market means that anyone can find a style to suit his own tastes, and can use same to just roar around the sky for pure sport. But for competition flying — could they be on the way out?

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short talk of activities and problems. Universal problem seems to be flying fields — which is one of the main reasons PARCC was formed. It is also planned to hold inter-club fun-flies at various club fields. Many door prizes were donated by some two dozen R/C concerns. Present plans are to have perhaps two such formal meetings each year, but several flying get-togethers will keep the group in close touch.

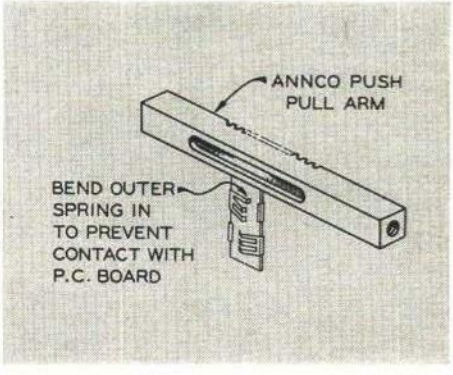
The same old plane: Dale Root (6036 Telegraph Ave., Oakland, Calif.) is still flying his old retract-gear low winger, fitted with smoke-maker. He says the East Bay RCC is about to lose their fine field, with its L-shaped paved runway. Dale and quite a few others in the area seem to have been bitten by the glider bug. Perhaps San Francisco will join the Los Angeles and Washington D. C. areas as glider hotbeds.

Dale says there is a hill with tremendous slope lift above the Oak Knoll Naval Hospital in Oakland, and as many as nine gliders have been at the spot at one time. Dr. Henry Sparks (ex-DC/RC member) is stationed at this hospital, flies gliders and small planes. Dale has for some years been making sleek power plane fuselages of formed balsa. Sheet balsa sides are dampened and bound on molds so that a finished fuselage has a strong but light oval cross-section. He feels this might be fine for gliders too, may have one flying by the time you read this.

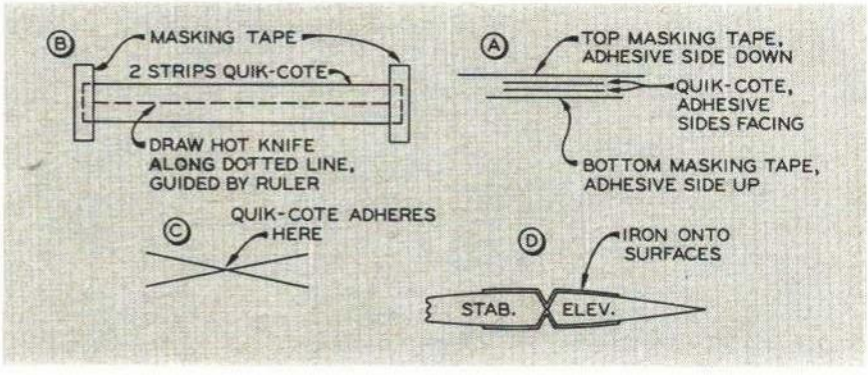
The Upton-Graham racing team model is a Super Tigre 40-powered Stafford Midget which features a Bob Palmer fiberglass fuselage; tiny tail wheel, tight-fitting, and small wheel pants; fully faired cowl and tail fillets. These racers can average over 100 mph.

Adding to local glider enthusiasm is Jerry Nelson (our West Coast R/C editorial representative) who has built and flown some real beauties (see p. 32, April '68 issue). He is a certified full-size glider pilot. Jerry is working on a kit for a 12′ span glider that will weigh around 8 lbs. in ready-to-fly form. Much of the construction is of laminated fiberglass and balsa, with a very high strength-to-weight ratio. There is no estimate as to when this glider will be ready to market.

Continued on page 31



Servo mod for "dead man's" type throttle is suggested by hydroplane racer Dennis Elder.



Bill Darin, producer of Quik-Cote, recommends use of this material for hinging. He cautions that this is the only safe method of doing so. It is easy and lasting.

TWELFTH IN A SERIES

Getting Started in R/C

Electrical noise and your capacity to eliminate it.

HOWARD MC ENTEE

OF all the problems that bug R/Cers, "noise" right in the plane is one of the most baffling. We don't refer to the roar of the engine exhaust but to "R.F. noise" — though in many cases engine *vibration* is the culprit. Any two pieces of metal rubbing together in the plane could possibly cause "R.F. noise" that will interfere with a receiver's operation. However, some plane components are virtually *sure* to cause trouble unless you take pains to prevent it. Let's look into some of the most likely causes of "R.F. noise."

Servo motors are prime suspects. As the motor armature rotates, the brushes, bearing upon the commutator, produce tiny sparks. These sparks are tiny "radio transmitters" and can put out enough interference at close range (after all, the receiver and its antenna are only a few inches away) to cripple the receiver. Most servos have at least a capacitor (often .01 mf. — the value isn't critical) connected across the brushes. Its leads are as short as possible as at A. Some servos have two capacitors, with a lead from each soldered to the motor frame — if this is of metal (see B.). Others might have a capacitor and R.F. chokes connected as at C. In any case, leads of all these components should be kept as short as possible, and the parts themselves should be small; long leads or large parts themselves can radiate the interference.

Servo wipers in reed and single-channel servos can be a noise source, but generally this is not too critical; dirty contacts can cause erratic action, however, not from a noise-radiating standpoint but simply because they don't maintain a solid contact. The same might be said of the moving contact of feedback propo servos.

Motor brushes and servo wipers produce electrical noise because they carry considerable current, and there are actual sparks at the points of contact. But we have another source that is just as bad, and the power involved is so tiny you can't measure it! This involves linkages in the plane, whether to control surfaces, throttle, wheel brakes, steerable nose wheel or whatever. Take a look at Fig. D, which depicts a typical "worst possible case." At 1 we have an escapement (most of which have a metal wire shaft ending in a crank, which engages a wire loop at the forward end of the torque rod). The torque rod might be a length of music wire terminating in another loop at the tail, with a metal pin to move the rudder. Located above all this metal is the antenna, 3.

It's true there is no solid, electrical connection between the escapement's metal frame and the wiring to the receiver; but there is capacity coupling, which looks just as bad to the receiver. Escapement bearings, the rubbing wires at 1 and 2, all produce varying (in other words — very poor) electrical contacts that can seriously affect receiver performance. This is true, even though the antenna may be placed entirely different — perhaps running out to a wingtip or vertically. What can we do to prevent such interference? Simply "break the circuit" with insulation; a piece of insulating tubing over the escapement pin at 2 will help, or better yet, make the "hairpin" that engages this pin of insulating material. Actually, the metal to metal joint at 2 wouldn't cause too much trouble; but if the torque rod were an insulating material (balsa, wood dowel, etc.) you would eliminate a possible noise source.

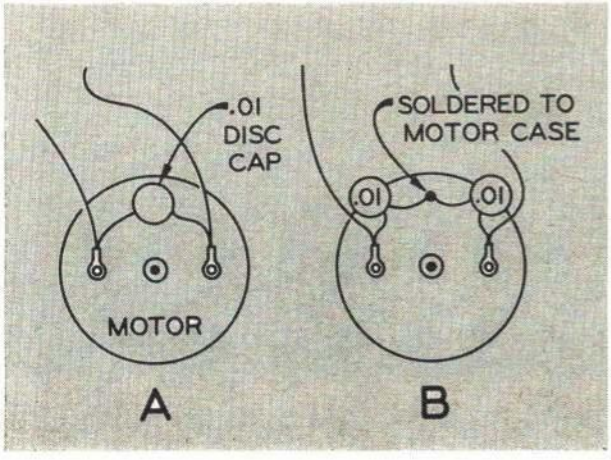
The setup at D would be just as bad if we had a motor driven servo with metal output disc, and a metal pushrod to the rudder — and the cure is the same too. Simply break up the circuit with insulation. Many servos have nylon output discs, which helps a lot. Most also have nylon gearing, which is a further aid.

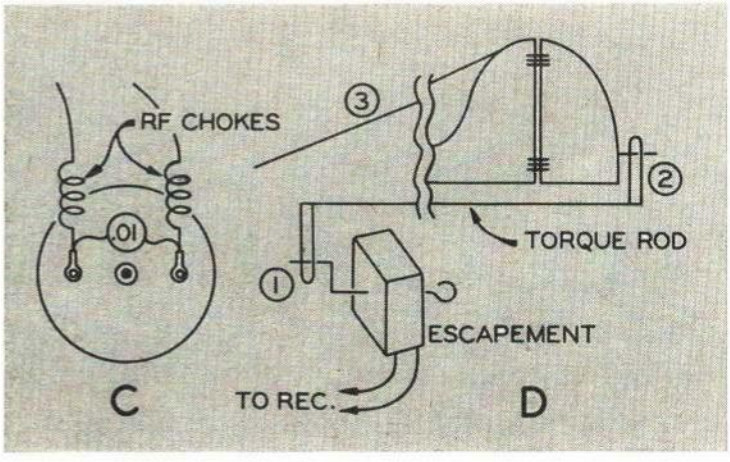
Digital outfits have gained a reputation for being extremely sensitive to electrical noise from linkages, servos and other metal parts in a plane. Fortunately their makers are finding ways to reduce such sensitivity. Superhet receivers are generally much more noise sensitive than super-regens. Probably the most immune to any sort of interference — from within the plane or without — are reed receivers. The reeds act as sharply-tuned filters, responding to signal (or noise) of only a few cycles width. Receivers incorporating tuned audio filters (quite a few analog propo sets do) are next best.

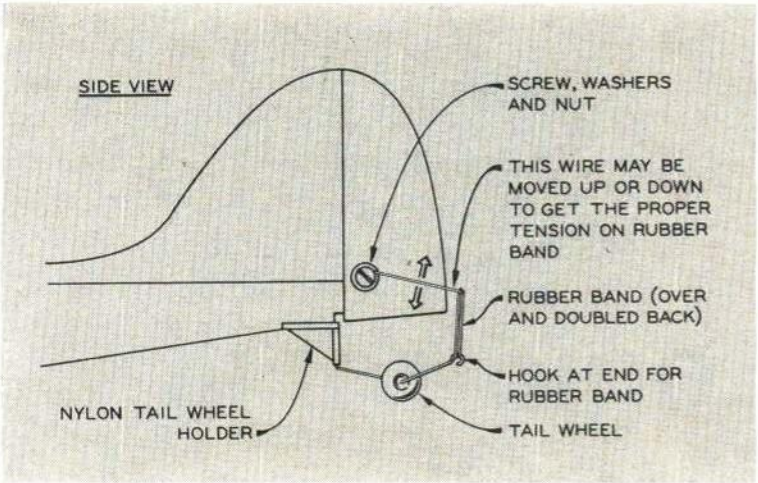
You should check for electrical noise before flying any new plane. One way is to make a ground check, with transmitter antenna removed or fully collapsed. Find maximum distance at which you get reliable control operation on the ground, then start the engine. The resultant vibration shakes the linkage and other metal parts that could cause noise problems. You may find your reliable ground range drastically reduced. If so, you have a serious noise problem. The trouble could be the vibration effect upon such items as servo pots, moving contacts, switches, connectors or even certain components in the receiver. Don't fly until you have traced it down. Vibration in battery holders can also be a problem.

If, with the motor running, the controls seem pretty solid (that is, they don't flap wildly) when you are not giving a control signal, chances are engine vibration isn't causing too much trouble. Be sure to vary engine speed over its full range — vibration often "peaks" at certain speeds — not necessarily top speed. Try the controls with the engine stopped; erratic operation at maximum ground range (but the controls work fine near the transmitter) could show servo motor noise as the problem.

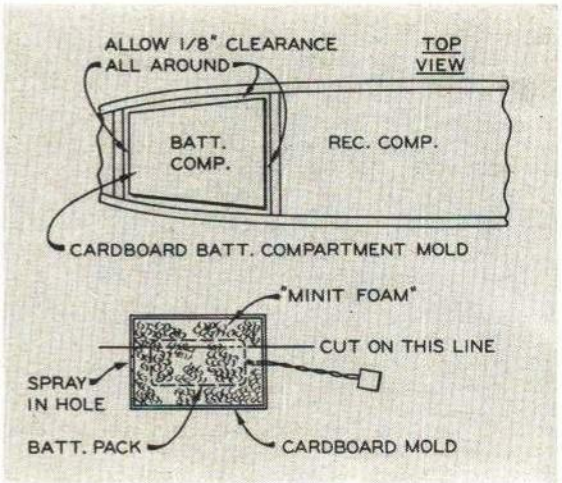
Assuming you have servos fitted with noise suppressors, what steps should you take to prevent other troubles we mentioned. Make sure there are *no* metal-to-metal joints in any linkages; this is not difficult with all the nylon servo horns, bellcranks and other parts we have available. Keep the antenna lead away from the receiver and as far as possible from servos and *all* wiring in the model. Some modelers use a vertical antenna near the front of the fuselage; somewhat a nuisance, but it surely keeps this sensitive pickup away from the servos. Another trick is to run the antenna from near the front of the wing back to a stab tip. And of course, make sure connectors, battery cases, switches, relays and other parts that could be bothered by vibration are of the least susceptible types, and are as well protected from vibration as possible. Such steps are a wise precaution, even though you may have a receiver that is supposedly quite immune from noise and vibration. You know the old saw about "An ounce of prevention. . . ."







Smooth ground steering of a tail-wheel-equipped Galloping Ghost guided model is possible with rubber-band linkage. Submitted by R. G. Adams.



Minit Foam, a quick foaming synthetic liquid product, offers excellent total crash protection for R/C gear.

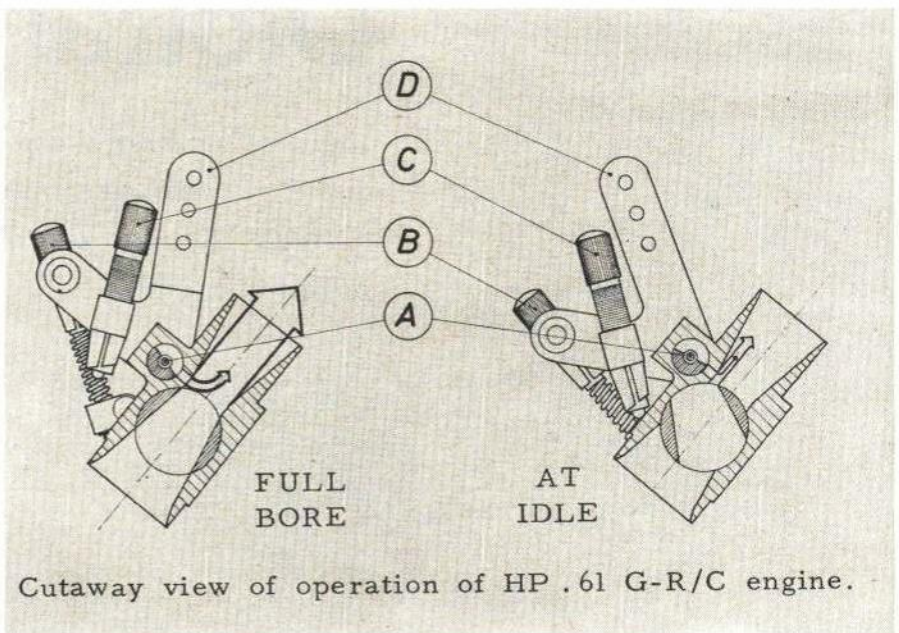
Continued from page 29

TECHNICAL

Modified Annco servo: Probably of special interest to power boat modelers is modified servo used by Dennis Elder (721 E. Sunset, Springdale, Ark. 72764). Dennis notes that when the operator of a fast hydro gets in trouble, the last thing his thumb hits is often the throttle lever — sometimes too late. He has used the Annco on reed equipment with fine results, and his slight modification makes the servo act in half-neutralizing fashion. To make a full-trim servo from the Annco, you bend both the top and bottom contacts so they don't touch the contact strips. But Dennis bends only one, per sketch.

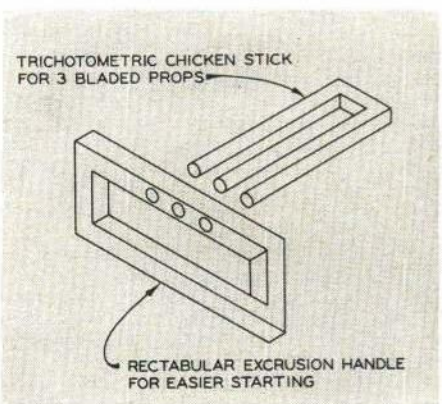
The throttle lever must be held on continuously, to maintain high engine speed; when the lever is released, the throttle goes immediately to half-speed. It can then be blipped to low by further lever action. When he is racing, Dennis feels it's much easier to concentrate on steering, and know he'll get instant power reduction when the throttle lever is released (rather than to try and find the lever when he is in a tight spot). Of course, a simultaneous transmitter and receiver are needed for such operation, even though only four channels are employed (two reeds for steering, two for engine).

Instant hinges: Simple way to utilize the new Qwik-Cote covering material to make control surfaces was explained to us by Bill Darin (Darin Bros., 5221 Allen Rd., Allen Park, Mich. 48101). First, you cut two strips of Qwik-Cote long enough to



Cutaway view of operation of HP .61 G-R/C engine.

High power of H.P. 61 R/C engine is partly due to the unusual carburetor design. Free venturi during high speed operation, and gradual fuel metering, as throttle is closed.



Starter for three-bladed props which won't rap knuckles. Tip: Stare at it.

Fox 59-powered Sr. Falcon sports home-made silencer by Van Keuren. It is made in three parts: collector, sound chamber, and Teflon tubing to route away residue.

make all the hinges you will need (when you slice the assembly into hinges of desired width). Bill suggests making the strips about 1¼" wide. Fasten the two strips with adhesive sides facing, with masking tape at each end. Stick the assembly via the masking tape to a flat surface and draw a hot knife or flatiron edge along a ruler, to form the hinging area. Then slice hinges off as needed, and apply to control surfaces as indicated on sketch. Whatever tool you use to make the adhering line in step B must be hot enough to activate the cement, of course.

Three-blader chicken stick: Intended especially for use with three-blade props is the Trichotometric chicken stick devised by Dick Sarpolus (32 Alameda Court, Shrewsbury, N. J. 07701). While the chicken stick proved very successful, Dick found it rather difficult to hold, so he further devised the Rectabular Excrusion handle, which has proven to be the final answer. We present these amazing developments as a service to all modelers.

Shock absorber in can: When he wanted to form a shock-absorbing compartment in his plane for a battery pack, Robert Spear (15 Booth Hill Rd., N. Scituate, Mass. 02060) discovered a new foam substance, which we describe below. A rough cardboard form of the compartment in the plane was made, allowing a bit of clearance all around. The battery pack was put in the cardboard box, and the foam sprayed in through a small hole. After a short wait for the foam to form and set, the cardboard was stripped off and a "lid" cut off the foam so the pack could be removed. The bottom portion of the shaped-foam was then put in the fuselage and a little more Minit-Foam sprayed around the edges to stick it in place. Bob suggests the same idea for holding receivers in a plane, as the foam is a good shock-absorber. Minit-Foam comes in sets of two cans, 6 oz. or 12 oz. (listing for $2.98 and $3.98 resp.).

It is our understanding that you must mix the entire contents of the two cans in each kit, and use the whole works within five minutes or so. In other words, you can't use just a little at a time. The 12 oz. size can makes up to ½ cubic foot of urethane foam, and we gather that if you shoot the foam into a space smaller than this, it will not build up any real pressure, but will just form a denser foam (some foams that have been used in model plane fuselages and wings have developed enough pressure to burst the structures!).

As the name implies, it takes about a minute for the foam to set. The foam is forced out of the can in liquid form, but soon foams up and hardens. Minit-Foam can be sprayed on the outside of an object, as well as into an enclosed space, and will adhere well. Looks as though this material might have uses in the model plane and boat fields.

GG tail wheel: Application of steerable tailwheel to a GG model, or one equipped with other type of pulse propo, is suggested by A/C Richard G. Adams (AF11651673 Box 4478 CMR #3, Travis A.F.B., Calif. 94535). He used a Top Flite tailwheel bracket and a single piece of music wire to hold the wheel and form the rubber band hook. The wire has a Z-bend, to form the wheel axle in the center. Rubber band size and tension will depend upon plane size; use enough tension to get positive steering when the rudder is given maximum deflection, but not enough to prevent proper rudder action in the air. With correct tension the tailwheel will remain almost stationary when the rudder is pulsing at neutral, but rudder movement will give reliable ground steering.

Continued on page 66

Blue Ribbon Radio Control Equipment

Logictrol III– Five Channel Digital System

Logictrol receiver is smaller than many one-channel units now sold, yet it maintains full sensitivity down to 1.1 V. System will operate on only 75% of the power supplied.

AN entirely new line of digital proportional equipment has been introduced this year by EK Products, Inc. (Hurst, Tex. 76053). It includes complete digital systems from Galloping Ghost up to seven controls, with three and five controls in between. The GG systems are unique in our field since no tone is involved — carrier only, comes in both low pulse rate (for straight GG with a single servo) and high rate (using two servos), and the popular Rand servos are included. All the other digital systems utilize the brand new and much smaller feedback servos developed by EK.

Perhaps we should note here that there is a new affiliate for EK Products, Inc. You will be hearing more of KEK Corp. The extra "K" is Roy Klett, an expert in plastic molding and tool design. Needless to say, with Roy's knowledge available, all plastic items used in Logictrol equipment will be manufactured on the premises.

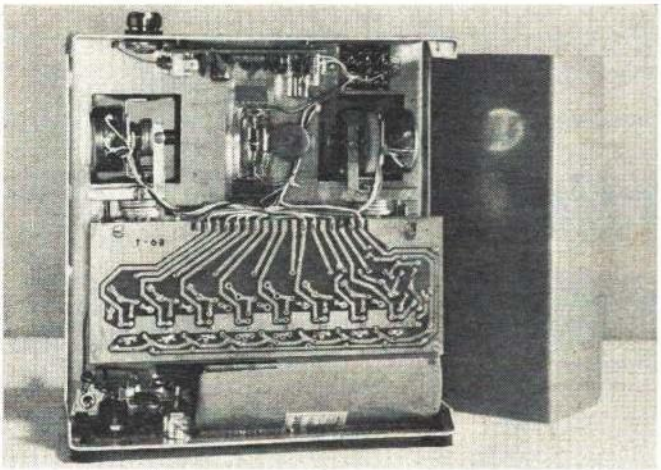
Our description of the Logictrol 5 system came about at the last minute (it was scheduled next in this series), when other equipment we had expected to cover was not available in time. No circuits were received, and we must guess at some features of the equipment, but let's take up the components, one by one.

Transmitter: Housed in red vinyl-covered aluminum case, which measures 6 11/16" high, 2 5/16" deep and 6 ¼" wide; weighs 2 lb. 8 ¾ oz., including antenna. Latter is 39" long on the 72-mc outfit we reviewed (lower frequency "Log-3" transmitters use 54" long antennas), is about 11 ¼" high collapsed. Our unit is dual-stick, and controls are of the simple "open" assembly style, centered with scissor springs and have a nice feel. Internal assembly is very neat, with small electronic parts, all on two PC plates, one for the RF section, one for the encoder. Most wiring (except in the battery charger) is fully cabled. The decoder board has space for two more controls, and thus can be expanded at the factory to seven controls. The 12-V 500-maH battery is firmly cemented to case bottom (and to an internal angle bracket also). Charger output connector for plane battery, and connector for AC line cord are on case bottom; a neon light shows when charger circuit is energized.

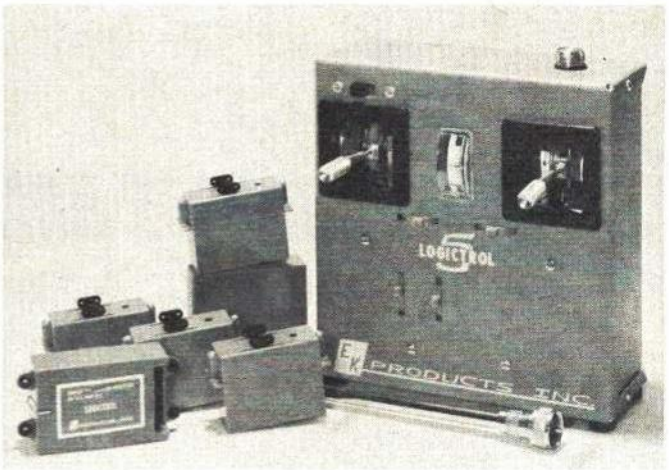
There is an edgewise meter on the front panel, which indicates relative current in final stage of the RF circuit. Thus, it indicates both RF output and battery condition. There is no identification on any of the trim levers, or the Auxiliary control levers, but such panel markings should not be necessary. The on-off switch (positions likewise unmarked) is a 4-pole unit, with two pairs of poles paralleled, for added reliability. Very small pots are used for trim and auxiliary controls, and they require very little pressure to move. This could lead to inadvertent moving while flying, or when handling the transmitter; perhaps some simple "drag" would be preferable on these levers. This can be done by sliding the lever on the pot shaft so that it is off-center in the slot on the transmitter face.

