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american aircraft MODELER

P. 20

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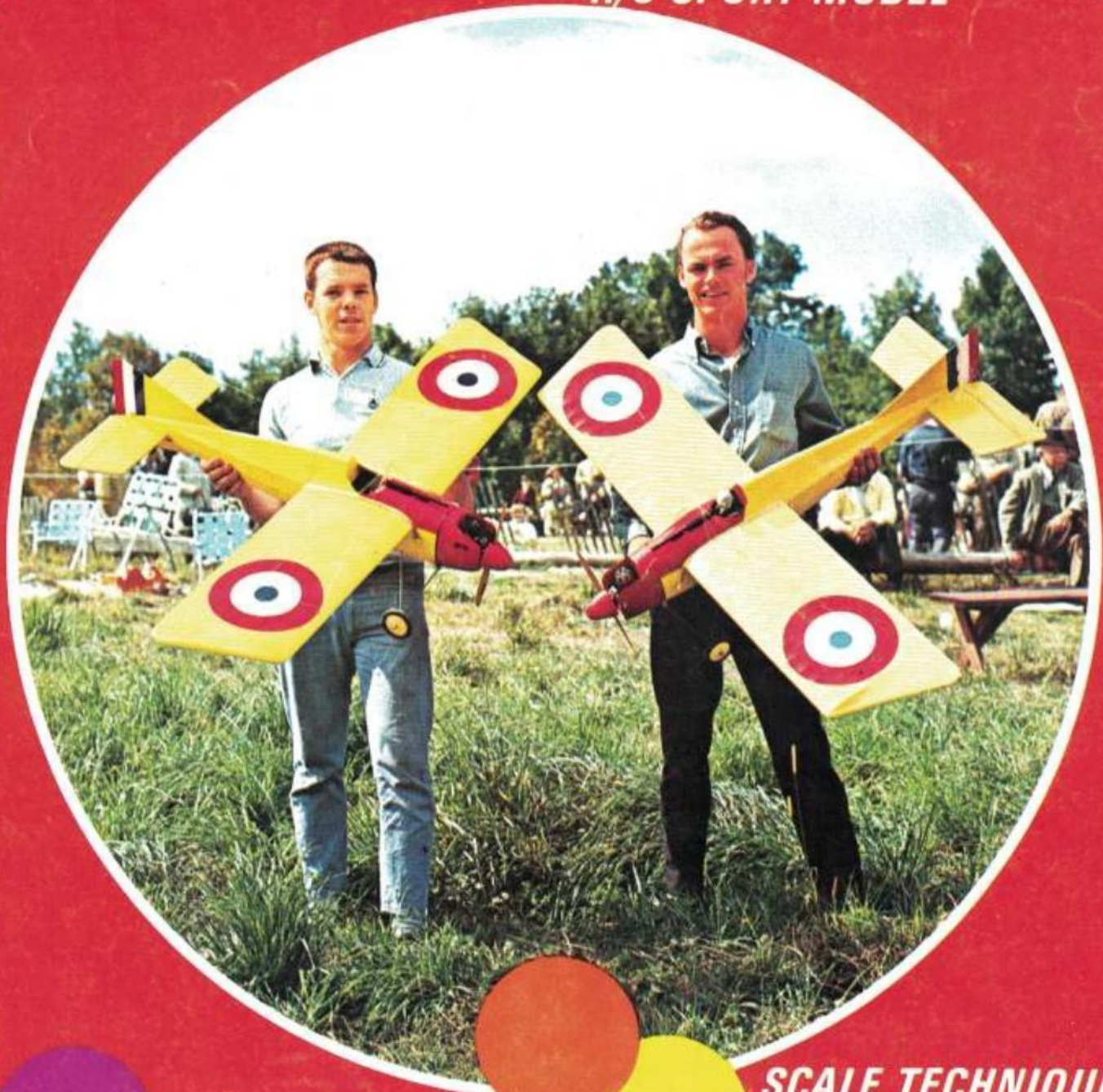

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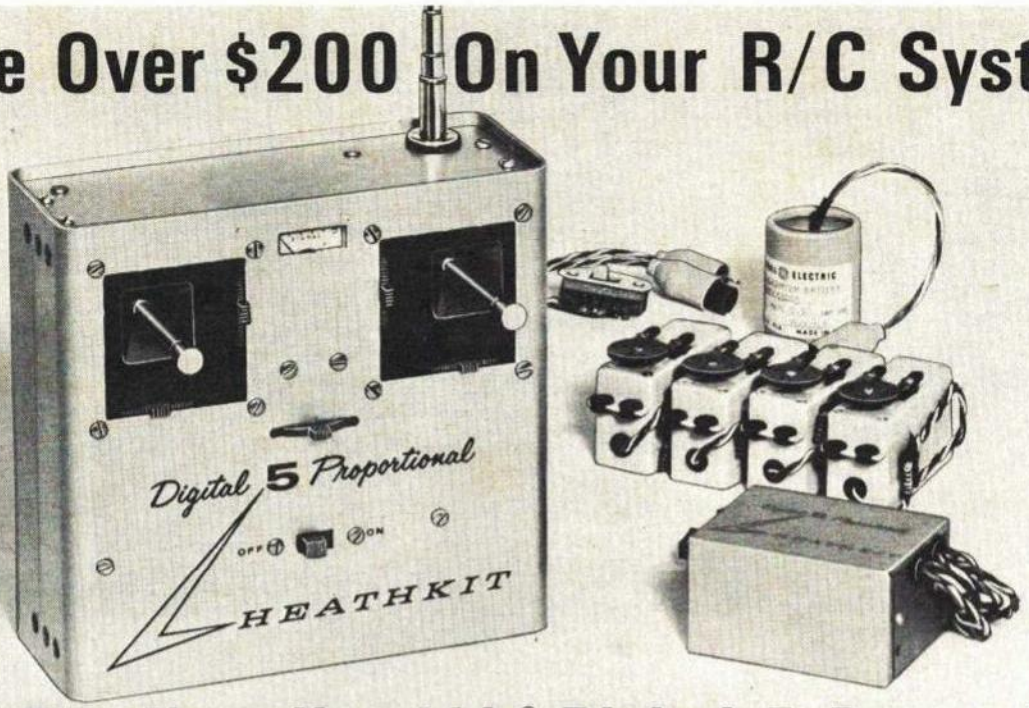

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AMERICAN AIRCRAFT modeler

VOLUME 66, NUMBER 4 APRIL 1968

COVER PHOTO: These beautiful Morane Saulnier's were flown at the WWI Jamboree in Rhinebeck, N. Y., by Nick Ziroli, the designer, left, and Walt Moucha. Both planes had rudder, elevator, motor control. Bill Coons' photo.

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STRAIGHT AND LEVEL

Two things hold attention. In New York, the passing of Joe Hardie, of Flying Models. In California, the MATS show.

IT is with sadness that we report the passing of Joe Hardie just before Christmas. Mr. Hardie was the owner of Rajo Publications, in New York, publishers of *Flying Models* magazine. If we refer to him both as "Mr." and "Joe," it is because he was the senior of all the publishers in this field, and the head of a chain of magazines, commanding of respect; yet somehow, to all who knew him, and to the far greater number who only knew of him, he had always been just Joe Hardie. If our familiarity will be pardoned, we should like to tell you a little about this fine gentleman we all called Joe.

Our own acquaintance with him began in 1946 — when after our own ten years on the old Air Trails had finished — he visited one afternoon on a trip to his printer to talk about the property that was to become *Flying Models*. You old-timers will recall *Flying Aces*, a colorful publication dating from just after 1930. F.A. had gone out of business, and one in-between publisher had put out one issue under the ambitious name, *Flying Age Traveler*. From this debacle, Joe had come up with the subscription fulfillment obligation. You see, a publication that gives up the ghost must see to it that its subscription obligations are met.

Joe, to whom model airplanes were a new world, had this concept of a modest magazine, stressing how-to-do-it and the beginner. What he wanted was merely an opinion if it could work. Well, obviously it worked! In consulting capacity we served briefly, and others who followed had the same respect for Joe's ideals: Walt Schroder, Cal Smith, Bob Buragas, and Don McGovern who is doing such a good job there today.

Later, when the old *Air World* magazine folded, Joe asked us about the advisability of taking over its subscription fulfillment — which, no doubt, he would have done anyway. From these quiet beginnings, he put together a book which has continued to please us all for more than 20 years. In all that time, under Joe's supervision, the book which was closest to his heart — of all his publications and it was by no means a leader of his properties — F.M. reflected his qualities. It was never pretentious, nor did it ever strike a false or phoney note. It has never harmfully criticized anyone or anything. Indeed, when any development took place in the field, Joe would appear to shake a man's hand and to wish one the best of luck — even if the competition obviously was critical to him. Two years ago he came to Washington and wished us well on the revived AMERICAN AIRCRAFT MODELER. He was genuinely happy for A.M.A. as well.

To say that he will be missed or that we all cannot afford to lose him, is an understatement. His associates and competitors — who are friends as well — will remember him with respect. It is to be hoped that his example will not be lost on us. Neither Joe nor his *Flying Models* ever seemed like a competitor. The much-abused term "peaceful coexistence" comes to mind. He gave it meaning. And one gets the same feeling from F.M.'s present staff — who, with Mrs. Hardie, will carry on. Understandably, *Flying Models* is our favorite "competitor." You should read it.

JANUARY is pleasantly looked forward to these days. It is then that the Model Airplane Trade Show is held on the coast. The site is the Orange County Fairgrounds, which is well south of Los Angeles, near where the mountains almost come down to the sea. Radio control created the phenomena of all these symposiums and trade shows, DC/RC, Buffalo Bisons, the fantastic Toledo affair begun by the Weak Signals — also held on a fairground.

MATS is well attended, informal, low pressure. So many exhibitors, members of the trade, and just wandering modelers — to say nothing of kids with cotton candy, a guy in Indian regalia, and daredevil pilots in bright flying togs from the air show that took place overhead — came together in that friendly western spirit (and we saw no hippies). It is a pleasant place to greet old friends — even assorted editors seem glad to meet each other there. This show is growing — for the first time it really filled the hall with two more rows of booths down the middle, where last year, individuals' models had been displayed upon the floor.

What were the trends? Sweeping miniaturization of propo equipment, a strong play for ready-to-fly planes, boats coming on like mad, cars fantastically improved, keen rivalry between tricky new covering materials.

Since all these shows take place in mid-winter — well, the DC/RC Symposium is in the spring these days, but that is not a trade show — flying exhibitions usually come down to desperate polar expeditions. In Southern California this part of the show is fun indeed. RC boats maneuver in the special tank out front, race cars tear up and down, shifting up and down (!), rockets stab into the sky far overhead, control-line combat jobs chase streamers, and all manner of RC crates take to the air.

While MATS is not the biggest, and seems destined to forever trail the more centrally located Toledo affair, it does reveal more than its share of new products. It is, after all, the first show of the year. Since it comes rather late for even our April issue which is loaded with features which, for many reasons, could not be dropped, we are not able to present even a representative selection of photographs, although Tom Roe outdid himself in shooting them. Alas, you can't win them all!

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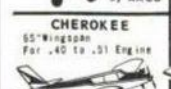

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Rickenbacker, by Edward V. Rickenbacker, 458 pgs., $7.95. Published by Prentice-Hall, Inc. Englewood Cliffs, N. J.

An autobiography of America's Ace of Aces in World War I is "must" reading for aviation fans. In Rickenbacker's exciting story, we now have his own account of the adventures that has made "Captain Eddie" a legend.

Beginning with his boyhood memories of Columbus, Ohio, the story proceeds to his racing-car days. One of the earliest racing-car drivers on the national circuit, he competed against all the great drivers of the sport's beginning period. His enthusiasm for the sport led him eventually to ownership and supervision of the Indianapolis Speedway for 20 years.

The speed, mechanical perfection and desire for victory which Rickenbacker acquired in car racing, propelled him into the field of aviation. When America entered the first World War, he joined up, was sent to France with the A. E. F. and eventually managed to get himself transferred to the Air Service. Here the legend begins. As a fighter pilot he fought many a battle in the skies with Baron Manfred von Richtofen's Flying Circus, flying one dangerous mission after another. He became America's number one ace, earning no less than 19 decorations for bravery in action. He became world famous.

After the exploits of World War I, the story returns to the United States and to automobiles with an account of how he built his own company and his own car and eventually joined with General Motors. Then follows the story of his financial battle with General Motors to get control of Eastern Air Lines, from which point he began to play an important part in the airline industry.

A gripping part of his life's story is the incident of his crash into the Pacific, when in 1942 he was on a special confidential mission for Secretary of War Henry L. Stimson. Believed to have perished, Rickenbacker and his crew survived after spending 24 horrible days and nights in rubber rafts.

Rickenbacker's story covers 50 years of aviation history — from the flying days of the 1920's and the trial of Billy Mitchell to the tremendous build-up of our airlines and aircraft in the Jet Age. Of special interest to aviation fans is the final chapter in which Rickenbacker makes his predictions of future world developments.

- Within a few years, electronic devices and controls will make the operation of aircraft independent of the weather. Aircraft will make scheduled stops in rain, fog or snow; and furthermore we shall not only ignore the weather, we shall control it.
- Cities and towns will no longer be dependent on land or water transportation for growth and prosperity. Any hamlet has the potential to be a port of call as long as it has the facilities and services for airport use.
- Huge airships will be able to remain aloft for a year or more on a bucketful of fuel. Such ships will serve as mother ships, with smaller aircraft rising from points below to transfer or take off passengers. American military ships, which stay aloft for a year or more, will serve as perpetual peace patrols from which all points on the world beneath can be observed.
- Huge platforms will orbit the earth to serve as launching pads for ships to the other planets.
- Within the next 50 years, spaceships will become commonplace for interplanetary travel with speeds up to 25,000 mph on power derived from nuclear energy.
- Instead of being the most deadly weapon that God ever let man create, the airplane and its successors, will truly become the angel of peace that He intended it to be.
- The exhaustion of oil and coal, which is inevitable, will necessitate breakthroughs in the potential nuclear power.
- A major communications breakthrough will occur in the field of extrasensory perception. Just as we now can transmit impulses electrically through the atmosphere and space and receive them and understand them, so "shall we be able in the future to receive and understand the mental impulses that have emanated from the minds of men over the past millenia."

There is much, much more to this book, but again our concern is with aviation and related matters.

Air Organizations of the Third Reich, by Roger James Bender, 192 pgs., $9.95. Published by R. James Bender Publishing, Mountain View, Calif. and distributed by Aeronautica, John W. Caler, Dept. AM, 7506 Clybourn, Sun Valley, Calif. 91352.

In a handsome, colorful book, Roger Bender has compiled a reference work on the distinguishing features of all the World War II German air organizations. The different uniforms, rank insignia, decorations, awards, badges, armbands, daggers, banners and aircraft markings are all described and shown in over 500 photos, mostly in color. Some of the air organizations presented are: the NSFK (National Socialist Flying Corps); the Deutscher Luftsport Verband (German Flying Club); the Condor Legion; the Luftwaffe including the Parachutist units such as the SS-Fall-

schirmjäger and the "Herman Göring" Panzer Division; the auxiliary Luftwaffe units such as the Haimatflak (home air-defense) and the Luftwaffenhelferinnen (women's air force organization); and various Foreign Legions of the Luftwaffe.

This is a convenient reference book on German World War II air organizations, particularly on personnel identification.

Messerschmitt Bf 110, by R. S. Hirsch and Uwe Feist, 52 pgs., $3. Published by Aero Publishers, Inc. 329 Aviation Road, Fallbrook, Calif., and distributed by John W. Caler, Dept. AM, 7506 Clybourn, Sun Valley, Calif. 91352.

This paperback book, Volume 16 in the "Aero Series," features the heavy long-range fighter of the Luftwaffe. Although the Messerschmitt Bf 110 was not superior in performance, as were some other Luftwaffe fighters in World War II, it did hold the distinction of being used throughout the entire war.

In describing the 25 or so different models of the Messerschmitt Bf 110 and giving the pertinent characteristics of each, the authors include numerous photographs — some in color — of the aircraft and its distinguishing parts and markings.

The Korean War, by Matthew B. Ridgway, 291 pgs., $6.95. Published by Doubleday & Company, Inc., Garden City, N. Y.

General Ridgway, who was Supreme Commander of the United Nations forces in Korea and Supreme Commander of the United States Far East Command, tells his story of the Korean War.

In describing his experiences — the Inchon Landing, the battles at the Yalu, Heartbreak Ridge and Bloody Ridge, as well as the numerous peace talks and intermittent stalemates — General Ridgway covers the many problems overcome and relates them to our present situation in Southeast Asia.

With reference to air power, Ridgway takes exception to the popular estimates. He acknowledges the great value of air in close support and air drops of food, ammunition and medical supplies. He states, "No one who fought on the ground in Korea would ever be tempted to belittle the accomplishments of our air force there. Not only did air power save us from disaster, but without it the mission of the United Nations Forces could not have been accomplished." But air power does have definite limitations, Ridgway maintains.

Air power cannot accomplish the miracle of interdiction; it cannot cut all the flow of reinforcement and supply to an embattled enemy. He puts it this way: "In Korea where we had air mastery over practically the whole peninsula, MacArthur himself acknowledged our inability to isolate the battle area by air bombardment or to choke

Continued on page 67

Voice of the Critic

I would complain about some models being built by some designers. Many are ugly, have unpleasant lines and, if of a scale type, are crude, careless copies. Construction is too heavy. Instead of using good design practice to gain strength, many modelers use heavier materials but usually unsuccessfully, as the aircraft needs more power, etc. and, of course, when it hits something, there is a much greater weight to be absorbed in a crash (usually unsuccessfully).

I think also, to improve your magazine, some simple, well-designed rubber models would increase the interest of the youth, one who in his younger age could not afford the cost of some motors or radio. This would also give him basic training, and pleasure to the old timer who wants some fun.

Al Jurik, Cloverdale, B. C., Can.

We could not agree more! To meet such specs, a design should be attractive — its configuration should appeal, it's lines should be good. Structure should make sense, simple, functional — and appealing in itself. No tricky parts. If free flight, it should be capable of practical flight not too far from home — certainly not require a field 100 miles away. It should have great stay-on-the-field ability. Pictures and sketches should show more difficult steps. Oh, well, we can dream. . . . Ed.

Hope it's Contagious!

The "new look" of AMERICAN AIRCRAFT MODELER is absolutely tops! The new presentation of articles, slick paper, the whole bit, makes it a cover-to-cover magazine. Hope to see plenty on scale, flying, solids, plastics, drawings, etc.

Warren D. Shipp, Brooklyn, N. Y.

If the Shoe Fits . . .

On the urging of my three smaller sons, I decided to go into model aircraft construction once more, after a lapse of 25 years. I purchased a copy of your magazine from our post exchange, as a reintroduction to modeling. I was aware that aeromodeling must have changed a great deal, with the advent of such things as practical radio control, new materials, and such. Your magazine was quite interesting, and I have no complaints there.

The next step was to purchase a number of the simpler kits. The post exchange does stock a small variety of kits, from which I selected a number of rubber-powered type kits made by Comet, and a few by Sterling. The kits are quite impressive externally and were consistent with my (and my children's) experience. After we had flown a few of these simple kits, I thought then we might be able to tackle something

a bit more advanced, such as one of the simpler free flight gas-powered models.

My main complaint is in the nature of the materials supplied. From the construction, and fundamental engineering standpoints, there is nothing wrong with the kits. But the execution is a sorry mess. In earlier days, kits were supplied with sheet stock, upon which the outlines of the various parts were printed. Or, complete drawings were supplied, and it was up to the modeler to cut the required parts from blank sheet stock. Now this I could live with; but there isn't a darn thing one can do with this present mess of die-cut parts.

There are two major faults. Firstly, the dies are usually dull, so rather than cutting through the sheet stock, the result is a badly crushed and warped sheet. In fact, the local model building fraternity explains that all such kits are contemptuously referred to as "die-crushed" kits. Secondly, in spite of the use of dies—which, in usual machine shop practice, implies accuracy — the parts do not fit. Thirdly, because of the crushing action of the dies, instead of a proper cutting action, the sheet stock has been so severely stressed that even after the parts are carefully cut away, it is found that many of them split, often into several pieces. In most cases, the parts are useless. In the one model which we have managed to assemble, and to fly, *all* balsa parts had to be replaced. For the price of the kit, all that we obtained that was of any use, was a set of plans, two sheets of tissue, a pair of wheels, a hardwood nose bearing, a plastic prop, and the piano wire fittings. Oh, yes, and the decals. Now, this is hardly what one would expect from a "complete flying model kit."

The 100% replacement of the balsa parts was accomplished by a trip to the base hobby shop, which stocks balsa sheet stock only; a jig saw, and a balsa slitter got us the 1/16 squares, and the other strips required. But in cutting out the required parts, such as ribs and formers, we ran into another snag — the plans. Rib outlines, and former outlines are no longer printed on plans, it seems. Presumably this is because they are no longer needed, since one is supplied with pre-cut "die-crushed" parts. The bald fact is that these die-crushed parts are useless. In order to get our model built, we had to go by guess, in many cases, scale off hopeful rib sections from the assembly drawing, and hope that the results would produce a model that might fly.

This situation may possibly explain why, on our base, of the hundreds of these kits sold, one never sees a completed rubber-powered model flying. Most of the models you do see are of the expensive RC or control line variety. . . . Or they are scratch-built. Now, I would still like to buy some kits, but I am not going to waste money. I am not going to buy anymore kits until I can locate some made by a manufacturer who cannot afford die-crushing presses, and must supply kits with either printed stock, or blank stock and a decent set of plans. Until then, I am going to tell my children to stick with model railroads. I have yet to replace any parts from their kits.

H. C. Cappello, San Francisco, Calif.

A generation of modelers have criticized die-cutting quality. Actually, many lines of kits have superlative quality — but some don't. Strangely, the manufacturers are not particularly aware of this consumer problem. When kids are involved — and die-cutting tends to suffer in lower price ranges — unduly difficult obstacles eliminate thousands as long-term hobbyists and customers. ED.