The transmitter is said to operate satisfactorily over temperature range of zero-150 degrees F., as are receiver and servos. EK also makes single-stick transmitters in both five and seven controls, at moderately higher cost, with same general electrical specs as noted above.

Receiver: Our first thought when we saw this tiny unit was that there are quite a few single-channel single-control receivers on the market today which are both larger and heavier! Our scale showed this midget to weigh 1.82 oz. It measures 2½ x 1⅝ x ⅞", less the mounting lugs. Latter are a new idea for receivers. They hold grommets same as used for the servos, and the receiver may be mounted the same way. However, EK can supply a special mounting bracket that makes it very simple to



Logical (no pun) transmitter layout, with open-face, no backlash stick assemblies, has RF board above and encoder board below. Note open holes on encoder for two additional channels.



System is available on all modeling frequencies, comes with transmitter, receiver, four little EK servos, nicad batteries and charger. Five-channel set is convertible to seven channels.

shift the receiver between planes. It holds receiver and three servos.

One of the real advances of this receiver is the built-in connector bank at one end. Battery and servo connectors plug in directly, thus greatly simplifying the plane installation. While the instructions do not so indicate, the caps on the connectors have one flat side and one with an "edge," the latter must go *away* from the case. It would be difficult to put them in the opposite way — but it could be done! Another really new feature of the Log-3 systems is that only three wires go to each servo, and only two to the battery pack. This means less wires throughout, and less soldered connections. But the biggest plus is the fact that the system will operate with one dead cell in the battery pack! In fact, the maker claims that through use of zener diode regulators, the receiver will maintain full sensitivity down to 1.1V. While the servos might still turn a bit at this low voltage, they certainly would have little power. But, in any case, it would be seldom that more than one cell could go dead in use, and the pilot would not know it. The receiver draws 25 ma idling (no controls being moved).

Receiver, servo and battery cases are of a very tough poly-carbonate plastic, for light weight and maximum protection. Parts on the receiver circuit board are coated with poly-urethane to prevent vibration. Circuit-wise, the receiver has a tuned RF amplifier stage, and decoding is via silicon-controlled switches; silicon semi-conductors are utilized throughout. The receiver is convertible to 7 controls.

Servos: Also very small, per present trends, they weigh 1.82 oz. each and the cases measure 2 x 1½ x ⅞", less mounting lug projections. Latter hold the usual shock-mount grommets. A feature of these servos is that the lugs — which are the part most likely to break in a crash are on the portion of the 3-piece case that is easiest to replace. The factory can do this job without disturbing gears, feedback pot, motor or amplifier, or any other vital parts; result is significantly lower servo repair costs (provided there is no internal damage).

We noted above the advantages of the no-center-tap wiring system. The servo amplifier operates the motor through a bridge circuit, unique in present model digital systems. A dead cell in the power pack should not disturb servo centering, but would naturally cut down servo power somewhat. Servos have a 4-lb. thrust, draw only 4 ma. when not moving. Push-pull output arms are provided, and the feedback pot is a hard-surface carbon-ceramic unit.

A 5" long extra cable is provided for the aileron servo; by the way, no harm is done if the connectors are not plugged together properly — which can happen. So make sure to match the connector "sharp" edges.

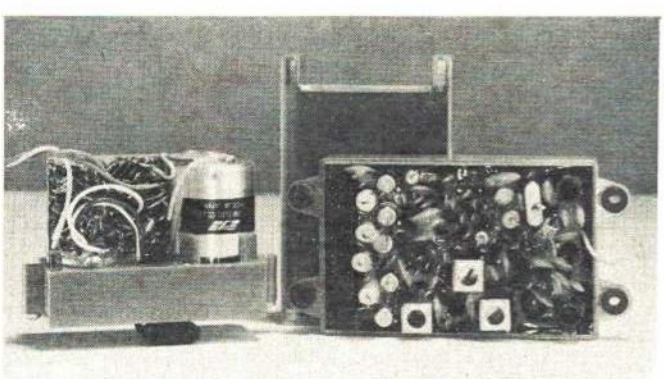
The entire system: We found the servos fast and accurate in operation, with absolutely no interaction — as we have come to expect from top-grade modern digital systems. Instructions note that the 39" receiver antenna wire should be run as far from servos as possible — a wise precaution in any digital system. However, we wrapped the antenna wire among the servos and battery pack in many ways, and were able to get good control action with the transmitter (no antenna used) some 30 feet from the receiver. With the antenna stretched out as it should be, good control action (still no transmitter antenna) was had some 75 feet away. Not very scientific tests, to be sure. But, they do show that the receiver isn't extremely sensitive to servo electrical disturbances, and that the system should have very good control range.

Despite its small size, no integrated circuits are used in Log-3 systems. EK doesn't feel they bring enough benefits to offset their present cost.

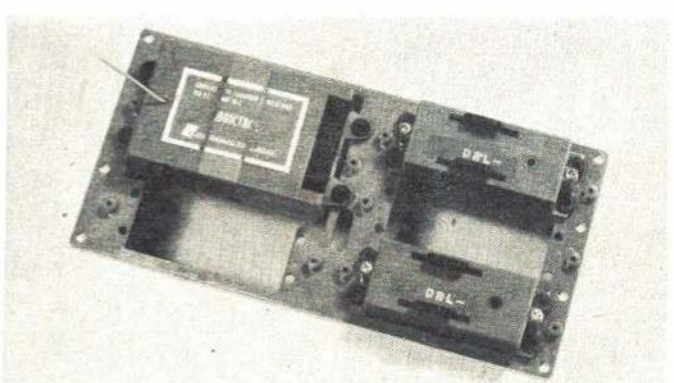
Receiver battery pack is of the flat type, housing four 500-maH pencells with welded strap contacts between cells. It weighs 3.9 oz. We found total four-control system weight less than the maker claims, as checked on a pretty honest scale. Our total came out at less than 13 ½ oz.

The Logictrol will have a Pro-Brake to plug into the receiver, to provide fully proportional electric brakes (using the WAG or Du-Bro wheel brake units). There is also a special flap servo (this is in the older and larger case size) to allow 180 degree rotary output action, for retractable landing gears and other special operations. It can be used for heavy-duty operations with normal gearing and power.

— Howard McEntee.



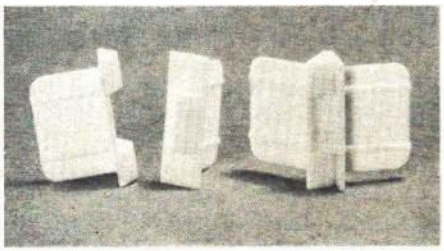
Unique feature of Logictrol III is the no-center-tap battery system, which means less wiring, less solder connections, less weight, and all silicone transistors in receiver and servos.



Extra cost item is choice of plastic mounting tray for three or four servos (former not shown, is smaller) and receiver. Unit is transferable from plane to plane without unplugging.

NEW PRODUCTS CHECK LIST

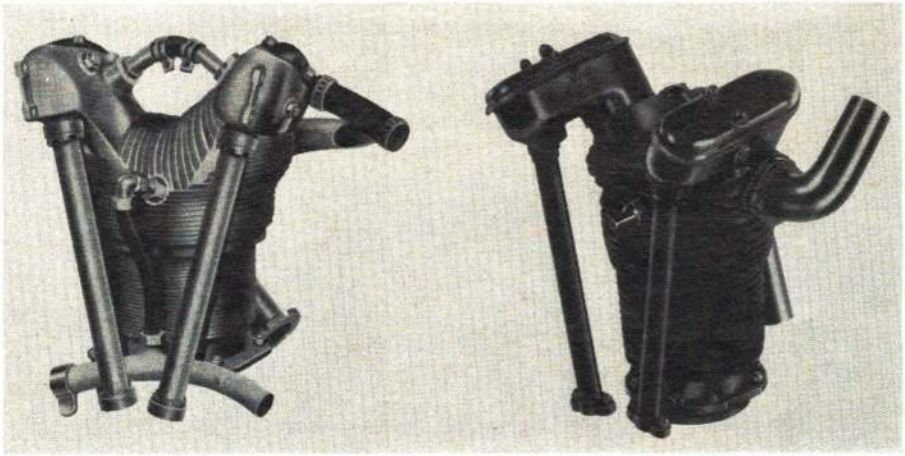
Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."



Rand Mfg./Improved Hinges. To ease installation — Rand made some improvements in their hinges. Material has been changed from Delrin to Nylon. The webs are thinner too, so that they will fit an X-acto knife blade slot without distorting the wood. Four styles suit every need and fit stock ⅛" thick and up. Prices and part numbers remain the same as before.

Many owners of Rand equipment have asked for the electronic parts as used in the GG Pak and the Dual Pak. So it was decided to offer the switcher and decoder in kit *and* assembled form. The switcher (kit-$9.95; assembled-$14.95) has been adapted for use with any Rand actuator. You need only one battery to power the receiver and actuator with this switcher. The decoder (kit-$14.95; assembled-$21.95; or complete with an elevator servo-$32.00) makes available the advantages of Rand's Dual Pak system. It uses an integrated circuit and six transistors for single battery flying. Request the catalog sheet with the conversion chart: RAND MFG. CO., 8909 Hubbell Ave., Detroit, Mich. 48228.

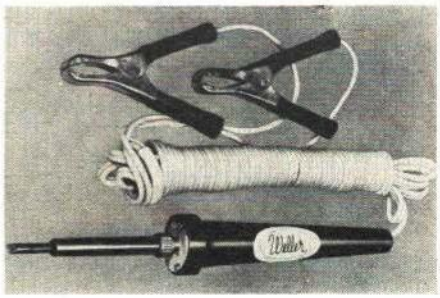
Citizen-Ship/Proportional. Lighter, simpler, smaller and stronger — that's Citizen-Ship's four channel, digital propo system. The DPT-4 transmitter is ready to operate. There is a choice of stick modes, and a charger is built-in to service both power packs. Integrated circuits are used in the receiver's decoder section. With all wires and the cable harness, its weight totals only three oz. Size is small too. A lightweight, four-cell battery supplies power for the airborne gear. Four DMS servos are provided. Their cases and gears are molded of Nylon. Three outputs (two linear and one rotary) eliminate any mount problems. Servo thrust is over four lbs; servos can be interchanged with C/Ship's DPC units. Entire propo system on the 27 MHz. band is $374.95; on the 72 MHz. band it is $399.95. Ask: CITIZEN-SHIP RADIO CORP., 810 East 64th St., Indianapolis, Indiana 46220.



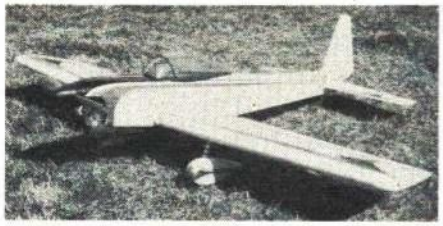
Williams Bros./ Radial Engine Cylinders. With the emphasis towards scale — modelers will be interested in these high-impact styrene, engine cylinders. Two types have been molded. Used in the 20's and 30's, they are the Pratt & Whitney Wasp Jr. (left) and the Wright J-5 Whirlwind (right). Highly detailed, they are available in 1, 1½ and 2 inch scale. Prices are 65c, 85c and 98c in that order. Assembly is easy and a drawing is furnished to show the construction of a scale crankcase to hold the cylinders. Query: WILLIAMS BROS., 6719 Salt Lake, Bell, Calif. 90201.

Jim Walker Mfg./Firebird. Primary feature of this new control-line kit is the tough wing made of Aerofoam. Aerofoam is an expanded-bead polystyrene plastic. It's rugged, very lightweight and fuelproof. Walker Mfg. molds the wing in two halves; easy for the builder to install the bellcrank, leadouts, etc. (included) and glue the halves together. Rest of the model, all balsa sheet, is assembled on the wing; it serves as a construction jig. The claim is — the Firebird can be built and flown on the same day! It's a ½A size model with a 24" span, 176 sq. in wing area and a weight of 6 oz. Should prove a good trainer and very durable. Kit price is $4.00. Query: JIM WALKER MFG., INC., P. O. Box 8991, Portland, Oregon 97208.

Monogram/B-52 Kit. At 1/72 scale, it just has to be the largest plastic model airplane kit produced. The Stratofortress has a wing span over 30" and a fuselage length more than 26". It's bound to cause a flurry of shelf-building activity among plastic modelers. More than 250 parts are involved. Working features — moveable rear turret; operating wing flaps, bomb bay doors, wing spoilers two-position landing gear plus a jet engine sound produced by a concealed, battery powered electric motor. Other features — scale bombs for mounting in bomb bay and on wings; detailed cockpit interior; fuel tanks and an extra jet nacelle contains a jet engine for an additional display. Complete insignia and color details included. Ask for prices: MONOGRAM MODELS, INC., 8601 Waukegan Rd., Morton Grove, Ill. 60053.



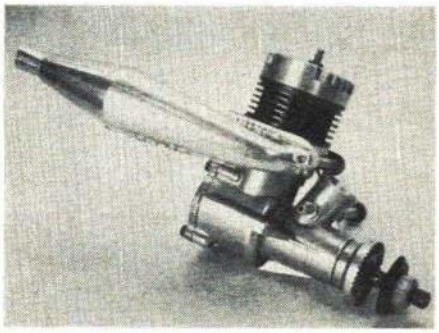
Weller/Soldering Irons. For a long time there's been need for a good 12 volt soldering iron — a very useful item for our field use or wherever 110 VAC is not readily available. Weller now makes a soldering iron, the TCP-12, just for this purpose. It won't overheat as it has a thermostatic control; won't burn the tip either. Checks by our R/C Editor show that this iron heated to temperature in less than a minute and the current drain was about 2.5A. Lightweight iron has a 12 ft. power cord and battery clips. A similar iron by Weller, the W-60, also has the thermostatic control and is for 110 VAC. It weighs 2.5 oz. Rated at 60W, it will accept other tips with a variety of temperature ranges. WELLER ELECTRIC CORP., Easton, Pa.



Midwest Model Mfrs./Mini-Monk. Midwest Model produces pre-assembled R/C models, and the Mini-Monk is their latest. Construction is all balsa — foam wing is covered with 1/16" sheet. Model is jig built with a span of 50" and an area of 450 sq. in. All control surfaces are hinged; wing halves are joined. Pre-bent landing gear is included along with a canopy, wheel pants and Nylon push rods. At $49.95 the Mini-Monk is ready for your own finish. MIDWEST MODEL MANUFACTURERS, 4046 Boothill Dr., Salt Lake City, Utah 84120.

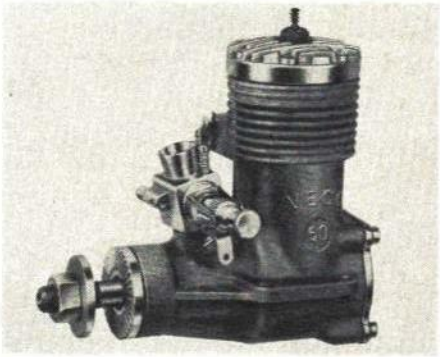
Hallco/Steady Ghost. Any Hallco 103 system is now expandable to a high rate/dual-servo system called the "Steady Ghost." The Hallco 20, an add-on electronic switcher, converts the Hallco 103. Price is $33.50, and only two steps make the easy addition. Hallco suggests — start with the 103, fly smaller models all at a lower initial cost. Add the 20 (your system now becomes the Hallco 123 — as easy as that) and fly larger models, .30 powered Tri-Squires and Champs for example. No interaction between rudder and elevator. Also the Hallco 20 may be added to most any center-tapped powered system (relay or relayless) using the LR3 actuator. Or go all out and order the Hallco 123 complete at $171.00. Want more info? Send 50c for flight notes and technical data on Galloping Ghost/Steady Ghost. HALLCO PRODUCTS, INC., Dept. A, 416 East Water St., Urbana, Ohio 43078.

America's Hobby Center/Model Airplane Bulletin. Latest in a long line of bulletins from AHC is this one—Bulletin No. AB168. It's free. Just send them an unused six-cent stamp — don't forget your name and address. The 16 page, tabloid-size bulletin is packed with accessories of all types. There are innumerable kits and engines. Specials are found on every page. A "must" publication for the mail-order modeler. Write: AMERICA'S HOBBY CENTER, INC., 146 W. 22nd St., New York, N. Y. 10011.



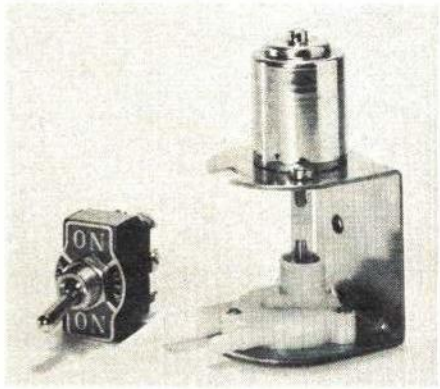
Tatone Products/Peace Pipes. Best name we've heard yet for a model engine muffler. In an effort to maintain peace between modelers and those residents near the flying fields, Tatone makes Peace Pipes in three sizes. For .09-.19; .29-.40 and .45-.65 engines, their weights run 1¼, 1½ and 2 oz. respectively, and all sell at $4.95 each. They are cast in halves of a light alloy. More quieting can be obtained by the easy addition of restrictors, steel wool, etc. Generally the throttle's exhaust baffle will need to be removed. The muffler's exhaust stack throws oil well clear of the fuselage. Adaptable mounting arrangement allows the muffler to be installed in a reverse position for marine use. Query: TATONE PRODUCTS, 4719 Mission St., San Francisco, Calif. 94112.

Hawk Model Co./Metallic Series. One of the newest models in Hawk's metallic series is the Westland Lysander in ¼" scale. This dynamic model has authentic sliding canopy, maximum detailing in the cockpit, landing gear, stub wings and bomb racks. All external armament and the Air Force insignia complete it. Hawk's "Authentiplate" finish gives the Lysander a silvery look. Ask: HAWK MODEL CO., 4600 N. Olcott Ave., Chicago, Ill. 60656.

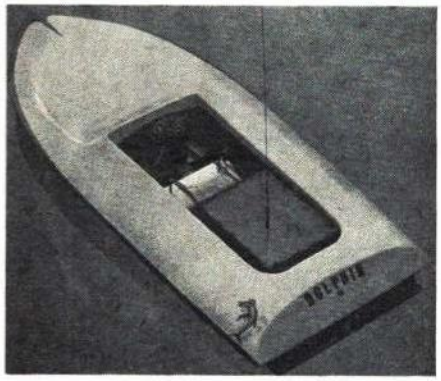


K & B Manufacturing/Veco .50 R/C. Another popular Veco engine — as manufactured by K & B — will be available soon. Features include: ball bearings, a single-ring piston and a coupled exhaust/intake throttle control. Price will be $39.95 at your dealer. Write: K & B MANUFACTURING, 12152 Woodruff Ave., Downey, Calif. 90241.

Controls Engineering Co./Simul Logic Seven. Newest digital proportional system in production is the Simul Logic Seven. Offered on all R/C frequencies whether 27, 50 or 72 MHz, it is ready to install in your model. No wiring is necessary. Cable harness and switch is included. Power packs are nickel-cadmium and a charger for both is built into the transmitter case. The latter case and the receiver case have a tough, epoxy coating. The receiver is unique, being. Among the industry's most selective. It has five tuned IF's and a field-effect transistor in the triple-tuned RF amplifier. Result is complete noise immunity. Input to the transmitter's final amplifier is one watt. At the $298.95 price, four servos are supplied with the seven channel package. More are available separately. Query: CONTROLS ENGINEERING CO., 184 Green Ave., Woodbury, N. J. 08096.



D & B Industries/Fuel Pump. Some time ago, D & B's field box and electric fuel pump was mentioned with the fact that the pump was available separately for modelers wanting to customize their gear. Here's a look at it. Corrosion-proof pump is driven by a motor that will operate from 6 to 12VDC. without strain. Twelve ounces of fuel can be pumped in one minute at 6V., in 20 seconds at 9V. and in 13 seconds at 12V. D & B claims that a 6V. lantern battery will pump over 12 gallons of fuel. Price is $5.95. A heavy-duty DPDT switch (with a center-off position) is sold at 95c. It can be used to reverse direction of fuel flow by reversing polarity. Write: D & B INDUSTRIES, 3655 Calumet Rd., Decatur, Georgia 30032.



Fiber Foam Products/Dolphin Ski Boat. Fiber Foam applied their fiberglass techniques to the model boat field and came up with the Dolphin. Designed as a competitive ski boat, it corners easily in the ¼ mile oval and is stable on the 1/16 mile straight. Beam is 13" and overall length is 36". Tests with a ST .71 and a .60 show speeds near the record mark. Boat is completely assembled (red deck with white hull). Motor mounts have been left out, though full-size plans and detailed instructions will guide you in making your own custom installation. Price is $44.95. Ask: FIBER FOAM PRODUCTS, P. O. Box 12091, Plantation, Florida 33314.

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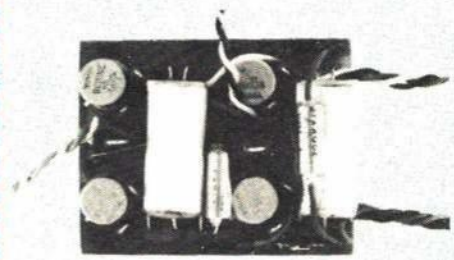

SIMPRO III KIT

The Simpro III kit above is a refinement of the earlier Simpro units which have appeared in American Modeler. The October 1967 issue contains full info on a relayless version for use with commercial actuators . . . Does away completely with any adjustments—and provides non-interacting rudder and elevator controls when used with the Ace Jansson or Sim-Plus transmitters, or most other GG transmitters. Motor control is achieved by full on and full off . . . The Simpro III makes into a compact unit. Measures 1½ x 1⅞ x ¾". Designed to work with most of the commercial proportional actuators available. Go-Around types are required for motor control. Compatible with Rand HR1 and HR2. Mini Max, Mini Max RM, Ghost, Airtrol, Bellamatics, and home made units built around Micro Mo motors. (NOTE: 1.8 ohm resistors required only for Micro Mo units are not furnished in kit.) . . . Kit contains reed units, all transistors and diodes, capacitors, resistors and an etched and drilled PC board to duplicate this fine decoder. Connectors not supplied.

No. 15K43—Simpro III Kit $27.75

Note—Simpro III systems require pulse rate of 15 to 25 pulses per second. Transmitter modification may be required.

SIMPRO III DECODER PACKAGE OFFERS

You've got a good GG system, and it's a lot of fun—but you have wished for something that performed as well, in a plane just a bit larger? Well, there's no reason to start from scratch—simply add the Simpro III decoder unit, along with the required actuators and mounting board, and you are there! The Simpro III decoder can be adapted to almost ANY existing simple GG system and provide you power enough for engines up to .45! . . . Extra cost is minimized since you can use your transmitter and receiver (relay or relayless), and with Simpro III, Rand HR1 and HR2, you have proportional Rudder, Elevator and positionable Motor Control. Packages include a special 3/64" mounting plate for the Rand units to simplify mounting—template for use with any servo is silk screened on. . . . Or, you have a GG system using the LR3. Use the LR3 as the rudder-motor servo, and add a Rand HR1 for elevator and you cut cost still more with our package #2. . . . The Simpro III decoder pulses fast enough so there is only a slight dither in rudder; elevator works only on command.

No. 15K1—Simpro III package #1: Contains Simpro III decoder kit as detailed above, Rand HR1 and HR2, and special 3/64" mounting plate for use with YOUR GG receiver and transmitter combination. A $65.00 value. . . . . Only $59.50

No. 15K2—Simpro II package #2: Contains Simpro III decoder kit as above, Rand HR1, special 3/64" mounting plate for use with your GG combo and your LR3. A $46.00 value. Only $41.50

Note—Simpro III systems require pulse rate of 15 to 25 pulses per second. Transmitter modification may be required.

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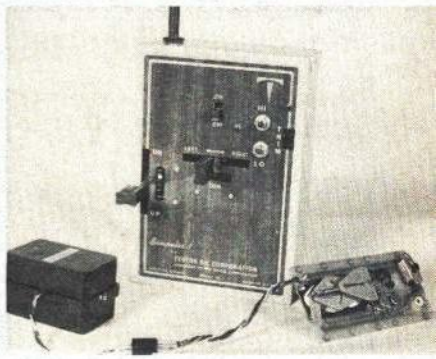
NEW!
DICKERSON—TESTOR CONVERSION KIT



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

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

RECEIVER CONVERSION KIT

The Dickerson conversion kit for the Skyhav receiver utilizes some of the components ready in the unit, but adds a switching decod to convert signals for a Rand LR3. Kit consis of PC board for housing switcher, LR3, swit and charging jack on a 2⅜ x 4¼" deck. Co tains all transistors and resistors. LR3, co nector, switch and charging jack are not su plied.

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

TRANSMITTER CONVERSION KIT

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

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

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

TESTOR RX CONVERSION PC BASE

Printed Circuit base for plane and receiver co version is available separately for the scrat builder.

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

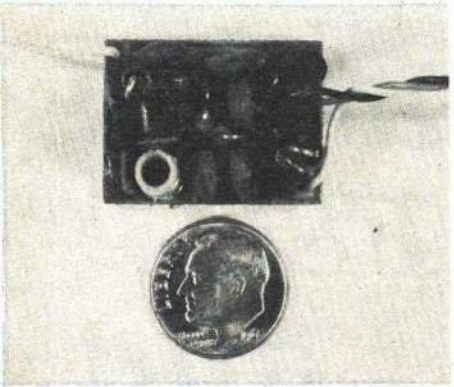
NEW!
TRANSMITTER SIGNAL STRENGTH METER KIT

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

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

Simple to install: All components mount meter except for connections to antenna a case. Kit contains all components, includi instructions.

No. 22K17—Transmitter S/S Meter Kit.....$4.



NEW! ALBIN MICRO RECEIVER KIT

Would you believe a superregen receiver weighing just .2 oz? This Bill Albin kit design measures 13/16 x 1 1/16". uses silicon transistors, 1/8 watt resistors, micro mini caps, drilled 1/32" PC base. Single ended output for actuators of Bentert type.

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

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

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

NEW! AOSK II KIT

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

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

Complete kit contains 1/32 etched and drilled PC base, 1/8 watt resistors, tantalum cap, two Motorola transistors and full instructions. A gem of micro miniaturization using discreet components.

No. 15K55—AOSK II Kit.....$3.25

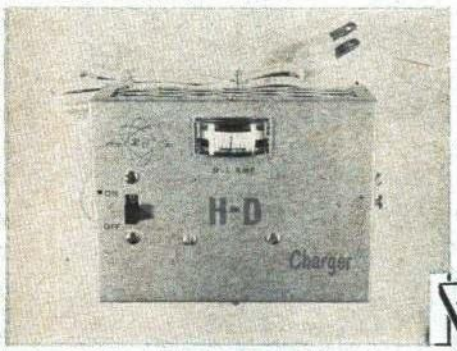
ACE-CLASSIC FULL SIZE PLANS

The UGLY STIK . . . designed by Phil Kraft, and originally called the Square Stik. By adding scalloped ailerons and scalloped elevators and a semi-scale type rudder, this .45 to .65 proportional test bed resembles the Fokker-Eindecker World War I plane. Features extremely fast construction, and is designed as a proportional trainer.

No. 13L108—Kraft's Ugly Stik, $3.00.

The SNIPE is a sailboat of a very popular design in full size. This is a 36" scale model, patterned after real racing types. Plans contain full size sail plans, as well as some construction details on building this model. May be built from balsa or from plywood. Is just it for the R/C fan who is looking for something that is different, and yet easy to build.

No. 13L189—Snipe plans, $3.00



NEW! H-D CHARGER

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

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

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

NEW! ACE GG PACKAGE!

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

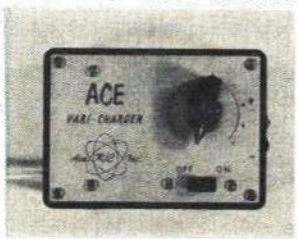
If You are going GG—Go First Class—With ACE GG!

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

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

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

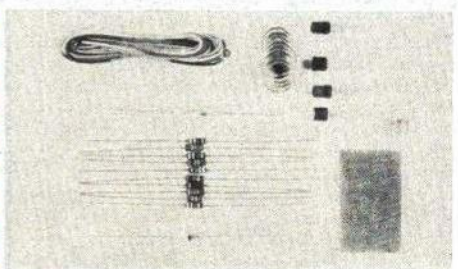
PROVEN WINNER! ACE VARI-CHARGER



IN KIT FORM OR ASSEMBLED

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

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



NEW! MARKS BASIC VERSAPULSER KIT

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

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

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

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

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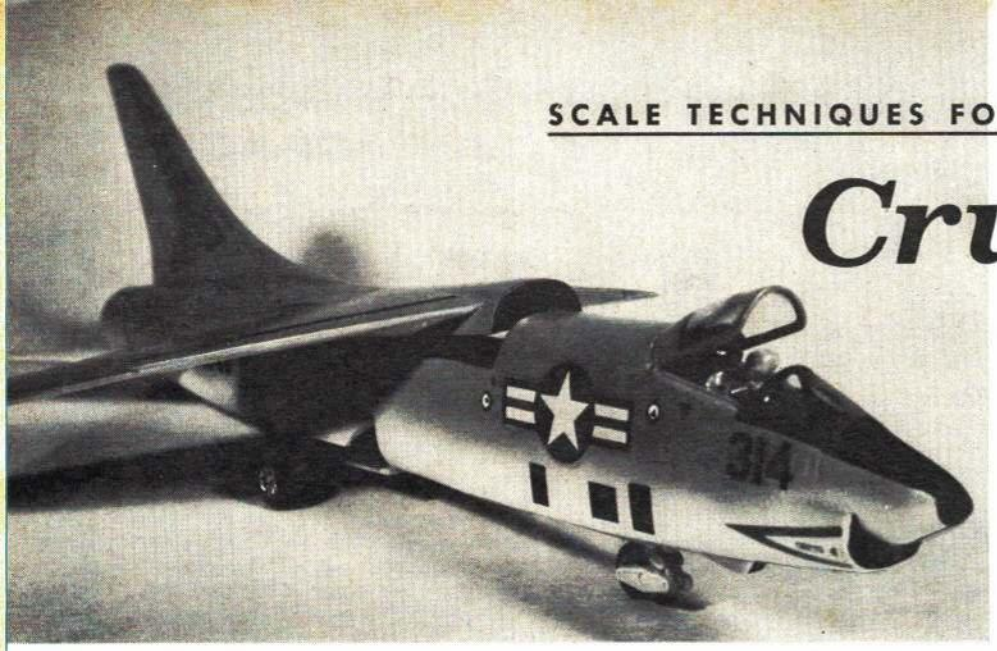

Crusaders F8U-2 and F8U-2P

JOHN N. TOWNSLEY

THE Crusaders were produced by Chance Vought Aircraft who developed many successful naval warplanes, from the VE-7 (the first aircraft to take off from the U. S. Navy's first carrier, the U.S.S. Langley) to the A-7A Corsair II currently in use.

In 1952, the U. S. Navy required a single-seat shipboard air-superiority fighter aircraft capable of attaining speeds in excess of Mach One in level flight. In May 1953, the radical-Chance Vought entry was chosen by the Navy as the best of seven proposed designs. Scarcely 22 months later, on March 25, 1955, the XF8U-1 exceeded Mach One on its first test flight from Edwards Air Force Base.

Only 21 months after the first flight of the aircraft, the F8U-1 was delivered for Fleet Introduction and the VF32 was the first U. S. Navy squadron to re-equip with the Crusaders. In the early months of 1958, two F8U-1's were modified and used as the prototypes from which the F8U-2's were developed. The main changes were: addition of two low aspect ratio vertical fins and the addition of improved performance engines.

The main external alterations to the F8U-1P and F8U-2P photo reconnaissance planes are aft of the cockpit, where the lower fuselage cross-section is squared to provide flat, distortion-free windows for a battery of aerial cameras. Another forward-facing camera is housed in a ventral fairing in front of the main camera compartment. The fuselage top decking is bulged aft of the cockpit to compensate for the lower, cross-sectional area in a revised area rule layout. The refueling probe is concealed behind a flush door in the fuselage side, and the pitot tube was transferred to the nose.

The models in this month's article are converted from the Revell kit No. H-255-130, which is the Ling-Temco-Vought F8-E Crusader aircraft. (Kit is very close to 1/72 scale, and retails for $1.30.)

Specifications: Length: 54′ 5½″, width: 38′ 8″; height: 15′ 9″. Armament: Four 20-mm cannon and two Sidewinder missiles, or up to 4,000 lbs. of bombs.

Tools and materials: Razor saw, jeweler's files, spatula (flexible), dividers, rubber bands (medium), tweezers (large), cement, emery boards, several sheets (assorted sizes) of wet or dry, four sable brushes (#000 and #00 pointed, and ⅛″ and ¼″ flat), masking tape, automotive putty or model car putty, and an assortment of different-colored paints.

Preliminary procedures: Check contents of kit for broken or missing parts. Wash parts in warm detergent suds, drain and rinse in clear warm water, drain again and allow to dry completely. The model can be constructed and painted as the kit model, which will give you an F8-6E Crusader, or you can build either type portrayed in photos in article—the F8U-2 or the F8U-2P. To build the above two variants of the Crusader, the following changes are to be made:

1) To make the F8U-2, which is the easier of the two: saw missile rack in two and install top halves only.

2) Modifications for the F8U-2P are a little more difficult and require a bit more work for the conversion. First, you must decide which type you wish to construct, before you start to assemble model, as the photo-recon plane requires cutting into the fuselage, as follows: Measure 1″ forward from front edge of wheel well and ⅜ up on fuselage and make a location mark; then measure 2″ forward from first mark, and ⅜ up on fuselage to make second location mark. Connect both marks with pencil and saw the marked piece out. Repeat process on other half and saw out. Paint and install pilot, as per instructions below. After cementing in place in right fuselage half, and cementing halves together, you then will have to make a small block of wood to fit cutout in fuselage. Be sure to keep corners of fuselage almost square. After shaping block and sanding it smooth, use putty around all crevices where block of wood joins plastic. Windows are of black decal paper, as is the lettering of both versions.

Painting and assembly: Paint small parts with #00 and ⅛ flat brushes as follows: Pilot: face, flesh color; gloves, black; shoes, black; flight suit, orange-red; Mae West: yellow; helmet, red or yellow; oxygen mask, dark green (almost black); pilot's seat, medium yellow. Nose and main gear

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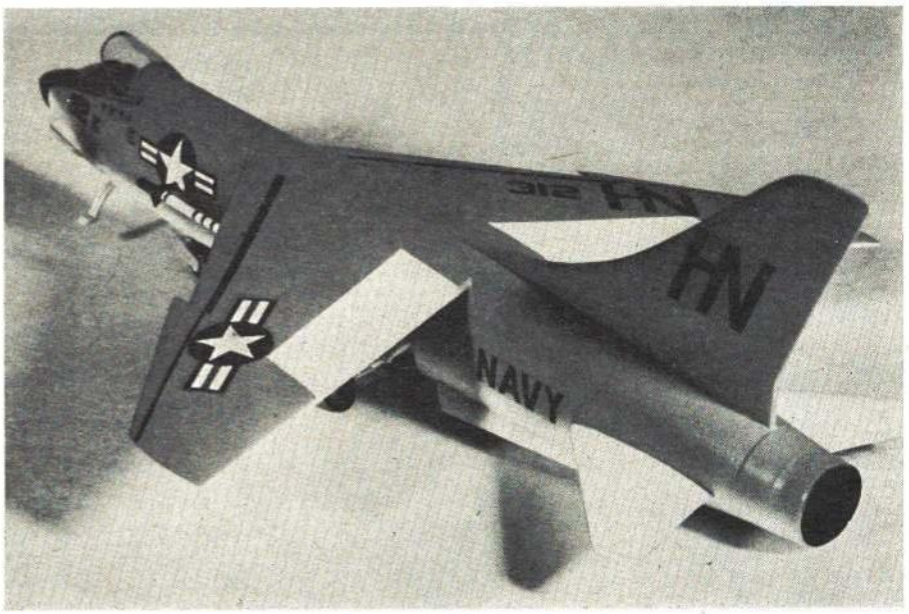

Top: Photo-recon Crusader, with wing raised for incidence to keep fuselage more level during carrier landings, has modifications for camera windows and revised forward cross-section area. Above: Fighting version has full armament and usual ventral fins.

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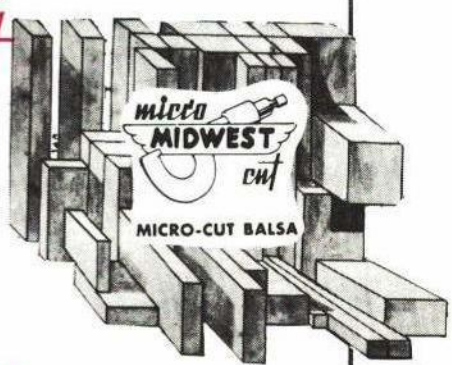

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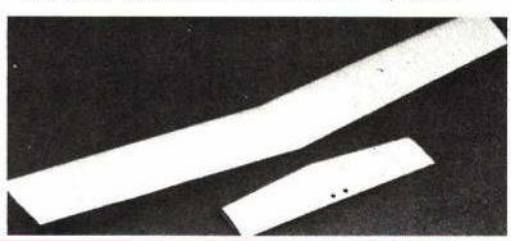

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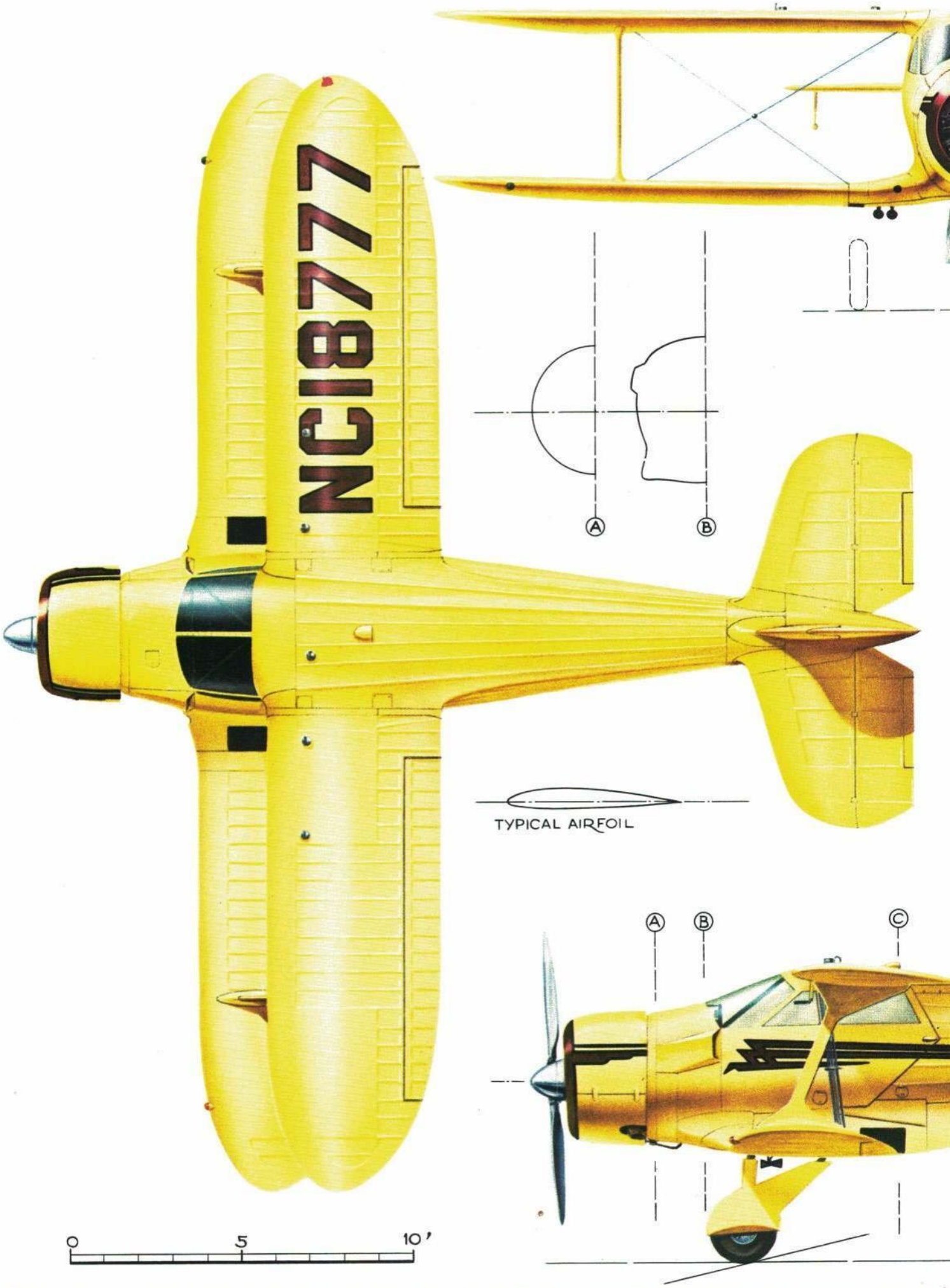
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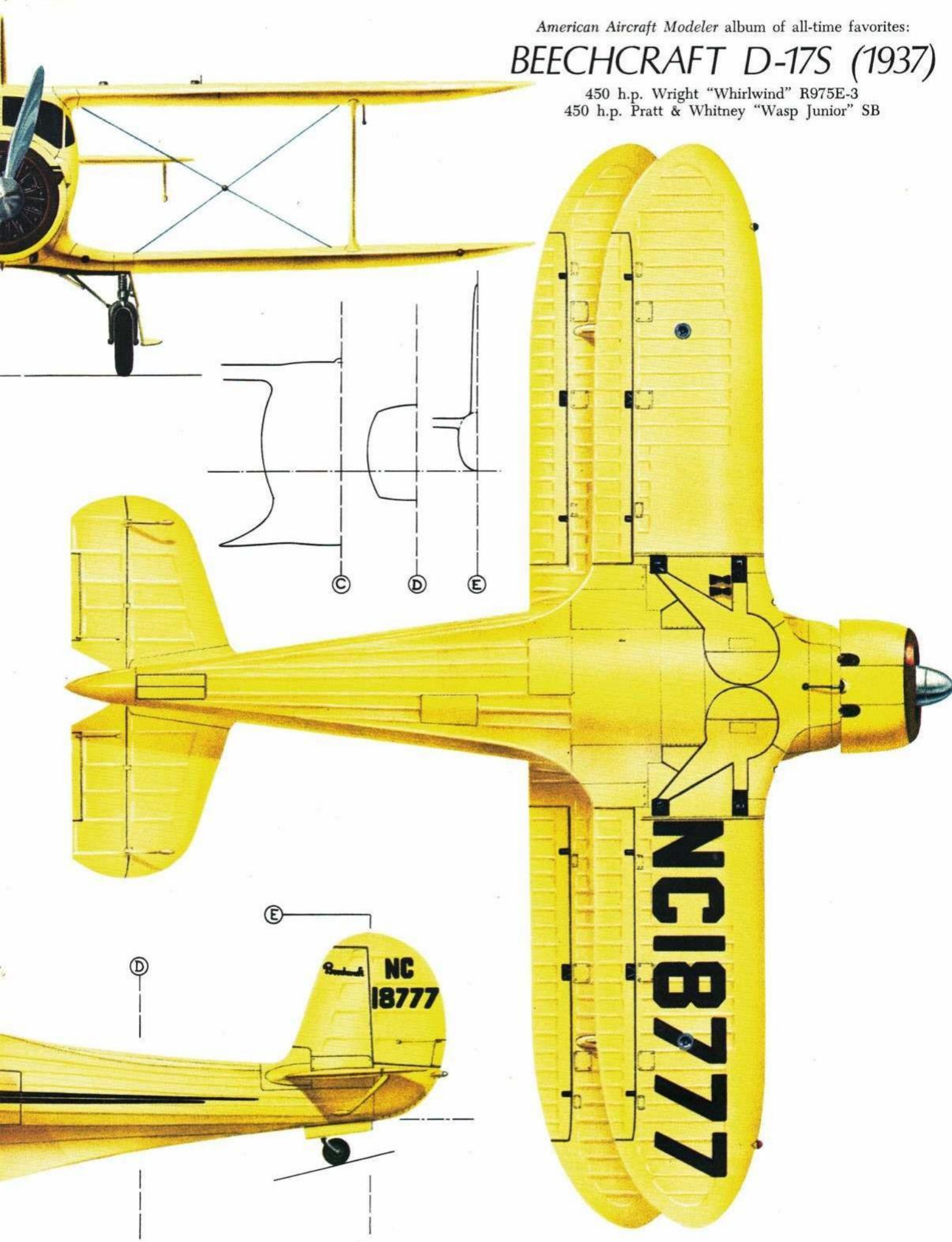


BJORN KARLSTROM

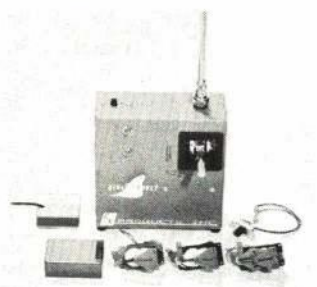
FROM THE RELIABILITY LEADERS

HI-REL LOGICTROL PROPORTIONAL RADIO CONTROL SYSTEMS

HI-REL XL-3 SYSTEM

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

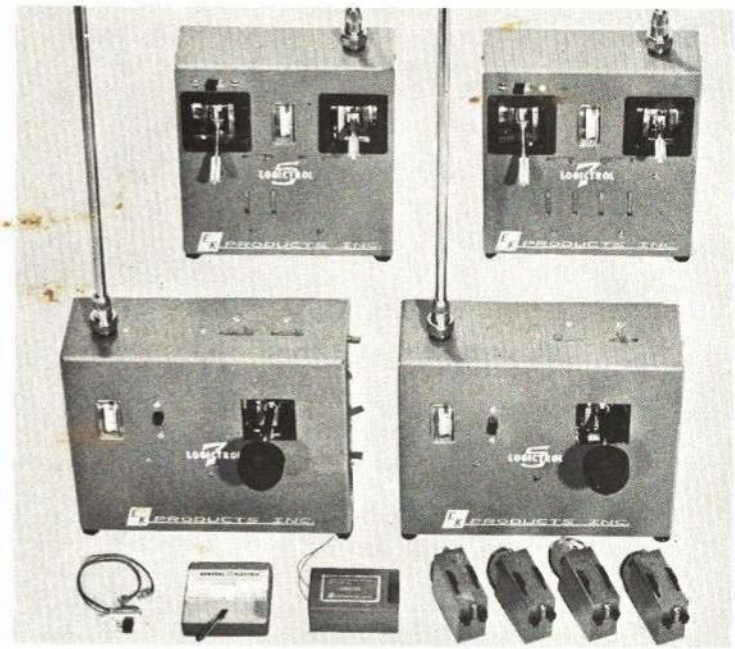
HI-REL DIGI-GHOST



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

HI-REL LOGICTROL III

MINI-SYSTEM



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

LOGICTROL 5 may be expanded to 7 controls

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

COMPLETE SYSTEM PRICES

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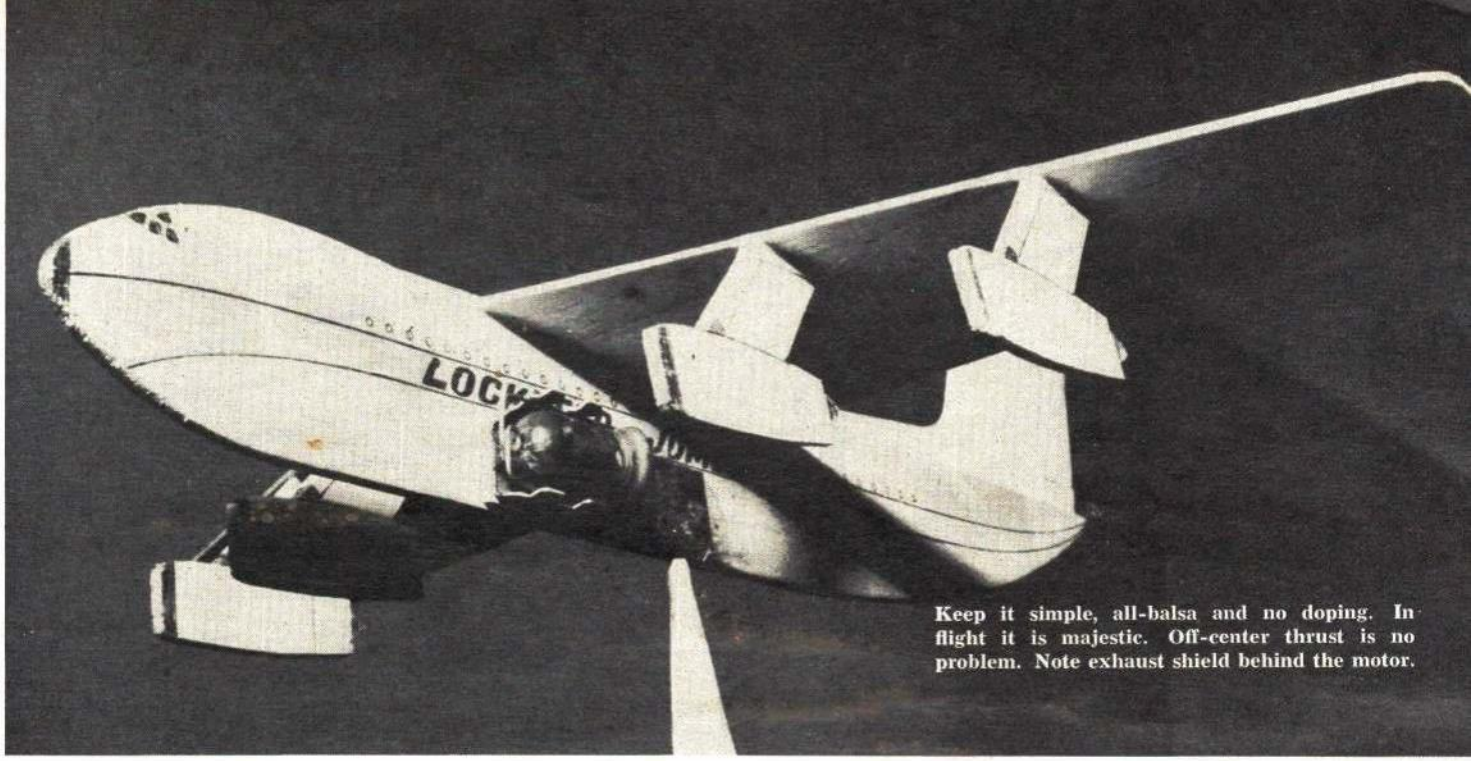

Keep it simple, all-balsa and no doping. In flight it is majestic. Off-center thrust is no problem. Note exhaust shield behind the motor.