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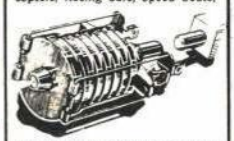

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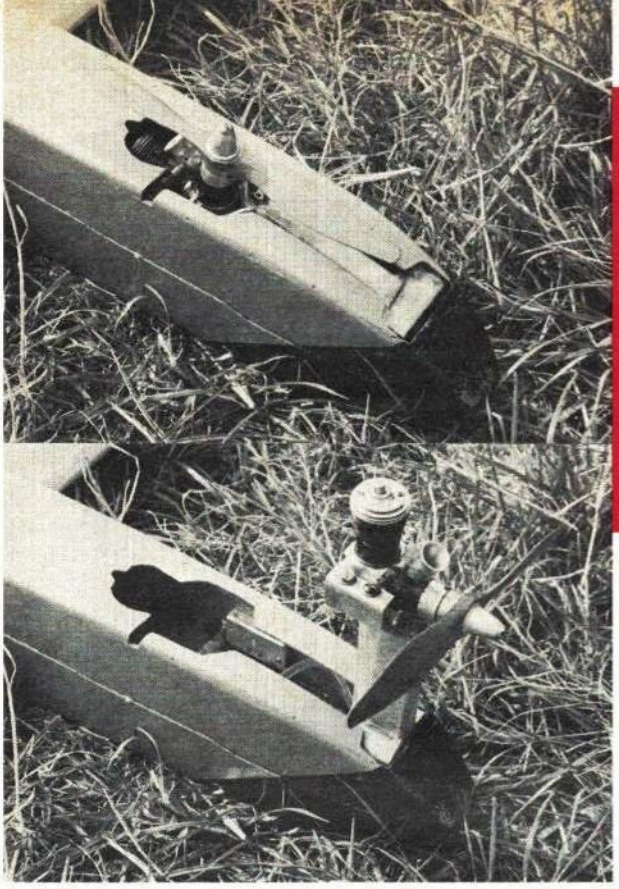


model world
...on the international scene

Houlberg event - a new breed

A new international event was inaugurated in 1967 in honor of the late Alex Houlberg of England, first president of Federation Aeronautique Internationale's model committee (C.I.A.M.). First to have his name engraved on the Houlberg Trophy was Jules Salon of Belgium. His model, possibly a trend-setter, had a retractable engine to reduce drag, a worthwhile consideration since the trial F.A.I. rules call for towline flights (100-meter towline) *and* power flights (.1525 cu. in. maximum, 60-second run) with the same model. The models are radio-controlled by rudder only and are judged for duration. They must be landed within a 75-meter square.

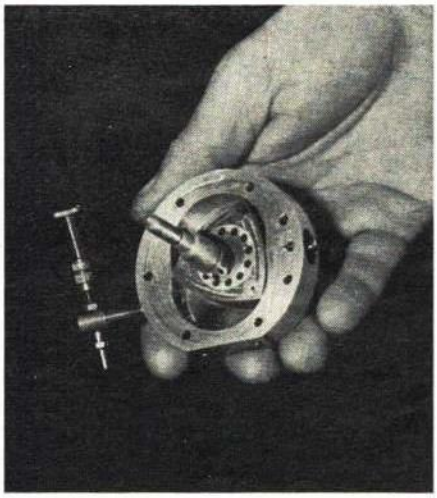
Graupner Wankel engine nearer production

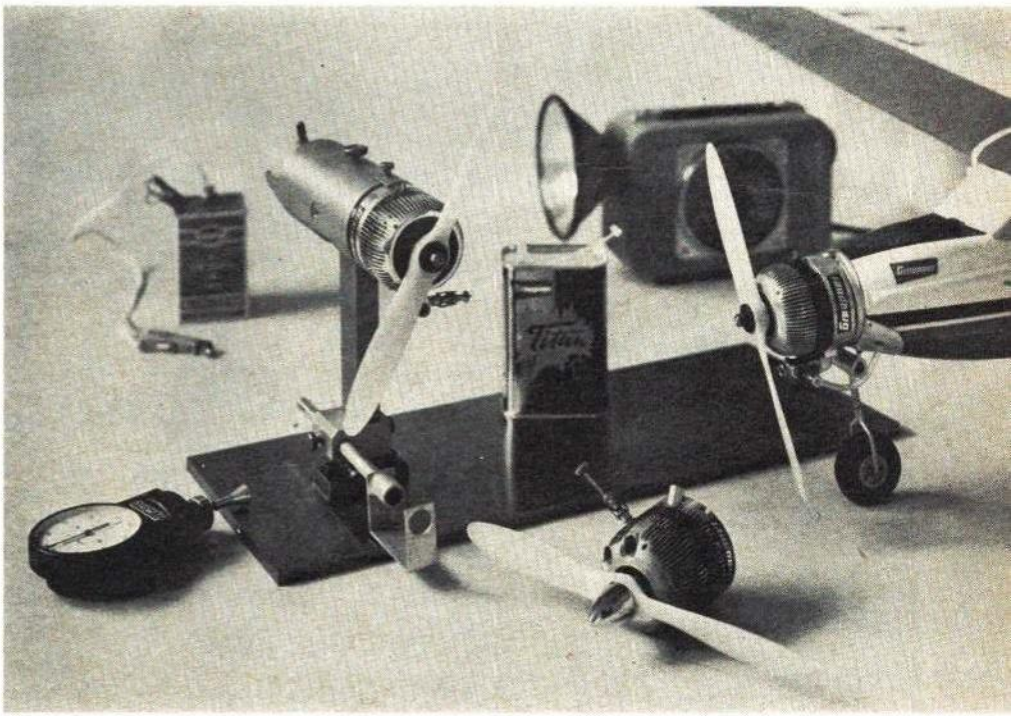
Hailed as the RC engine of the future, it now seems that full-scale production of the first model-size Wankel-type engine may be just around the corner. This is the word from Johannes Graupner, German engine manufacturer.

Unlike typical model airplane engines which have a mass (the piston) which moves in opposing directions causing vibration, the Wankel rotary combustion engine's limited number of parts all move in a continuous direction, making vibration all but non-existent. The smooth-running characteristics should make it ideal for RC use. A goodly number of modelers have been using multi-cylinder engines as an aid to smoothing engine operation. In a multi-cylinder engine, the opposing cylinders provide a dampening effect.

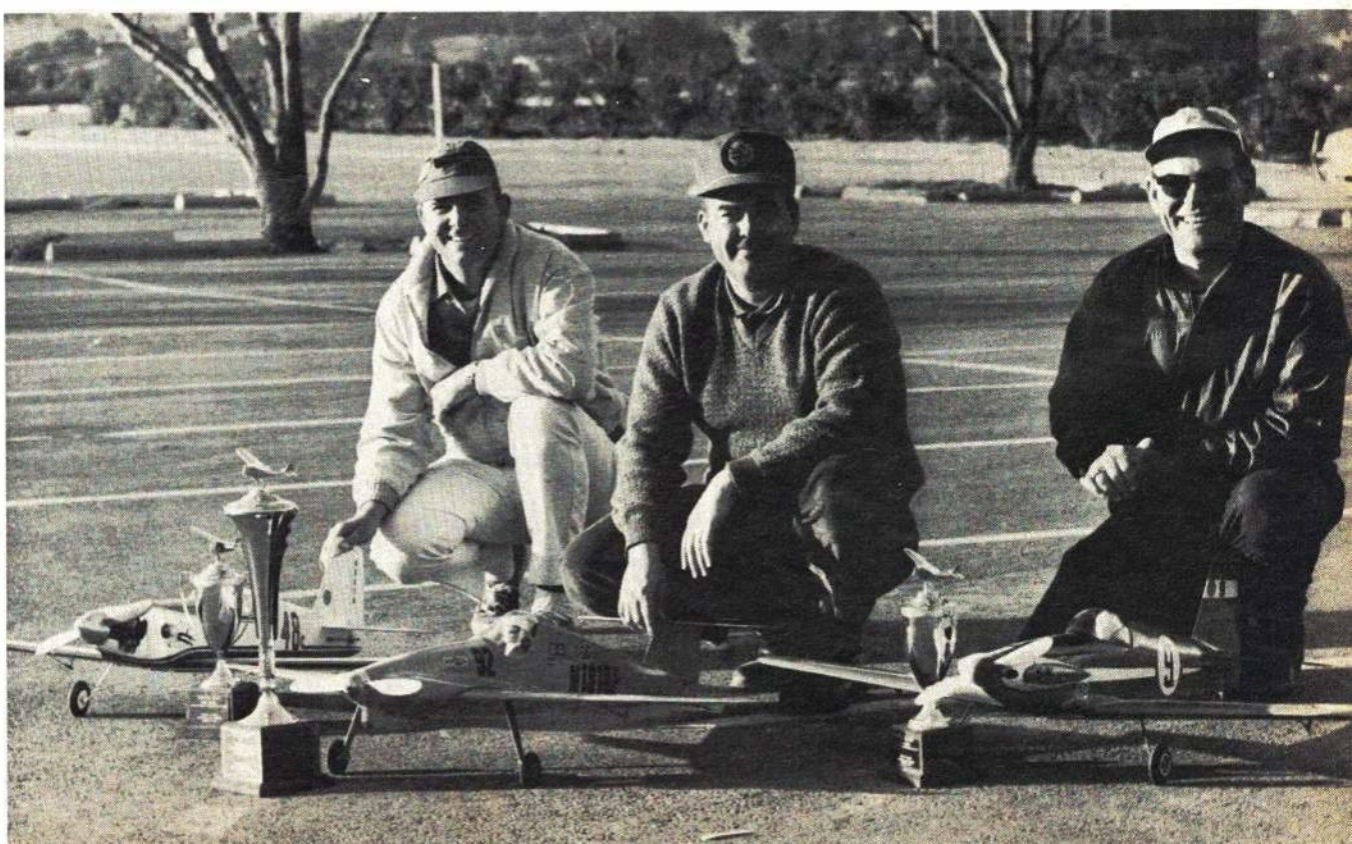
Whether application of the Wankel-type engine will take hold is still subject to speculation. Chief drawbacks up to now have been both higher weight-to-size and lower power-to-displacement than comparable piston engines. The guts of the Graupner Wankel engine show clearly in the photo at lower left. As positioned here the "trochoid" (that three-pointed rotor with the curved sides) is in the compression stage. In the process of the rotor being turned by the ensuing explosion at ignition, the turning gears (visible only in cut-away) cause the shaft (with the eccentric at its end) to turn and thus drive the propeller.

How nicely the prototype Graupner Wankel engines form a cowl-like appearance when fully assembled is evident in the photo at lower right. One of the three engines shown is mounted on a test rig, while another shows a typical model attachment. Two of the other items calibrate the engine's performance.



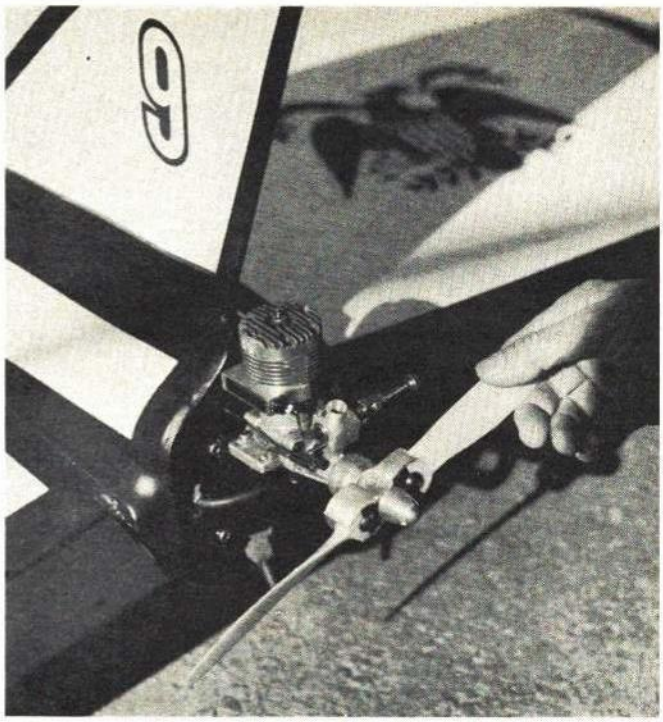


Greatest Model Airplane Show on Earth



Left: If you guessed this spectacular shot showed full-size midget air racers battling out a dead heat, you'd be wrong. Actually shown is a not-so-close RC pylon race. Joe Foster's Rivets (top) has lapped the field. A half-lap later, Jerry Nelson's model collided with Odino's, crashing the latter.

Right: Special models create special problems, but solutions are found by thinking modelers. When Phil Gerrard of Laguna Beach, Calif., couldn't find a pusher prop large enough for his 10½ lb. Enya 60 pusher-powered model, he built an aluminum hub to convert a 10″d x 6″p prop to $11\frac{5}{16}$″d x 8.3″ p.



model world
...on the international scene

Photography on these two pages / TOM ROE

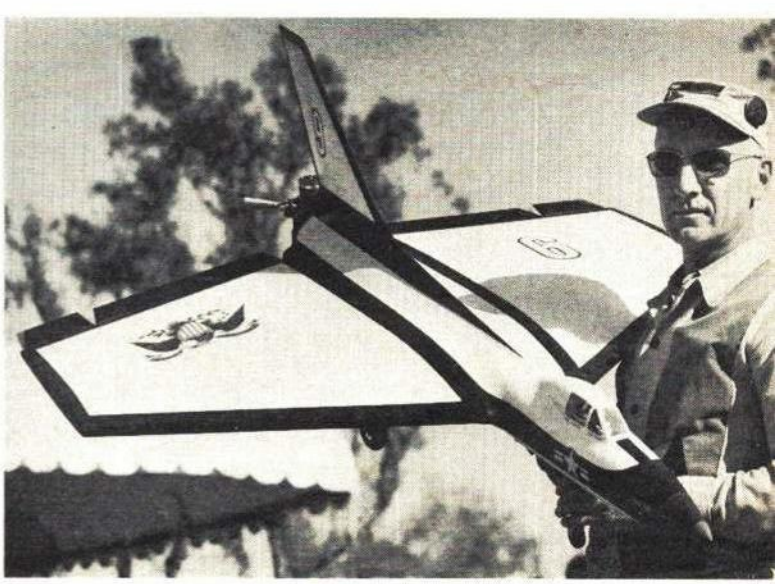
SO it was billed by its sponsors, Universal City Studios, but to most California modelers it was the "Coldest Model Airplane Show on Earth." Enthusiasm may have been chilled early in the day by the 53-degree weather with a cold north wind, but it warmed as the day and pylon competition progressed.

The show was a pilot event to test spectator appeal for RC flying. Universal City Studios conducts tours of its lot and is considering the inclusion of a model airplane show at regular intervals.

Primarily the show was an invitational pylon event but the activity was punctuated with demonstrations of Class III and sport flying. The runway was a large parking lot atop a man-made mesa on studio property. The wind created very tricky drafts which drew many unaware flyers into the hill short of the runway. The Goodyear casualty list was quite high as a result.

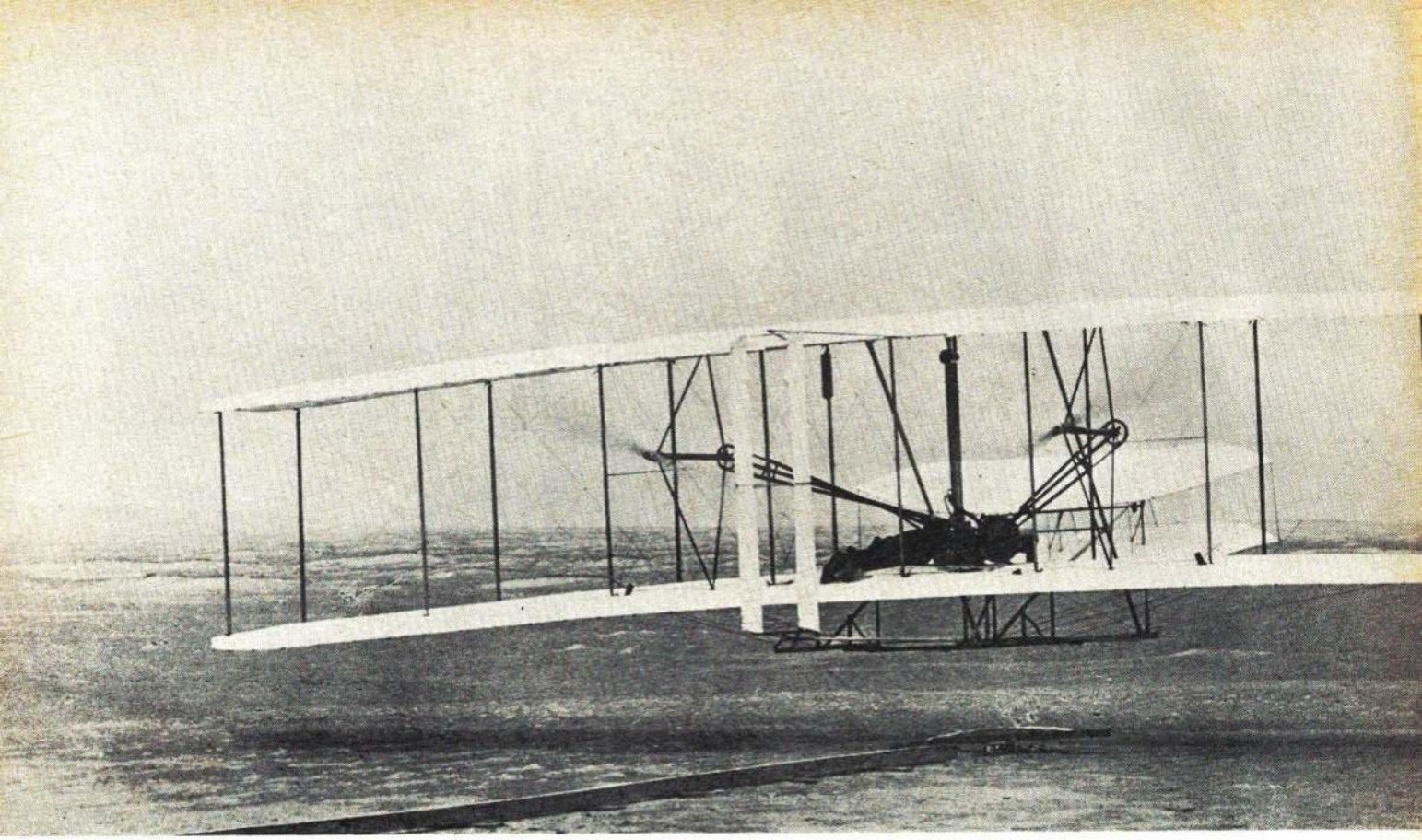
From all appearances the event was successful. Several thousand people got their first look at RC flying despite the cold winds. Good weather would undoubtedly draw more people but Universal might be hard put to figure out what to do with them.

Center right: One way to obtain the specifications necessary to build an accurate scale model is to own the original article. This, we understand, was the case with Bob Thomas who built the pictured RC scale Bensen Gyrocopter. Said to have flown, Thomas unfortunately was not present at the Universal City exhibition.



Right: Shown here is Phil Gerrard with his magnificent RC pusher-powered delta. (Business end shown upper right.) The delta, ninth in his series, is constructed of thermo-formed plastic with plastic-covered foam wings and uses Logictrol gear. Unfortunately, it collided with a curb on takeoff at the exhibition.

Left: Trophies to winners of the RC Pylon Race, provided by Universal City Studios, were engraved "The First Annual Greatest Model Airplane Show on Earth." Shown are (L to R) George Killeen, third place; Joe Foster, first place; and Joe Bridi, second place. This was Killeen's first Goodyear trophy.



Discovering the secret of flight: Part 1

Four Keys to the

DOUGLAS J. INGELLS

All photos: Smithsonian Institution

THE tall, boney-cheeked, pallid man of about 35 years of age, rose from his chair at the speakers' table and took his place at the rostrum. His was to be the principal address of the evening before the annual meeting of the Western Society of Engineers in Chicago. The man's name was Wilbur Wright, an unknown bicycle manufacturer from Dayton, Ohio. Many in the audience wondered why he had been selected to address such a learned group.

Wilbur was visibly nervous as he stood there. In the first place, he didn't like public speaking. Secondly, it was "Ladies Night" and he was always shy around the fairer sex. And he felt very conspicuous in his plain business suit. Almost everyone else was dressed in formal attire.

He glanced around the room, and recognized some of the faces. Alexander Graham Bell, inventor of the telephone was there. Another personage was Dr. Samuel Pierpont Langley, secretary of the great National Smithsonian Institution in Washington, D. C. So was Professor John J. Montgomery of Santa Clara College, Calif. And there was Octave Chanute, the president of the society who had invited him to make this speech.

Chanute, Montgomery, Langley, Bell, these men of science and invention, Wilbur recognized because there was a common interest among them which he, too, could share. Chanute was famous for his gliding experiments, a foremost authority on the science of aeronautics in this country, author of the book, *Progress In Flying Machines.* Montgomery, likewise, had made great strides in gliding on the West Coast, creating quite a furor among flight enthusiasts with his curved wing surfaces and experiments with hinged ailerons. Langley, already had flown his large steam-powered model aerodrome to prove the practicability of mechanical flight. And Bell, whom everyone believed the performer of miracles after his invention of the "talking wire," had just announced he was building a man-carrying flying machine. The common bond among these men was that they were pioneers in the exploration of the principles of flight.

Wilbur could share that distinction because he and his brother Orville, for the past two years had been doing their own experiments with gliders. Indeed, they had recorded more time in the air gliding at Kitty Hawk, N. C. than any other individuals. And Chanute had seen them perform. That is why he had invited Wilbur to talk about the Wright Brothers' progress with their flying machines.

The speech Wilbur gave was anything but dull. His nervousness disappeared when he began to expound his theories. His words had the ring of authority and fact, not fiction. The talk lasted for about 35 minutes, but during that time there were many raised eyebrows, the shaking of heads in disbelief, whisperings of criticism about his text, among the staid members of the Society who were generally recognized — and considered themselves — the foremost authorities on the science of aeronautics in this country. They were not too pleased with what they heard. Wilbur had challenged some of their theories. In fact, he said that some of their published data on the subject were just plain wrong!

"Who is he to doubt our facts?" Alexander Bell is said to have remarked. And Chanute, himself, confided to Wilbur after the speech, "You may have made some enemies in some highly influential places."