JUMBO

Designed for quick-building, kids, and school-yard flying, a Jetex-powered model of the 500—airliner of the 1970's.

By Dick Mathis

THE "Jumbo" is a model of the Lockheed-500, the civilian counterpart to the C-5a cargo ship now being built for the military. The 500, along with the Boeing 747, will be the first of the giant Jumbo airliners of the 1970's. They will be the largest airplanes in the world, capable of carrying over 500 passengers.

You can build our rocket-powered Jumbo, buy motor and fuel, for less than $2.50. The rocket motor (Jetex "Hellcat," available at most hobby shops for $1) uses solid fuel pellets which will cost 10c per flight, and are very safe. No special skills or tools are needed to operate the Jetex, since it has nothing to adjust, and is ignited with a simple fuse. It never wears out, and, most important, it sounds and performs like the real thing! All you do is load it, which takes only a minute or two. It gives about ¾ oz. of thrust for 15 seconds, which is ample enough to carry the Jumbo over 50 feet high, before it starts its glide.

The Jumbo is all sheet balsa, so you just cut the parts out and glue them together. No paper covering, or painting is necessary, and markings like the cockpit, windows, and elevator outlines are made with a ball-point pen. If you make good strong glue joints, the ship will be practically indestructible.

To begin yours, go to the hobby shop and purchase one sheet of 1/16 x 3 x 36", and one sheet of 1/8 x 3 x 36" balsa wood, plus a small tube of cement (not plastic cement). You will also need a few straight pins, a straight ruler, and a sharp modeling knife, and, of course, the Jetex motor and fuel. All of the necessary wicks and gaskets are supplied with the fuel.

Study the plans, which are shown full-size so you can take the outlines of all the parts directly from them. Do this by placing the piece of balsa underneath the plans, and making pin holes through the plans and into the wood along the outline shown. Then the pin holes will give a good guide for cutting the actual part out accurately. It also helps to guide your knife with a straight edged ruler to make clean cuts. After cutting out all the parts, you should make whatever marking you want with the ball-point pen. A straight edged ruler will make it look neater.

Before assembling the plane, sand all parts smooth with fine sandpaper. Then, using the ball-point pen, mark the balsa for the outlines of the control surfaces, name, and other decorative details.

Over a sheet of wax paper, join the wing halves. One half is pinned down to the building board and the other is jacked up at a slight angle so that its tip is one inch above the surface of the board. Use a piece

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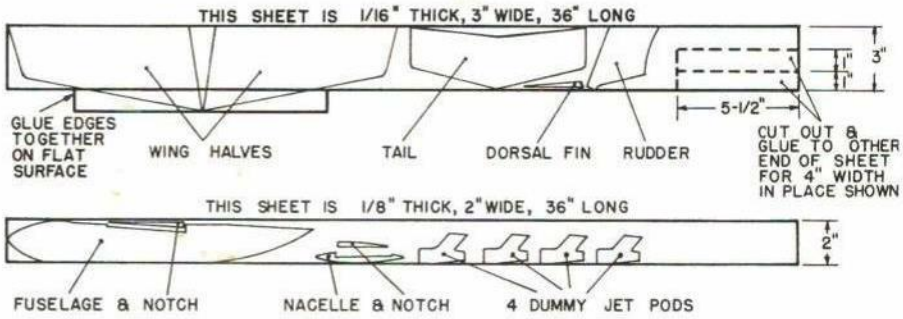
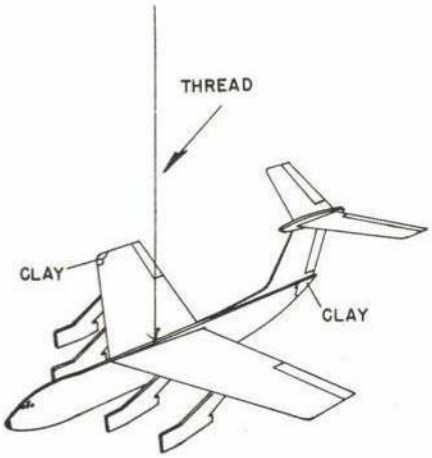
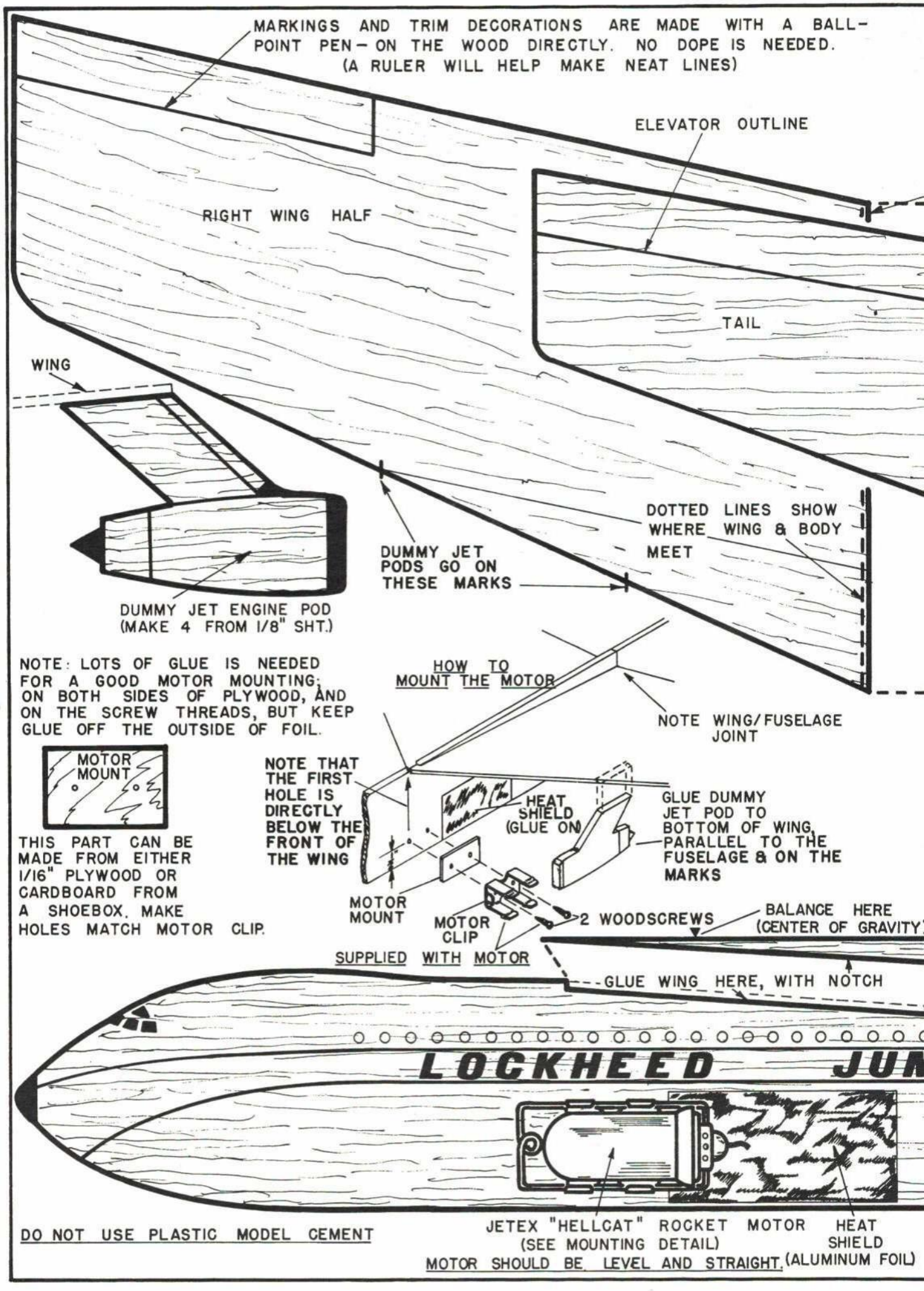
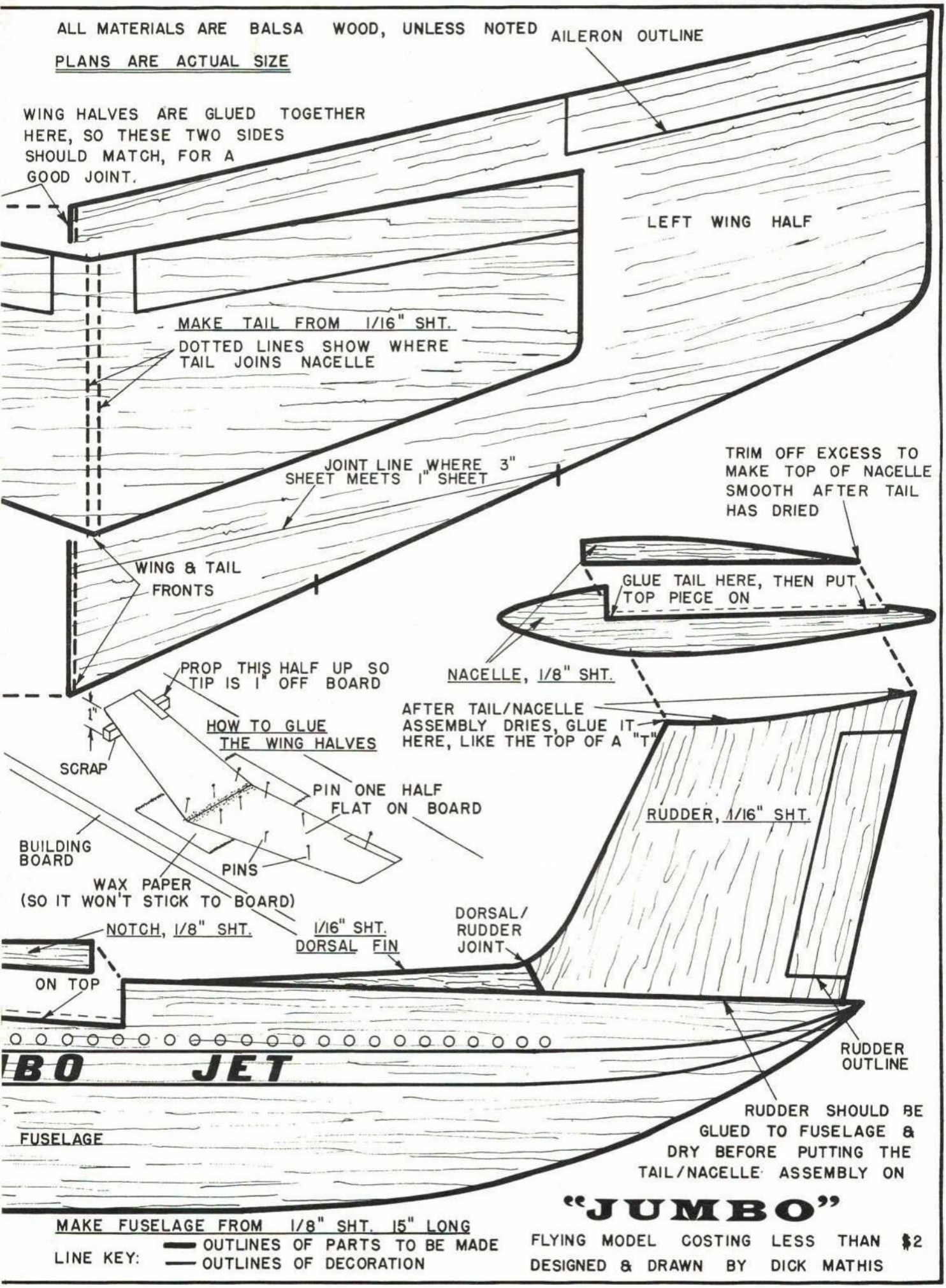


All parts can be cut out of two sheets of store-size balsa with space to spare. After cutting out, make whatever markings you want with ball-point pen before assembly.



With Jetex loaded, balance the model with thread attached at CG location as shown.


MARKINGS AND TRIM DECORATIONS ARE MADE WITH A BALL-POINT PEN – ON THE WOOD DIRECTLY. NO DOPE IS NEEDED. (A RULER WILL HELP MAKE NEAT LINES)
ELEVATOR OUTLINE
RIGHT WING HALF
TAIL
WING
DUMMY JET ENGINE POD (MAKE 4 FROM 1/8" SHT.)
DUMMY JET PODS GO ON THESE MARKS
DOTTED LINES SHOW WHERE WING & BODY MEET
NOTE: LOTS OF GLUE IS NEEDED FOR A GOOD MOTOR MOUNTING; ON BOTH SIDES OF PLYWOOD, AND ON THE SCREW THREADS, BUT KEEP GLUE OFF THE OUTSIDE OF FOIL.
HOW TO MOUNT THE MOTOR
NOTE WING/FUSELAGE JOINT
MOTOR MOUNT
THIS PART CAN BE MADE FROM EITHER 1/16" PLYWOOD OR CARDBOARD FROM A SHOEBOX. MAKE HOLES MATCH MOTOR CLIP.
NOTE THAT THE FIRST HOLE IS DIRECTLY BELOW THE FRONT OF THE WING
HEAT SHIELD (GLUE ON)
GLUE DUMMY JET POD TO BOTTOM OF WING, PARALLEL TO THE FUSELAGE & ON THE MARKS
MOTOR MOUNT
MOTOR CLIP
SUPPLIED WITH MOTOR
2 WOODSCREWS
BALANCE HERE (CENTER OF GRAVITY)
GLUE WING HERE, WITH NOTCH
LOCKHEED JUN
DO NOT USE PLASTIC MODEL CEMENT
JETEX "HELLCAT" ROCKET MOTOR (SEE MOUNTING DETAIL)
MOTOR SHOULD BE LEVEL AND STRAIGHT.
HEAT SHIELD (ALUMINUM FOIL)



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KWIK-FLI III

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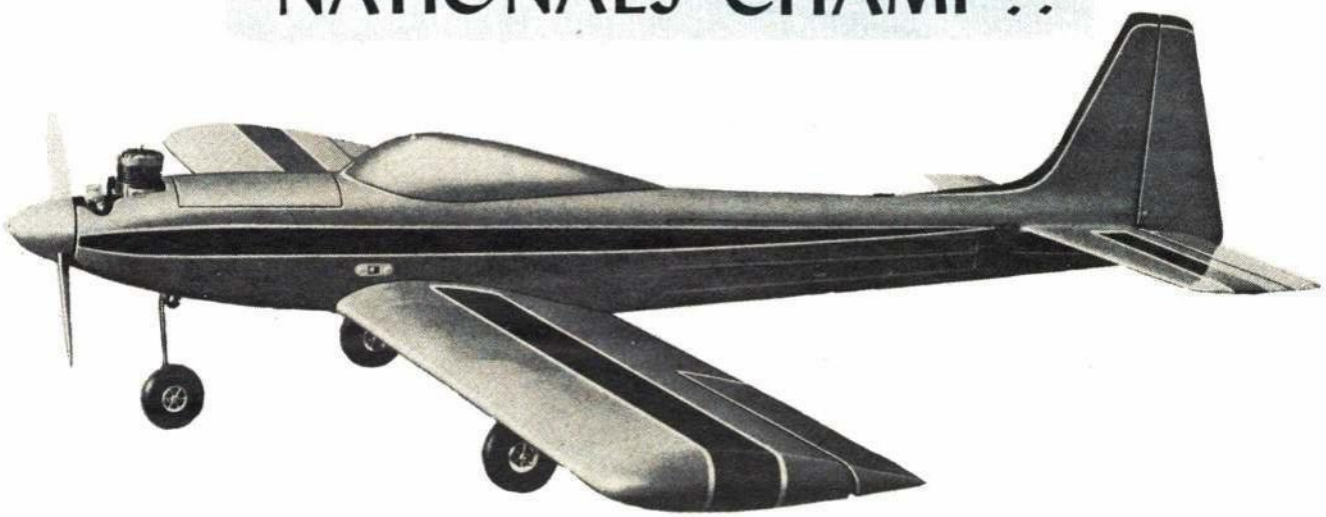

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These innovations, combined with many completely finished parts, make **KWIK-FLI III** easier and faster to build than ever.

** T. A. C. means True Accuracy Construction.*

TOP FLITE

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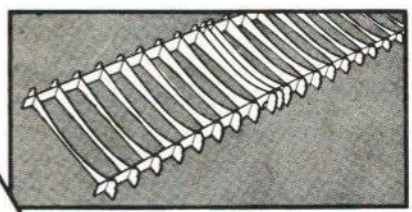

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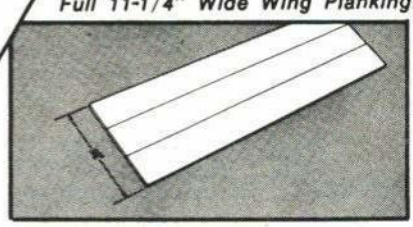

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AUGUST 1968

model aviation

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

AMA Financial Report-1967

In the past a financial statement of the Academy of Model Aeronautics has been published annually in Model Aviation. It has mostly been ignored, mainly because it is usually full of confusing fine print, footnotes, and accounting jargon which is confusing. It has not been very helpful to the average member so far as providing an understanding of where AMA's money comes from and where it goes.

What follows is a new approach — an explanation of financial factors in general terms, by description along with basic figures. Hopefully, the average AMA member — and non-members, too — may gain a better overall picture of how the Academy operates with the funds available. Meanwhile, the usual detailed financial statement has been provided to AMA executive officers. Here, then, is the 'new look' in reporting of AMA's financial picture of 1967:

Overall: AMA had an income last year of almost $178,500, plus just over $2,000 in donations. Operating expenses were almost $178,300 so we ended the year about $200 in the black. Because of this, all of the donation money was able to be applied to AMA's old deficit, reducing it from $19,600 to about $17,300. Total assets of the organization as the year ended were just under $76,000, including about $5,000 owed to us.

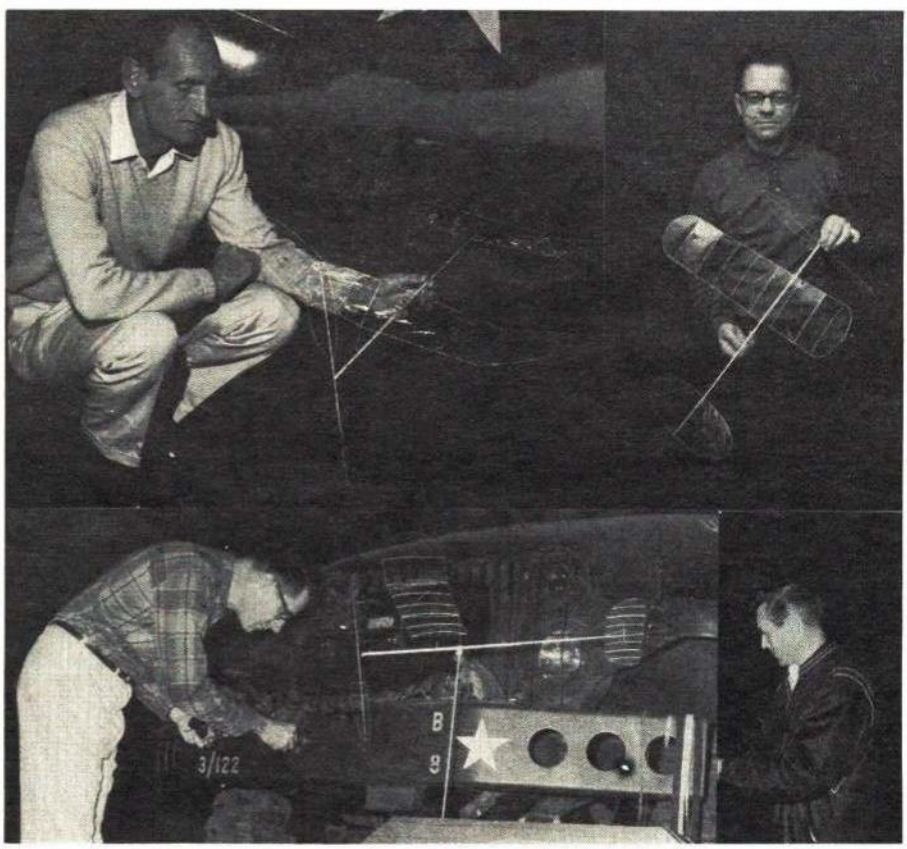
Our liabilities at year end included $2,000 in bills owed and we had an obligation to provide almost $81,000 in services to members for 1968 (mostly in magazines, insurance and other benefits paid for in '67). We also were holding almost $10,000 in trust for U. S. competition teams (over $7100 for Free Flight, almost $700 for Radio Control, about $1200 for Indoor, and close to $800 for Control Line). In addition we were holding $500 in a Scholarship fund.

Income: Dues from 22,767 memberships in 1967 accounted for two-thirds of total income. Servicing of memberships and providing insurance for the National Association of Rocketry brought in about $5100. Another $5,500 came in from Supply and Service sales. Contest and record sanction income was just over $2500, and FAI Stamp sales came to about $1100. Mailing services brought in just over $500 from members almost $4000 from American Modeler (subscription processing). Club charter fee income was just over $14,000 (from approx. 9,000 members in AMA clubs). Fees to provide insurance for meets not sponsored by chartered clubs totaled close to $1100. Various advertising and promotional efforts brought in about $700.

The Nationals, AMA's biggest single annual promotion, raised just over $23,000; almost $7,000 from about 50 sponsorships, almost $6000 from the hobby shop, close to $7500 in entry fees, just over $1100 in RC judge donations, and about $1800 from miscellaneous sources. Yet the Nats lost almost $8000 overall — it cost over $31,000 to put on! Expenses for officials, supplementary PR efforts, trips to promote sponsorships, and other such administrative efforts cost over $4600. Trophies (over 500 of them) cost almost $3200, merchandise for the hobby shop cost over $4100, lodging for the RC judges cost $1200, about $3500 was needed for meet supplies and miscellaneous items, entry processing supplies were purchased for about $1500. Our basic — and major — PR effort for the Nats cost just over $4100. Apportionment of HQ salaries, rent, taxes and telephone expenses totaled about $8800.

Other Expenses: Membership processing was the largest single 1967 cost item for AMA, totaling almost $71,000. The biggest part of this went to salaries of those in the HQ membership department — just over $37,000 (a little over half of the total HQ salary cost). Postage required was more than $3200, rule books cost over $1300, supplies came to almost $5900. Insurance coverage for members came to just under $17,600. Membership promotion (PR) and apportionment of general costs (taxes, rent, etc.) totaled about $5500.

Model Aviation, the Academy's official publication, cost a little over $40,500 last year, mostly in direct cost of purchase —



1968 US Indoor World Championship team: upper — Clarence Mather (L) and Al Rohrbaugh (R), lower — Jim Richmond (L) and Manager Bud Romak (R). Team was chosen last August at central fly-off in Indiana. World Championship to be at Rome, Italy, this October. Romak reports that Mather is actively working on new designs hoped to better his team placing model.