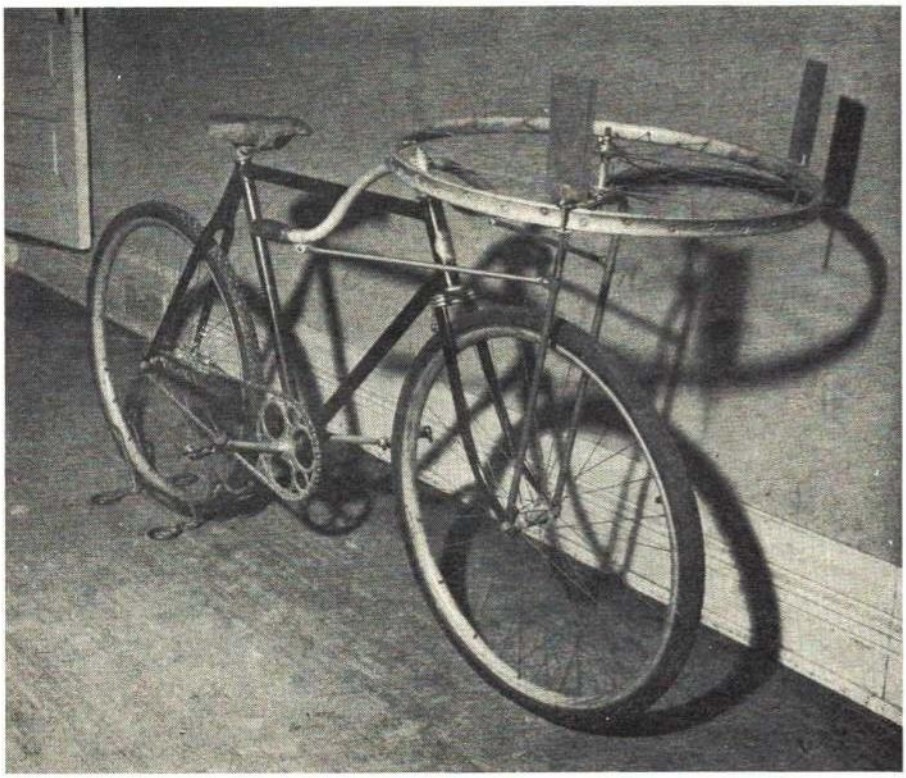
Whether he did or did not, Wilbur Wright that evening made history of a sort. It was a night to remember in the annals of aviation, although few histories of the air put much emphasis on the im-

The author, in the bicycle shop where the plane was made, examines a wing rib built by the Wrights.

After the plane had been set upon the launching track and the engine run up, Orville arranged the camera on a tripod and focused it upon a point a few feet short of the end of the track. Confident that the flight would be a success, he asked John T. Daniels, one of several men from the Kill Devil, N. C. lifesaving station who were present, to snap the shutter as the plane cleared the starting rail. Daniels apparently did as he was told, but the Wrights were not sure they had a picture until Orville developed the film in their darkroom after they had returned to Dayton, Ohio.

Sky

A long-time newspaper reporter and neighbor of the Wright Brothers, the author reveals many little-known facts about their thinking which lead to man's first powered flight.

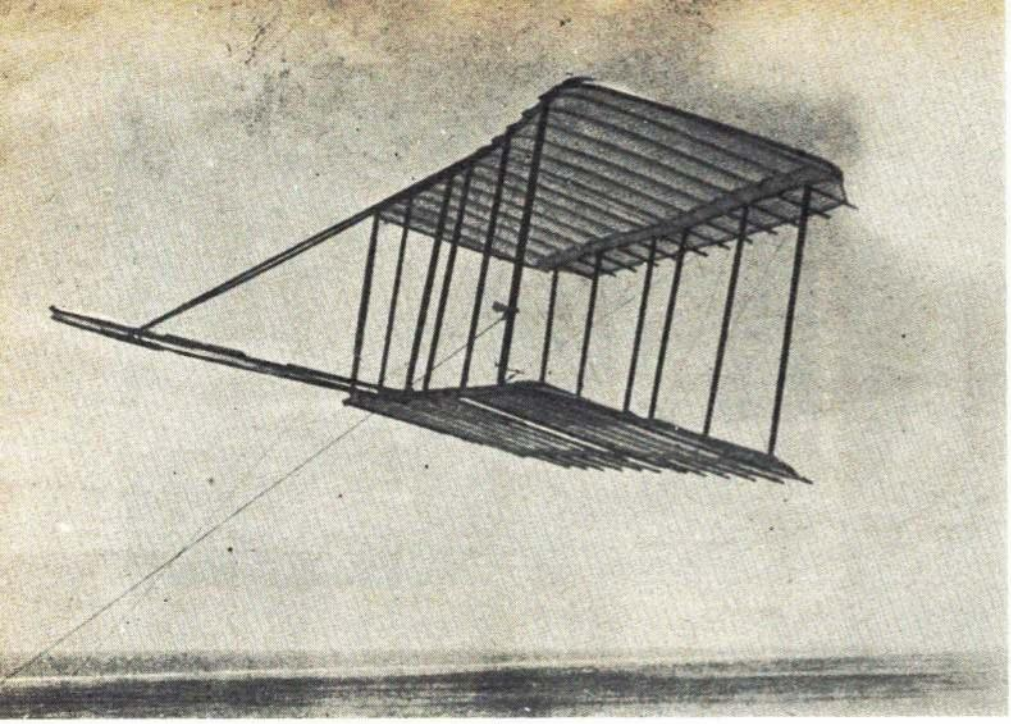


portance of his speech. Few know of it.

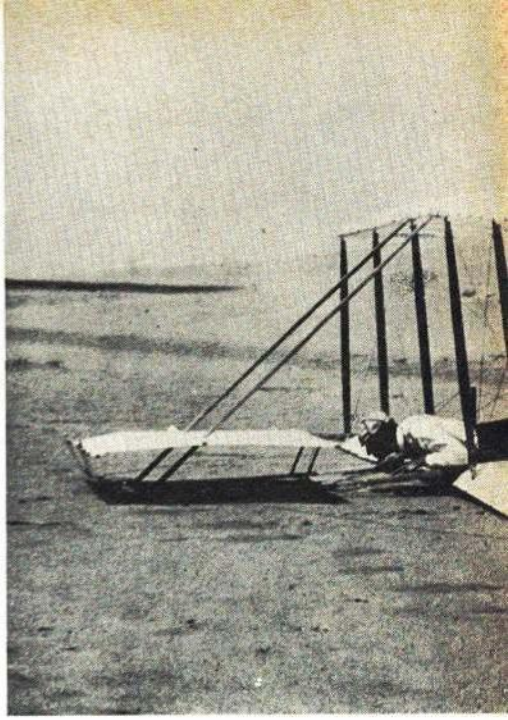
The date was September 18, 1901. And the significance is that if Wilbur had not made that speech, the Wright Brothers might well have discontinued their experiments. Admittedly, that might have changed a lot of things.

The magic wind box: Years later when I was a young cub reporter on the *Dayton Daily News*, the Wrights' hometown newspaper, I was talking with Orville Wright, and he brought up the subject of that speech Wilbur made in Chicago. Orville was 65 then, the surviving brother (Wilbur had died of typhoid fever, May 30, 1912) and he was in good health, alert, and with a keen memory. Contrary to many reports, he liked to talk, even to reporters, provided he could talk about their early experiments and "clear up all those mistakes you fellows write." The big problem was getting in to see him. Fortunately, we lived only a few doors from his laboratory on North Broadway, an unpretentious building just around the corner from the site of the original shop where they built the first airplane.

Lacking a suitable tunnel, the Wrights used this bike to check out airfoil sections. Two may be seen mounted on the tireless wheel which altered angles.



The 1900 glider was flown as a kite. Wing section appears to be almost flat.



Wilbur in a prone position following a landing

My father had introduced me to him one day when I was only about 18, and I'm sure he saw more hero-worship in my eyes than reportorial inquisitiveness, so I never had much trouble getting to talk to him. Most of the time I'd catch him early in the morning when he drove up in his old Plymouth coupe, and then he'd invite me into his office. The truth is, I don't believe I ever asked him ten point-blank questions in the many, many times I had opportunity to be with him. We'd just talk, which is the way it was that day when he brought Wilbur's speech into the conversation.

"It was an important turning point in our thinking," he explained. "I guess we were a little scared that we'd bitten off more than we could chew in making some of the claims Wilbur had discussed publicly. It was a matter of honor that we had to prove that we were right in our own theories. I think this was a very great influence in our decision to keep on with our experiments. We thought we were being presumptuous about our own data in contradicting some of the supposedly established facts of the more learned experimenters."

He went on to clarify this position, admitting that to date their information was based on actual gliding experiments in 1900 and early 1901 at Kitty Hawk. There, they achieved remarkable success with their glides, but as Orville put it, "our progress was mostly, trial and error method, and we learned to our surprise that some of the data on air pressures and lift (probably Lilienthal's) which had dictated our wing shapes or curvature, seemed to be in error. The trouble was, no set of figures we got relative to lift/drag ratios was like the next one, because of changing winds and other atmosphere conditions, and there was no yardstick to go by. We certainly weren't absolutely sure about any of our data. . ."

Because there was this doubt, after Wilbur's speech, they took a more scientific approach to the problems, and the world benefited. "It was really a matter of simple economics," Orville once confided. "We didn't have the money or time to go on building different shapes of wings, more and more gliders, hauling them to Kitty Hawk and running more and more experiments in the air to arrive at some basic, reliable design criteria. So, we decided to find a way to get this data by another method."

A first attempt was most ingenious. They had the principle of a wind tunnel in mind only in reverse. Orville told me, "We made a series of small airfoil sections of different curvatures and mounted them on the handle bars of a bicycle. Then, we raced the bike into the wind, observing the changing angular tilt, up or down, of the various shapes in the air stream. In this way we definitely established some shapes indicated greater lift potential than others. But there was still the problem of maintaining a constant flow of air, setting up a basic table for comparisons, and a measuring device."

In quest of a solution to the problem, Orville took an old rectangular box about 18 inches long and a foot square at the ends, and jerry-rigged a crude wind tunnel. Inside he fashioned an apparatus, much like the principle of a weather vane, to permit mounting different shaped wing contours in an airstream forced through the open-ended box by a fan. A glass top, permitted them to observe the changing angle effects of the air current on the different surfaces, and a simple ruler let them measure the differences. "We were encouraged," he said, "when we began to get some constant figures from which to work as a base in drawing comparisons, between curved surfaces and plane surfaces."

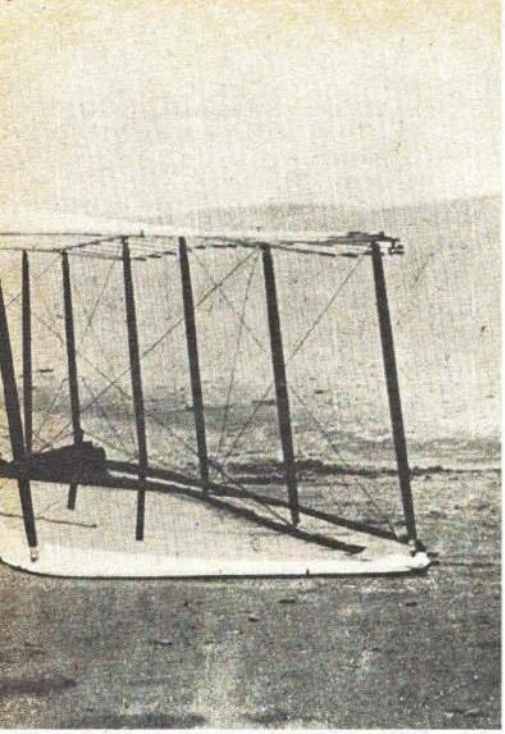
As a result, they decided to build a larger wind tunnel. Orville called it "our magic wind box" and you can see it today in the original Wrights Bicycle Shop at the Henry Ford Greenfield Village museum a few miles from Detroit. The birthplace of the airplane was moved here to preserve it for posterity. The small wind tunnel, so far as is known the first of its kind used by the early pioneers of flight, is still operable.

The Wrights original wind box is an open-ended wooden box about six feet long and 16 inches square. At one end is a fan driven by a small one-cylinder gasoline motor which they also built themselves. Inside the box near the fan is a pigeonhole partition (like honeycomb) devised to straighten out the airflow affording more accurate measurements of the air pressures as the wind whistled around the various wing shapes suspended in the tunnel at different angles to the airstream. In principle, the whole idea was like holding your hand out the window of a speeding car and changing the angle of the flat surface as the rushing air strikes it. Instead of feeling the difference in air pressures, the Wrights measured it with a homemade balancing scale.

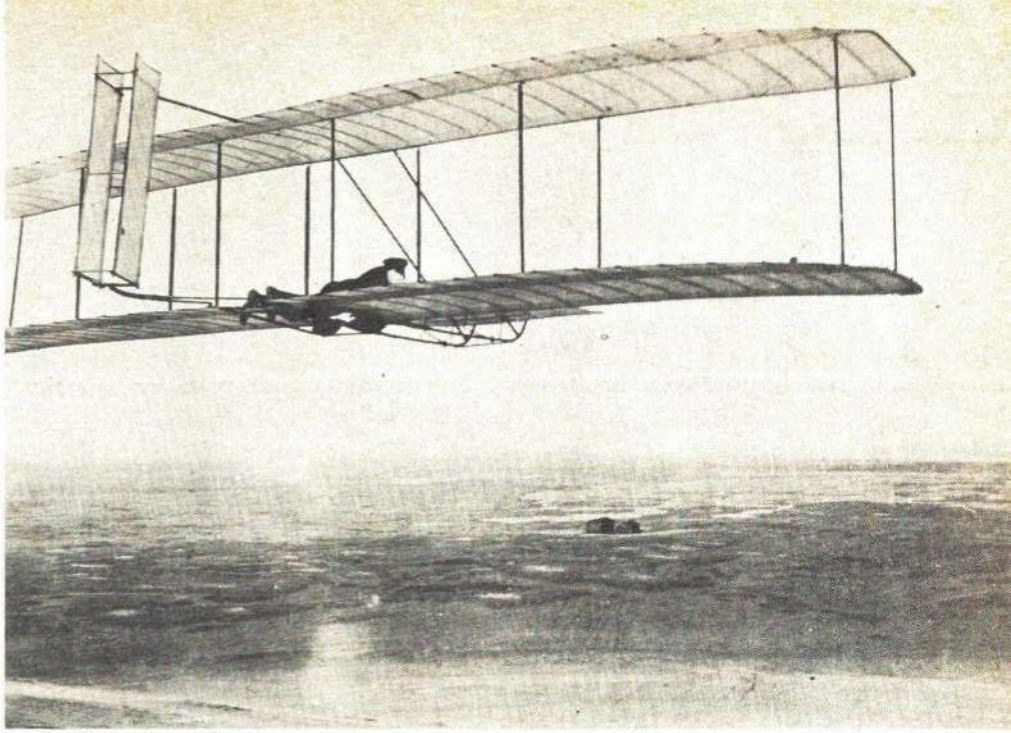
I remember, right after the end of World War II, his secretary, Mabel Beck, called and said Orville had found something behind some old filing cabinets that might be of interest, and to come over and have a look. When I got there, he was all excited about his discovery: some rusty old broken pieces of a hacksaw blade and bent bicycle spokes! "These are part of the measuring scale we used to measure the air pressures in the first wind tunnel," he explained. "It was the first device that enabled us to get any kind of consistent figures, measuring the variable air pressures."

Unimportant? Indeed, not. A hacksaw blade and a bicycle wheel spoke helped them to pick the lock on the door of the vault holding the sky's secret.

Altogether, in the wind box, they tested more than 200 different wing shapes, thicknesses and configurations. Each one taught them something. A thin wing, was more efficient than a thick wing. A wing with a curved cross section was better than a flat wing. Such data as these



at Kitty Hawk of the 1901 glider.



The 1902 glider sails off Kill Devil Hill, Kitty Hawk, on October 21, 1903.

enabled them to formulate tables of air pressures and their effects, which in turn showed them clearly the amount of lift and the best configuration and wing arrangements by which they could design a machine capable of lifting itself.

"It was at this point in our experiments," Orville once remarked, "that we began to think seriously, not just of gliders, but of a heavier-than-air, man-carrying vehicle of the air. The data we obtained on the lift characteristics of the various airfoils, led us to believe that a wing could be designed that would support the weight of a powerplant and an operator. If the results had been negative, instead of positive, I'm sure we would have concluded that human, mechanical flight was impossible."

I'll never forget how Orville emphasized the importance of the wind tunnel tests. One time, for instance, I asked him two rather naive questions: "Did you have a lot of apprehension about whether the first power-driven machine at Kitty Hawk would fly? Did you get much sleep the night before that historic flight on December 17, 1903?"

"Oh, we slept all right," the first man to fly answered with a chuckle. "We knew the machine would fly; all our tests in the wind box indicated it would. We were really more concerned about whether the engine would start and about the weather!"

Significantly, the huge and complex wind tunnels in use today at various aeronautical research centers around the country, provide little refinements in the basic data which the Wrights were able to obtain in their original experiments, when tests are run on the same airfoil sections the Wrights used. It has been tried and proven.

Generally recognized as inventors, who by trial and error managed to achieve powered flight ahead of their rivals, the Wrights seldom are given credit for their long hours of tedious, grueling and monotonous laboratory work as pioneers in basic aerodynamic research. They didn't just invent the first successful power-driven, man-carrying flying machine; *they discovered the successful formulas for human flight.*

Beyond this, they applied them. One minute, they were scientists, probing into the unknowns of the ocean of air above. The next minute, they were mechanics molding the science they discovered into machinery.

The wing and the sail: The Wrights became interested in flying machines when they were young boys. Their father, Milton Wright, a United Brethren Bishop, one day brought them a small toy flying machine. Made of bamboo, paper and cork, with a small rotor, powered by a rubber band, the toy flew up to the ceiling and fluttered back to the floor; the principle of the helicopter. It was the invention of a Frenchman, Alphonse Pénaud. Both Wilbur and Orville were intrigued by the little toy and tried unsuccessfully to duplicate it with larger models. It was their first thinking, Orville admitted, about anything to do with flying machines.

Recalling these childhood experiences with the Pénaud toy helicopter, Orville said: "It led us to go to the library and read up everything we could on the subject of flying machines, whereas we probably wouldn't have had this interest, if it weren't for the little toy." In this quest for more knowledge they met, in the pages of magazines and books, the great German glider enthusiast, Otto Lilienthal, whom Orville said, "probably influenced us more than anybody else to build our first glider."

"Not because we had the idea of conquering the air, or inventing our own flying machine," he confided, "but chiefly because we thought soaring through the air in a gliding machine must be a great sport." By this time, it must be remembered, they had already established themselves in the bicycle business, and both did a lot of bike racing, a popular sport just before the turn of the century. "The next thing to flying," Orville described it, "because of the need to balance one's self while going forward at terrific speeds."

In all their reading, the Wrights felt that Lilienthal, of all the early flight pioneers, was closest to being on the right track. After his death in 1896, they began building their own man-carrying kites and gliders. Even in death Lilienthal greatly influenced their thinking. The German was killed, they read, because he lost his balance when a high gust of wind threw his machine out of control and smashed it to the ground. This had great significance, they thought.

"We decided to concentrate on a better system of control and balance technique in our gliders," Orville declared. "It seemed to us that there must be a better way to use the air itself as an ally, rather than to conquer it as an enemy. For some reason, we thought of applying the principle of the sail to the wing." They did not know it then, but this was to be a vital key to their success.

The analogy of the sail and the wing was a good one. For by changing the different surfaces of their gliders — presenting more area to the rushing winds to accomplish bank and turn, climb and dive, and directional stability — they were "sailors of the sky." More sail here, more sail there; more wing here, more wing there — to effect maneuverability. They reasoned, and rightly so it proved, that sailing ships of the sea and ships of the sky reacted the same to variable air currents and pressures.

In their early kite flying experiments, Orville explained that they applied the principle of warping the wing tips to help in lateral control. (This was the beginning of the present day aileron.) A system of movable elevators — in the Wright gliders they were forward of the wings — provided up and down control, allowing for climb and dive. For direc-

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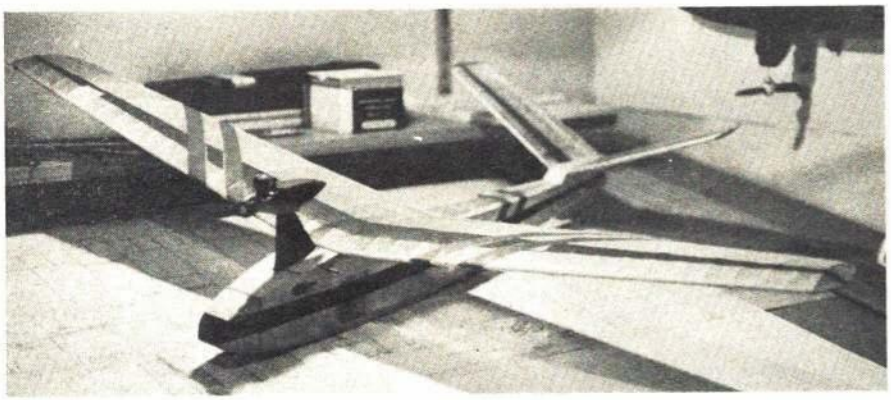
The author hand-launches his light-weight powered soarer. Built-up construction will please those who like the good feel of open framework, and the sun shining through the covering.

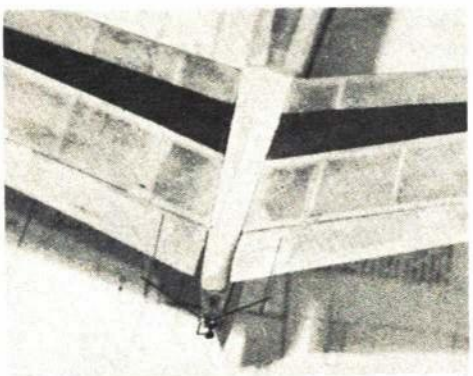
Sunday Fun

Easy power-boosted flights up into those thermals and long, soaring glides add up to enjoyable, relaxed flying sessions. It takes just an 02 for power.

CAPT. EDWARD C. WESTWOOD



Sitting pretty as you please on the designer's workbench, the little ship is set to go. The high thrust line makes for a good, fast, clean trim.



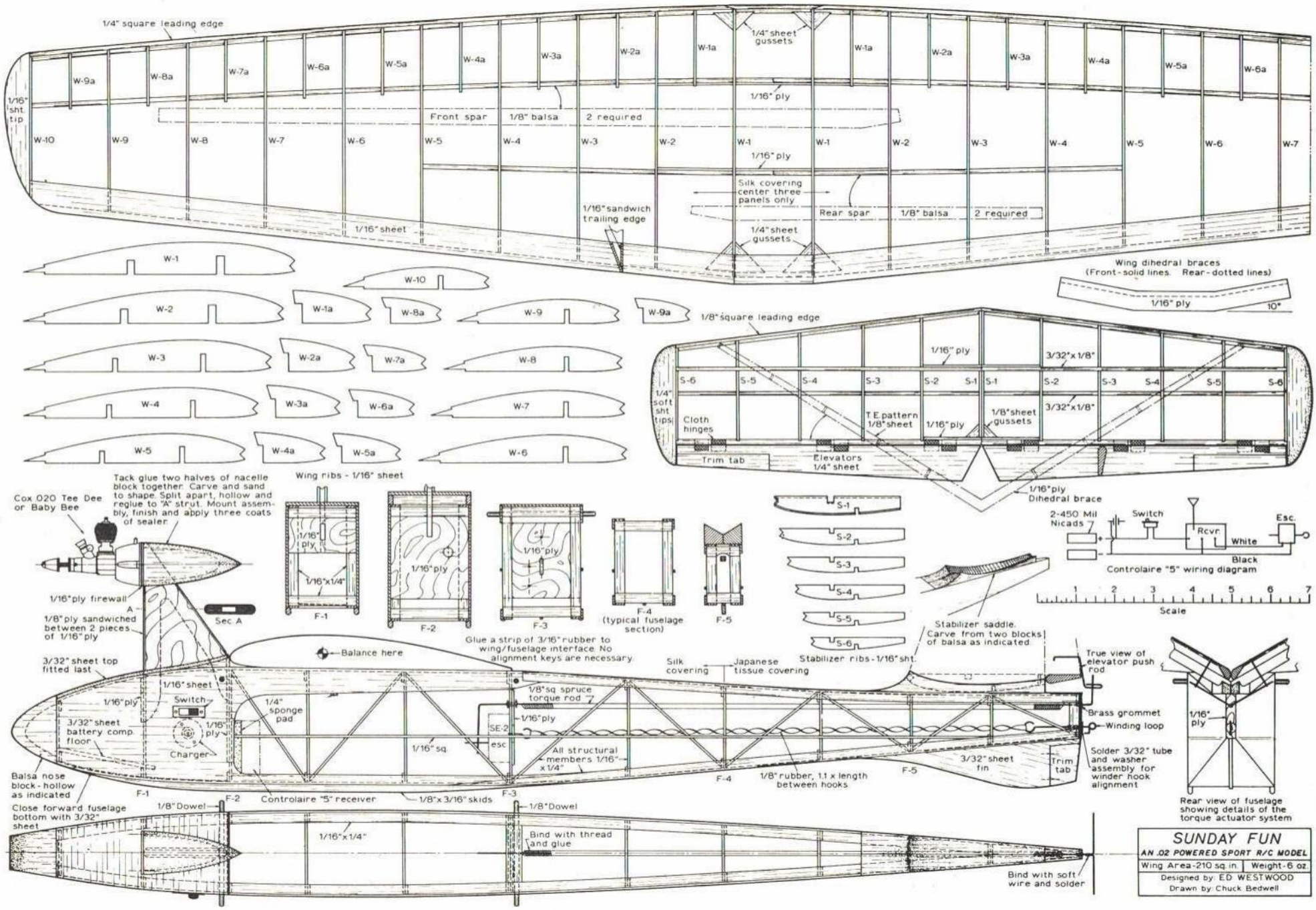
There are long-haired reasons for that V-tail, but perhaps the best of all reasons is that it's nice to have a change of pace in styles. Linkage is different, but no bother at all to form.

A light, buoyant soaring model capable of relaxing flight, is my idea of Sunday fun. This powered glider was designed to be just that. It is an uncomplicated and conveniently sized ship not critical in any particular dimension. It uses a relatively high-lift wing that will act predictably. The flying speed isn't great but the model can penetrate well. This is because the wing section is fairly thick and lifts a load easily, but is trimmed to fly flat and fast. It is basically a Clark-Y section, no undercamber or reflex. To facilitate this flying characteristic, the model purposefully is made as light as possible. It will catch the good thermals and stay up for long enjoyable flights without difficulty. It also will ride the slope lift easily.

The butterfly tail configuration was chosen for only a few good reasons. First, using only two surfaces at the tail, there is less building to be done! Second, they cause less total aerodynamic drag. And third, the use of two control surfaces gives very positive control of the plane, yet a flat turn. Turns without the usual steep banking in a thermal, or at the edge of the slope lift, should be as flat as possible, yet in a very tight radius. A butterfly tail controls bank while causing powerful turn. I suppose yet another slight benefit is that the dirty exhaust of the engine flows clear of the flying or control surfaces, hence a cleaner model. When sitting on the ground or while landing, butterfly tails do not catch the ground first and break. Model will slide to a stop and rest on a wing gently. After many flights you'll appreciate this bonus — less patching or spar splicing. And they look better!

The construction is neither difficult nor easy. It is supposed to be strong, and I assure you it is! Since the lighter they are, the softer they fall, I have designed as light and durable a model as possible. Wherever stress is expected, an extra brace or spar is found. For example, the wing has one short spar. Gliders can build up extra speed trying to dive out of a lift and strong wings help make for smooth landings. Fuselage structure is interesting in the use of corner cap-strips instead of longerons. These strips of light balsa offer all the strength of a longeron as such, but at only a fraction of the weight. Also, you will notice the built-up bulkheads. No great strength is needed of them. The diagonal braces are quite important parts of the fuselage. They prevent torsional warping and transfer the shock loads of hard landings to the entire structure, hence preserving the plane through rough treatment.

The engine is pylon mounted. It is as streamlined as practical, and its particular shape helps to cancel torque effect of the motor. There is no rudder as such at the tail for the swirling propeller slipstream to blow against. One word of advice, keep the RC installation as light as possible. Use strong batteries — your flights might be longer than you planned! Wind up that escapement well before each flight. Or use a light motorized unit — but then use light nicad batteries. Escapements are preferred in this model because they are light in weight. Light weight makes a small plane possible. Happy soaring!



SUNDAY FUN

AN .02 POWERED SPORT R/C MODEL

Wing Area - 210 sq. in.	Weight - 6 oz.

Designed by: E.D. WESTWOOD

Drawn by: Chuck Bedwell

Pittsburgh's Answer to the Junior Problem

Delta Dart-Ranger 21 part of meet under way in Pitt Field House. KDKA-Radio received 10,000 requests for Dart kits in one week.

The remarkable success of this unique promotion proves the untapped potential that exists across the land.

PAUL G. KASTORY

Photography / CLYDE HARE

HAVE you ever seen a model airplane contest offering hundreds of awards advertised on your local TV station, with free building courses and flight adjustment demonstrations? Or have you ever heard a local disc jockey advertise free model airplane kits on your radio? Such was the advance publicity for the Third Allegheny Model Aeronautics Council Indoor Meet, held on April 15-16, 1967 at the University of Pittsburgh Field House.

Events for Junior competitors were arranged so that both novice and experienced flyers could compete. The age classification breakdowns of Dodoes, (9 years and less), Fledglings (10-12 years) and Juniors (13-15 years) provided Juniors with competition within the limit of their capabilities. The events for the Junior classes were Delta Dart, Hand-Launched Glider, Pre-Fab, Flying Scale, and Originality & Performance. Two thousand of the Delta Dart (AMA Racer) kits made by Sig Mfg. Co. were provided by KDKA-Radio, with special naming of KDKA F-1020 Racer, and distributed free to the first 2,000 requests. Approximately 6,000 requests were received after the first day's announcement, and over 10,000 requests within the first week.

Although the events and awards were aimed primarily toward the Junior and Sub-Junior age classification, separate events were held for Senior and Open flyers. The awards ranged from trophies through third place, merchandise certificates, Junior Science Scholarships, flight instructions and an airline ride for the 100 highest scoring Junior competitors. Sponsors for the awards were KDKA-TV and Radio, Mr. Rockwell, Page Airways, Pittsburgh Institute of Aeronautics, Buhl Planetarium, Sig Mfg. Co., Micro-X Products, C. G. Models, Jetco, and AMERICAN AIRCRAFT MODELER Magazine.

Big moment in little fellow's life. Paul Hare receives a trophy from Allegheny Airlines stewardess — 83% of entry under 16 years.

Since contest-type indoor flying sites are not generally available in Pittsburgh, Saturday, April 15 was designated as a day for test flying and record trials. Test flying was allotted to alternating 30-minute time periods. Over 100 contestants participated in Saturday's test flying and many new untried models were returned for repairs. On Sunday, April 16, 1967 all official flights were recorded.

Some 189 contestants (including 11 females) completed over 1400 official flights; 156 (83%!) were under age 16. Fifty-four were nine or less, 63 were from 10 to 12, 39 were between 13 and 15 years old. It should be noted that there were more Junior class contestants completing a higher total number of flights than all other age classes combined. There was a very small number of Senior entries. This is due to the fact that prior to three years ago, there was no indoor competition in Pittsburgh for over 20 years. The AMA Delta Dart program, pioneered by the Allegheny Model Aeronautics Council, was mainly responsible for the large number of Junior contestants, who otherwise might not have ever built a model airplane.

Special awards for Junior teams were

Continued on page 54

Then Lt. Johnson in the cockpit of "Lucky" — 22 of eventual 23 confirmed victories shown on side.

Model is made from Hawk kit. Can be built with either bubble canopy, or razorback fuselage as shown.

JOHN N. TOWNSLEY

Undeniably 'Lucky'

Republic P-47D Thunderbolt as flown by the American Ace, Robert S. Johnson.

Lt. (later Major) Robert S. Johnson's aircraft was most aptly named the "Lucky." Twenty-three of his 28 victories were scored in this aircraft, and its untimely end was none of his doing. Who knows how many additional victories he might have added to the string in the Lucky had it not been destroyed during Johnson's absence? Johnson was in London on leave when Dale Storm, a fellow pilot, was flying the Lucky in combat on March 22, 1944, when the plane was lost in the North Sea.

While he flew it, the Lucky served Johnson well, receiving the best of maintenance from his crew chief, Sgt. "Pappy" Gould and his men. Well aware that team spirit and endeavor are of paramount importance, Johnson has given generous credit to the maintenance crew, realizing the value of an able and dedicated crew in keeping a fighter plane operable and in fighting trim. It seems amazing that the plane withstood the punishment of the gruelling day by day air combat with the Luftwaffe, at a time when so many of the planes had such a short combat span.

Six of Johnson's victories were scored in the last 25 hours of his combat duty. These hours represented a requested extension of the standard 200-hour tour; a very eventful day and an hour in the life of any combat pilot!

I purchased the Johnson-Caiden book "Thunderbolt," which rekindled my interest in the plane and pilot and considered that AMERICAN AIRCRAFT MODELER readers would share my regard for this plane as one which should be included in a collection. The book I highly recommend to anyone interested in pilots and planes of WW II. It is a very well written account of a fighter pilot's wartime experiences. The paperback version, Ballantine publishers' Book No. F323 K, sells for 50¢.

From Robert Johnson, now living in the Long Island area, I obtained data and the photos used in this article, which were sincerely appreciated. After learning that Johnson's plane was named Lucky, I recalled that Hawk had produced a P-47D kit from which the modeler could construct either a razorback or bubble-canopy aircraft. Airfix manufactures a P-47D kit also, but this is for the replacement aircraft for the Lucky — the "Penrod and Sam" plane. The Airfix kit is in 1/72 scale and retails for 50¢; the Hawk kit (#500) retails for $1.

The decals in the Hawk kit are for Johnson's plane. The kit is excellent, which is fortunate, as this seems to be the only available kit on the market from which to build this model. Some of the special features of the kit are as follows: the tires are molded black plastic and the wheel centers are aluminum color, allowing insertion in the tire without being painted.

I am sure you have all been frustrated at one time or another while painting the wheel centers and tires. This problem is neatly solved for you by the manufacturer. Another feature is the way in which the propeller is assembled. The tail wheel also is designed so that you need not be bothered painting the tire and wheel after assembly. The canopy can be made in open or closed position. The decals are excellent, with plenty of small lettering to give the aircraft a factory look. All parts are clean of flash and go together smoothly.

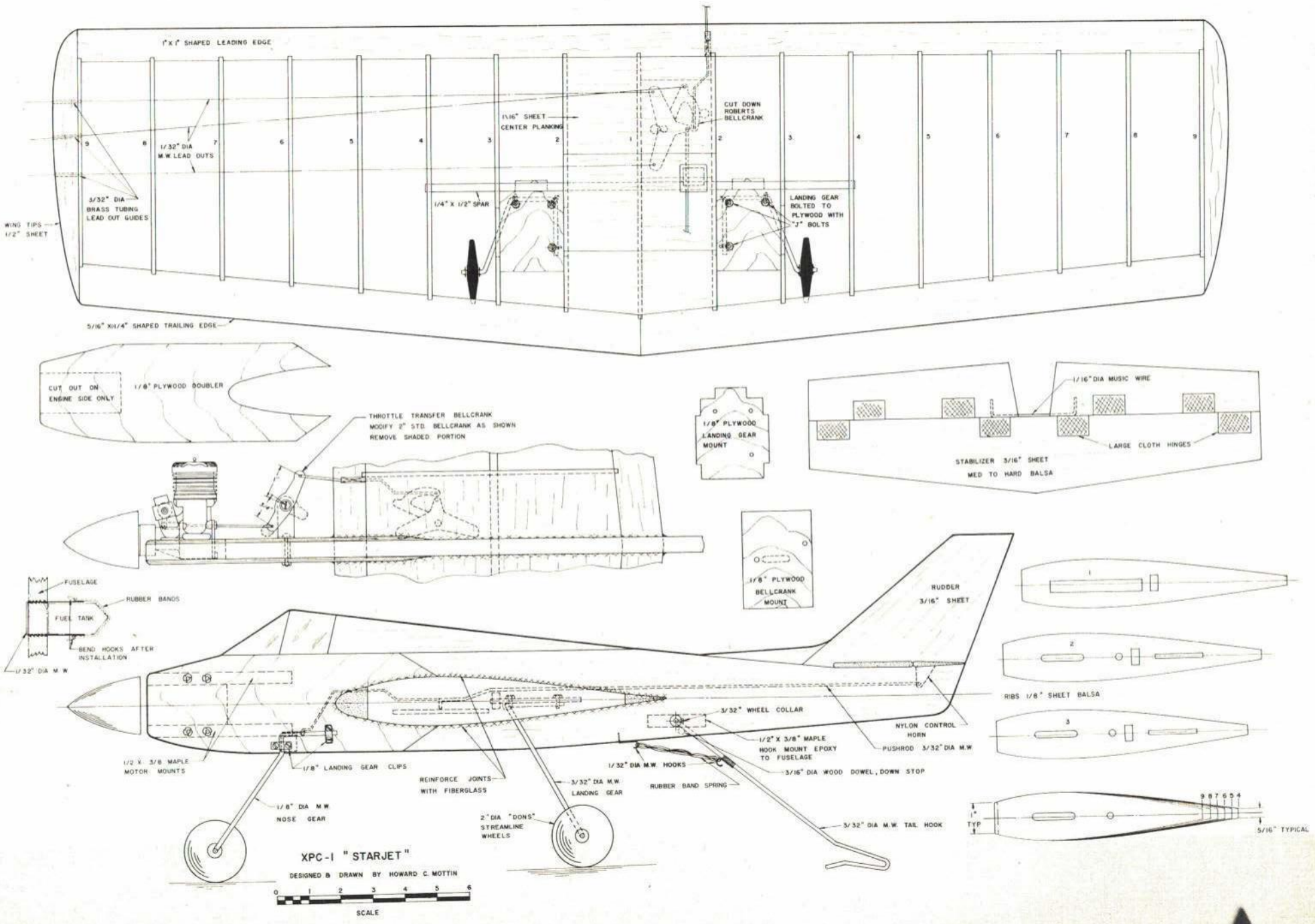
Color Scheme: Cowling was white back to first panel joint-line; uppersurfaces: olive drab, undersurfaces: sky gray.

Continued on page 70

Republic P-47D Thunderbolt

Republican Aviation Corporation technical data: Total number of aircraft produced: 16,000. Specifications: P-47D-25RE*; Powerplant: a Pratt & Whitney R-2800-59 two-row radial, developing 2000 hp rated and 2300 hp maximum. **Wingspan:** 40' 9". **Length** (with Hamilton propeller): 36' 0-¾", (with Curtiss propeller): 36' 1-¾". **Wing area:** 300 sq. ft. **Armament:** six or eight 0.5 Browning machine guns; up to 2500 lbs. of bombs or ten 5" H.V.A.R. rockets. **Maximum loaded weight:** 17,500 lbs. **Speed:** 433 mph at 30,000 ft. **Range:** 950 mi. at 10,000 ft.

*Manufacturers' code letters: RA — Republic, Evansville; RE — Republic, Farmingdale; G — Curtiss Wright, Buffalo.



FULL SIZE PLANS AVAILABLE — SEE PAGE 60

If the Starjet looks familiar, it's because the wing is approximately the same as a Ringmaster's. A kit "mod" is feasible.

You don't have to be a stunt champion to fly this fun-type craft!

The Starjet

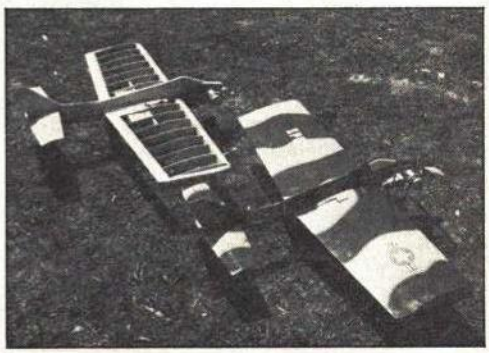
HOWARD MOTTIN

THE trend in control line is toward simplification of design to enable more people to compete in a variety of events. These are primarily fun-type events that enable an individual to build a plane in a couple of days and still be on a competitive level. Following in the footsteps of profile Goodyear (an official AMA event for 1968) and the slow-combat event now under consideration, is a proposal for a Profile Navy Carrier event. Profile Carrier has been held at the Nationals for the last few years and as a junior event at quite a few local contests, but there hasn't been a definite set of rules to guide the event. Usually, the event is run under Class I rules, except for the deletion of the scale requirement. In the past, this has sometimes resulted in confusion as to what the aircraft requirements are. Also, this unrestricted event with high powered HO's and exotic fuels does not lend itself to a fun event.

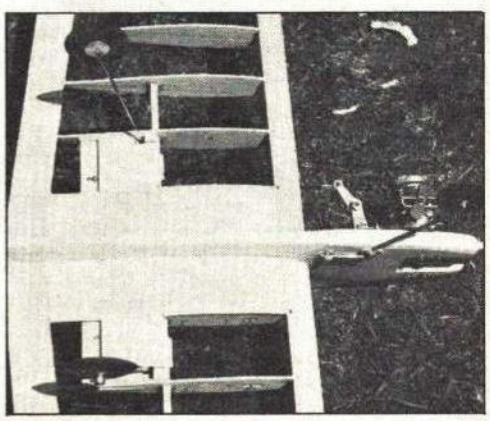
As an effort to establish a fun type event for the Profile Carrier classification, a new set of rules have been drawn up and have been adopted by the Michigan Model Airplane Assoc. for use in Michigan contests. The theme is to provide a simplified form of Navy Carrier competition, using readily available stunt or RC engines with easy-to-construct airplanes, for all age groups. This was not intended to be just a Junior-Senior beginners event, but an event for the Open flyers as well. Some of us old men are beginning to tire from holding onto that Rossi. Besides, I think it is more beneficial to Junior flyers to have the example of Open flyers in an event.

A brief summary of the Profile rules are as follows: a) Three 60-ft. 015 lines required; b) Engine limited to 36 C. I. D. "stock" stunt or RC engine without pressure fuel system; c) Fuselage must be Profile with 23" minimum length and height in proportion; d) Minimum wing area 300 sq. in., banning auxiliary lift devices; e) Model to be finished in military colors and markings; f) Stunt fuel only.

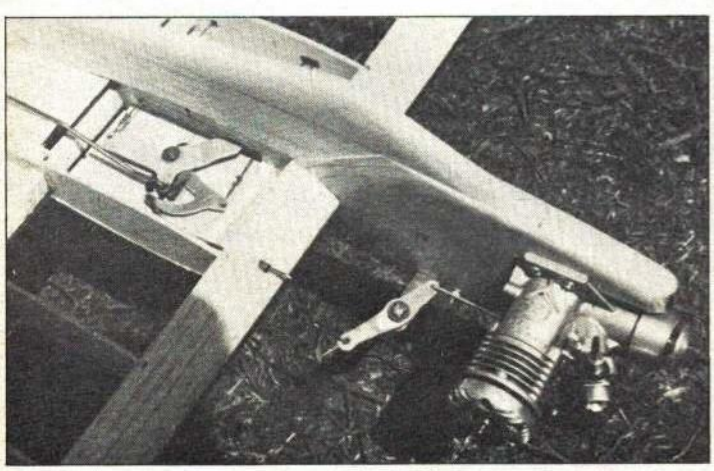
The chief reason for these rules is to place an emphasis on low-speed flying and to simplify the aircraft. Just about anyone can hang onto a plane going 100 mph, but it takes a greater skill at flying a plane close to 20 mph, especially in the wind. The rules define a size plane that is easy to fly and will look like a semi-realistic military type plane not restricted



The camouflage scheme — which makes this picture rather hard to see — takes two coats of gray, green patches, edges airbrushed.



Bottom view of uncovered frame shows landing gear detail. Nose wheel strut imbeds in fuselage, is held by two metal brackets.



Cut-down Roberts bellcrank for three-line control mounts on ply platform. Throttle pushrod goes through leading edge fairlead.

Transfer bellcrank with throttle linkage to Super Tigre 35 RC engine. Metal mounting bracket for transfer bolts to fuselage.

to U.S. By eliminating hopped-up engines and exotic fuels the event is further placed within reach of anyone. Furthermore, you don't have to be a stunt champion to fly the event; once you've mastered flying level you can compete. This should be particularly helpful to novice flyers.

Simplicity, durability and flyability are the keynotes of the design I have chosen for this event. Since the "jet type" is currently the most popular plane, I chose this as a starting point. To further enhance this aspect I used a camouflage paint scheme. After a few trial sketches I discovered that my plane closely approximated the size of the old standby Sterling, Ringmaster so I designed the wing with the same rib positions. Thus, those who don't care to trace out ribs and cut out parts from plans can use a Ringmaster kit and modify the kit to follow this design. My second plane was built in this manner and it was far easier to build, and required about half the construction time of the first plane. Construction is easy and along conventional lines. I will mention particular points that specifically apply to the Profile Carrier event.

Wing: The wing construction is begun by laying out the shaped leading and trailing edges on the plans and cutting the notches for the wing ribs. The ribs can be cut from a piece of 1/8" sheet. The easiest way to make the ribs is to use a long plastic sweep or, if this is unavailable, to make a template from 3/32 plywood. Make the template to the shape of the upper edge of the number one rib. Since the front and trailing edges of all ribs are 1" and 5/16" respectively, then it is simply a matter of laying out the proper lengths of all the ribs along center lines. Then, place the front tip of the template at the 1/2" mark at the leading edge, and pivot the template till the edge of the template touches the 5/32" mark at the trailing edge; then cut along the template. The center lines of the ribs can be marked by using either a ball point pen or a nylon tip pen. Cut out the notches for the landing gear and the holes for the leadouts in the inboard wing ribs.

Lay off the length of the stub spar on a piece of 1/4 x 1/2 stock and mark the location of the landing gear notches. Cut out these notches on the centerline of the spar. The landing gear mounts are cut out of a piece of 1/8 plywood (5 ply).