National AMA Indoor Records as of May 1

AMA Ceiling Category I (not over 35')

Class A ROG	Time
J — Bob DeShields	6:55.1
S — Larry Loucka	8:30.0
O — Hubert Entrop	12:10.0
Paper Stick	
J — Linda Randolph	8:28.0
S — W. James Skinner	8:50.0
O — James Richmond	12:49.8
B Stick	
J — Bob DeShields	8:57.6
S — Larry Renger	10:38.6
O — W. Hewitt Phillips	16:59.0
C Stick	
J — Kristi Tenny	8:57.0
S — Michael Fedor	12:54.0
O — W. Hewitt Phillips	19:30.2
D Stick	
J — Kristi Tenny	10:14.4
S — Tom Neumann	14:36.1
O — Harold Crane	16:46.2
B Cabin	
J — Jim Skarzynski	5:08.4
S — Neil Shipley	9:19.6
O — Dick Stamm	7:12.1
B Cabin ROW	
J — Dale E. Hacker	1:42.0
S — David Erbach	3:31.2
O — Ronald Ganser	4:51.0
C Cabin	
J — Ronald Ganser	3:48.0
S — Larry Loucka	9:12.0
O — Ronald Ganser	9:15.0
Autogiro	
J — Herbert Schubert Jr.	2:25.5
S — Edmund Smith	2:40.5
O — Ronald Ganser	4:19.0
Helicopter	
J — Dave Erbach	3:52.4
S — Nickey Jones	6:31.0
O — Walter Erbach	6:32.2
Ornithopter	
J — Dave Erbach	0:30.1
S — Edmund Smith	2:41.4
O — Ronald Ganser	3:07.0
H. L. Glider	
J — Bill Schubert	1:01.0
S — Bill Schubert	1:13.8
O — Ron Wittman	1:11.5
FAI Stick	
J — Kristi Tenny	8:01.0
S — Michael Fedor	11:06.0
O — W. Hewitt Phillips	16:59.0

AMA Ceiling Category II (35'-100')

Class A ROG	Time
J — Don Chancey	8:10.9
S — Larry Loucka	10:19.5
O — Robert Randolph	14:26.3
Paper Stick	
J — Jim Thornbery Jr.	14:58.1
S — Larry Loucka	16:03.2
O — Robert Randolph	20:41.4
B Stick	
J — Linda Randolph	14:35.4
S — Dave Erbach	17:16.8
O — Robert Randolph	22:47.0
C Stick	
J — Tim York	19:46.0
S — Larry Loucka	19:18.5
O — James W. Richmond	29:21.5
D Stick	
J — Ronald Roharik	20:37.0
S — Jim Skinner	22:59.2
O — Dick Kowalski	29:47.4
B Cabin	
J — Jim Skarzynski	7:15.0
S — Dave Erbach	11:31.8
O — Al Rohrbaugh	18:25.0
B Cabin ROW	
J — Dan O'Malley	4:30.6
S — Dave Erbach	7:44.7
O — Warren Williams	9:15.8
C Cabin	
J — Dave Erbach	7:35.8
S — Larry Loucka	18:06.4
O — Charles Sotich	17:54.8
Autogiro	
J — Herbert Schubert Jr.	2:10.0
S — Dave Erbach	5:02.2
O — Walter Erbach	6:32.8
Helicopter	
J — Dave Erbach	3:47.2
S — Nickey Jones	6:30.3
O — Walter Erbach	5:50.8
Ornithopter	
J — Robert Postage	1:51.0
S — Dave Erbach	1:15.0
O — Edmund Smith	2:45.4
H. L. Glider	
J — Bill Schubert	2:12.1
S — William Schubert	2:14.1
O — Robert K. Larsh	2:04.8
FAI Stick	
J — Kristi Brock	12:12.0
S — (no current record)	
O — Harry Lerman	17:46.0

AMA Ceiling Category III (over 100')

Class A ROG	Time
J — Arthur Saltzman	10:09.0
S — Raymond B. Harlan	15:01.4
O — Joseph Foster	21:52.0
Paper Stick	
J — Linda Randolph	19:03.0
S — Raymond B. Harlan	19:48.6
O — Frank Cummings Jr.	24:52.2
B Stick	
J — Ronald Cummings	24:03.0
S — Don Kennedy	25:37.6
O — Tom Finch	34:15.6
C Stick	
J — Bob DeShields	27:17.0
S — Raymond B. Harlan	26:38.4
O — Thomas Finch	39:55.0
D Stick	
J — Daniel Champine	25:45.4
S — Drew Morris	30:26.0
O — Ernest Kopecky	43:42.0
B Cabin	
J — H. Kaczynski	12:42.4
S — Raymond B. Harlan	18:24.4
O — Frank Cummings Jr.	25:44.0
B Cabin ROW	
J — Stephen Stackhouse	3:06.4
S — David Call	13:13.0
O — Anthony D'Alessandro	17:20.0
C Cabin	
J — Randy Richmond	18:33.3
S — Raymond B. Harlan	19:21.8
O — Joe Bilgri	29:06.3
Autogiro	
J — Edward Vargo	3:53.8
S — Dave Erbach	5:27.4
O — Fred Weitzel	8:27.0
Helicopter	
J — Curtis B. Lee	4:38.2
S — Edmund Smith	6:45.6
O — Hal Cover	8:11.0
Ornithopter	
J — Edward Vargo	1:18.0
S — John Bock	3:22.0
O — Fred Weitzel	4:30.5
H. L. Glider	
J — Randy Richmond	2:08.8
S — Arthur Markiewicz	2:20.2
O — Curt Stevens	2:50.4
FAI Stick	
J — (no current record)	
S — (no current record)	
O — (no current record)	

FAI Stick (FAI Ceiling Categories)	Time
I — JSO — W. Hewitt Phillips	17:29.0
II — JSO — Stan Chilton	17:15.0
III — JSO — James Richmond	33:47.5
IV — JSO — James Richmond	28:52.0

$24,000 to provide each member with a copy each month, at 10c per copy. About $3500 more was required for postage to mail the magazines, the rest was for HQ staff time in preparing material, supplies, telephone, apportionment of rent and other general office expense.

AMA's Supply and Service operation, the organization's mail-order "store," cost was just over $3700, about $1600 of that in cost of items sold, $250 more in postage, about $1800 in apportionment of general expenses. The operation paid its own way, coming out about $1800 in the black.

FAI Programs in 1967 cost a little over $10,000. The annual franchise fee paid to the National Aeronautic Association accounted for $1000. Team expenses overseas cost a little over $1300 more ($33 for Indoor, about $440 for RC, almost $900 for FF). FAI world record processing fees cost $65. Apportionment of HQ salaries, supplies, postage, telephone, and other general office expenses cost about $6900. The total expense was within the 10% of dues income which has been budgeted for FAI activity in recent years.

Contest administration, mostly involving the processing of sanction and national record applications, cost was just over $7100 in 1967. The amount is a direct apportionment of overall HQ expenses, including about $3600 (5%) of total HQ salary costs. Over 500 meets were sanctioned in 1967 but only a little over $2000 was produced in sanction fees, so there was a deficit of about $5000 — contest administration has always been a red ink operation. However, this is considered a worthwhile subsidy since it promotes activity, one of the basic aims of the Academy.

AMA officer services cost about $1800 last year — a remarkably low figure. This amount covers HQ expense and reimbursements of postage and miscellaneous expenses of volunteer officer efforts. Over 60 officers are involved (Executive Council, Contest Board, Contest Coordinators) so this is an extremely low cost in proportion to services rendered. It indicates that most officers cover their own expenses in performing their duties.

General administration services cost $13,000 last year. These services are those outside of such specific areas as listed previously. Mostly such services are involved in the direct handling of membership inquiries — letters, phone calls, etc., in relation to individual problems of miscellaneous nature. Basically this expense covers the HQ effort in handling the daily workload of membership mail — a tremendous effort that goes on constantly without fanfare. The costs are an apportionment of overall HQ expenses.

That's the basic financial story of how the Academy of Model Aeronautics operated last year. It was — and always is — a tremendously complicated operation. By any measure it was a big operation and one largely invisible to most members. Obviously there would be a big hole in the model aviation picture if the Academy effort was not in being.

Obviously, too, the effort is appreciated as AMA membership is currently breaking all of last year's records. At press time, membership was already over 21,000, several months ahead of 1967.

A-1 Record Error

The May issue of Model Aviation incorrectly lists A-1 Towline Glider records. Those listed should have been retired as of Jan. 1, 1968, in favor of new records which went into effect then, requiring seven flights instead of five.

When the AMA national record listing was revised for FAI events, A-1 Towline Glider was overlooked because it technically is not an FAI event (it used to be). However, A-1 and A-2 use the same flight rules, and new national records should be started for A-1 just as they were for A-2.

New World RC Speed Record

Attaining a speed of 198.8 mph for powered radio control models on April 14, Werner Kaeseberg of West Germany is believed to have established a new World Record. This flight, when accepted as official by the FAI, will replace the record of USA's Maynard Hill set June 27, 1966, at 140.28 mph.

World records for models as well as full size aircraft and spacecraft are maintained and supervised by the Federation Aeronautique Internationale, headquartered in Paris, France. AMA is FAI's representative for model airplanes in the US through franchise with the National Aeronautic Assn.

Interesting fact about the new RC speed record is that it is so close to the FAI absolute speed record for model airplanes — 203.2 mph. In this category, where all types of allowable power and all types of allowable control compete together, the current record is held by an Italian, Elio Zanin,

with a control line model powered by a reaction (jet or rocket) engine.

All AMA members may compete for FAI World Records. Details for authenticating such flights are contained on p. 61 of the 1968 Official Model Aircraft Regulations — the "rule book" provided to all AMA members or available separately for 50c from the Academy of Model Aeronautics, 1239 Vermont Ave., N.W., Wash., D. C. 20005.

1968 NATIONAL MODEL AIRPLANE CHAMPIONSHIPS

NAVAL AIR STATION OLATHE, KANSAS (near Kansas City)

Here's where the 37th annual National Model Airplane Championships will be held Aug. 3-8, 1968. Entry forms still available from AMA HQ, but if not postmarked by July 7 must be presented in person at Olathe NAS, no earlier than 1 pm Friday Aug. 2 and no later than 11 am Sunday Aug. 4. Competition flying for indoor free flight events starts Sunday, Aug. 4, 9 am (Kansas City Municipal Auditorium) and Monday, Aug. 5 at Olathe NAS for all other events. The annual contest, the world's largest model meet, ends 7 pm Thursday, Aug. 8.

FF Team Finals

This year's big meet to pick the United States Free Flight team to compete in the 1969 world championships of the Federation Aeronautique Internationale (FAI) will be held at Bong Field, Wisconsin (about 80 miles North of Chicago), Aug. 30 through Sept. 2. About one hundred flyers who qualified at preliminary meets last year will fly-off to pick three team members in each of the following categories: Nordic A-2 Glider, Wakefield Rubber, FAI Gas Power. There will be five rounds of flying each day in each event.

Controversy delayed approval of the finals site for several months. Pressures were exerted for sites in California, Colorado and Kansas. Wisconsin, however, scene of what has been termed the greatest free flight meet ever (the team selection flyoff in 1966), was finally approved on the basis of best compromise between distance, logistics and other factors.

Meanwhile, for the first time in many years, the status of the 1969 Free Flight World Championships is in question. At press time there was no commitment from any country to host the event — two previous bidders (Italy and Spain) announced their inability to proceed. And no other countries seemed willing to commit themselves. A championship hosted by the U. S. has been suggested by some but this would probably be limited, due to transportation problems, to western hemisphere countries. The fate of the 1969 meet will probably be decided at the Novmber 1968 annual meeting in Paris of FAI's Committee for International Aero Modeling.

FAI Agenda Notice

Within a few months AMA HQ will submit official US proposals for consideration at the annual Committee for International Aero Models meetings of the Federation Aeronautique Internationale. Proposals relating to rule modification for all FAI categories of model interest are acceptable, although no model specification changes can be expected for free flight and radio control before 1970 — in these categories, only items of rule interpretation or meet procedure for the '69 World Championships will be acted on.

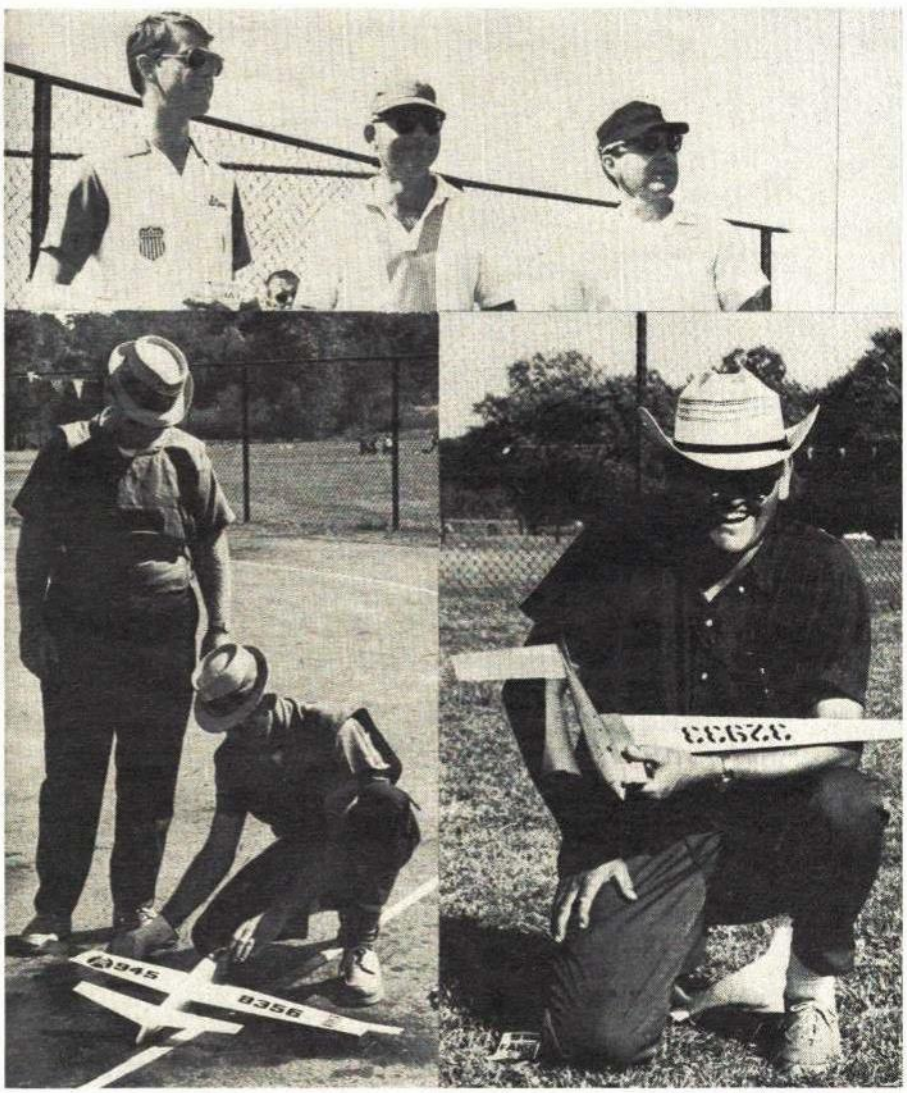
AMA's representatives on FAI subcommittees are: Steve Wooley — Control Line, Bob Champine — Free Flight, Maynard Hill — Radio Control, Leroy Weber — Scale, Harry Stine — Rockets. Any proposed agenda items should be submitted to them directly or via AMA HQ by Aug. 1, as all proposals must be forwarded to the FAI about Sept. 1.

International RC Judges

It looked like curtains for U. S. participation in the first International RC Judges Course this past April. Sponsored transportation to Germany, where the course was to be held, was available for only one person. This was assigned to Maynard Hill, who was to instruct the course. Two others from the U. S. who were to be instructed as judges, Bill Northrop and John Patton, had no means of getting to Europe.

Fortunately, the **Radio Control Industry Association** came to the rescue by providing sufficient financial assistance so that Northrop and Patton could go as originally planned. **Thanks, RCIA!**

Hill reports that the judges course was highly successful. It promoted better understanding of what it takes to make judging more consistent and the course was well attended. Thirty-three delegates from 18 countries took part.



Teams for the FAI Control Line World Championships will soon be departing for Helsinki, Finland, where the Championships will be held July 29-Aug. 1. Teams were selected in a fly-off last fall in St. Louis. The Stunt Team (top, L to R) consists of Steve Wooley, Bob Gieseke, and Jim Silhavy. Team Race teams are made up of Stockton-Jehlik, Duncan-Wright (above, L), and Marvin-Albritton. The Speed Team comprises Roger Theobald, Arnold Nelson (above, R), and Bill Wisniewski. Team Manager is Pete Brandt.

DIRECTORY OF AMA OFFICERS

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

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CONTEST COORDINATORS:

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IV: D. L. Johnson, 3367 Sudlersville So., Laurel, Md.
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VIII: M. Frank, 2933 Blankenship, Wichita Falls, Tex. 76308
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Pete Brandt, 5817 W. Ironwood, Palos Verdes Peninsula, Calif. 90274 (South)
XI: A. L. Grell, Rt. 1 Box 165, Tangent, Ore. 97389

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

Bold type below indicates Chairman of Contest Board.

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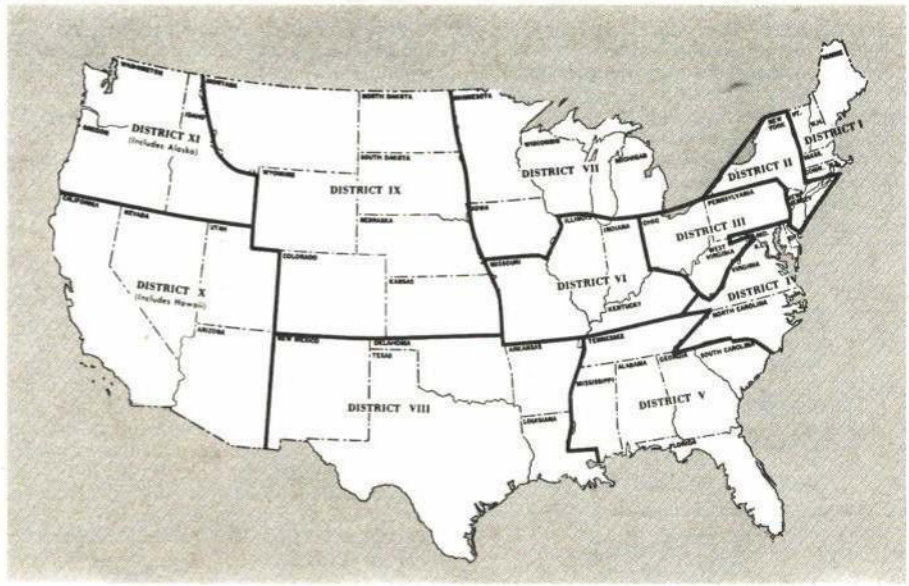


CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

July 6 — Ayer, Mass. (AA) Yankee Championships for FF. Site: Ft. Devens Air Field. G. O'Roak CD, 168 Beulah Rd., Whitman, Mass. 02382.

July 6-7 — Wichita Falls, Tex. (AAA) 11th Jaycee Red River Championships for FF, CL, RC. Spec. Event. Site: Jayee Park. M. Frank CD, 2933 Blankenship, Wichita Falls, Tex. 76308.

July 6-7 — Sebring, Fla. (AAA) Confederate Nationals Contest for FF & CL. Site: Air Terminal. R. Myers CD, 3935 S.W. 125 Ave., Miami, Fla. 33165.

July 6-7 — Kansas City, Mo. (AA) KCRC Annual Contest for RC. Site: Lake Jacomo. B. Drummond CD, 9115 Charlotte, Kansas City, Mo. 64131. Sponsor: **Kansas City RC Club.**

July 6-7 — Murfreesboro, Tenn. (AAA) 3rd Annual Volunteer State Championships for FF, CL, & RC. Site: RAMS Field. E. Cole CD, 1434 Diana, Murfreesboro, Tenn. 37130.

July 6-7 — Chicago, Ill. (AA) Chicagoland RC Open Meet. Site: CRCM Club Field. D. Burt CD, 3048 Central St., Evanton, Ill. 60201. Sponsor: **Chicagoland RC Club.**

July 7 — Ayer, Mass. (AA) Yankee Championships for FF. Site: Ft. Devens Air Field. R. Sisson CD, 16 Kings Rd., Canton, Mass. 02021.

July 7 — El Monte, Calif. (AA) Goodyear Meet. Site: Whittier Narrows. D. Hamilton CD, 19045 E. Alford, Glendora, Calif. 91740. Sponsor: **San Gabriel Valley RC League.**

July 7 — Olean, N. Y. (A) Annual Fly for Fun for RC. Site: Line Material Field. G. Flynn CD, Rt. 2, Box 456, Olean, N. Y. 14760. Sponsor: **Olean Model Airplane Club.**

July 7 — Lowry AFB, Colo. (AA) Sky Dusters 6th Annual AA CL Contest. Site: South Hanger #2. E. Haynes Jr. CD, 3065 Jackson St., Denver, Colo. 80205.

July 7 — Forest Preserve, Ill. (AA) 3rd Annual Aero Angels CL Model Meet. Site: Cumberland & Irving Park Rd. D. Hardt CD, 7371 N. Lincoln Ave., Lincolnwood, Ill. 60646. Sponsor: **Aero Angels.**

July 7 — Queens, N. Y. (AA) Luftmeister Model CL Olympics with special rules. Site: Flushing Meadow Park. J. Radle CD, 131-30 223 St., Laurelton, N. Y. 11413.

July 7 — Columbus, Ohio (AA) Northland Controlline Championships. Site: Northland Shopping Center. C. Marco CD, 1466 Burnley Sq. N., Columbus, Ohio 43224. Sponsor: **Capital City Controlliners.**

July 13 — Taft, Calif. (AA) Thunder Bugs 1st Annual Night FF Contest. Site: Gardner Field. J. Bonang CD, 1320 Welton Way, Inglewood, Calif. 90302. Sponsor: **Thunder Bugs MAC.**

July 13-14 — Selma, Ala. (AAA) Ala. State FF & CL Championships. Site: Selfield. K. Scott CD, 904 Kings Bend Rd., Selma, Ala. 36701.

July 13-14 — Salt Lake City, Utah (AA) July Fiesta RC Contest. Site: Saltair Model Port. C. Pannier CD, 1781 Mountain View Dr., Salt Lake City, Utah 84106.

July 13-14 — Nashville, Tenn. (AAA) 5th Annual Mid South RC Championships. Site: Edwin Warner Park. R. Reuther CD, 216 Vaughns Gap Rd., Nashville, Tenn. 37205. Sponsor: **Middle Tennessee RC Society.**

July 13-14 — Minneapolis, Minn. (AA) TCRC FAI RC Qualification. Site: TCRC Model Strip. D. Blazek CD, 9230 Bryant Ave. So., Minneapolis, Minn. 55420.

July 13-14 — Turlock, Calif. (AA) Pioneers Annual RC Contest. Site: Municipal Airport. R. Morse CD, 3351 Pruneridge Ave., Santa Clara, Calif. 95051. Sponsor: **Pioneer RC Club.**

July 13-14 — Mandan, N. D. Missouri Slope Annual Model RC Fly In. Site: Mandan Airport. A. May CD, Rt. 2, Box 58, Bismarck, N. D. 58554.

July 13-14 — Roanoke, Ill. (AA) 3rd Annual RC Contest. Site: Robert Sherer Farm. E. Dalton CD, 1429 E. Hendryx Lane, Peoria, Ill. 61614. Sponsor: **Peoria RC Modelers.**

July 13-14 — San Antonio, Tex. (AAA) Sidewinders 4th Annual CL MAC. Site: Churchill H.S. G. Aldrich CD, 3219 Shady Springs, San Antonio, Tex. 78230.

July 14 — Urbana, Ill. (AA) 6th Annual Aeronautics Model Airplane Meet for CL. Site: Illini Airport, Rte. 45N. J. Fruit CD, 406 E. Newkirk, Tuscola, Ill. 61953.

July 14 — Aurora, Colo. July FF Fun Fly. Site: MMM Flying Site. A. White CD, 1373 Bellaire, Denver, Colo. 80220. Sponsor: **Magnificent Mountain Men.**

July 14 — Dayton, Ohio (AA) Midwestern ½A CL Championships. Site: Municipal Model Flying Field. C. China CD, 5028 Broughton Pl., Dayton, Ohio 45431. Sponsor: **Dayton Buzzin Buzzards.**

July 14 — Mitchel Field, N. Y. (AA) 6th Annual FF & CL Contest. H. Mayer CD, 18 Magnolia St., Central Islip, N. Y. 11722.

July 14 — Suffield, Conn. NCRCC RC Fun Fly. Site: Club Field. R. Bernier CD, 761 Mather St., Suffield, Conn. 06078. Sponsor: **Northern Conn. RC Club.**

July 14 — Hastings, Minn. (AA) Minneapolis MAC Summer FF Meet. Spec. Events. Site: 3 Mi. So., 1 Mi. West. D. Monson CD, 131 W. Wentworth, W. St. Paul, Minn. 55118. Sponsor: **Minneapolis MAC.**

July 14 — Geneva Area, N. Y. Hobo or Fun Meet. Site: Oaks Corners. H. Ford CD, 11 Stephens St., Clifton Springs, N. Y. 14432. Sponsor: **Sky Rovers RC Finger Lakes.**

July 14 — Rostraver Township, Pa. (AA) 1st Annual Mon-Valley RC Meet. Site: Cedar Creek, County Park. J. Parrinello CD, 1928 Carson St., Pittsburgh, Pa. 15203.

July 14 — Westminster, Md. (AA) Westminster CL Meet. Site: Shopping Center. R. Pease CD, 65 E. Main St., Westminster, Md. 21157. Sponsor: **Westminster Aero Modelers.**

July 14 — Grand Junction, Colo. (AA) Red Baron CL Meet. Site: Lincoln Park. P. Neilsen CD, 2104 Gunnison Ave., Grand Junction, Colo. 81501. Sponsor: **Grand Junction Modeleers.**

July 20-21 — Croom, Md. (AAA) D.C. Maxecuters FF Championships & Record Trials. Site: Croom Landing Field. G. Buck CD, 4215 Howard Rd., Beltsville, Md. 20705. Sponsor: **D.C. Maxecuters.**

July 20-21 — Chicago, Ill. (AA) 2nd Annual SAC RC Meet. Site: Crawford Ave. & Vollmer Rd. S. Peterson CD, 6416 S. LaPorte, Chicago, Ill. 60638. Sponsor: **Suburban Aeroclub of Chicago.**

July 20-21 — Houston, Tex. Southwest Pylon Championships. Site: Bissonett at Roark Rds. C. Hirsch CD, 412 W. 30th, Houston, Tex. 77018.