A good way to assemble the wing is to clamp the leading edge in a vise and assemble vertically. Fit together all the ribs with the spar and landing gear mount in place and pin to the leading and trailing edges. Check the alignment of the structure, making sure not to build in any warps, and then glue all the joints thoroughly. The center section of the wing between the No. 2 ribs is planked with 1/16 sheet. The bottom front sections of sheet are glued in first. The section that will extend over the landing gear on the bottom is glued in after assembly of the wing to the fuselage. The Roberts bellcrank should be cut down to the size shown on the plans and illustrated in the instructions with the unit. The

Continued on page 49

The wing tips were rounded to cut down wing area and to make the model look like a military plane. Tail surfaces reshaped to suit the pilot's purposes.

Streak for Carrier

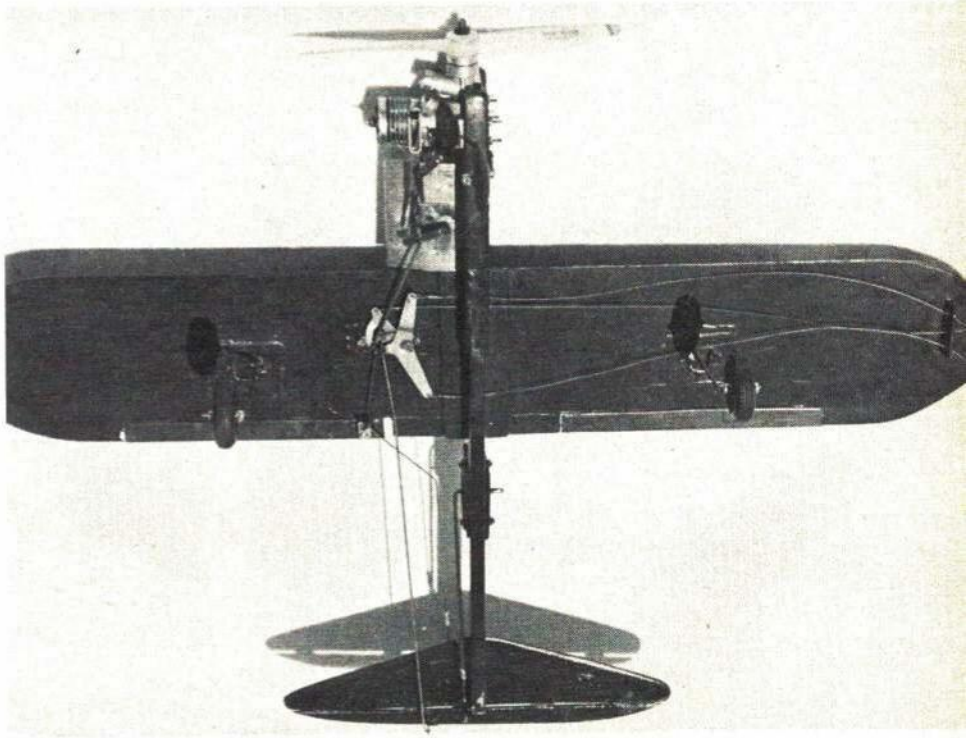
How a Junior entrant modified his Flite Streak to win Class 1 Carrier at the Nats.

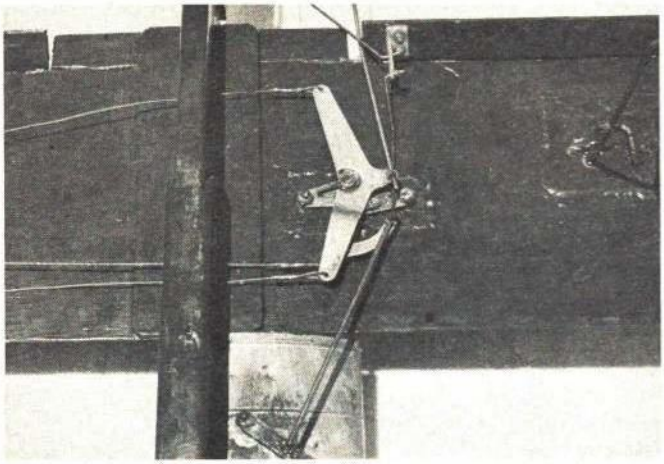
JOHN HERNDON

Photography / JOSEPH HUDSON

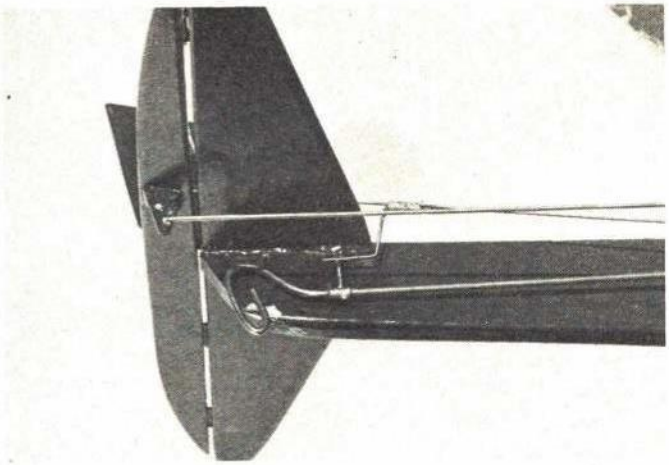
I walked over to the results board at the '65 Nats to see how I'd done in Carrier I Profile. I was pleased to see that I had placed fifth, but it tore me up to see that Kathy Banisch, that cute little thing from North Carolina, had placed first. Now mind you, I'm not complaining about placing fifth, but for a *girl* to place four places above me. . . .

I wasn't completely satisfied with the model I was flying then, so when we got back to Texas, I decided to look for a bet-





Close-up of Roberts bellcrank installation. Connection to the wing flaps, and from flaps to rudder is evident in this pic.



Tail hook in the up position. Note how forward movement of the rudder slow-speed pushrod releases hook, which then can drop.

ter plane. One day my dad (who helps me a lot) and I were showing some other boys in Gonzales how to fly. We were using a Flite Streak Trainer by Top Flite. I like this ship as it is a tough, virtually indestructible little plane. We had a McCoy 19 on the front. As I was watching the other boys fly, my thoughts went back to Willow Grove. I got so excited I made my friend stop his flight! I ran over and looked the plane over very carefully. This was to be my next Carrier I profile plane!

I obtained a kit and went to work. I rounded the tips to cut down on area and make it look more like a military plane. You may shape these any way you desire; I don't think it affects the flying. I completely redesigned the stab, elevator and rudder. These shapes are also left to the discrepancy of the modeler. I drilled another hole in the motor arm of the Roberts bellcrank to accommodate the pushrod for the flaps (these are approximately ¾ x 10, but not critical. The flap control horn in turn controlled the rudder and hook. To connect the hook I soldered a Z-shaped wire hanging down from the rudder pushrod. The bottom end of the wire is inserted into a loop soldered onto the hook. This is made by looping a piece of soft copper wire around a nail one time and twisting several turns to the desired length. Solder the entire length of the twist. It makes a solid loop, flexible enough for adjustment for the hook drop. With this arrangement, low motor gives flaps, right rudder and drops the hook.

I did away with the conventional gear supplied in the kit and added tricycle gear. This makes for smooth takeoffs and easy landings on the carrier! The gear was installed in the wing in the following manner: Using ⅛ plywood and ⅛ piano wire, first bend the gear wire to a suitable length with a U at the top for fastening to the wing. The gear is bolted to the plywood brace using J bolts and the bolts are cut off flush with the nut and soldered to the nut. The underside of the wing must be carved out ⅛ for the brace and further to accommodate the nuts. The plywood brace I used was about 2" sq., but this is not critical. You should also use this same procedure in the mounting of the Roberts Control. All three braces should be epoxied in and must be allowed to dry 24 hours. The bottom view in pictures shows an extra control horn mechanism soldered through the tank. This was to accommodate a Johnson Fuel Metering system which my dad, Mr. Johnson, and I finished installing at 3 a.m. the day I flew at the Nats. (This is not a recommended procedure.) I might add that the Johnson fuel control tremendously helped my Super Tigre 35 turn a low 29 mph slow speed. I highly recommend it.

The Streak Trainer with the trike gear, flaps and other modifications, along with a fine Tigre 35 and Johnson fuel system enabled me to rack up 289 points in Carrier I Profile at the '66 Nats in Chicago. This was well ahead of second place and was enough to place me third in Carrier I *without* scale points! It is a fine ship.

Bottom view shows installation of total hardware system which is needed for carrier operations. Note the wide landing gear.

Tail hook here is shown in the down position, ready to snag the arresting cables on carrier deck. Hook is generous, natch!

CANARD POINTERS

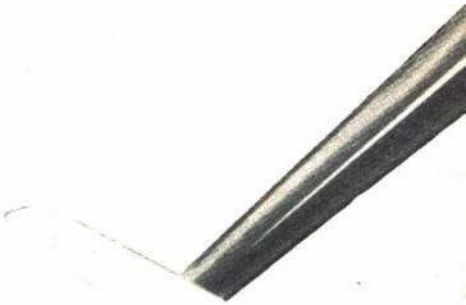
Looking for something new and different in RC designs? Then add a canard to your must list for '68!

CAPT. RONALD VAN PUTTE

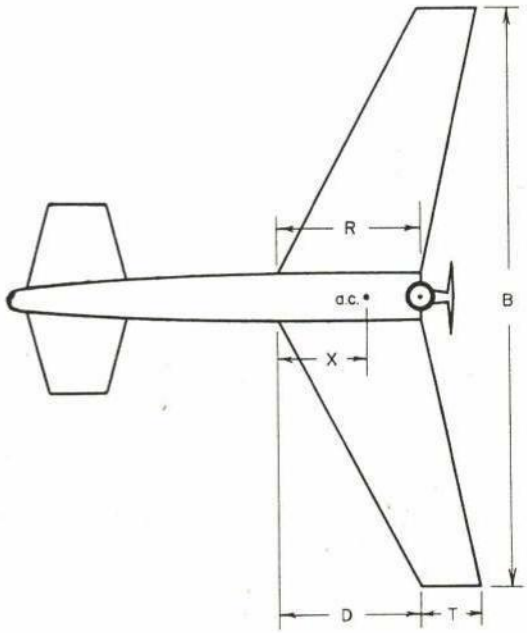
IF you ask yourself, "Why would anyone want to build something as unconventional as a canard?" — then you are missing the point. The main reason for building a canard should be that you want to get out of the rut and do something different.

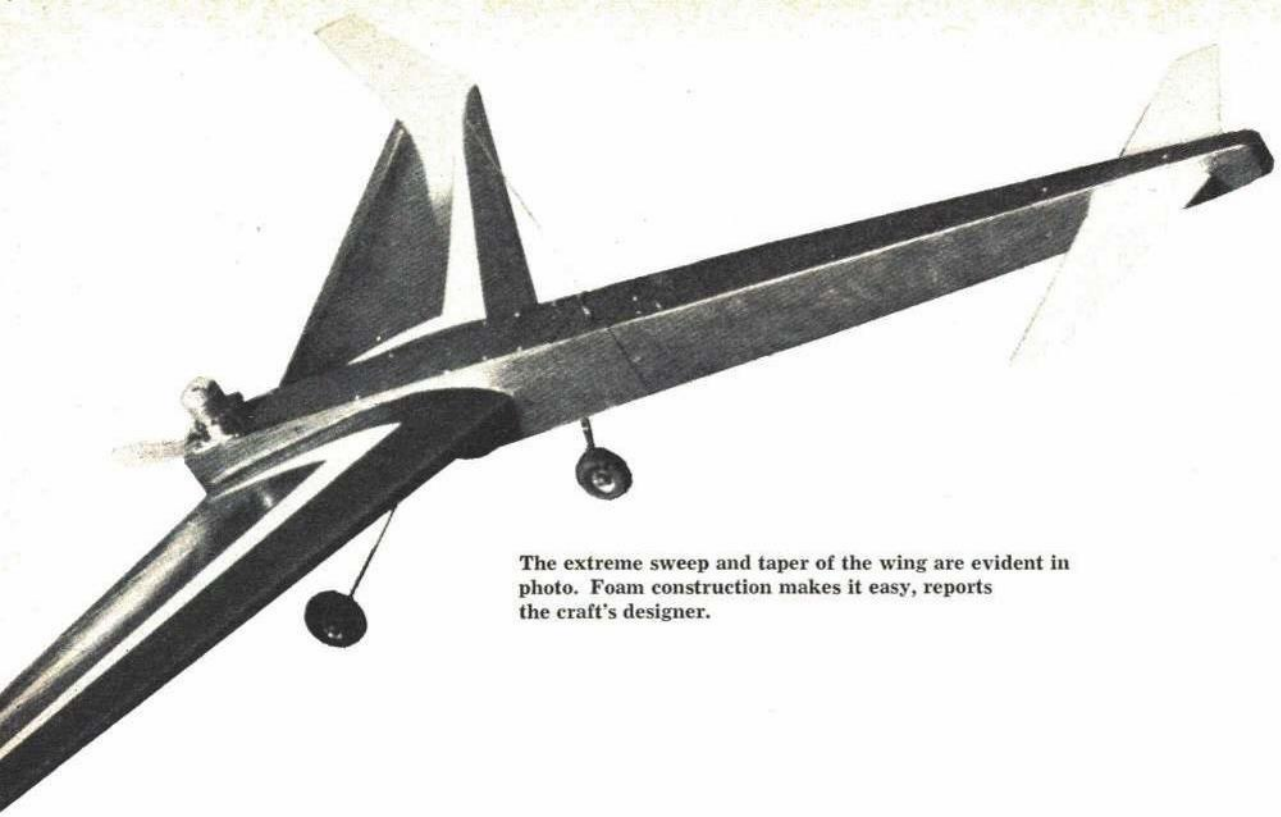
My interest in canards began when I was looking for a problem to give students in the stability and control course at the Air Force Institute of Technology, Dayton, Ohio. All Air Force officers, they were graduate students in a combined Aeronautical-Mechanical Engineering program. I wanted a problem that was challenging and interesting. The design of a canard airplane seemed ideal. I told my students that if the design looked promising, I would build and fly an R/C model of it before they graduated in mid-March, so they could see the result.

Construction began about a week before Christmas, and the plane was completed in time to be displayed at the Toledo R/C Conference. The first day warm enough for the plane to be flown was March 9. We gave it a try with Don Lowe at the controls. Results were extremely gratifying. The plane had three flights and exhibited no nasty tendencies in normal flight maneuvers. Normal stalls were very gentle. Only bad tendency the airplane has is in a deep stall recovery. On the third flight Don pulled the airplane up steeply, as though he was going to loop it, and suddenly chopped power. It fell through to a near-horizontal attitude, going into a classic falling leaf stall with the wings rocking $\pm$ 30 degrees. The airplane would not recover, no matter what Don did. I suspect this condition was caused by an unfortunate combination of planform areas that will not be repeated. To date my canard has success-



Don Lowe, acting as test pilot, prepares for takeoff on maiden flight. Among interesting features is the short-coupled gear.





The extreme sweep and taper of the wing are evident in photo. Foam construction makes it easy, reports the craft's designer.

fully flown many times; it is as easy to fly as my Senior Falcon.

But, what about *your* canard? With the design points I am going to pass along, every competent R/C builder-flyer should be able to design his own canard. Let's talk briefly about separate parts of the airplane (wing, horizontal stabilizer, vertical fin, fuselage and engine) and then discuss them as part of an integrated design.

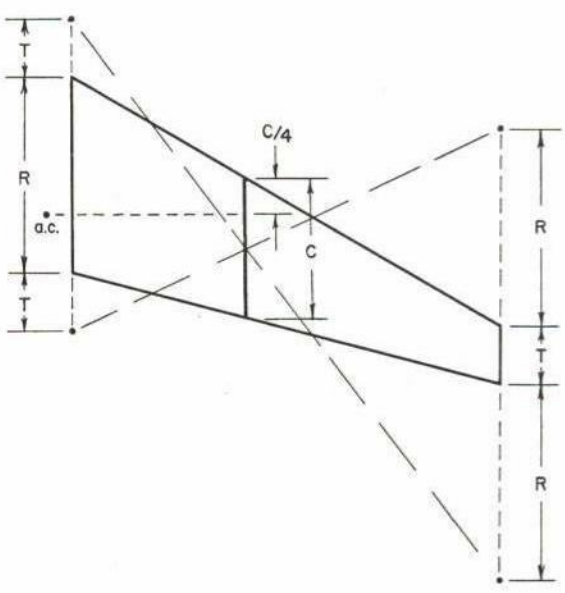
There is no reason why a canard's wing cannot be the same as the wing on a conventional model. In fact, if you are crafty, the wing from your Taurus, Kwik-Fli, etc. can be used. The horizontal stabilizer (including elevator) also can be conventional. Or, you may wish to try something different and use an all-movable stabilizer as on my canard. Remember, though, up elevator on a canard makes it pitch down!

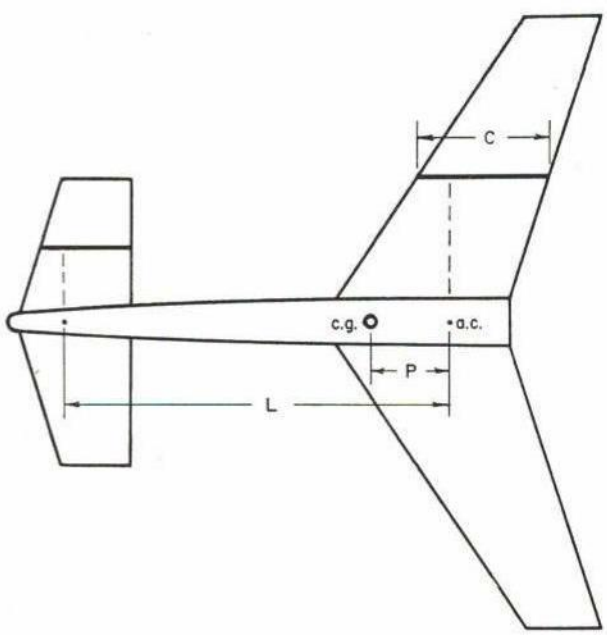
The horizontal stabilizer should be about 20% of the area of the wing if it is about the same distance from the wing as a conventional airplane. Make it slightly smaller for longer tail moments and vice versa. Stabilizer should be a little smaller than on a conventional airplane because it will be out of the wing wash and more effective.

The vertical fin (including rudder) will, in general, have to be different. Do not mount it on or near the horizontal stabilizer. A fin is used primarily to provide directional stability to the airplane. It (or they) should be mounted as far behind the center of gravity as possible to be effective. Since the horizontal stabilizer and most of the fuselage are located ahead of the CG, they create a destabilizing effect. Obtaining sufficient directional stability is one of the biggest problems in canard design.

The fuselage will have to be somewhat different, more for esthetic reasons than practical ones. You must admit a Sonic Cruiser fuselage would look pretty silly going backwards. Seriously, the destabilizing effect of a forward fuselage can be alleviated by making it a rather slender boom.

The engine should be operated as a pusher at the rear. If one mounted the engine at the nose, a serious CG problem would result, requiring a large amount of ballast at the rear of the plane. Attempting to operate the engine as a tractor, located on a pylon near the CG, would cause trim changes from engine-on to





engine-off. A twin-engine canard with engines on the wing or on pylons to either side of the fuselage and near the CG is certainly practical.

This leaves one with a pusher being the most practical type of propulsion. The problem in using a pusher layout is finding engines that will run backwards or in finding sufficiently large pusher propellers. The largest commercially available pusher prop is a 10-6 nylon (which is a bit small for engines of 51 cu. in. and up). However, I used a 10-6 pusher on a Super Tigre 56 in a 7.5 lb. airplane with reasonable success. The only time the plane lacked power was in the vertical maneuvers.

Now, what about the integrated design? You must put the pieces together so that the airplane is stable and controllable. If you have doubts about how things should be made, control deflection, etc., rely on experience and do what has worked before. This may not sound technically exciting, but it works. General construction techniques are the same in a canard, since all you do is rearrange basic aircraft components.

If you had success building and flying R/C airplanes, the canard design you have in your mind will probably fly if the CG is properly located. The problem is to find the proper location. Let's assume that you have your idea sketched on a piece of paper, and it looks something like Fig. 1.

The first thing you must find is the location of the wing's aerodynamic center. You may use equation 1 to determine

Equation 1:

$$X = \frac{R}{4}\left[\frac{1 + 2B \quad (1+2K)}{3S}\left(\frac{D - R\,(1-K)}{4}\right)\right]$$

Equation 2:

$$S = \frac{RB}{2}\,(1+K)$$

Equation 3:

$$C = \frac{2R}{3} \quad \frac{1+K+K^2}{1+K}$$

Equation 4:

$$P = \frac{LA}{S} + \frac{C}{10}$$

Equation 5:

$$V = \frac{3SB}{200F}$$

Equation 6:

$$\frac{A}{S}\,\frac{L}{C} = 0.5$$

X, the distance the wing aerodynamic center is aft of the leading edge of the root chord (in inches). In the equation, R is the root chord (in inches), B is the wing span (in inches), S is the wing area (in square inches), D is the distance between the leading edge of the root chord and the leading edge of the tip chord (in inches) and K is the ratio of tip chord to root chord T/R.

You may easily determine the area of a trapezoidal wing by using equation 2. The mean aerodynamic chord (C) of a trapezoidal wing is determined with equation 3. If your arithmetic is rusty, or you don't understand the equations, the wing aerodynamic center may be determined graphically as follows: Draw an accurate picture of one half of the wing as in Fig. 2. Extend the root chord in both directions an amount equal to the tip chord. Extend the tip chord in both directions an amount equal to the root chord. Draw two lines from the four points as indicated. The two lines will intersect at the midpoint of one of the wing chords. This chord is the mean aerodynamic chord C. Measure toward the leading edge an amount equal to one-quarter of this chord. Project the point you've just located to the fuselage centerline. This is the aerodynamic center of the wing. Both techniques for determining the location of the aerodynamic center of the wing involve approximations but are accurate enough for our purpose.

Locate the aerodynamic center of the horizontal stabilizer in the same way. Let L, Fig. 3, be the distance between the aerodynamic centers of the wing and stabilizer. Let S be the wing area and A be the area of the horizontal stabilizer. The CG should be located, a distance P, ahead of the aerodynamic center of the wing as shown in Fig. 3, where P is determined by equation 4.

Use of this equation actually places the CG ahead of where it should be for an optimum balance of stability and controllability, but it does guarantee longitudinal stability. After your canard has flown successfully, you may want to move the CG slightly rearward. If it looks as though you can actually get the CG where you want it, you are well on your way. However, if it seems like an impossible location, without adding a lot of ballast, change your design until the CG is in a reasonable spot.

It was mentioned earlier that obtaining directional stability was one of the biggest problems in canard design. For this reason I recommend that the wings on your canard should be either swept or a modified delta shape with vertical fins on the wing tips. Either technique puts the vertical fins well rearward of the CG, a condition mandatory for good directional stability. However, fins located on the tips of even highly swept wings are still not as far back of the CG as vertical fins on conventional craft. Therefore, each vertical fin should be about the size of the vertical fin on a conventional airplane. A good rule of thumb, in deciding how big to make the vertical fins, is equation 5. In the equation, V is the area in sq. in. of each vertical fin, including rudder, and F is the distance from the CG to the center of the vertical tail (in inches). The other terms (S, B) were defined before.

The formula assumes you are using two fins; if you are using only one, multiply the answer by two to get the required area of a single fin. If you insist on a straight wing, make the horizontal stabilizer area about 40% of the wing area in order to move the desired CG well forward, providing more distance between the CG and vertical fins.

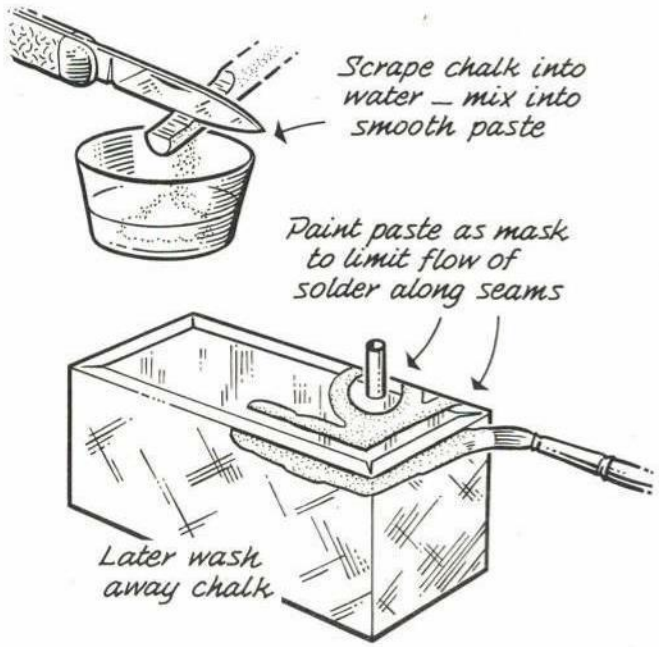
Continued on page 54

The author and his rare bird. The design resulted from a problem he gave students at the Air Force Institute of Technology.

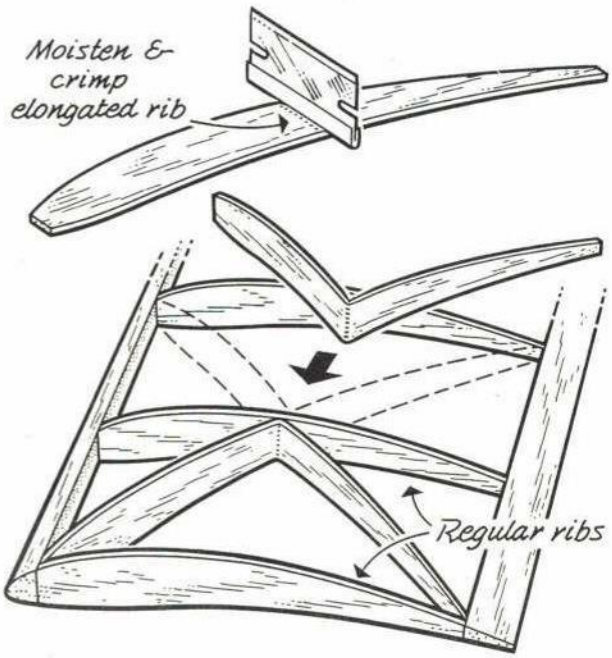
H. A. THOMAS

SKETCHBOOK

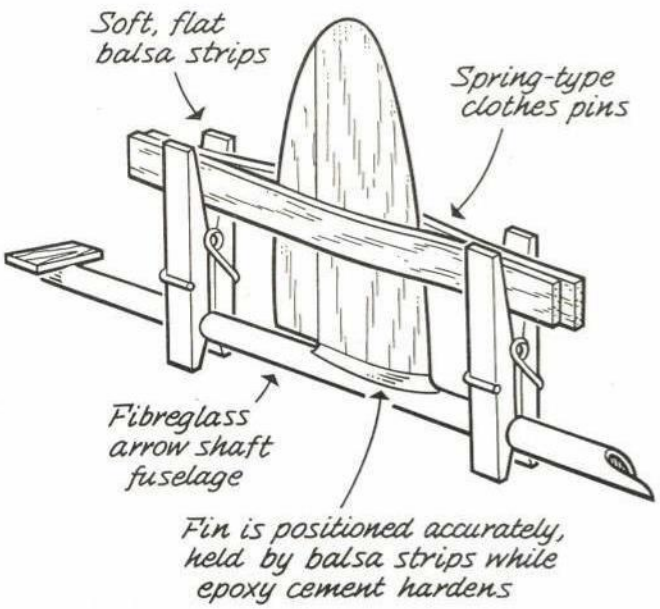
Have a new idea for construction, adjustment or operation of model aircraft or RC? AM pays $10 for each 'hint & kink' used. Send rough sketch and description to Sketchbook, c/o American Aircraft Modeler, Potomac Aviation Publications, Inc., 1012 14th St., NW, Washington, D.C. 20005



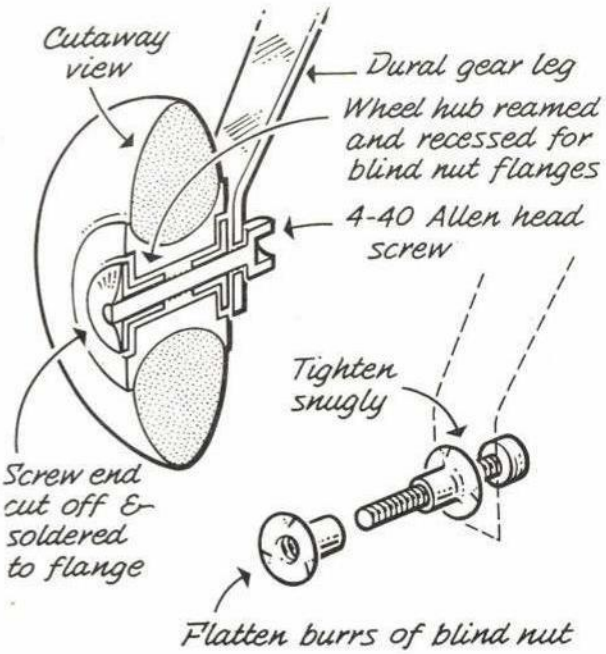
Masking material for soldering is a paste made by dissolving stick of chalk in water. Apply with brush around area to be soldered. After solder cools, wipe off chalk. Suggested by Eliseo Calvo, Mandaluyong, Rizal, Philippines.



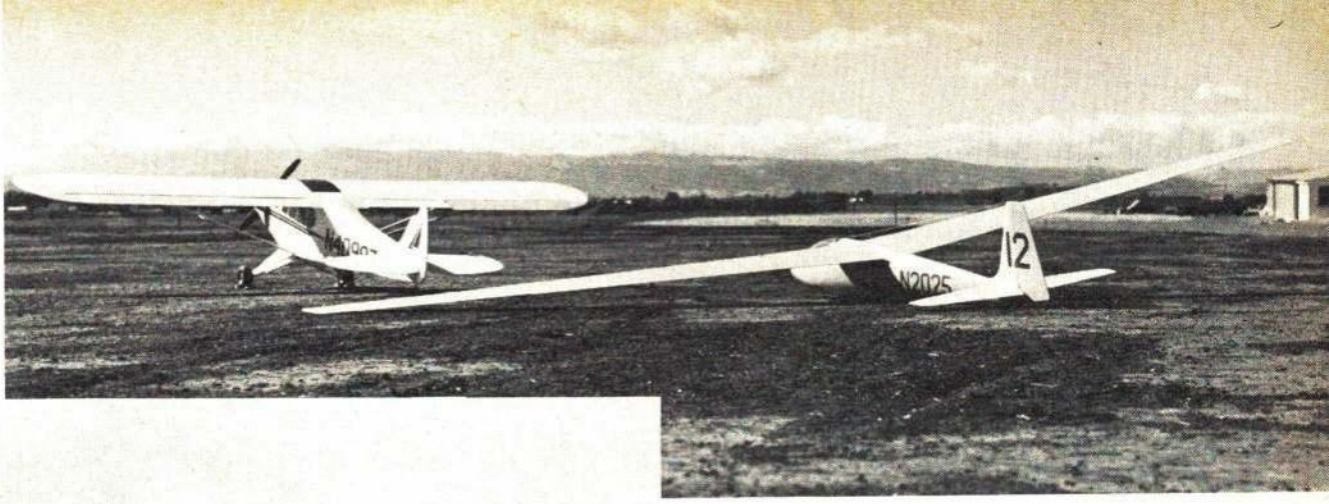
Improved structure and easier assembly are advantages of geodetic wing, stabilizer frames designed by John E. Pfeifer, East Lansing, Mich. Elongated ribs are moistened, scored and bent to fit in position for final cementing.



D. A. George, Park Forest, Ill., uses fibreglass arrow shaft for A-2 towline glider. To install fin accurately, spring-type clothespins are clamped onto shaft. Balsa strips wedged between ends of clothespins hold fin firmly to shaft.



Trim, workmanlike hub assembly for rat-racer gear uses Allen head cap screw and blind mounting nuts. Special recesses are cut in aluminum hub. Submitted by John Schwartz, West Palm Beach, Fla.



Above: The Cub and KA6E pose together at the glider port, about to be hooked up for a tow aloft. There is excellent lift in California for this kind of soaring flight. Below: Jerry Nelson's most recent achievement is this 12-ft. soarer, an 8-lb. copy of a German KA6E competition sailplane. Model is towed by an equally magnificent 8-ft. Piper Cub.

RADIO CONTROL WORLD

A ROUNDUP OF LATEST NEWS

CONDUCTED BY HOWARD MC ENTEE

'The writer had the unenviable experience of being thrown off three fields in one weekend — all because of engine noise.'

The muffler problem: We keep hearing about the noise produced by model plane engines, but no one does much about it (meaning no one in the model industry). Perhaps "no one" is a bit too strong — we do have some mufflers available, but most are just "attachments" to existing engines. Those who have dug into the engine noise problem feel that satisfactory noise reduction can come only when an engine and the muffler are designed together as a unit, not entirely separately as has been the case so far.

For those who really fly out in the "stix" there isn't any noise problem; as long as the modelers themselves can stand the engine noise, no one else will be bothered by it. But not too many of us do fly in wide open and uninhabited country. The writer has flown at many sites in the crowded Northeast, and has seen individuals and club groups evicted from many good (well, relatively good!) flying fields. Many reasons have been given for such evictions — "the planes frighten the chickens," "a model plane might fly right through my living room window," "those planes are dangerous and someone is gonna get hurt" . . . and so on. But most of us evictees know in our bones that the main complaint is *really* engine noise. The writer had the unenviable experience of being thrown off three model fields in one weekend, all because of engine noise. So do we look into the matter of mufflers? Nope — most of us just try to find another field where we can operate for awhile with our screaming engines!

The noise problem with model engines is much more complex than it seems, but unfortunately no real attempt has been made to get the answers we need, at least in this country. The AMA has tried to get some muffler research going, but it takes a lot of time, and a lot of equipment; most modelers have too little of either. The engine manufacturers don't seem much interested in the problem; it will take their time, and money to solve it too, and until we modelers show there is a demand and a market for muffled engines, there seems little hope from this source. One solution might be in urging students at engineering colleges to delve into muffler research, perhaps even do a thesis on the subject. Here the time would be put to good use, the engineering knowledge is available, even the necessary equipment could be had. We have heard of some attempts in this direction, but no real all-out assault.

Actually, quite a bit of isolated muffler research has been

BETTER MOUSETRAPS?

Sleek homemade muffler: Seen at a 1967 meet was a very attractive muffler built by Jerry Wagner, and fitted to a plane of his own design. We stress "attractive," as many model engine mufflers are anything but, even though they may work efficiently. As seen in our sketch, this 1" O.D. unit has a smooth streamlined shape, and it has nothing inside. Even so, we noted it definitely cut down the uproar of Jerry's 60 engine, but he says it hardly reduces power. While this unit may look ridiculously simple — and thus hardly capable of doing any worthwhile "muffling," there is an interesting principle involved.

It will be noted that the stack from engine to muffler is offset from the centerline of the latter. The theory of this construction is that the exhaust gases spin rapidly around inside the tube, losing some of their pep — and therefore some of their noise; they are also cooled by the contact with the muffler walls. The Wagner unit is machined completely throughout; the straight center section has a .030" wall (a thinner wall was tried but proved too weak), and the nose and tail walls are .020" thick. Flanges on the latter fit inside the main tube, and 2-56 screws hold it all together. Jerry fitted a rotary damper in his machined aluminum exhaust stack. Some muffler users feel this is not really necessary to get the desired low idling speed, as the muffler restriction itself keeps the glow plug from cooling too much; since this unit has a low back-pressure, could be the restriction isn't enough for low idling speed.

The two holes in the main tube wall allow screwdriver access to the two 4-40 screws that hold the tube to stack. Note internal filler block which allows solid seating for these screws. They also allow exhaust priming.

On the same plane Jerry had an unusual braking system. He had mechanical brakes on all three wheels of the trike-gear. The nose-wheel brake is operated by full down elevator. But the main gear brakes are hooked to the aileron linkage, and clamp a wheel on either side, as the aileron control is turned toward that side. Thus, a very flexible brake system, capable of aiding ground steering in strong winds, and probably of holding the plane steady on the ground during an "engine runup."

Servoless car steering: Even when we think of a single-channel car, we normally envision a servo linked to the front wheels for steering. But George Siposs (10462 Parliament Ave., Garden Grove, Calif. 92640) does the job with no servo, no relays, and he claims differential action and increased traction besides. When a car negotiates a turn, the inside wheels slow down, while the outside ones speed up. George felt if the front wheels were individually motorized, they would not only steer but propel the car.

A Testor RC car was modified to try the idea; gears were attached to the inside of each wheel (the original axles had to be lengthened) and a small motor was mounted so that it pivoted with each axle and wheel, while driving the wheel via a small pinion. It worked fine, but space restrictions prevented applying much power to the wheels.

The motors were driven by the transistor circuitry seen here; the input was simply tapped into the Testor receiver at a point that allowed sufficient drive to Q1. With even on-off pulsing (control stick centered) each motor receives equal alternate pulses of drive power, and the car travels straight. Even though drive power is not continuous, the car doesn't "wiggle" along, as mechanical inertia damps out the pulsing — just as it does in a plane with pulse rudder; the plane follows the average rudder position, not each rudder wiggle (provided the rate is high enough). When the transmitter stick is moved, the motor on the long pulse side gets current longer, so it pulls harder than its mate, and the car turns accordingly. This action also produces true differential action — neither drive wheel has any tendency to skid around a turn. The front wheel drive makes the car very stable on turns; the rear wheel just free-wheel, of course.

George is trying further experiments to improve the system, mainly so he can get larger motors in the drive system, especially in the smaller 1/20th scale cars. One way is to drive via flexible shafts, which eliminate all gearing on the wheels themselves, and also all universal joints. The photo shows a chassis with only one motor and shaft in place. An earlier chassis had motors on the chassis, driving through rather complex gearing and U-joints.

To pass the necessary current, the final drive transistors are small power jobs, the collectors of which are connected through small threaded studs. George apparently did not need heat-sinks for these transistors, but with bigger motors and more current, this might be necessary. Interesting to note that Polk's Procon Uni RC car utilizes this same dual-motor front-wheel drive system.

Tom Roe likes speed and excitement. A 4RS guides Kwik-Fli decked out in an Indian blanket pattern. At 5-lbs. with a Merco 61, this one really goes.

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done in the U. S. by individuals and by some clubs. If it could all be collected together, analyzed and taken from there, we would have a real headstart. We have mentioned such research efforts in this space in the past, and have shown some of the mufflers that have evolved. Fact is, we have printed quite a few plans for mufflers in the past several years, and more are coming.

So far, just about every muffler that has been used on model engines has caused a power loss. Prospective muffler users are much more concerned with this power loss than in how well a unit muffles! With the present day stress on super-performance, this is understandable. Generally, if a unit quiets an engine sufficiently, it also cuts the power considerably. But there are gimmicks that promise considerable noise reduction with very little power loss. One neat trick was shown in the Feb. '68 issue, on a muffler by Walt Watkins. The last two issues have had further muffler ideas that work well. As we say — there has been, and still is being, much private work done on model engine mufflers; if we could only gather all the knowledge and research together and see what we have . . . !

While *most* mufflers cause a power reduction, there are some that actually *increase* power! A fine example of this is the tuned exhaust setup now enabling UC speed flyers to top all existing records; the prime idea here is to get higher engine power, of course; but some of these tuned systems provide a dramatic noise reduction besides! Again, research is needed to adapt such ideas and methods to our uses and needs.

While we U. S. flyers are bemoaning the loss of flying fields because of noise, some clubs and area groups are putting in mandatory muffler rules. You must have a muffled engine or you don't fly at a club field! Several overseas countries have gone much farther. The flying site losses were getting so drastic in England that a country-wide muffler requirement was put into effect by the SMAE, their equivalent of our AMA. Needless to say, this caused loud wails of anguish in many quarters, but it also initiated much muffler research, both by clubs and by manufacturers. (We understand that the muffler requirement has been lifted recently for all planes except RC, so the field loss and eviction-from-flying-sites will doubtless increase.) Germany, Sweden and others have nationwide muffler requirements. The trend will doubtless continue.

Now all the words in AAM on mufflers haven't been inserted because we love them. We don't — all we have tried have been bulky, heavy, have caused power loss, have spoiled the neat nose lines of the planes that carried them. But all these problems don't necessarily have to accompany muffler use — suitable research could overcome all of them. We have never had the pleasure of flying at a field where *all* planes in the air sported mufflers. But members of clubs which do have muffler requirements tell us they hate to fly at other fields, or at meets; the raucous engine noise proves downright disagreeable! Can't we learn something from such comments?

Seen in Poland, Wieslaw Schier float-equipped multi-purpose RC sport model. Flown with German Grundig-Graupner gear.

Len Purdy shows off prototype semi-scale Crusader. It joins the rest of the Lanier family of ready-to-fly plastic models. Tri-geared and 60 powered. Real performance on this power.

RADIO CONTROL WORLD

Continued

Simple wheel brake: Usable on either nose or main wheels, this brake suggested by Walt Watkins (RFD 1, Box 137, Eatontown, N. J.) takes little shaft space. Two metal wheel collars are required. One is filed as shown at lower right, and a wire actuating arm is soldered into the setscrew hole. This goes on the inside of the wheel, against a washer soldered to the shaft at a matching angle. Next comes the wheel itself. Latter is retained by the outer collar, to which is soldered a disc of shim brass. With no pull on the actuating cord, the wheel must turn freely. When the cord is tightened, the entire wheel-hub assembly is forced to the right, and friction between hub rim and the brass disc results in brake action. Better braking will be had if the disc is roughened on the inner face. Note that the actuating arm must face the nose of the plane, for best operation. We see no reason why the same deal can't be applied to both main wheels of a trike-gear or even a two-wheel plane; a little adjustment should provide equal braking action on both wheels.

Better pulser operation: Noting that some control stick assemblies do not allow very wide movement of the pot, John Phelps (7 Forester Rd., Liverpool, N. Y. 13088) offers a simple improvement. It's applicable to the many Phelps pulsers which are based upon a uni-junction transistor, consists simply of putting a regulating diode in series with the uni-junction pulse oscillator. Zener diodes are fairly expensive, but John has found that a 2N2646 does a fine job on pulsers utilizing 22½ volts (this one "regulates" at 9-10 volts) while Phelps uni-junction pulsers operating on 9-12 volts may use a 2N3638 transistor (which regulates at some four volts). In either case the transistor is hooked in series with the uni-junction transistor as indicated; no connection is made to the collector. Stick to the transistors indicated; substitutes might have entirely different action in this application. The other components are not labeled as they vary with individual pulser circuits. John claims this simple mod will effectively give more gentle control action on the first flights of those GG planes that are not yet trimmed out.

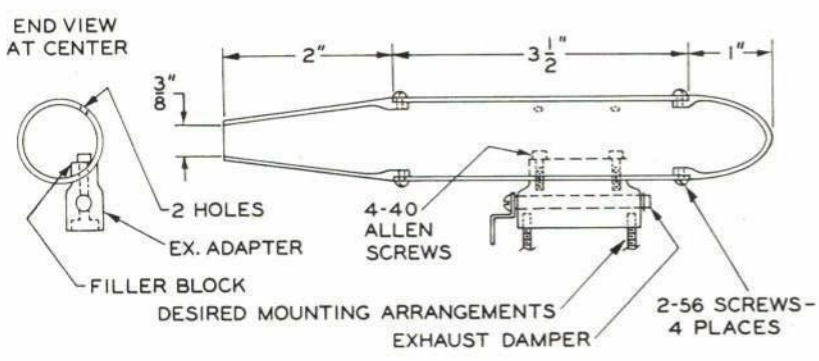
Some hints on maintaining propo servos that utilize wirewound pots are also offered by John. He claims that most trouble with "dirty" pots stems from the notion that a little Silicone lubrication is good for these pot elements. He says long field experience has shown that bone dry, clean pot elements are very reliable — but they must be entirely free of oil or grease. The same thing holds true in servo motors which utilize silver-base brushes, as these cannot tolerate even the slightest trace of oil. "Dead spots" in motors often come from commutator oil contamination.

Pots and motor commutators and brushes (also sliding contacts in servos) can be cleaned with "unloaded" solvents, lens tissues, or just pieces of clean Silkspan. One-sixteenth wide strips of #400 wet-or-dry abrasive paper will take stubborn tarnish off motor commutators. Never use tuner or volume control lubricants, or those for slot car track strips — they were never intended for use in RC servos!