July 20-21 — Oklahoma City, Okla. (AAA) Sooner State Model Championships for FF & CL. Site: Memorial Rd. & N. Western. F. Miller CD, 1900 Rolling Ridge, Bethany, Okla. 73008.

July 21 — Lima, Ohio (AA) Lima Prop Busters 1st Annual CL Meet. Site: Lima Airport on Baty Rd. R. Loescher CD, 535½ N. Elizabeth, Lima, Ohio 45801. Sponsor: **Prop Busters.**

July 21 — Tacoma, Wash. (AA) TMA Stunt & Carrier Meet. Site: Stewart Heights Playfield. K. Loutocky CD, 1419 S. 48th, Tacoma, Wash. 98408. Sponsor: **Tacoma Model Aires.**

July 21 — Hempstead, L. I., N. Y. (AA) Meroke 4th Annual RC Meet. Site: Mitchel Field. R. Geyer CD, 913 Washington St., Baldwin, N. Y. 11510.

July 21 — Bong Field, Wisc. (A) Restricted Illinois Model Aero Club-N.I.A.M.A.C. Contest for FF. P. Sotich CD, 3851 W. 62nd Pl., Chicago, Ill. 60629. Sponsor: **Illinois Model Aero Club.**

Continued on page 73

Rubber Motor Testing

JIM HORTON

AFTER getting poor and varying results with several pounds of Pirelli rubber, we decided something was lacking in our technique. A simple straightforward test was needed to determine the physical state of a rubber motor. Such a procedure, useful while breaking in the motor, would also indicate its contest-life capability and serve, too, as an indicator of quality from one batch of rubber to the next.

We decided to measure the force, in pounds, developed by a motor stretched to a fixed length. A simple spring scale measuring from zero to 50 pounds was purchased at a hardware store. Our Unlimited design motor, 18 strands of ¼ x 1/24" Pirelli 32 in. long, was stretched to three times its original length, and readings were taken on the spring scale.

Throughout the contest season readings were taken not only after motor break-in but also after each contest flown with four of the motors. Chart 1 gives the force profile of these motors. Standard, conventional break-in procedure was used — motors were stretch wound, increasing the turn count by 10% each time until the maximum turns-per-inch (18 in our case) was reached. Our results, as indicated on the chart, show that after a motor is completely broken in, the force line becomes constant.

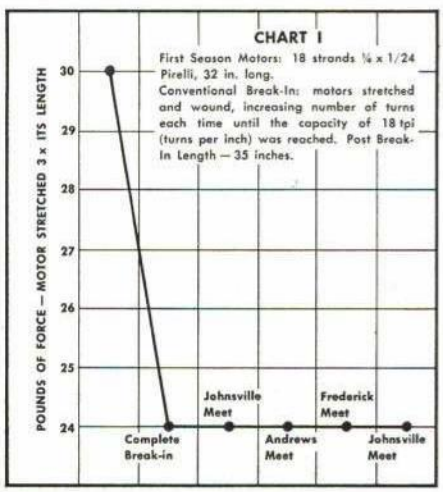
Armed with these readings we decided that, if motors could be broken in without winding, their useful life could be extended. To reduce erratic results a controlled stretch method was used. Motors were stretched four times their original length and readings taken with the scale at 24-hour intervals. We were amazed to find that it took three days to break in a motor. At the end of this period, "controlled-stretch" motors were giving the same tension force readings as those obtained from broken-in motors of the previous contest season. Permanent stretch was also the same — motors increased their length three inches, from 32 to 35, after break-in.

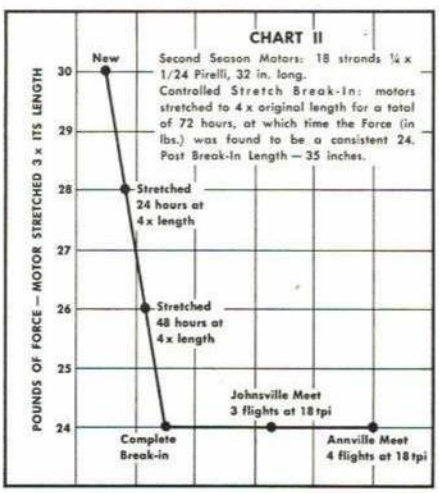
These motors have been used in two contests this past season and wound to 18 turns per inch on each flight. So far we have not broken a single strand and the force readings have remained constant. Chart 2 gives the force profile of the motors used.

Some interesting by-products resulted from this testing. At one meet last season, we had a real dud of a flight after making two maxes. Naturally, we were ready to place the blame on a dead motor. A quick check with the scale indicated, however, that the motor was in perfect shape, shooting down another good excuse. Another interesting point was noted: it takes the motors 24 hours to fully recover from a winding to maximum turns. Readings taken immediately after full contest turns will not be the same as 24 hours later. All chart readings given here were made after this rest period in order to keep results consistent. It's amazing how strong the motors were; even after a season's flying, they registered the same tension force readings. In fact, motors were retired due to age rather than weakness. Strands popped, causing an excess of knots.

One strong message was clearly given on the force charts. Motors cannot be wound to a contest turns maximum without proper break-in. Fresh Pirelli will develop high stresses and has been known to blow at 50% of normal turn capacity.

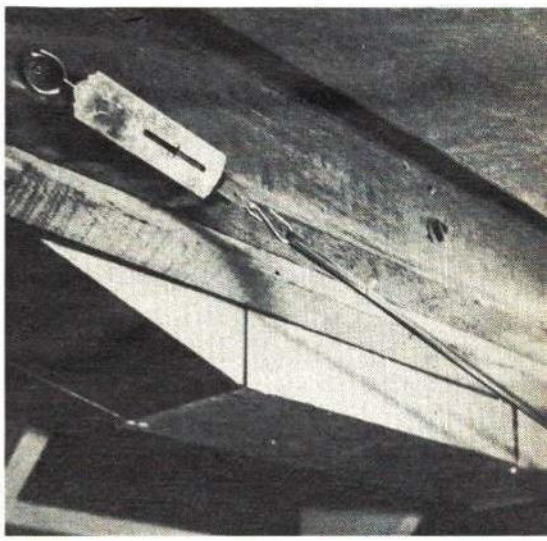
Remember, this article is specifically for the motors we used. However, this procedure can be used to evaluate any size or length of motor. We feel these tests useful for the contest flyer.



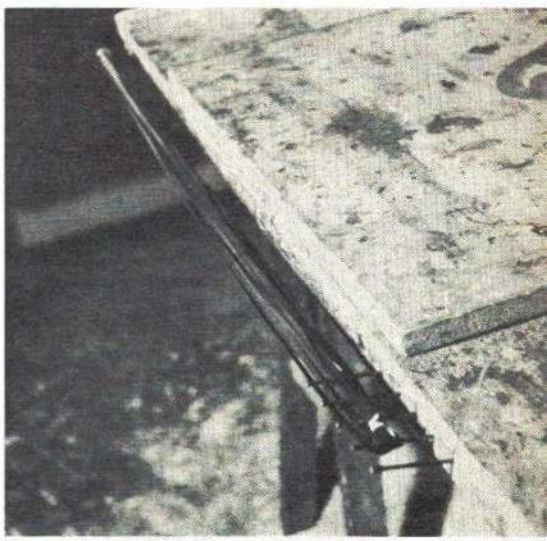


Charts compare both conventional and controled-stretch break-in procedures over 2 seasons of competition. Force readings and amount of stretch were the same for each.

Unlimited design by Horton has enviable contest record of 11 trophies. Motor test procedures described in articles were used on this model.



Rubber motors were stretched four times original length for a period of 72 hours. Cool, dark basement was convenient. Light has an adverse effect on rubber.



Motors were made up to required length around nails in workbench. Additional nails at one inch intervals indicate permanent break-in stretch.

COUNTDOWN

At Pittsburgh, John Worth, who worked for NASA a few years ago, discussed in detail Rogallo wings in boost/glider application.

Two Lively Conventions

The Pittsburgh Spring Convention for young modelers and the M.I.T. Technical Convention for advanced model astronautics were outstanding successes.

G. HARRY STINE

AS you are reading this, the National Association of Rocketry is holding its Tenth National Model Rocket Championships at NASA Wallops Station. A national competition is not unusual, of course, but the fact that model astronautics is only one year older than the national rocket meet is indeed out of the ordinary because a hobby-sport usually has to grow for several years before it has its Nats.

But competition is only one aspect of model astronautics, and NAR isn't about to ignore the lessons of other hobbies and neglect the educational aspect. So we have seen the genesis and development in model astronautics of the Spring Convention.

A better phrase for it might be Technical Meeting. Although there may be a couple of hours of sport flying scheduled for such a convention, the main purpose of the get-together is to exchange technical information about model astronautics. In a sense, a Spring Convention is a junior version of a technical convention of the American Institute for Aeronautics and Astronautics.

There were two Spring Conventions this year, one in Pittsburgh and the other at the Massachusetts Institute of Technology. I attended both, and the two meetings were as different as night and day.

This was the third year for the Pittsburgh Spring Convention, held at Shady Side Academy outside the city on March 15, 16, 17. It was originally sparked by Jay Apt, who is now studying physics at Harvard but who returned to Pittsburgh this year just for the meeting. It was run by Arnold Pittler and the members of the Steel City Section of the NAR. The boys ran it with the adults just standing by to help where necessary. The convention was held on the beginner's level and aimed at the age level of 12-14 years. About 200 modelers attended, and only a handful of them were members of the NAR when the meeting started. Following the welcome by Arnie Pittler and the keynote address by NAR President Beetch, the convention broke up into technical discussion groups. These were glorified bull sessions.

A sample of the titles of the discussion groups will give you an indication of the scope of the convention: construction techniques, working in clubs, research and development, scale modeling, boost-glider technology, and model rocket math. There were also movies from NASA, and lecture demonstrations on rocket history, Project Nerva, and guidance.

It was impossible to attend everything at Pittsburgh. I ran a discussion group on introduction to model rocketry and two discussions on boost-glider technology. We had a real treat during the second B/G discussion; John Worth gave us 45 minutes of intensive instruction on Rogallo wings. John, who is Exec. Dir. of AMA and a trustee of the NAR, was deeply involved in the flight test program of Rogallo wings conducted by NASA Langley Research Center several years ago. The general conclusions: Rogallo wings are great for getting lots of wing area into very little space and very little weight when folded and stowed, but are trickier than the devil to trim and, at best, have a glide ratio of about 4, which is nothing to shout about for a competition B/G design.

There was enough NAR brass at Shady Side to start a band. Eleven out of the 13 NAR Trustees were present, and there was the interminable Board meeting that took care of the business affairs of the NAR. The results of this, and other, Trustee meetings, appear in The Model Rocketeer.

The sport flying session had to be cancelled because of a downpour. It was probably just as well. There were about 150 models turned in for safety checking the night before, and I should not have volunteered to help check them because those models shook me up. It seems that most beginning rocketeers don't read the instructions.

It is disturbing to find guys who don't care enough about their model to put on even **one** coat of paint! It's a very good thing that model rocket kits are designed with a liberal safety factor, because some of the models I saw were sloppy, to say the least.

Bob Cannon of Estes Industries and Doug Malewicki of Centuri Engineering were on hand to represent the industrial side of model astronautics. Looks like scale is the big thing this year with several beautiful new scale kits just about ready to go from both Estes and Centuri.

The M.I.T. Technical Convention was held by the M.I.T. Model Rocket Society on

At M.I.T. George Caporaso demonstrated how to use an analog computer for studying all aspects of model rocket flight.

Individual responsibility and safe flying practices are essential to the future of model rocketry — Dr. Beetch, NAR President.

B/G experts Biales and Mandell, discuss high-point airfoils for conventional models. Chalk and theory flew thick and fast!

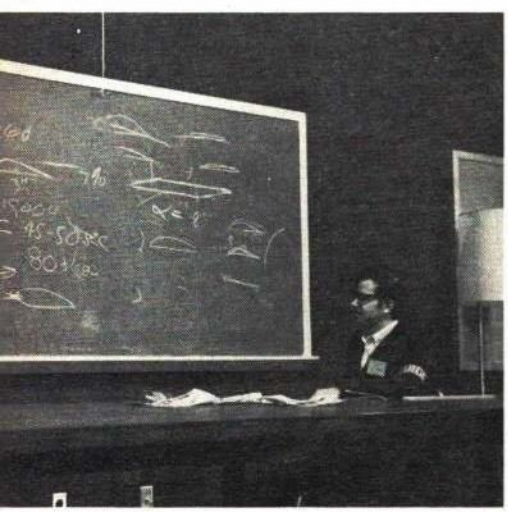
March 29-30-31 at Cambridge, Mass. The tone of the M.I.T. get-together was quite different. Convention chairman George Caporaso and Sect. Pres. Richard Fox aimed at the senior high school and college undergraduate level. The theme of the meeting was to investigate those areas of model astronautics that might benefit from a more rigorous application of scientific and technical discipline. Some attendees were disappointed because the meeting was held on a very high technical level and they couldn't follow it.

There was a great flight session held out at L. G. Hanscom Field near Concord on Saturday morning, March 30. This was the same spot where we held NARAM-5 back in 1963. Altogether, we must have flown some 50 models that morning just for fun . . . and TV and radio coverage from all three major networks. Dick Fox put up a transmitter with an accelerometer for instrumentation, but his top stage failed to get an air start. Steve Glines of New Canaan, Conn. put flights number 90, 91 and 92 on his original Whee-2 (built long before the Estes plan came out).

The M.I.T. gang has access to some pretty good computers, and they have been using them. With the analog computer, George Caporaso has been investigating changes in thrust, duration, weight, ballistic coefficient, etc. which he can simulate on the computer by simply twisting the right knob. The resulting flight path, position data, or velocity data appear on the face of a TV tube like a graph.

Using the flight equations developed by Len Fehskens, also at M.I.T., the crew has been programming the digital computers

Continued on page 52



model rocketeer

NATIONAL ASSOCIATION OF ROCKETRY

1239 Vermont Avenue NW, Washington, DC 20005

NAR

NARAM 10 PLANNING UNDERWAY

NARAM-10 Contest Manager Jim Barrowman has reported that the planning phase for NARAM-10 at the NASA Wallops Station is well underway. Barrowman and Jim Kukowski, NAR Public Affairs Trustee, visited Wallops Island on April 17, to check out the launch site, housing and Meet Operations Center.

Modelers who did not apply for the meet are welcome to view the "shoot" on any of the days of operation, August 20, 21, 22 and 23.

PITTSBURGH CONVENTION

Over 200 model rocketeers attended the 3rd Annual Pittsburgh Model Rocket Convention, March 15-17. Once again it was a rewarding meeting of modelers. Special programs on modeling, space exploration and NAR operations were given. Among those providing lectures were G. Harry Stine, Douglas Malewicki, Jim Barrowman, John Worth, and members of several NAR sections.

The NAR Board of Trustees met in open and executive session to discuss operations of the Association. Robert Atwood reported that there were several sections that have not rechartered and will seek to determine the cause. He also made a plea for individual leader members to take the responsibility to form and assist in the formation of new sections. Mr. Kirchner reported that he is working to develop a new system for keeping contest records that will be much easier to handle.

Mr. Stine reported that an International Model Rocket Meet is in the talking stage for 1969 in Eastern Europe.

The Board of Trustees also voted to reduce the cost of chartering a section from $15 to $5. Sections having mailed their fee of $15 will get a refund.

PINK BOOK REVISION

A change in contest operations has been made by the Contest Board. Effective 11/1/68 these additions are to be made:
Rule 13.4A

The number of events for the following meets must be held on one calendar day. Section meets and area meets cannot have more than six (6) events.

The number of events for a Regional Meet must not exceed eight (8) events and must be flown within two (2) consecutive calendar days.

REMINDER

NAR Technical Services has many items available for purchase. NAR pins, decals, iron-on transfers, etc. are available. For a list of items available write to: NAR Technical Services, 511 South Century, Rantoul, Ill. 61866

REGIONAL MEETS INCREASE

There has been a welcome number of open regional meets planned for this year. It is hoped that there will be a great many more during this year. Anyone wishing to sponsor a regional meet can obtain assistance by writing to the NARHAM or Star Spangled Banner sections. NARHAM sponsored the East Coast Regional Meet (ECRM-2) in April and the SSB section sponsored the Middle Atlantic Regional Shoot (MARS-2) in June.

LAC ACCOMPLISHING MUCH

The Leader Administrative Council (LAC) of the NAR, made up of Leader Members, has accomplished several of their projects scheduled for the 1967-1968 year. The new NAR By-Laws are available now from NAR Technical Services. In addition, work continues on a Tech Service Survey, a publicity manual, R & D reports, and compilation of a list of major unresolved troubles in model rocketry.

NAR SECTION ROSTER

April 15, 1968

Star Spangled Banner, H. L. Galloway, 428 Ben Oaks Dr., West, Severna Park, Md. 21146

Black Hawk, Randy Custer, 2408-28th St., Rock Island, Ill. 61201

Dixon Haven Hitters, Julie Moriel, 355 No. Almond, Dixon, Calif. 95620

Model Rocket Research Society, W. E. Mueller, Natural Science Museum, Univ. Cir., 10600 East Blvd., Cleveland, Ohio 44106

M. I. T. Section, M. I. T. Branch, P. O. Box 110, Cambridge, Mass. 02139

C.S.A.R., David Gregorek, 4451 Danforth Rd., Columbus, Ohio 43224

U-F-O, Jeff Pauley, 3211 Blueford Rd., Kensington, Md. 20795

Hempfield Area Model Rocketeers, Susan Woodward, 15 Wayne Ave., Jeanette, Pa. 15644

Fairchester, Gary Jacobson, 88 Sanford Lane, Stamford, Conn. 06905

Narhams, Jim Barrowman, 5614 Hamilton Manor Dr., Apt. #1, Hyattsville, Md. 20782

Apollo Rocket Society, A. C. Aldrich, 2611 E. Grandview Rd., Phoenix, Ariz. 85032

Birch Lane, Thomas Hills, 2429 Temple Dr., Davis, Calif. 95616

North Shore, Larry Weiss, 239 Normany Rd., Massapequa, N. Y. 11758

Catawba Valley Rocketeers, T. L. Butler, 807 6th Ave., S.W., Hickory, N. C. 28601

Glen Ellyn Rocket Society, F. Scott Godron, 476 Main St., Glen Ellyn, Ill. 60137

Narfax, Bill Dintaman, 5616 Sedgewick Lane, Springfield. Va. 22151

Mansfield Aeronautics and Space Assn., Robert Hagedorn, R. D. 1, Taylortown Rd., Mansfield, Ohio 44903

Metro Area Rocket Society, Mrs. Peggy Sipes, 5427 85th Ave., Apt. #101, Lanham, Md. 20801

Dreher Park Rocket Society, c/o Science Museum & Planetarium, West Lake Wood Rd., W. Palm Beach, Fla. 33406

Lasalle, Don Simpson, Box 1335, Cumberland, Md. 21532

Rock Creek, C. E. Townsend, 3529 Tilden St., N. W., Washington, D. C. 20008

Delaware Valley Rocketeers, R. R. Shue, 100 Overlook Ave., Willow Grove, Pa. 19090

Continued on page 52

On the Coast

Joe Foster's Rivets continues to be the standard of Goodyear racing.

With Jerry Nelson

New "little" radios: The little integrated-circuit radios are here to stay. Most guys feel that the IC's (for Integrated Circuit radios) are only for the 09-19 little multis. Not so. They have the servo power for any multi job or scale ship.

The weight saving means we can beef up the structure for a more durable model, or put on a beautiful finish. Put the primer on. Total weight will be about the same because of the IC's lighter weight.

Added reliability of the IC's means we can put more effort into original designs and scale models, with less worry about possible crashes.

Information centers: Newcomers ask where to find more information about R/C in general and R/C clubs. If you live on the coast, contact these individuals: Ralph Brooke, 17845 3rd S.W., Seattle 66, Wash.; Ken Thorstad, 4503 N. Interstate Ave. at Prescott St., Portland, Oreg. 97217; Stan Powell, 6904 Maita Cir., Sacramento, Calif. 95820; Dale Root, 6036 Telegraph Ave., Oakland, Calif.; Jim Sunday, 363 El Camino Real, Mt. View, Calif. 94040; Alex Chisholm, 615 Belmont Ave., Fresno, Calif.; Betty Stream, 3922-½ Studebaker Rd., Long Beach, Calif.; Larry Rosenberg, 16513 Superior St., Sepulveda, Calif. 91343; Allen Coomber, 11601 Anabel Ave., Garden Grove, Calif.

Scale activity: Systems are "go" for promotion of R/C scale in Southern Calif. At least one scale function will be held by one of the major R/C clubs each month till September. The first World War I meet will be held in August.

Palm Springs pylon meet: The pylon meet in Palm Springs April 6, 7 was a highly attended meet. Over 20 ships in Goodyear and over 30 in open pylon. Joe Foster came out on top in Goodyear with his Rivets. The Foster Rivets is the standard by which we judge other pylon racers and flyers. Second place was won by Jack Stafford with his Minnow (now available in kit form). You should see several in the finals at the Nats this year. It's a natural. Third spot fell to Bob Francis with his K & K Ballarina, which outlasted them all. His consistency keeps him in the winner's circle. Open pylon winners as follows: Vartanian 1st, Bridges 2nd, and Foster 3rd.

Model flying was in conjunction with the full-scale air-show activity. R/C pylon was held an active taxiway. Full cooperation between the full scale ships and the models existed during the entire meet.

A general comment was the fact that appearance points were not used for handicapping. Take-off position was done by drawing numbers out of a hat. Opinion held by many was that, if this keeps up, the quality of the models will diminish, thus losing one of the major features of the event.

A few 600 sq. in. Continental ships raced in open pylon at a highly competitive level. Until this event grows, the open pylon event is a natural for the 600's.

New items: Received a new OS60 front rotor. This engine, in my opinion, is vastly superior than previous OS engines. The power is there along with a good idle. Have the OS in my Mooney Mark 21. Good combination.

Also received one of the new OS40 Goodyear racing engines. This engine has a L ring and an aluminum piston. The venturi diameter is a shade smaller than ¼". It can be opened up if required. Preliminary tests indicate that it is equal to the K & B 40 front rotor. Going to put it in my Stafford Midget.

From Wintronics, c/o Ivor Wimby, 622 Miller Ave., San Jose, Calif., comes news that you can purchase the new style Orbit servo with Wintronics amplifiers for most of the newer digital radios and Digitrio type systems.

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THE NEW KAVAN CUSTOM R/C CARBURETOR $9.95

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AVAILABLE FOR THESE ENGINES

O.S. Max 19, 30, 40, 50, 58, 60 / Merco 35, 49, 61 / Super Tigre G 21/29-46, ST 51, 56, 60, G 60, G 60 Fi / Enya 45, 60 / Rossi 60 / Veco 35, 45, 61 / K & B (front) 40, (rear) 40, 45 / Webra 60. / Indicate engine and displacement when ordering. Also excellent for U-Control Engines.

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Spare Connector Ends	20¢ ea.
Adjustable Connectors	98¢ pr.
PUSH END RODS	40¢ pr.
ENGINE MOUNTING BOLT & BLIND NUT SET	49¢ (4)
RBM SERVO MOUNTING KIT & RBB SERVO BOARD MOUNTING KIT SET	55¢ (4)
AILERON Differential	$1.29 pr.
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FIBER GLASS PROP	$1.59
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RUDDERVATOR single channel rudder and elevator servo powered by low drain motor and is self-neutralizing. 1¼ high, 4 long;

CODE-A-MATIC has "flight-feel" control stick and separate "throttle" button. Energized automatically, also self-neutralizing. Transmits commands with accurate precision.

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.074 w/universal wrench $2.99

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(Fits .074 & .11 engines)	
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Compensator, automatic co-pilot	98¢
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Designed to power all nautical models: ships, speed boats, submarines, novelty items, etc. Runs approx. 1 hour on single pen cell battery. Has adjustable rudder and built-in switch. 4⅞" long, 1" dia. Attaches to any nautical item with supplied suction cup or V-shaped mount.

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Nordso Kutter 20"	$25.00
Jylland 39"	45.00
Lilla Dan 26"	25.00
Danmark 35"	60.00
Neptune for R/C 33"	35.00
Mercante Boat 38½"	55.00
Santa Maria 21"	21.00
Norwegian Lion 40"	90.00
Vasa 23"	28.00
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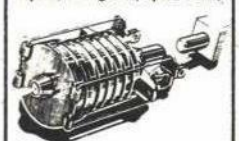

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Model Rocketeer

Continued from page 49

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Countdown

Continued from page 49

for similar flight studies. This is very similar to the work done by Doug Malewicki, but it is computerized. But it is still much quicker for me to whip out the old slide rule and the Malewicki Report and whack off an altitude prediction than it is to sign up for computer time, de-bug the program, and run the program. The computers can be useful for such things as parametric design studies of B/G configurations. There are so many variables in that kind of work that it takes days just to run one calculation by hand.