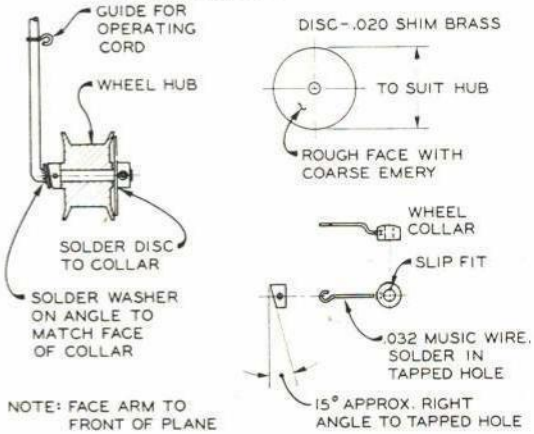
Better idling: In these days of fairly sophisticated carbs on RC engines, we tend to forget that early carbs did not have all the adjustments now available, particularly the "idle bleed" adjustment which allows a modeler to compensate for over-rich fuel mixture at idling speeds. Carbs on some of the lower cost engines do not have adjustable bleed, or any other way to lean out the mixture at low speed, but Tiny Harley (318 East Ave., Augusta, S. C. 29841) resurrect the old idea of filing a notch in the carb rotor, and we include it here for those who might never have heard of it.

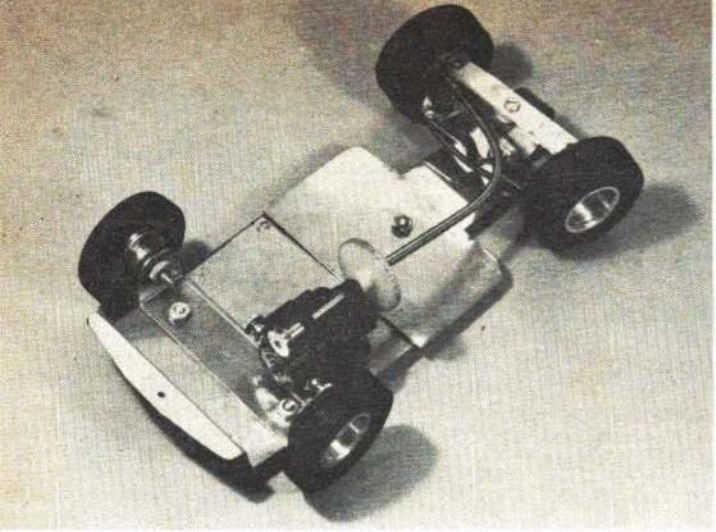
After an engine needle valve has been adjusted for proper high-speed running, the engine will invariably richen up when the throttle is closed; the engine will run roughly and with considerable smoke from the exhaust. If the throttle is suddenly opened, the engine may quit — or it will sputter and smoke for a time till the extra fuel in the crankcase is burned off. This can be cured by filing a small notch in the top edge of the rotor, to let a little more air in when the rotor is closed. (The idle bleed in modern carbs does the same thing, but the air goes in through a hole, usually in the front of the carb body.) This is a cut-and-try proposition, so enlarge the notch a little at a time, until the engine runs more smoothly and with little smoking at low speed. As you lean out the idling mixture, the engine will speed up and you will have to close the throttle more. But keep at it and you can attain just as good an idle as with modern adjustable bleed carbs.

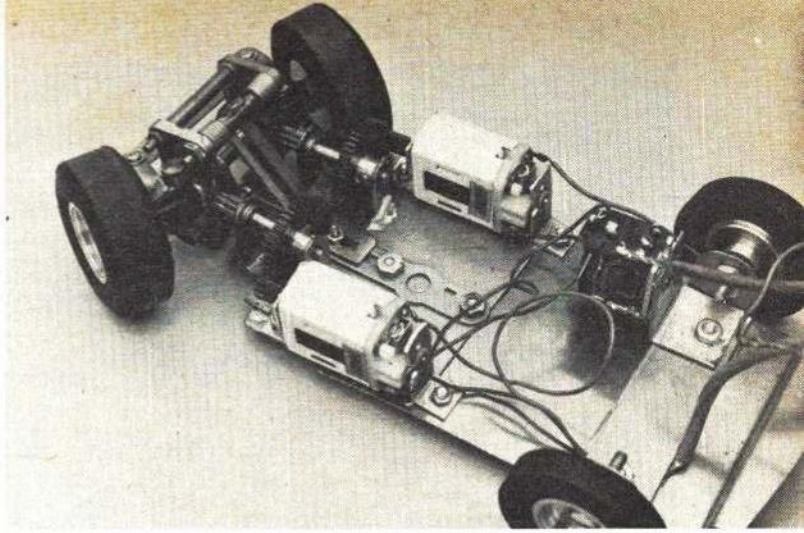
How simple can a good brake be? Cam action forces the wheel hub against the disc on the outer wheel retainer. Walt Watkins developed this idea.



Jerry Wagner sends dimensions used in his sleek-looking muffler. It uses the swirl technique of silencing and cooling the exhaust. It's a machinist's job.



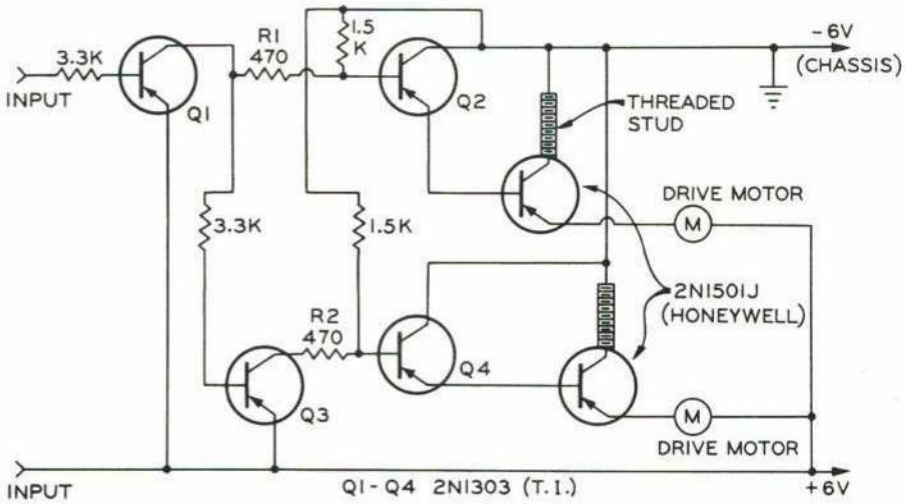




Above: A much improved and less complicated drive system without gearing uses a flexible shaft. Only one motor installed at this point. Electronic switching will be used in this car.

Above, right: George Siposs has been developing simplified auto-drive systems. Here, two slot-car motors controlled by a relay, drive the front wheels of his hot rod. Differential power provides steering.

Right: The circuitry for the RC cars applies six volts to each motor alternately. By driving one motor longer than the other, the vehicle is steered. Very rugged power transistors featured.



Low cost charger: Not only low cost — it could be free! Warren Plohr (Bay Village, Ohio) suggests checking into defunct electric toothbrushes of the type that have a rechargeable battery. After several years' use. chances are the nickel-cad cells won't be much good. But the holders for these brushes have built-in chargers that can have many uses for us. One of those Warren salvaged had a charger that would put a pretty fair charge rate into two 500 or 600 maH cells in series, or it would trickle charge four such cells in series.

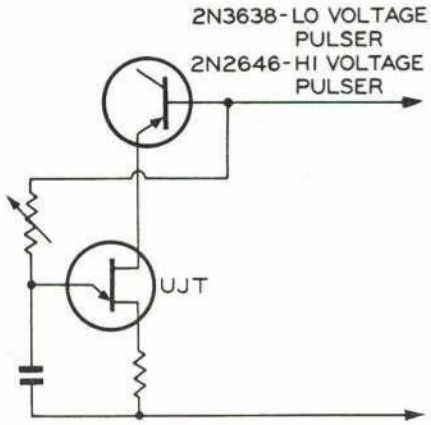
The chargers generally have a transformer so there is little shock hazard; there may also be a series resistor you can alter to get a different charge rate. But check each charger; Warren found two that had quite different outputs. For new chargers, he suggests a line of units made by Electronic Components Corp.; a wide range of voltages and current rates is offered, many of them listed in the catalog of Newark Electronics Corp. They are compact and produce little heat, so are ideal to build right into a transmitter.

Servo article corrections: Upon reading over the servo article on p. 40, Jan. 1968 issue, we realized several items had been omitted from the circuit that might cause a little confusion for readers. Paragraph starting at bottom of p. 40 mentions an overdrive protection feature, based upon "two contacts just to the right of Q." Checking the circuit, there are no such contacts! Actually, they are small plates located at the ends of the servo pot element but insulated from same. They are connected directly to the plus and minus 3.6V battery leads.

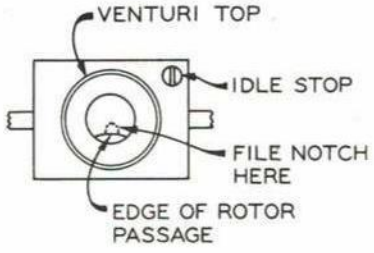
Spar engineers have called our attention to the fact that a circuit quite similar to that on p. 27 (Sept. 1967 issue of A.M.) has been in use for some years on the Spar analog transmitter. Circuit is used for the same reason as that in the Sept. issue — to give scale expansion to the meter, so that more accurate readings might be had over a limited voltage range.

Handy hints: Again we have a collection of useful items. Bud Schenck (Toms River, N. J.) suggests use of a material called CRC Spray, obtainable in boat and auto supply houses, for waterproofing equipment in boats and seaplanes. The equipment is thoroughly sprayed with the material before installation (it doesn't seem to bother moving contacts or motor commutators and brushes). If the equipment is dunked, spray it again with CRC as soon as possible after removal from water (either fresh or salt). The spray is also a potent rust remover. . . . From *Squawk Sheet* of Port Arthur (Texas) RCC comes hint for a good "mixing board" for epoxy cement. After getting dried epoxy over tool box top and many other areas, one member covered a thick sheet of hard balsa with Saran Wrap (purloined from kitchen stock), keeping all seams on underside, held tight on the wood with adhesive tape. When you are finished with a cement mix, just peel off the Saran and apply a new sheet, ready for next time. . . . From the *Glitch*, paper of the Soo Modelers RCC (Sault Ste. Marie, Ont., Canada) comes suggestions that if you need long quick links, bicycle wheel spokes are useful, come with threaded end that will fit the links; they also come in hard or soft steel — take your pick. From same source, if the inner

Continued on page 71



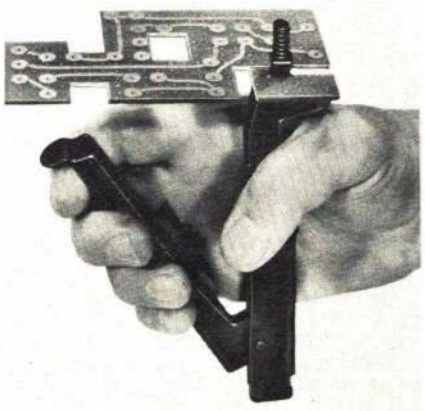
With higher-rate systems so popular and other systems demanding more accurate pulse rate-width operation, John Phelps recommends adding one transistor to conventional unijunction pulsers to stabilize current at UJT.



An often-repeated idea that keeps cropping up in letters from modelers who have "discovered" it, filing a notch in the top side of the rotary throttle barrel will lean the idle mixture. To richen the mixture, file notch on the lower side.

NEW PRODUCTS CHECK LIST

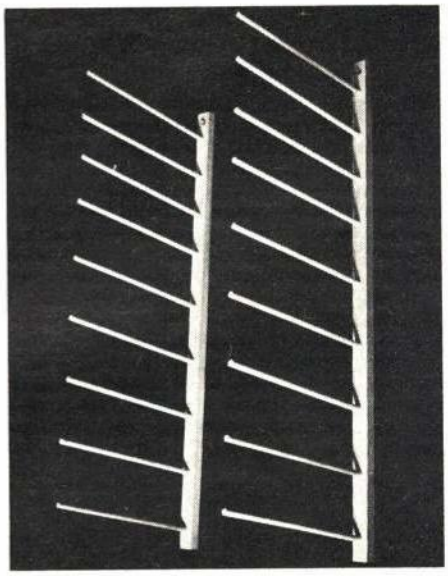
Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."



Adel Tool Co./Nibbling Tool. About the handiest metal cutting tool we've seen is Adel's Nibbler. A hand-operated device, much like a spring-loaded punch and die, it takes crisp, little bites along straight or curved lines or into square corners. Try it on small RC cases. We used it to cut out cowling sections from aluminum soft-drink cans without distorting the cut edges. Lately the Nibbler has seen use on Vector board stock and insulator sheet. Saves on saw blades too when cutting 'glass PC boards. Maximum thickness of stock to cut is 18 gauge (.046") steel or 1/16" in aluminum, copper and plastics. Price is $4.15. Write: ADEL TOOL CO., 4640 Ronald St., Chicago, Ill. 60656.

Tatone Products/Engine Starting. When it comes to starting model engines, Tatone has it in the bag. We spotted several Starter Bags worn by modelers at the last Nats. Simply, they are a sturdy, denim fabric bag that hangs on your belt. Carry whatever you want, but it's handiest for toting a starter battery ("Pocket Booster" for example), a save-your-fingers "Chicken Stick" and the "Little Squirt." That last item is a one oz. poly bottle with a leak-proof nozzle. Great for engine priming or topping-off the fuel tank. Other items — prop wrench, pliers, wiping rag, etc. may be 'bagged' too. Starter Bag is $1.25 and the Little Squirt is priced at 49c. Ask about their other accessories: TATONE PRODUCTS, 4719 Mission St., San Francisco, Calif. 94112.

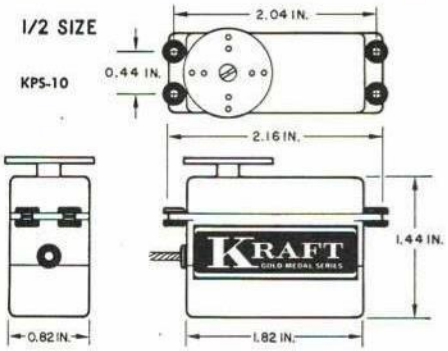
Official Products/Finishes. Let's face it, Official makes dull paint. In fact, they brag about it, saying it's twice as dull as other brands. And as you might suspect, this makes the scale modeler happy. With their 70 pre-mixed, camouflage colors, any authentic service aircraft finish may be produced on plastic, wood or metal. These shades are also available in several assortments covering particular battle campaigns or color groupings. Prices here offer a savings over the purchase cost per single bottle. Official also publishes "Markings" six times a year (single copy is $1.50; year's subscription $8). It contains lots of color drawings and photos plus researched articles giving you exact markings and camouflage of military gear. Official also sells "Metal-Clad." An adhesive-backed thin aluminum sheet, it applies easily, lets the rivets and other detail show through and turns an ordinary model into a replica! Introductory kit contains 600 sq. in. of Metal-Clad, a burnisher and instructions. Ask for their illustrated price list and data sheet: OFFICIAL PRODUCTS, 473 Washington Ave., Belleville, N. J. 07109.



Su-Pr-Line Products/Su-Pr-Rak. This is the adjustable storage rack for wings and fuselages. Hang or mount the two hardwood strips most anywhere. Keep them 12 to 24 inches apart. Insert the 18 dowels provided, spacing according to your needs. No cutting or glue is needed. Thin wings or stabilizers and wings may be racked together. Wings with attached landing gear may be placed at the bottom. It saves on shelf space, yet all components are at hand. Kit price is $4.95. Also new is the NYRODapter, a 4" piece of 1/16" wire with 2-56 threads at one end. Use it as a connecting link from Nyrod to servo. The Su-Pr-Keeper snaps over 1/16" wire and keeps the wire and servo output arm together. It also has a second hole for additional linkages (perfect for ailerons on a rudder/nose wheel tie-up). A package of two each, NYRODapter and Su-Pr-Keeper, costs just 49c. Write for illustrated price list: SU-PR-LINE PRODUCTS, 34 Copper Dr., Plainfield, Ill. 60544.

Royal Products Corp./P-38 kit for RC. Scale fans take note if RC is your game. Royal Products is introducing a new line of RC scale kits with the P-38 Lightning. These flight-proven kits will have the finest in prefabrication. The P-38 has a 74¼" wingspan and a fuselage length of nearly 51". Wing area is 695 sq. in. The weight will run 9 to 10 lbs. Power required: .35 to .49 twin; .51 and .61 sizes are optional. The kit price is $44.95. Further information is available from: ROYAL PRODUCTS CORP., 6190 E. Evans Ave., Denver, Colo. 80222.

Kraft Systems/Gold Medal Series. Phil holds the transmitter of the new propo Gold Medal Series now in production. Smart looking case is covered with gold vinyl and sticks are chromed. Front to back the Tx is thinner; stick lengths are adjustable to fit your hand. One of the smallest sets now produced, they are available with four or six channels and an option

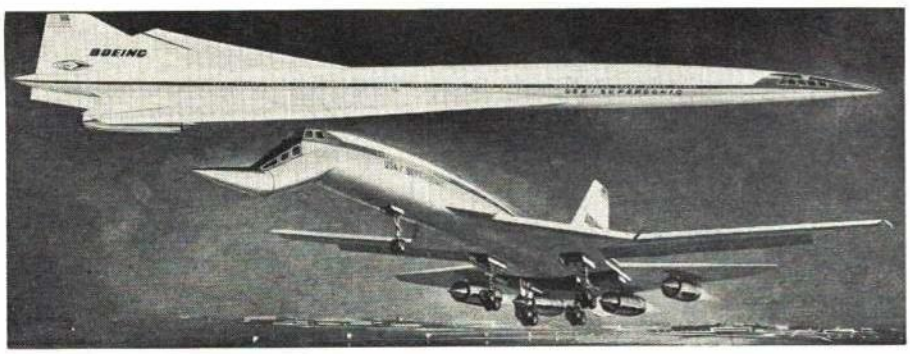


of servo size at no extra cost. Use the regular size servo, KPS-9 (see "New in RC" in March issue) or the new micro-miniature KPS-10. See dimensions on drawing. These servos use a ceramic feedback pot, have a thrust of over 3¼ lbs. and have a travel of ⅝". Airborne weight of the receiver, 225 mah battery pack and four KPS-10s is 12 oz. — ideal for the small multi ship. Any standard frequency may be ordered at no additional cost. You have control stick options too. Four channel system is $399.95 and the six is $449.95. Detailed and comprehensive spec sheets will be sent upon request: KRAFT SYSTEMS, INC., 2466 Seaman Ave., S. El Monte, Calif. 91733.

Hawk Model Co./P-47 Thunderbolt. Although the P-47 has been scaled-down in many reproductions, Hawk claims that only their kit offers the Thunderbolt with two customizing choices. The $1 kit is complete with two canopies and turtle decks so the modeler can build either the "Razor Back" or "Bubble Canopy" version shown here. The ¼" scale model has the usual sharp detail and realism. Parts are chrome plated. Inquire: HAWK MODEL CO., 4600 N. Olcott Ave., Chicago, Ill. 60656.

Myers Models/Pathfinder Series. Taking aim again at the RC novice, Myers decided to lead the way with the Pathfinder, a low-wing configuration with high wing stability. Pathfinder Jr., see photo, is just right for .049 to .15 engines and Galloping Ghost or small multi installations. Span is 41" and area is 273 sq. in. Price is $12.95. The larger Pathfinder has a span of 54" and area of 480. Use a .19 to .35 for a trainer or full-house system. Kit price is $26.95. Both kits feature crash-proof fuselage construction. That is — the sides are one-piece, May-Ply, ⅛" thick. This is exclusive with Myers and it is a close-grain plywood that is easy to work and lightweight. All parts are pre-cut and hardware is furnished. For the flyer: MYERS MODELS, Stewartstown, Penna. 17363.

Moody Machine Prod./Tap Drill Set No. 70. This set consists of five small, precision drills with a swivel topped, self-locking, chuck-nose handle. Drill sizes are correct for holes to be tapped in these sizes: 0-80, 1-72, 2-56, 3-48 and 4-40. They are stored in the regular Moody dust-free container. List price is $3.50. MOODY MACHINE PROD. CO., 42-46 Dudley St., Providence, R.I. 02905.



Revell, Inc./Jet Age Firsts. Two new plane kits, each signifying a milestone in the Jet Age, have been released by Revell, Inc. One is the Boeing Supersonic Transport (SST) prototype. Revell's unique model is actually two completely different versions (see drawing above). Each is 18" long and comes with its own display stand. The kit number is H-262 and the price is $3. Second new kit is the Bell HueyCobra Helicopter in 1/32nd scale. This world's first fighter-helicopter has many parts and is highly detailed. Fuselage is 16" long and the rotor span is 18". Kit H-287 is priced at $2. REVELL, INC., 4223 Glencoe Ave., Venice, Calif.

World Engines, Inc./1968 Catalog. Latest edition — 1968 — of the well-known World Engines catalog is just off the press. Its contents, 152 pages packed with modeling information, are nicely wrapped up in a four-color cover on heavy stock. Price per copy is 75c. The many exploded-view drawings and parts lists of Supertigre and O. S. engines are worth the price alone; it's a good reference. Order from: WORLD ENGINES, INC., 8960 Rossash Ave., Cincinnati, O. 45236.

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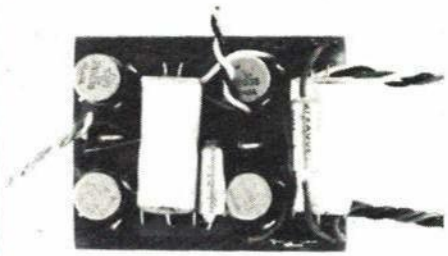


SIMPRO III KIT

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
No. 15K45—Simpro III assembled and tested $34.95

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. On motor, all surfaces cycle through fast and plane does not respond.

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

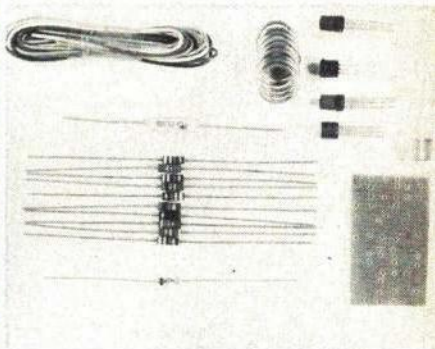
WHAT'S NEW AT ACE R/C

Among the many fine lines Ace represents—Coming the new Rand Decoder, MRC-Webra Engines, Diesel and Glo; Wright Electric Fuel Pump More-Craft Goodies, Wilhold White Glue (best b test), Epoxy Bond products, Jensen, Rocket City Micro Molding, and many, many more represening the BEST additions to our highly selectiv line.

FLASH!—ACE HAS THE FABULOUS NEW COVERIN MATERIAL—SPL AND 990—IN STOCK NOW!