Gordon Mandell at M.I.T., where he is Class of '69, has tackled the knotty problem of dynamic stability. And he is well on his way to simplifying this so that modelers will be able to determine ahead of time whether or not their model is dynamically stable. I honestly believe that Gordon Mandell has a better overall knowledge of the dynamic stability of fin-stabilized rockets than most of the experts at NASA. Not to demean NASA, but dynamic stability is not well understood, even by experts. Mandell is making a major contribution.

It was fun to listen to Gordon Mandell and Bernard Biales in the technical discussion of the boost-glider design. Gordon is a rocket buff turned glider enthusiast, while Bernard is a hand-launched glider buff turned rocket enthusiast. Most of the discussion ranged around the subject of flight at very low Reynolds Numbers, where some interesting things happen to air flow.

For years, I have wanted some solid data on high-point airfoils. I can't find it. A lot of HLG and flea-fright aeroplane types have told me that high-points just work better, but nobody can say why. This is not good enough for me or for most advanced model rocketeers. We want data, not opinion. We want airfoil polars on the high-point sections. Apparently, they don't exist.

Gordon, Bernie, and myself have built models with all different airfoil sections — they all turn in just about the same time. There are problems involved, because most modelers do not spell out the weather conditions in which they flew. Bernie Biales maintains — and he is right — that temperature, wind velocity, and other factors

have a large effect on gliding flight. He also claims — and has trophies to prove it — that low wing loading is the prime factor in glide ratio. One would think that this would not hold true in windy, gusty, turbulent weather; but, if your bird is stable, it doesn't seem to care about the turbulence.

Another big problem with getting good flight data is the fact that most modelers do not make enough flights, so that their data is statistically meaningful. You need to make dozens of flights, under similar weather conditions, if possible.

All of the sessions at MIT were fairly technical. If you were a beginner, you were out of luck. There is nothing wrong with this. If we pay too much attention to the beginner, we'll lose the advanced modeler who is really doing much to advance the state of the art.

I see the Pittsburgh Spring Convention and the MIT Technical Convention as harbingers of things to come. We need technical bull-sessions such as these, and we need them on two levels: elementary and advanced. In spite of the fact that model astronautics probably has more printed material readily available than any other hobby, the beginners don't read; a technical convention on the elementary level lets them see how it is done correctly, and permits them to compare what they are doing against what others are doing. In the advanced area, it is often a year or more between the time when something is solved or developed and details about it published; technical conventions on an advanced level can spread the word faster, permit better communication and understanding of the advanced area, and act to stimulate additional work.

These technical conventions should be regional affairs, and perhaps one meeting can combine both elementary and advanced aspects. We need more of them in places other than the East Coast.

It is also important that the results of these technical meetings be published . . . perhaps as "transactions," perhaps as NAR technical reports, or perhaps in a new publication devoted solely to the technical aspects of model astronautics.

Since other sciences and technologies have long ago discovered that the technical get-together performs a useful function, it should come as no surprise to learn that model astronautics has discovered this.

Pitcairn Mailwing

Continued from page 25

spruce blocks and drill all strut locations with a 1/16" dia. drill and all rigging wire locations with a 1/32" dia. drill.

Tail surfaces: Saw the fin and rudder, and the stabilizer and elevators out of 3/16" sheet balsa. If you plan to install full rigging wire details, cut a 3/16" wide strip off the rear edge of the fin and stabilizer and cement 3/16" square spruce spars in their place. This harder wood will resist the sawing action of vibrating rigging wires far better than the balsa it replaces. For even better results, install a 1/16" dia. tubing bushing through these spars at each rigging wire location. Sand these parts to shape and add the Veco control horn and hinge details to the horizontal tail surfaces.

Fuselage: Cut out the 1/8" sheet fuselage crutch members and all bulkheads. Lightly score and crack the crutch members at stations #3 and #8 and cement all bulkheads between these members. Epoxy the 3/8 x 1/2" maple motor mounts in position (Bulkheads #1 and #2). The Roberts bellcrank with leadout wires bolts in next. It is good practice for every model that one owns

that is equipped with a Roberts operated throttle to idle down or speed up with an identical trigger movement at the control handle. Otherwise in an emergency situation when an automatic reflex might save a ship, confusion and disaster may result. For this reason a Roberts **suspended** bellcrank was installed in an **up-right** position in my model. Analyze your own fleet of models and the throttle throw of the engine you will use to determine the proper bellcrank for your model. Temporarily bolt the engine and pin the horizontal tail surfaces in place to make up the throttle and elevator linkage wires. Make sure these move without binding before proceeding. Some slight bending of the bellcrank pushrod horn will probably be required if the suspended bellcrank is used.

Make up the cabane and landing gear struts, then bind and epoxy these into place. Four of the landing gear struts have short bent-over ends that pass through the bulkheads to help position and prevent shifting of these struts during installation and on hard landings. Epoxy the fuel tank with its special modifications into position next, followed by all stringers and balsa filler blocks. Make up, finish and install the cockpit floor and all cockpit details. Epoxy spruce rigging wire locator block to top of Bulkhead #1 and then plank fuselage top from Bulkhead #1 to #4. Do not cut cockpit opening till after all sanding, doping, and rubbing is completed. Bind 1/16" dia. aluminum tubing rigging wire locator to Bulkhead #1, install lower wing spar support, then sheet cover fuselage bottom from Bulkhead #1 to #3. Add tailskid detail. Make up cowling block, hollow same, fit to model and carve to shape. Note that cowling slides forward to remove leaving an unsightly hole aft of the McCoy cylinder head which must be filled

with a balsa block that is permanently cemented to Bulkhead #1. Sand the entire fuselage/noseblock assembly to final shape and cover these parts with silk. Install all cabane strut and landing gear strut fairings and reinforce these with silk wrappings.

Assembly: Toughest problem for most people who attempt biplanes is the finish, assembly, alignment sequence. Our goal with this model is to be able to dope and rub down all parts separately and then have all these finished parts cement into pre-drilled holes that automatically align the wings during final assembly.

Slide the lower wing into position, check for alignment and cement well. Pin the three balsa wing alignment templates to the top wing and slide the upper wing into position. Trim just enough of the balsa cabane strut fairings away so that the center template rests on the fuselage top when the cabane strut ends have been fed into the pre-drilled spruce blocks. Bend each 1/16" dia. wire interplane strut to size and slip into the pre-drilled spruce blocks. After all interplane struts are fitted, check the assembly for alignment and pin and tape the whole together rigidly. Solder the brass line guide to the port pair of interplane struts and then fit all interplane struts with balsa fairings. It is important for each strut fairing end to be a close fit. The assembly can now be dismantled and the struts with their balsa fairings will automatically align the top wing during future fittings. Set the alignment templates aside, reassemble and tape the top wing into position again. All the 1/32" dia. rigging wire can be bent and cut to size and temporarily fitted in the model. Label each rigging wire with masking tape before dismantling assembly once more. Soft copper wire can be wrapped and soldered to

each strut or rigging wire end in widely spaced coils. Enlarge all 1/16" dia. predrilled strut location holes to 3/32" dia. and enlarge all 1/32" dia. rigging wire location holes to 1/16" dia. A cautious builder might reassemble to check that the fit and overall alignment of these parts has not changed.

Covering: Cover the wings, struts, and tail surfaces with silk. Make up the headrest, landing lights and aileron horn fairings and cement in position. Prick a pin hole in the fabric at each pre-drilled strut or rigging wire locator hole or these will be lost under all the coats of paint to come. Use your favorite method to finish the model. Briefly, mine consists of four brushed clear coats, followed by eight thinned-out sprayed filler coats, followed by at least six thinned sprayed color coats with a wet or dry sanding thrown in between every two or three coats. Then rub all parts with Aerogloss Rubbing Compound. Wash thoroughly with soap and water and use home-made stencils to spray the various marking and lettering details. These stencils are a story in themselves. Letraset rub-on lettering is used for the "Pitcairn Mailwing" rudder markings. Protect this rub-on lettering with a clear dope overspray. Rub these marking and lettering details with compound. Carefully cut out the cockpit opening and use white glue to cement very thin leather padding around this opening and on the headrest. We are now ready for final assembly and detailing.

Butter epoxy cement on all strut ends and slide all cabane and interplane struts into the appropriate pre-drilled holes in the top and bottom wings. The wings should be accurately aligned automatically. Tape this assembly together and allow to dry overnight. The following day all rigging wire ends can be buttered with epoxy and slid into position. These too should dry overnight. Cement all tail surfaces to the model. Make up and finish details like the windshield, oil and gas filler caps, steps, aileron horns, vibration dampeners, pitot tubes, position lights and wheels and cement or solder these to the model.

Dummy engine: The Monogram Wright Cyclone Plastic Engine Kit PE52 was cannibalized for the cylinder details. The cylinders were filed so that a 1/8" dia. dowel pin could be centered in the cylinder for alignment and reinforcing. Before joining the cylinder halves, pack each with lead wool. About seven ounces of ballast can be packed in the nine cylinders. Additional ballast can be installed in the cowling bottom. The author's model required about 10 ounces of ballast for proper balance for control-line flying. See plans for drawing of a simple jig that can be bolted to the McCoy crankshaft to drill the 1/8"

dia. pilot holes for the cylinder dowel pins. After all pilot holes are drilled, carefully cut away cowling at the base of each cylinder until proper cylinder height is attained. The reverse side of the aforementioned jig will accurately locate the height of each cylinder. Install the push-rod and ignition harness details with plastic cement. None of the Pactra enamels or plastic parts used in detailing the cylinder details seem to have been effected by our model fuels. Weight can be tolerated in the model's nose, so use plywood and tubing where desirable for strength when making the exhaust collector ring detail.

Rather than have an unsightly needle valve extension shaft cluttering up the engine and cowling details, the entire flexible spring needle valve extension was snipped off. Needle valve adjustments cannot be made with the cowling in place. Needle valve adjustments must be made with the cowling removed prior to moving to the flight circle. When a satisfactory adjustment has been achieved, the cowling can be replaced and model is ready for flight. The McCoy does not have a touchy needle valve setting so this is a safe procedure. This procedure would not be practical for all model engines.

Recommended for those who love classic biplanes, contest flying, and trophy collecting, the Mailwing is hard to beat!

Scepter

Continued from page 19

agonals should be light but stringy.

Wing ribs are cut so that the back portion behind the front spar is a straight line top and bottom as shown on the plan, excess material is sanded off after the leading edge sheeting is in place. This al-

lows the wing to be built flat on a building board with either side up. It is absolutely necessary to have a flat building board as the construction provides a very rugged structure. Any warps built in will be almost impossible to remove. The easiest sequence of operation is to pin down trailing edge sheet, attach spar to it, and then ribs, pre-shaped and notched leading edge, rear webbing, top rear spar, top rear sheeting and the top front spar and sheeting. Then invert the wing and install front webbing, spar and sheeting. Now is the time to sand the excess wood off the ribs. Saw or sand center ribs to correct dihedral angle and glue wing panels together. I have not mentioned installation of miscellaneous plywood doublers, etc. It is assumed a competent modeler will do this as necessary. I believe you will like this construction after you try it. Although slightly more complex, it is light, rigid and strong.

The stabilizers are easily built if the correct sequence is used. Make a simple template to cut the wedge-shaped ribs then cut a piece of light, C-grained 1/16 sheet balsa that will extend from the rear spar to the high point of stabilizer (shown by dashed line). Pin this to a flat building board, attach trailing edge spar, cut ribs to correct length and attach to bottom sheet and T.E. Now take another piece of 1/16 sheet identical to bottom piece, glue on top and add pre-shaped L.E. The curved portion of the ribs may now be roughed out with a template and sanded to shape — use a little extra care here. Pin stabilizer back onto board, sheet leading edge. When dry, turn over and pin back to board; sheet the other side. This sounds somewhat difficult. It isn't, and the construction provides a light, rugged, airfoiled stabilizer. It might be a good idea to build the vertical stabilizer first (same airfoil). It is smaller and consequently easier to build and will provide a little practice before starting on the horizontal stabilizer.

The Scepter in the photos was pre-doped with approximately five coats of butyrate; sanded lightly; silked and clear doped. Dope and talc were then used to provide a smooth surface for the color coats.

Weight should be around 6 to 6½ lbs. ready to fly. Balance point should be at the front spar. (Later this can be moved back ½ to ¾"). Adjust elevator movement to approximately 75% of what you normally use; flap angle should be approximately ½ elevator throw. Flap and elevator angles can be changed later to suit the flyer, but this is a good place to start.

Best of luck with your Scepter. A lot of time, thought, and effort went into developing this design. You will be pleased with its performance.

Rubber Power

Continued from page 15

little drag increase, and might be helpful on some sections.

Artificially induced turbulation is another mysterious subject about which we have little factual data. Vibrating thread positioned in front of the leading edge, and various devices (thread, triangles, sand, square strips, castellations) attached to the upper surface 5 to 20% aft of the leading edge apparently are worth-while improvements to Nordic A/2's, but appear to be of questionable value for rubber models. I prefer multi-spar construction for structural reasons, but this also provides surface interruptions which turbulate the boundary layer air. I always locate one spar at the airfoil high point and one or two between the high point and the LE.

The stabilizer must fly at a slightly less angle of attack than the wing, therefore its max lift/drag ratio should occur at a lower angle. Usual practice is to use a thin flat-bottom section of 5 to 8% thickness. I use an undercamber section, of slightly less camber and thickness than the wing section, on Wakefields; these are on stabs with areas somewhat less than 30% of the wing area. I have used the NACA 6409 on both wings and stabs on gas and rubber models with very good results. With flat bottom-wing sections, stab sections of similar camber contour and 2% less thickness work well. There is nothing critical about selecting a stabilizer section.

As a rule, the angular difference between the wing and stabilizer should be as small as possible. Ideally, we should move the wing forward and decrease decalage until the model tucks in, and then back off and add a fraction of a degree incidence for the stability that we need. This procedure is usually not possible with fixed wing mounts in style. I build 2-degrees incidence into the wing mount and locate it, so that the CG will fall about 80-90% of the wing chord aft of the leading edge. This has worked out well on a Wakefield with an undercambered stab of 21% of wing area, with a moment arm of 6.4 wing chords between the wing and stab.

On this particular model, increased incidence caused drag, and a decrease caused instability. This was determined by shifting the 6 oz. ballast and changing the stab incidence, then flight testing. Of course, 2 degrees won't work on all models, but if I had to use more than 3 degrees, I would investigate why, and try to relocate the wing and/or CG to lessen the decalage.

Some long moment arms get away with a zero-zero set-up; my old unlimited job had its CG slightly behind the wing TE. In this case, the stab was 30% of the wing area, 7 wing chords aft, and had a thin flat-bottom section — this was with a high-lift NACA 6409 wing. I safely decreased the decalage to 0 degrees and depended on sufficient wing lift to overcome stab lift. Result: stability. This example gets into the subject of tail volume which could be a chapter by itself.

Structural design: For wings and stabs I prefer multispar, X-rib and sheeted leading-edge construction in that order. Multispar was originated by the Cleveland Balsa Butchers in the 1930's and was used successfully by Korda, Lanzo, Reich, and others. Apparently, it spread to the West Coast after WWII, and Bilgri, Foster, and Andrade used it in their winning designs. I use multispar on all size gas and rubber models and have had no structural failures, nor other bad experience with it. Probably, a combination multispar and X-rib would be more flutter- and warp-resistant but would be harder to build and slightly

heavier. If ribs are spaced close enough and sufficient spars are used and wood is carefully selected, the warp problem is practically eliminated. For example, my Wakefield wing has 4.9 in. chord with 5 spars and 1.5 in. rib spacing. Thin diagonal strips are practically worthless, for they add very little rigidity; full-depth diagonal ribs must be used if a non-flexible wing is required.

Sheet leading-edge upper surfaces are easy to make, strong, rigid, and heavy. Here, the only portion of the wing that maybe should be turbulated is smooth. And to add thread turbulators to the sheet LE doesn't make sense. Also, the tissue sag aft of the sheet can't be avoided and creates an untrue section which probably creates drag.

An ideal wing should have a multispar upper surface (back to the high point), a smooth sheeted undercamber, and X-ribs for rigidity. But this configuration isn't easy to build, practical, or light. So I use the 30-year-old multispar.

The Warren truss tissue-covered box body is used universally for unlimited jobs because it has a high strength/weight ratio and can be constructed easily. Perhaps a triangular cross section would be even better, but would be very difficult to construct. A jig would be required to locate the longeron above the work board. A longeron would be eliminated and maybe 20% weight saved. This design is used for TV antenna towers but doesn't appear too practical for models.

Wakefield fuses may be built in a variety of designs since (by rules) they are not weight critical. The rolled sheet balsa tube is probably the best, considering minimum wetted area and streamlining. And rolling a sheet around a fluorescent light tube is quick and easy. A tapered form is needed for the long tail boom; wing and stab mounts may pose a problem. I've always used the old fashioned longerons and sheet box body. And I always make the motor section oversize, as compared with some, to reduce blown motor damage. The most damage I've ever received was a few splits on the 1/16" sheet top and bottom — the hard 3/32" sides were undamaged. Repair was quick by wrapping the split section with vinyl electrical tape (which held for four flights). Now I used hard 1/8 sides and hard 3/32 top and bottom. Aft of the motor section is a hard 3/16 bulkhead to confine the blown motor forward of the tail boom, which is 1/16 sheet Sig contest balsa. If it weren't for this bulkhead, the whole tail end would explode when the motor blows.

I assemble all box bodies (Warren truss and sheet) between two straight edges. I use aircraft aluminum angles 4 ft. long, space them exactly parallel the maximum

fuselage width apart as shown. This guarantees a straight fuselage with no twist nor bow and of perfect rectangular cross section.

What we really need is a practical Wakefield fuselage design that permits winding outside the fuselage. Gerry Ritz is the only one I've seen wind outside. He uses a winder extension which is a 4-ft. long metal tube with a hook end. This is inserted through the fuselage, then the motor is wound and the fuse pulled over it. Then the prop and tail are hooked on. This takes at least two helpers, but it works, for at one contest Gerry had the ground covered with broken motors and no damage occurred to his one model. I try to build enough strength into a fuse to withstand a blown motor without damage, but I have never given up thinking about external winding schemes.

A word about wing mounts. The twin pylon, Joe Bilgri style, is the design I recommend. In addition to simplicity, lightness, low drag, high strength and minimum wing area blanked out, there is one fringe benefit: the wing is supported on two straight edges spaced the fuselage width apart. This increases the wing bend resistance and adds rigidity to the wing by reducing its torsional flexibility. Also, warps are practically eliminated in the center panels, and the wing has more flutter resistance. And since the supports effectively strengthen the wing, a weaker and lighter wing can be used on unlimiteds.

NEXT month, the second and final portion of Rubber Power Design and Flight will involve the propeller, its design and construction; care and treatment of the rubber motor; and flight trimming.

Jumbo

Continued from page 39

of scrap wood or a book to hold it up. Use some kind of light weight to hold the tilted wing firmly at both the book and at the joint. The angle you are making is called the dihedral. Use plenty of glue on this joint and let it dry very thoroughly. Before removing the pins or books, add some more glue and let it dry too.

Over another piece of wax paper, pin down the fuselage so that the rear of the plane, including the rudder, is over the paper. Glue and pin in place the rudder, dorsal fin, and the tail nacelle. Because of the different thicknesses of these parts, the rudder will be slightly off center on the fuselage, but this is O.K. Reglue both sides of these joints again after the first glue has dried. It is the second gluing that makes the model really strong.

The next two joints are very critical and require that both the fuselage and wings have dried thoroughly at their joints. Check that the wing, at the dihedral joint, fits the wing notch and that the tail fits on the nacelle on top of the rudder. From the plans you can check that the angles of these two mounts are correct also. Fit the fuselage between two heavy books so that the rudder is pointing up and so that the top of the nacelle and the wing notch are cleared for mounting the wing and the tail. Glue the wing onto its notch and pin it so that its dihedral joint lines up straight with the fuselage. To keep the wings level while the glue dries, slide some books under each wing half. The wing must rest firmly on the fuselage and the glue. Do the same thing with the tail, mounting it on the nacelle. Use pins and books again. Let these joints dry once. Then add some more glue all around these joints on the sides and on top. It is O.K. to mount the balsa parts on top of the wing joint and the tail mount now. Set the plane aside while these joints dry again.

The engine pods are mounted by gluing and pinning them in place as shown on the plans. Note that they are to be parallel to the fuselage.

Smear lots of glue around the Jetex motor mount and screw it to the plywood. Be careful that the motor points straight back. It must be parallel to and level with the bottom of the fuselage. Install a safety strap between the Jetex motor and the fuselage. A piece of very heavy thread will work so long as it does not touch the exhaust outlet of the engine. Make the thread only a few inches long tied to the loop in the motor assembly clip and tied to the mount.

A properly aligned Jumbo has both wingtips level and the tail also level, when the

fuselage is straight up and down. You check this by sighting down the length of the fuselage. You should also look down on the wing, tail, and dummy jet pods from the top to see if they are straight and (parallel) with the fuselage. The rudder should be straight with the fuselage also, and the Jetex motor should point straight back — not up or down or sideways. Also, there should be no twist (warps) in any of the main parts. These twists, especially if they are in the wing, will cause serious flying problems. They can be eliminated by bending the twist the opposite way, and holding it in that position for a minute or two. If this doesn't work, hold the surface over a pan of steaming water and try again, until it looks flat.

If you're satisfied, balance the complete model, with the **loaded** motor on it. Stick a pin into the top of the fuselage where the center of gravity is shown on the plans, tie a piece of thread to the pin and let the model dangle by the thread. In this position, the fuselage and wing tips should be level. If they are not, stick small bits of modeling clay on the light ends until it balances.

The balancing you've just done tells you one thing: the Jumbo should fly perfectly if all the other parts are correctly aligned. Don't be disappointed however if your Jumbo doesn't behave on its first flights. You can correct it, and you are becoming a real modeler.

Test glide it to make sure you've built the Jumbo correctly before making powered flights. Remember, it takes practice even to learn how to toss the model just right, so go cautiously and observe what happens each time you do something different. Due to its light weight and relatively large size, the Jumbo isn't at its best in high winds, so try to fly it (especially the

first time) when the wind is less than 10 mph. If you see a flag blowing straight out, you can be sure the wind is too strong. Always launch the model **into** the wind, whether test gliding or flying under power.

When you have loaded the motor according to the instructions, check the wind direction. Be sure there is enough clear space downwind (like a football field); light the fuse, and grip the model on the fuselage in **front** of the motor. As the fuse burns up to the fuel, there will be a brief silence, then, you will hear a few hisses. Now, the rocket is running, but wait a second or two longer to let it build up thrust. Launch just as you did for test glides, and the Jumbo should begin to climb after about 5-10 feet. It may climb straight, left, or right, but at an angle about like a real jet airliner taking off. As it gains altitude, it will also gain speed, so that most of the altitude comes in the last half of the power run. When fuel is exhausted, the Jumbo should glide smoothly to a nice soft landing — not dive, or stall. The motor will be very hot, so don't touch it for a while.

If something went wrong, and the result was a crash, ask yourself first if you gave it a good launch. Then, if you don't think that was the reason, what did it do? If it seemed to turn too sharply and dive, it was probably due to some rudder misalignment. This can be corrected by bending the rear edge of the rudder in the direction opposite the turn. If the ship looped, or stalled, you

can either add some clay to the nose or bend the rear edges of the tail down slightly. If it seemed to resist climbing, bend the rear edges of the tail up, or add clay to the back of the fuselage. Only slight amounts of any of these adjustments should be necessary.

1) Always use two fuel pellets — one doesn't burn long enough; 2) Keep the fuel pellets and igniter wick dry; 3) Change gasket and screen every five flights; 4) Keep rocket motor clean as instructed by its manufacturer; 5) When installing igniter fuse, be careful not to crack its outer coating, or it won't start; 6) Be careful flying on very dry grass — don't start a fire; 7) Frequently check around the motor mount to see if the heat shield is doing its job.

The igniter fuse may go out inside the motor. Just re-load carefully and try again. A crash can happen to anyone, but it is always a pilot error — put it back together and try to figure out what caused the crash. Chances are, the next flight will turn out to be a beauty.

Porterfield

Continued from page 18

Ft. Smith, Ark. He passed away from a heart ailment on August 29, 1948.

FLYING THE PORTERFIELD CP-65

Scale effect given the proper amount of consideration, one can say that generally, if the full-size airplane was a good flyer, so the scale model will also fly well. I have not had the pleasure of flying the model, but I can speak well for the full-size CP-65, having spent about 100 hours in the "pit" of one during my tender late-teen years.

Though looked upon with horror by modern students accustomed to tricycle landing gears, control wheels, and fly-by-itself stability, the Porterfield was considered quite a docile bird during its day. In level flight it felt like a Piper J-3 Cub, only heavier and quicker to respond to the aileron control. It was a slow machine. The factory claimed 92-mph cruise. Most of them flitted along at 80 to 85.

The CP-65 did not want to stall, but it approached the stall smoothly, without buffeting or shuddering. It maintained this smoothness right up to the point where it suddenly quit flying and dropped. Once stalled, the Porterfield spun freely with a rate of rotation that was surprisingly rapid for a light airplane. It recovered from a spin just as quickly and easily as it entered one, rotation stopping instantly upon application of opposite controls. When stalled hands-off, the CP-65 would tip its nose over and drop until flying speed was again attained. It would then level itself out and come to the cruising attitude without control correction being required by the pilot.

The Porterfield was capable of all primary acrobatic maneuvers, but was not an ideal acrobatic airplane. It was too stable. Whenever rolled to the inverted attitude, the CP-65 would try to right itself. If, while inverted, a pilot allowed the airplane's speed to decrease, it would roll right-side-up all by itself, and no contrary application of the controls would stop it.

The CP-65 was one of those good airplanes of the past. It makes into an interesting out-of-the-rut model you can be sure will draw attention at the local flying site on a Sunday afternoon.

A 6 ft. R/C model Porterfield was featured in the June issue. With this article and drawings a true-to-scale model can be made with adequate information for the scale judges at a contest. Ed.

Radio Control World

Continued from page 32

More Signals on 72 mc: We noticed an item in a magazine that indicated there would be large numbers of police, fire and emergency transmitters put on the 72-76 Mhz band, all over the country, and with high input power. This was checked out with our AMA council, who reports that no such new service as this is contemplated. However, the FCC has been licensing Public Safety Radio Service call boxes for use along highways, for emergency and fire alarm use on frequencies which have been assigned to the P.S.R.S., and which include those spot frequencies assigned to us for R/C operation (it was understood when we obtained these spots that no protection could be afforded against interference from other services in the 72-76 Mhz area). The P.S.R.S. call boxes can only be used if they are more than ten miles away from any Channel 4 or 5 TV assignment, and if it can be proven that there is no TV interference to these channels, if the call boxes are located from 10-80 miles from the nearest Chan. 4 or 5 assignment.

Power for each call box may be up to 500W if the TV interference specs can be met. So here is another possible source of R/C interference on 72-76, even though you may be far from TV stations, or industrial users of these frequencies. What we need is a good 72-76 Mhz monitor (and such a monitor must pass the FCC specs for radiation, just as do any R/C or other receivers used on this band, of course). What R/C manufacturer can provide one?

Muffler tests: Great plans had been formulated for muffler tests by the Valley Forge Signal Seekers, and we've noted here in past issues some info on the subject from F. F. Van Keuren Jr. (498 Meetinghouse Lane, Media, Pa. 19063). Recent letter from Van states that the plans have so far not materialized, since the group has been unable to obtain a portable sound test meter, for comparisons between different mufflers and engines. This seems to be the story all over the country. Many modeling groups have had to use mufflers due to local conditions (like neighbors with sensitive ears!) but few have been able to really check effectiveness of their mufflers. Van says the lowest cost noise meter he could locate listed at $182 — and even this really wasn't good enough to do the job right. And he couldn't afford it anyway!

Here is a fine project for R/Cers who are located at universities or manufacturing plants, where they could borrow a good noise meter and make some conclusive tests. Van sent a pic of his Senior Falcon with a Fox 59, and a manifold and muffler of his own manufacture, all linked together

with pieces of teflon tubing. He has rigged up a haywire sound meter from a microphone and pre-amplifier feeding into a 115V radio receiver, with a VTVM on the output. He agrees it's a poor excuse for a decibel meter — but perhaps better than nothing. No tests had been made at the time he wrote.

HP 61 G-R/C: This Austrian engine is creating considerable interest among modelers wanting high power from a so-called "legal" size engine. Claims for the HP 61 state, "1.0 bhp at 9,000 rpm on R/C fuel."

The HP's special carburetor is of interest. A cutaway drawing shows the relative positions of its parts under idle and full bore conditions.

Here's the operating sequence: single needle valve is adjusted for peak output with the venturi wide open. As throttle arm D is servo-operated to the idle position, the needle valve and its chamber, at A, rotates. This rotation is regulated by the adjustable, screw stop at C to allow only a minute amount of fuel to enter the venturi. At the same time the venturi barrel restricts the air flow. It is connected to the throttle arm by an adjustable link, B. Adjustment of this link permits precise control over the amount of air flowing through the venturi. Air flow is easily matched to fuel flow, resulting in a steady idle without need of exhaust baffling.

CLUBS AND COMPETITION

Feeling that the AMA Scale event is in trouble, and has been for some years, members of the Valley Fliers (Don Butman, 6161 Platt Ave., Woodland Hills, Calif. 91364) have developed some simple rules "to put the fun back in R/C Scale." They find that many Scale planes are built, quite a few are flown successfully, but not many are entered in competition. They feel Scale interest is actually on the increase, and hope their simplified rules will help boost it even more. For the ground judging, all you need is a three-view of the full-size plane you have copied. No detailed "presentation," dozens of professional photos etc. are required. For this judging, the judges simply check against the three-view the contestant provides for fidelity in side view (max. 20 points), top view (max. 15 pts.) and front view (max. 10 points); this can all be done in just a few minutes per plane. Workmanship is quickly checked (max. 20 pts.), as is Realism (max. 10 pts.).

Flight is judged upon 15 maneuvers, maximum of 5 pts. each. The Flight routine includes the regular AMA maneuvers through the Straight Flight back over transmitter, then we have a 360-degree turn, one loop, Immelman, a low pass, Touch-and-Go, Traffic Pattern Approach, Landing Perfection and Spot, plus taxi back. Five points are also available to judge

realism of the flying. Thus a flyer could get a top score of 150 points, the ground judging and flight time would be short, and latter could be accomplished by most any plane. Even the ground judges could enjoy a meet like this!

Model yachtsmen busy: Mid-winter regatta of the Regatta One-Design Class Assoc. was held near Playa Del Rey, Calif. on Feb. 24, with clear weather and fine sailing conditions. An easy sea prevailed, and there were enough wind shifts to provide a real challenge to the skippers of this popular model yacht class.

Gordon Wallace (Burbank) had top score of the day, followed by Matt Jacobson, Dr. William Meacham and Dr. Lawrence Warner. Several model boat racers were absent from this event, as they were in full-size annual mid-winter ocean yacht races at the time. RODCA is working up a complete 1968 racing schedule, available to members and other Regatta owners. Contact Pres. Matt Jacobson (846 Amherst Dr., Burbank, Calif.).

NEW IN R/C

More manufacturers have marketed completely sealed, or **non-spillable lead-acid storage batteries.** All types feature a jelled electrolyte, so they will function at full efficiency in any position. In the vented types, this electrolyte assures non-spill operation — even if the vent screw is loose. The **Eveready** type **NP** batteries are 3-cell, completely sealed, 6-volt units. The **NP3.5-6T** is a 3½ AH battery measuring 2 13/16 x 1 7/8 x 4 5/32" high, weighs 1.6 lb. and costs $12.95. This type also made in 6 and 8AH sizes. The **Eveready PDA3.5-6-T** has same capacity and voltage, but measures 2 13/16 x 1 7/8 x 3 13/16" high, weighs 1½ lb., costs $8.52; it has screw vents. In the **Burgess** line, we find 4 and 8AH, 6-volt batteries of this type, but they make only the vented style; again, the jelled electrolyte is featured. **No. Pb-2** measures 2¾ x 1.89 x 4.02" high, weighs 1.77 lb., lists for $7.75. We do not see much use for these batteries in planes or even R/C transmitters, but they could be most useful to model boatmen.

Competent **stunt plane kits** with fiberglass fuselages and foam wing cores are offered by **Gro-Industries (1 Joan Terr., Montvale, N. J. 07645).** Plane design is called **Mistifier F.R.P.-1.** A low winger with tapered wing, trike LG, it has 64" span and 640 sq. in. area, for .56-.60 power. Kits include foam stab, all parts for fin, elevators and rudder, hardware for main landing gear, and strip ailerons. Fuselage has bulkheads, servo rails installed, is ready to paint. Maker furnishes fuselage in two weights; one is light, intended for the expert. The other is heavier — more rugged, will take a beating from less-experienced flyers. Complete kit, $39.95. Concern will sell fuselage separately. Fiberglass fuselage for Goodyear racers will be available soon.

Low-cost **regulated power supplies** useful for the experimenter are made by **Spar Electronics Inc. (7969 Engineer Road, San Diego, Calif. 92111).** Most useful is **Type 117C-0-12-1.5R.** It operates from 105-125VA line, produces 12V at 1.5A, continuously variable and regulated for line voltage and load variations. In addition, it has unregulated output of 16-20V. Handy for testing transistor equipment, battery charging and general shop uses. Costs $19.95.

Light weight putty material called **Epox-O-Lite** is stocked by **Sig Manufacturing Co. Inc. (Montezuma, Iowa 50171).** Special filler material is added to epoxy base to provide a substance that adds little weight, but is quite rugged. Relatively easy to file or sand to shape; neat fillets may be formed, when the material has just started to harden, by rubbing with a wet

finger. Comes in two separate cans; mix the quantity needed just prior to using. $1.69 for 4 oz. size.

A **switcher** to convert the tiny Albin receiver to double-ended output capable of driving such magnetic actuators as the Adams is available from **Ace Radio Control (Box 301, Higginsville, Mo. 64037).** Will be sold in kit form for $3.25. Called **AOSK II,** switcher is so small it can be attached directly to the Adams Baby actuator. Ace **ERD** kit is an elevator rate decoder, for adding propo elevator to existing pulse length propo systems. Transmitter and receiver must be capable of a neutral pulse rate of 10-12 pps (many GG transmitters can be modified for this purpose). **ERD** kit lists for $11.00.

Crusader

Continued from page 38

wheels, tire color (prepared flat paint, or mix small amount flat white in flat black); wheel centers, white or aluminum; main gear and nose doors, flat white; missiles — first paint a minimum of two coats of flat white, then add black and yellow bands; tail cap, aluminum; nose cone, flat black; tail hook, dark gray.

After pilot and pilot's seat are dry, cement into right half of fuselage. Paint edges of right and left fuselage halves with cement (minimum of three coats) then clamp together under pressure, using rubber bands, spring-type clothes pins, or small pieces of masking tape. Set cemented parts aside to dry, then cement three parts of wing together, either in storage or flight position. When dry, assemble wings to fuselage; landing gear can now be cemented in place except for wheels. Cement missile rack (or racks, depending upon type of model being built) in place. Cement right and left stabilizers in place, then cement right and left ventral fins in place. Putty all areas where gaps are visible. After putty is dry, sand smooth with wet or dry until flush.

Spray entire plane with two coats white paint, and after dry mask off areas to be left white (check kit box cover and photos in article, if in doubt). After you have masked off areas and are sure that there is no danger of the navy gray paint penetrating the masked-off areas, spray with two coats gray and allow to dry thoroughly. Avoid sharp dividing line between white and gray areas — see photos in article. Paint canopy framework same shade as fuselage, using #00 brush. Add painted wheels, tail cap, tail hook and nose cone.

Now cement decals in place (including black window decals if you have made the F8U-2P). When dry, spray entire plane with clear semi-gloss (satin finish; not dull, not glossy — more of an eggshell finish), and you will now have one more model plane for your Miniature Air Museum.

Materials used: Testor's cement, 3-M wet or dry, SIG decal paper, and Badger No. 200 spray equipment.

THE MAIL BAG

A good preview of Revell's forthcoming offerings can be given this month, thanks to Howard E. Reider, Advertising Manager of Revell.

North American B-25B: Scale 1/48. Features include: movable and retractable lower turret (optional cover). Can be built as B-25B, before or after modification for Doolittle Tokyo raid. Three crew figures in authentic flight suits included; and markings for Lt. Col. Doolittle's plane. Detailed Wright Cyclone engines, removable cowlings, authentic skin detail, optional-position bomb-bay doors. A very excellent kit.

Bell Hueycobra Helicopter: 1/32 scale (3/8" equals 1' 0"). Features: 16 1/2" fuselage, 18" rotor span; highly detailed Lycoming T53 engine and transmission; removable cowling, movable rotors; detailed tandem cockpit interiors; pilot and gunner figures; clear cockpit canopy; movable gun turret; rocket launchers; minigun pods; grenade launcher; official U. S. Army markings.

Bell Huey Attack Helicpoter: 1/32 scale. 15 1/2" fuselage; 18" rotor span; detailed Lycoming T53 jet engine; removable cowling; interchangeable weapons system; includes SS-11 missile system, M-5 machine guns, M-6 machine guns with 2.75" rocket pods; 7.62mm guns. Ammunition belts; detailed instrument panel; movable rotors and cabin doors; clear cockpit and cabin windows; detailed pilot and gunner figures; official U. S. Army First Air Cavalry markings.

Junkers JU 88: 1/72 scale. Choice of building as reconn (JU 88 D-1) or bomber version (JU 88 A-4) —

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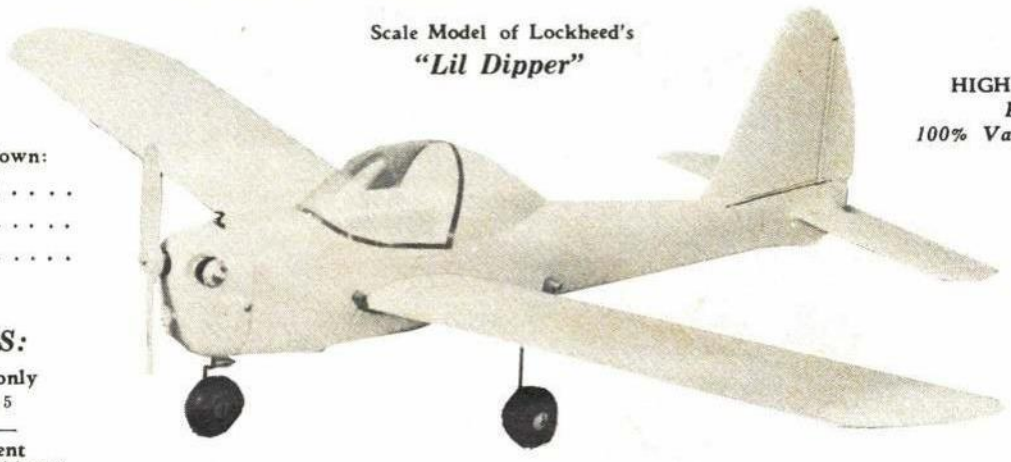

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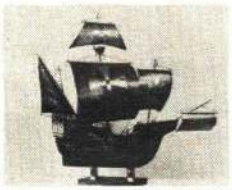

"Santa Maria"
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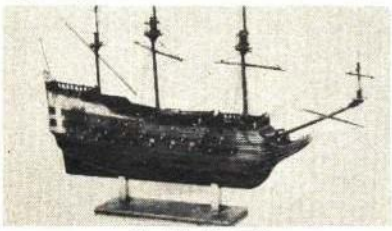

Warship "Wasa"
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latter actual plane on exhibit at the Air Force Museum, Wright-Patterson AFB, Ohio. Features: wingspan 11"; removable cowlings; two detailed engines; two-position landing gear; movable wheels and propellers; clear canopies; three crew figures; collector's three-view drawings; four 550-lb. bombs and bomb racks for bomber version; official German markings for JU 88 A-4 and JU 88 D-1.

Douglas A-20C Havoc: 1/72 scale. 10.2" wingspan; removable cowlings; detailed twin engines; two-position landing gear; movable wheels and propellers; clear canopies; two detailed crew figures; official markings (U. S. Army/R.A.F.) and collector's three-view drawing.

A-7A Corsair II: 1/72 scale. Features: full weapons load includes — (6) 250-lb. bombs, (12) 500-lb. bombs, (2) fuel tanks, (2) sidewinder missiles; two-position landing gear; movable wheels; clear cockpit canopy; pilot figure; official U. S. Navy markings; collector's three-view drawing.

To complete the lineup are the following: F-8E Crusader, 1/72 (kit used in article). A-3B Skywarrior, B-52 Stratofortress, MAC C-135B (1/144 scale). Kit containing three famous WWI fighters: British Sopwith Camel; Fokker E-III; French Moraine-Saulnier N. Kit containing three famous WWII fighters: Boeing P-26A (Peashooter); Macchi M-C. 200 SAETTA; Curtiss P-36 Hawk. Kit of three famous Freedom Fighters, WWII; 1/72 scale. Chinese Air Force Polikarpov 1-16; Polish PZL P-11C; Swedish Air Force Fiat CR-42.

Last, but by no means least, is the Boeing Supersonic transport SST. Two complete 18", ready-to-assemble models; supersonic and subsonic configurations with display stand included. Revell calls it, "America's big swinger in the sky!"

A.M. Reviews

Continued from page 9

History of Rocketry & Space Travel, by Wernher von Braun and Frederick I. Ordway III, published by Thomas Y. Crowell Co., 244 pgs., $14.95.

THIS volume covers the story of man's conquest of space from its beginning during the ancient Babylonian period down to today's plans for the manned missions to the moon and to other planets. Profusely illustrated with photographs, many in color, the book reviews the work of the three pioneers in rocketry—the American, Robert H. Goddard, German Hermann Oberth, and Russian Konstantin Tsiolkovsky as well as the other men whose accomplishments in this field were outstanding. It goes into the story of the experiments of von Braun and Dornberger in Germany before World War II and describes the development of the V-2 rocket at the Peenemünde center. How the German scientists surrendered to the American forces, joined with them at the Army's Redstone Arsenal and later at NASA's Marshall Space Flight Center, is told in detail.

After tracing the development of the numerous rockets, ranging from the "bazooka" to the huge intercontinental ballistic missiles and antimissile missiles, the book describes the various space programs including the Vanguard, Atlas, Polaris, Mercury and Apollo missions. A com-

parison is made between the accomplishments of the Russian and American space programs — the orbital flights, the probes of the moon, and the planets Venus and Mars.

Contest Calendar

Continued from page 46

July 21 — St. Louis, Mo. (AA) Hot Heads Model Aircraft Contest for CL. Site: Buder Park. A. Biehl CD, 2195 Bienville, Florissant, Mo. 63031. Sponsor: **Hot Heads MAC.**

July 22-26 — Arnold AFS, Tenn. (AAA) 1968 USAF Worldwide Model Airplane Championships for FF, CL & RC. Restricted. Site: AECD Model Flying Field. M. Collier CD, 518 Sharondale Dr., Tullahoma, Tenn. 37388. Sponsor: **Coffee Airfoilers.**

July 28 — Grand Ledge, Mich. (AAA) 5th Annual Flying Aces International FF & CL Contest. Site: Airport. C. Spencer CD, 236 Theo St., Lansing, Mich. 48917. Sponsor: **Lansing Flying Aces.**

July 28 — Fresno, Calif. (A) Fresno Monthly FF Meet. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702. Sponsor: **Fresno Gas Model Club.**

July 29-31 — Denver, Colo. (AAA) 2nd Annual Old Timers FF Championships. Spec. Events. Site: East Colfax Air Park. H. Elmore CD, 1326 Geneva St., Aurora, Colo. 80010. Sponsor: **Model Museum Flying Club.**

AUGUST

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

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

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

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

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

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

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

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

Aug. 11 — Belleport, N. Y. (AA) 3rd Annual CL Contest. Site: Rec. Field. H. Mayer CD, 18 Magnolia St., Central Islip, N. Y. 11722. Sponsor: **Suffolk Wings.**

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

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

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

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

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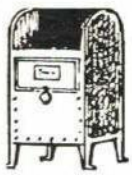

YOU said it!

Continued from page 11

A good question and answer department is truly an essential in any modeling magazine. So are all sorts of other things. But it would take a monumentally costly publication to report this hobby from A to Z. A.A.M. does its best. Ed.

Model Rocketeer by nature

After reading your latest issue and the "You Said It" column, I have decided to sound off one of my own opinions. I would like to say that I am a model rocketeer by nature, but I often flirt with model airplanes, basically for knowledge. Another thing, I am 14 years old.

I mainly wish to complain about your material for articles; however, I do believe yours is the best on the newsstands. In my opinion, the real enjoyment of any modeling hobby is self-satisfaction, that is, in building a beautiful model and a perfectly working model.

Another sensation that keeps modelers alive is pride, and the deepest roots of this is in a home design that you sat down and drew out from knowledge and experience. I mentioned that I was a model rocketeer by nature because you design and build nearly all your own rockets to your needs, tastes, and beauty. This is what model airplanes shy away from and especially with the inexperienced.

I plead for any type of article that will explain how to design your own efficiently working model with good wing area, engine power, etc. An article that will also shy away from the aerodynamic principles, as these can turn your head around, but just enough for a minimum understanding.

I hope you will read this letter and produce results.

Tancred Lidderdale, Jr., Dalton, Ga.

The man who can write a suitable series of such articles, who knows how to be practical, meaningful, and not lose everybody in a mish-mash of full scale aerodynamics and formulas which no one will bother with, has not been born. But if he were, the answer would be a special book — how to design model airplanes, perhaps. Ed.

From Down Under

Enclosed is check for my renewal to American Aircraft Modeler.

May I compliment you on the generally high standard of subject matter. Each issue seems to provide a fresh interest.

V. Kerr, Queensland, Australia

A good 'how-to' coverage

Your March, 1968 issue had a request by J. Susskind of Plainview N. Y. for literature on the hobby. Circumstances brought me to England where I found a number of sound books giving the whole hobby a good how-to coverage. Ron Warring, Ron Moulton, Vic Smeed, and Peter Chinn (of engine fame) have written books giving complete coverage on the hobby's building and flying techniques. A card directed to "Aeromodeller's" Model Aeronautical Press at Hemel Hempstead, Herts, or to Foyle's Book Store, Charring Cross Road, London would get the necessary details.

Charlie Coleman, Antwerpen, Belgium

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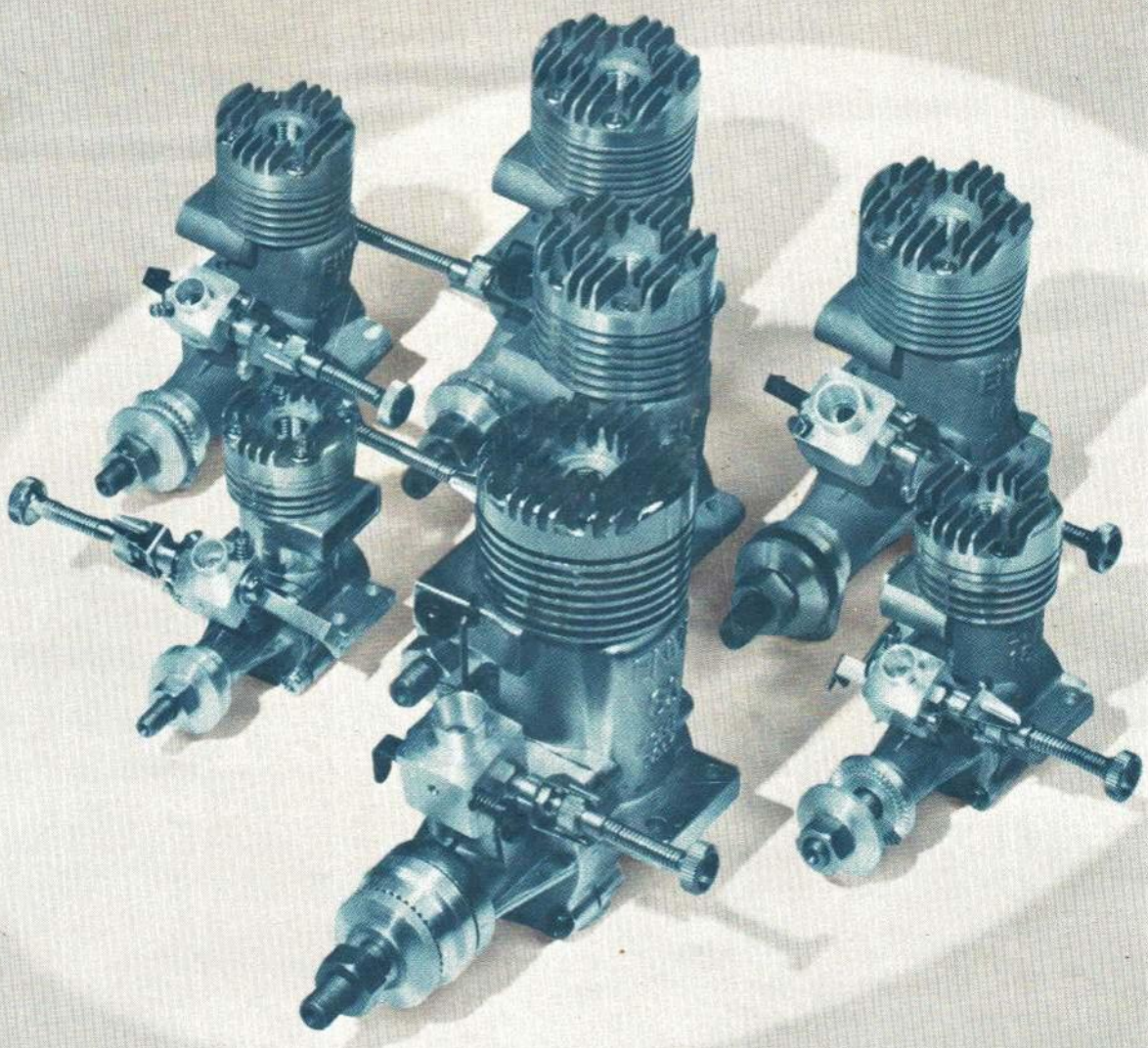

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