COMING—SIMPRO III +1 COMPONENT

The motor control system for Simpro III whic does away with much of the objection of the g around motor control will be in the next issue "American Aircraft Modeler." This is a POD d tector, and signal completely deactivates t rudder and elevator circuits, allowing them return to neutral, and does command your mot control to high or low, depending on whi button is pushed. May be used with an Annc or Bonner relay type servos or with a home bu servo of Micro Mo TO-3 type. . . . All compone parts for the Simpro III +1 will be available a will be announced in our next ad. . . . ALS COMING SOON in pages of "American Aircra Modeler" are Don Dickerson's conversion of t Testor Skyhawk for GG operation. Ace will ha complete conversion kits for this. They will available as soon as publication of this materi is made in this magazine.



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Submini Capacitors. Extremely small, lightweig Temperature compensated, close tolerance R/C. Gulton and Erie.

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No. 18K34— 27 UUF/NPO Gulton Disc, .28
No. 18K35— 39 UUF/N330 Gulton Disc, .28
No. 18K36—.01 UF/Erie 35V Trans-Cap, .25
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No. 18K38—.05 UF/Erie 12V Trans-Cap, .25

Submini RF Choke. No. 17K51—22 UHY, $ .75

Submini Coil Form (Glass Tork). 3/16" diamet epoxy, slug for up to 70 MC. Not wound. M be cemented into base.

No. 17K52—Glass Tork Coil Form/Slug, $ .45

Submini Switch. Used in Testor Skyhawk. 1 x 13/32 inches.

No. 30K33—Continental-Wirt, DPDT Slide, $ .50

1/8 Watt Resistors, 10%.

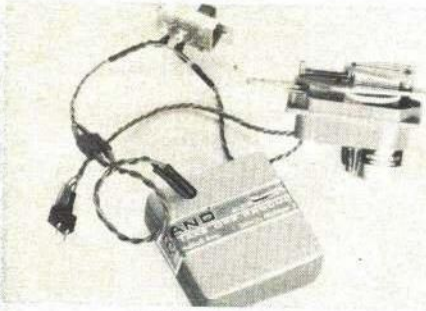
No. 29K33 (Specify value), $ .25 each, 1K, 1.2K, 3.3K, 10K, 15K, 33K, 47K, 470K, 560K, 680K.

MABUCHI MOTORS DELRIN GEARS

If you do it yourself, this ex cellen inexpensive motor is now available . . Diamete 15/16" length 15/16". . . Shaft diameter .05 Pinion gear & Delrin gears compliment & mat this unit. Wt. less than 1 oz. Milliampere drain free running state only 30 ma at 1.2v—40 ma 2.4v—45 ma at 3.6v—50 ma at 4.8v.

No. 14K160 Mabuchi RM31-1430 ..... $2.9
No. 14K158 Pinion gear to fit motor ..... .
DELRIN GEARS . . . Great for your servo co struction. Two types—80 pitch—with attache drive gears. Designed to be mated—both ¾" dia eter. The difference is in the smaller gear on t output gear.

No. 23K20-60/12 ratio gear ..... $.
No. 23K21-60/15 ratio gear .....



RAND FOR GG

Full line of Rand products for GG fans. We have the HR1, HR2, LR3, GG Pak and Dual Pak. These offer the modeller the finest approach to GG servos and decoders at the lowest cost and gives the most for your money—completely built . . . Our Simpro pack kits use Rand actuators; our Rand GG #1 uses the Rand GG unit. Our new Versapulser will adapt to either the Rand GG or the Dual. Also, the new Citizenship NPT and SSH-T TX and RX combos are adaptable for either GG or Dual. Our updated Jansson transmitter may be used with either Rand GG or Duals . . . We also carry **all** replacements for **all** Rand units in stock at **all** times. Also, **all** Rand rack items.

No. 15G46—Rand Dual Pak, 6PAK 6080, $75.00.
No. 15G40—Rand GG Pak, PAK, 6040, $39.90.
For complete listing see our new 1968 Handbook-Catalog.

ACE-CLASSIC FULL SIZE PLANS

The ACE-CLASSIC Line of plans were originally published in GRID LEAKS. They include designs by Bud Atkinson, Jess Krieser, Bill Winter and many other top model designers and builders. All plans presented in this series are of semi-scale planes, and are designed primarily for the sports flyer. The plans are ozalid reproductions of the original drawings and are full size; folded for ease of mailing.

PIETENPOL AIR CAMPER . . . by Jess Krieser is a semi scale of the popular 1920 home built. Designed for .35 engine, it has a 60" span with wing area of 635 inches.
No. 13K49—Pietenpol Air Camper, $3.00

The CURTIS ROBIN Scale . . . by Don Knaust is another semi scale. Designed for .19 to .25 engines. Has a span of 57 inches and a wing area of 570 square inches.
No. 13K78—Curtis Robin Classic plan, $3.00.

SKY SQUIRE . . . is another Krieser design, and is excellent for .19 to .45 power. A semi scale of the Cessna Skylane type of airplane. Wing span is 57 inches.
No. 13L107—Sky Squire plans, $3.00.

Bud Atkinson's CORBEN SUPER ACE is designed for the McCoy .35 and lightweight proportional. Has a wing span of 54 inches, and is beautifully detailed. Was featured in AMERICAN MODELER in 1966.
No. 13K191—Corben Super Ace plans, $3.00.

The LONG MIDGET MUSTANG . . . is by Jess Krieser and is a semi scale Goodyear type of racer. Designed for engines from .29 to .40. Slight modifications make this a good flyer.
No. 13K87—Long Midget Mustang, $3.00.

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.

KR-34 CHALLENGER is built to a scale of 1 inch to 1 foot. This is the Krieder-Reisner Bi-plane of the 1920's. Plan is by Jim Dean. Fine for single channel pulse proportional with an .049.
No. 13G47—KR-34 Challenger, plans, $2.00.

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! 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.**

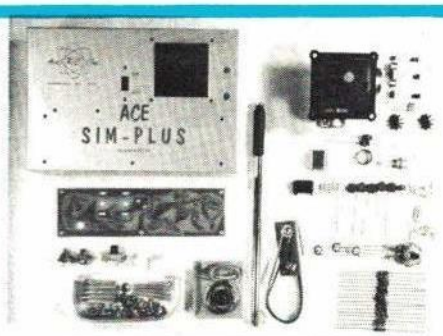
No. 10G1—Ace GG Package, ready to go with all batteries $129.50

VARI-CHARGER

The new Ace Vari-Charger is a most useful accessory—it will charge nickel cadmium batteries from 20 mils to 150 mils. It is capable of charging up to 12 volt packs . . . The dial is indexed, and an easy to read chart is furnished which enables you to set your milliamp reading for the battery pack size you are using . . . Completely isolated from the AC line supply . . . The unit is housed in a handsome Dakaware case which measures 3 25/32" long and 2 21/32" wide and is 1 15/32" deep. Metal cover is used and has an on-off switch. This is an extra deluxe item, using highest quality newly manufactured transformer, UL approved line cord, 500 milliamp diode, on-off switch, and full instructions.

Available in two forms, either as a kit and completely assembled.

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



SIM-PLUS TRANSMITTER KIT

This is the long awaited kit of the Jansson designed Galloping Ghost transmitter. It is a PLUS type transmitter, since it offers more versatility than any other GG unit on the market. Hundreds of Jansson's have been built, and the mods to the circuit improve the basic excellent design and offer the PLUS factors.

The SIM-PLUS Transmitter Kit is so designed that pulse rate and pulse width may be varied, generally by minor internal adjustments, so that it may fit any of the GG systems on the market, any Decoder system, the Simpro Systems, and the Simplex systems. Has provisions to allow it to be used with systems that are still in the works, so that it will not easily obsolete! Tone frequency may also be tailored to fit any tone receiver . . . May be fitted with High Pulse, so it is usable with Rate Detectors, or the full on and full off required on most of today's GG outfits. May be adapted for Rudder Only escapement or proportional, too! Many more PLUS features . . . All transistorized. Uses 9 volt dry battery for a full season of flying. Also available for 6 meters! Kit contains all components except battery. Instructions are step by step and most complete we have ever produced. Some kit building experience is desirable.

No. 11K51—Sim-Plus Transmitter Kit (specify 26 to 28 MHz. crystal) $49.50
No. 11K52—Sim-Plus Transmitter Kit 52.950 MHz. $53.50
No. 11K53—Sim-Plus Transmitter Kit 53.100 MHz. $53.50

MORE THAN JUST A CATALOG FOR 1968!

Our 1968 version of the Ace R/C Catalog is also a handbook—has an R/C Glossary; How To Solder; Pulse Proportional Control for Rudder and GG, including Decoders; Schematic Symbols; Batteries and Charging, Resistor Color Code, Transistor Chart; Electric Motor Spec Chart and many more Data Sheets you will refer to again and again. Three holes punched, 8½ x 11 in size, it is designed to be added to! Will fit special* Ace Binder, for permanently keeping any of your R/C instruction as well . . . In addition it lists all the latest Ace R/C Products and thousands of other R/C items and R/C accessories made by other manufacturers all over the world . . . Cost is only $1.00. BUT this is refundable on your first order! So actually the catalog costs you nothing. Your order also places your name on the Ace mailing list to receive regular additional R/C Data info, and newsletters . . . The Ace Handbook-Catalog is a must for the tinkerer, the Sunday and the sport flyer. We have served the R/C field since 1953 . . . Send your catalog buck on a round trip today. You can't lose!

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So much data is available on this rocket that it can be used in many NAR events — predicted altitude, scale, trajectory and aerodynamic studies, etc. But don't attempt flight operation with the $TiCl_4$, it makes hydrochloric acid!

Nike Smoke Sounding Rocket

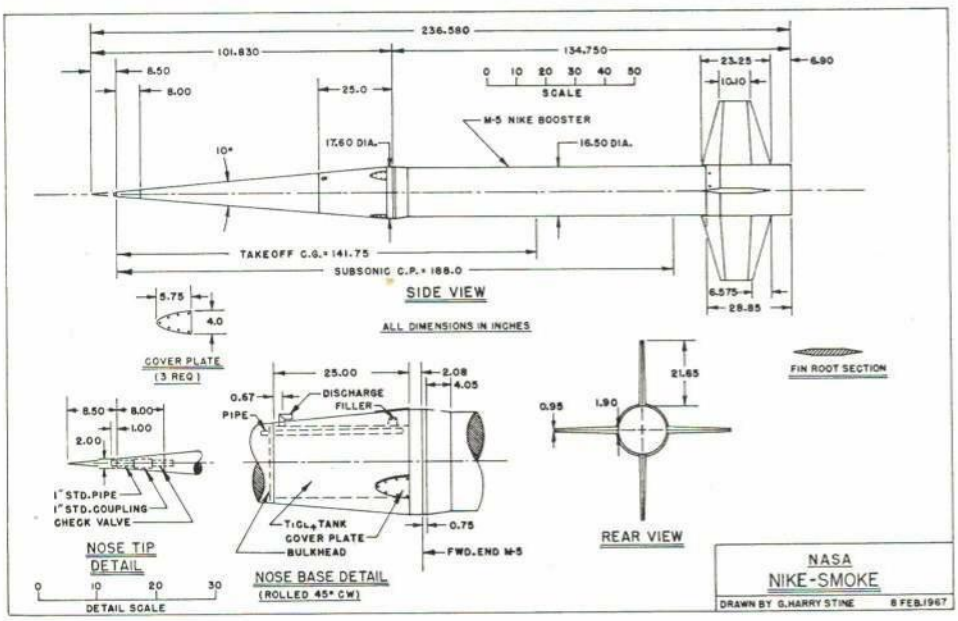
The full story — and specs — of an ideal subject for your scale project. The real bird was used to measure wind movement at 75,000 feet.

G. HARRY STINE

IN the February issue, we discussed some aspects of scale modeling, an area of model astronautics that is growing rapidly and gaining favor with both beginners and experts alike. The usual approach followed by a novice is to choose as a subject a rocket vehicle that is relatively well known. However, some of these vehicles are often very difficult to build into a properly flying scale model. There are dozens of different sounding rockets, some of them not well known but yet widely used by NASA and the armed services; these "obscure" vehicles are sometimes excellent scale subjects.

An example of this is the NASA "Nike Smoke" rocketsonde. Over 100 of them have been flown from both Cape Kennedy and NASA Wallops Station.

The information on the Nike Smoke vehicle that follows has been acquired from authentic sources and, accompanied by the drawing and photographs, is considered to be the typical sort of scale data for both general and competition purposes. This is what a scale modeler starts with, and it's up to him to go through the process of scaling, sizing, and designing from this information in order to come up with his scale model.



Use this scale drawing for designing your Smoke. The real rocket is single-stage, solid-propellant. Leaves white trail in sky to be photographed.

The Nike Smoke sounding rocket is a single-staged solid-propellant rocketsonde used by NASA to determine wind velocities up to an altitude of about 75,000 ft. The propulsion unit is a standard M-5 Nike solid propellant rocket with four cast and wrought magnesium fins. The payload is approximately 10 gallons (144 lbs.) of titanium tetrachloride ($TiCl_4$) contained within a 10-degree conical nose cone fabricated of 347 stainless steel. Upon ejection of the $TiCl_4$ into the atmosphere during flight, chlorides are formed which combine with the water vapor in the air to form droplets of hydrochloric acid. This reaction results in the formation of a persistent and reflective white trail which is photographed by two cameras approximately 10-12 miles from the launch site and 90 degrees apart in azimuth. Wind profiles are obtained by photographic triangulation techniques utilizing time-lapse photographs of the smoke trail. The Nike Smoke may be launched from a modified Nike Ajax launcher.

History: The Nike Smoke program was under the direction of NASA Langley Research Center, Va. During the period from May, 1962 to May, 1963, 55 vehicles

The Nike Smoke being prepared for a launch at Wallops Station, Va. Over 100 such vehicles have been flown.

were flown from Cape Kennedy with a launch elevation of 80 degrees and on an azimuth of 60 degrees. Fifty-three percent of the vehicles fell within a radius of one nautical mile of the desired impact point, and 91 percent of the vehicles were within a radius of two nautical miles of the impact point.

During the period from July, 1963 to January, 1965, approximately 70 vehicles were launched from NASA Wallops Station with a launch elevation of 80 degrees and on an azimuth of 100 degrees. Project engineer was James C. Manning. The Project Manager was Harold B. Tolefson, and the engineers involved in the project included Charles M. Dozier, Robert M. Henry, and Robert W. Miller.

Operation: The components of the Nike Smoke are assembled, checked for alignment and CG. The vehicle is then placed horizontally on a standard Nike Ajax launcher or a boom launcher. Approximately ten gallons of $TiCl_4$ are loaded into the canister inside the nose cone. The vehicle is then raised to launch elevation. A standard, zero-delay M-24 electrical igniter fires the vehicle on ground command.

During thrusting, while the vehicle is being subjected to high positive acceleration, the chemical is forced against the bottom of the canister; thus, the chemical surface is about 1" from the top plate. Air is forced into the nose cone by ram pressure through a 1" pipe and check valve, and enters the canister through the pressurizing pipe. It then bubbles through the chemical and flows out through the discharge orifice which is approximately $\frac{5}{16}$" in diameter. A small amount of $TiCl_4$ is also expelled during vehicle acceleration.

Upon burnout of the Nike M-5 booster, the vehicle deceleration caused by aerodynamic drag forces the chemical against the canister top plate. The impact pressure inside the nose cone then forces the

Continued on page 66

model rocketeer

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

THE LEGALITY QUESTION

Each month the NAR Headquarters receives numerous letters requesting assistance in getting model rocketry "legalized" in their community. Law enforcement agencies regard model rockets as fireworks, which thus are illegal unless the user complies with the local and/or state fireworks code. In most cases the local authorities tell the modelers that they can't launch models because "it's against the law." This month's entire column is devoted to a review of this problem and what has been done to alleviate it so far.

DEFINITIONS IMPORTANT

In order to more clearly understand the underlying reasons for the confusion some definitions (according to Webster and others) are necessary.

Rocket: 1) a firework, 2) an incendiary weapon, 3) a device containing a combustible composition projected through the air by a reaction engine.

Rocket Engine or **Rocket Motor:** 1) a jet engine that operates on the same principle as a firework rocket, 2) a chemical exothermic reaction engine that propels a missile or rocket into the air.

Pyrotechnics: 1) art of making or the manufacture and **use** of fireworks; 2) material (as fireworks, powders and ammunition) for flares, signals or skyrockets; 3) a display of fireworks.

Skyrocket: 1) a firework, 2) an aerial pyrotechnic display.

By accepted definitions you may already see the reason for the "glinch."

HISTORY OF FIREWORKS CODES

During the late 1930's and the 1940's a concerted nationwide drive was undertaken by public safety officials and concerned citizens to regulate the sale and use of fireworks (pyrotechnics). By the mid-1950's neary every state had some form of control over the sale and use of fireworks. It goes without saying that these laws were in the public interest and have prevented countless injuries and deaths in our nation.

The National Fire Protection Assoc. (NFPA) played a leading role in the anti-fireworks legislation. We'll hear more about the NFPA later.

Rocketry, during this time, was carried on by only a relatively few organizations and individuals. Most of the activity was of a military nature, but there were a few amateurs carrying on experiments. They were generally scientists and engineers who saw the need for rocketry in both space exploration and war in the future. The general public saw these experiments as a dangerous nuisance with little or no benefit to science or the nation.

In October, 1957, the "lid blew off" with the launching of Sputnik 1. The rocketry fever grew like Topsy. The press, radio and TV flooded the world with rocket news. There was a future "Von Braun" in almost every hamlet and city in the U. S. Amateur rocketry spread over the country and just as fast, amateur rocketeers were spreading themselves over the countryside. A mood was quickly established — outlaw amateur rocketry and leave the job to the professional!

At about this same time a small, but dedicated group of men, many NAR pioneers, was seeking a solution to the meteoric rise in interest in rocketry by the non-professional. A man with vision and another man with an idea chanced to meet by way of a magazine article. G. Harry Stine, a rocket engineer who sought a solution to the amateur problem, and Orville Carlisle, who had designed a simple and safe rocket, got together. The eventual outcome was the "model rocket." But, what was thought to be a solution by some was to others nothing more than a new type of skyrocket with a new name hiding behind a new national passion.

ASSOCIATION FORMED

The Model Missile Assoc. was formed in 1958 in Denver, Colo. The name was later changed to the National Assoc. of Rocketry. Seeing the spectre of regulation and control ahead, the association promoted the model rocket as the answer to the "rocketry problem." A concerted effort was made to make the model rocket engine as safe to handle as humanly possible. Vernon Estes, a young contractor, joined the "crusade" to make a rocket engine, designed with safety in mind, so easily available that non-professionals would not take the time to attempt construction of an engine on their own.

There were many hurdles to overcome. Through the efforts of the NAR in the early 1960's, model rocket engines were classified as Type-C Toy Propellant Devices and mailable with a minimum of restrictions. The Federal Aviation Agency exempted model rockets from rigid control exercised over other unmanned rockets.

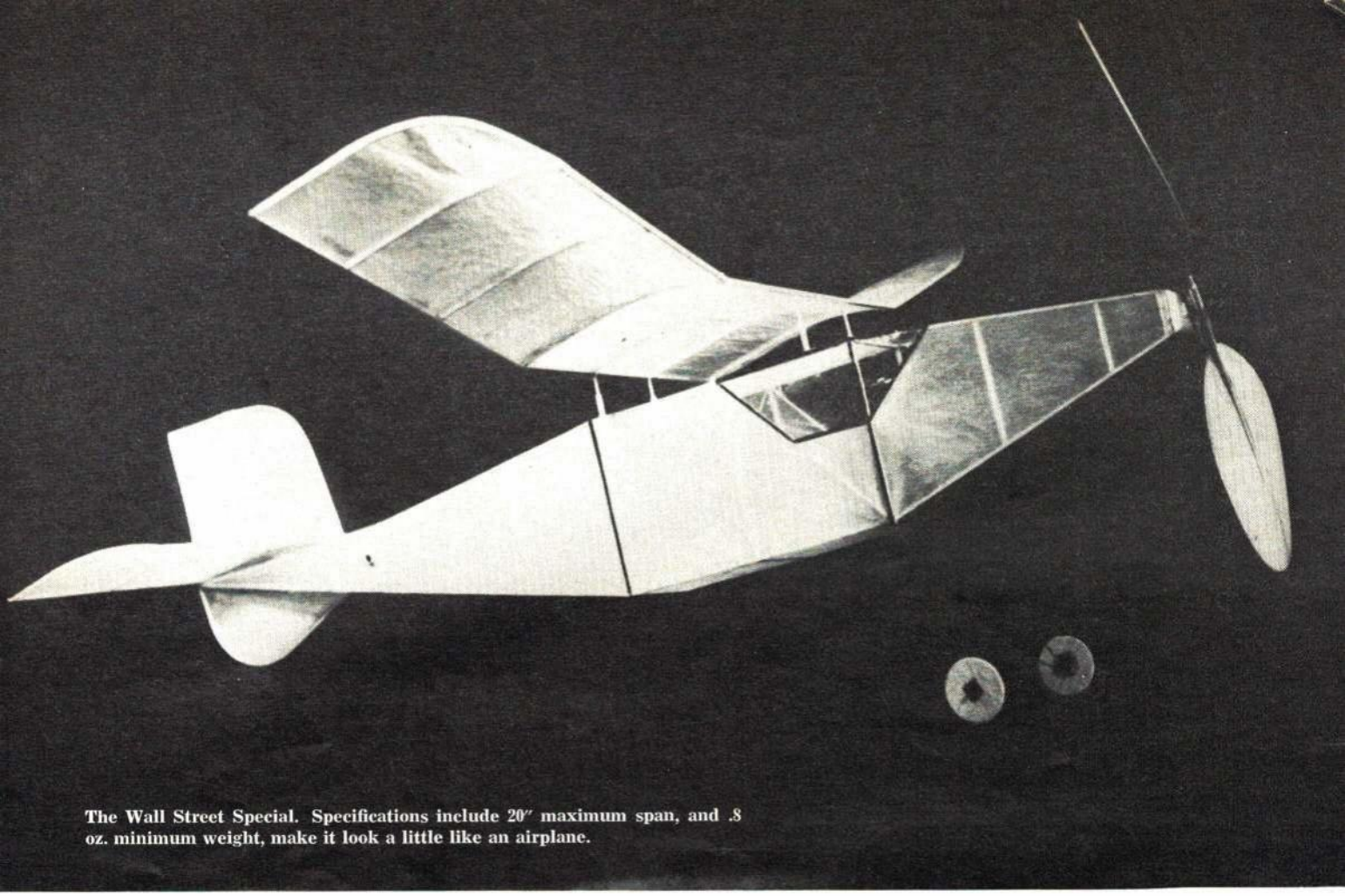
At about the same time, in 1963, the first steps were taken to amend pyrotechnics codes to permit model rocket launching with a minimum of control. The first major battleground was the state of Connecticut. A code was approved that later served as a model for other states.

A few other states followed with codes, but it was slow, tedious and disjointed progress. A decision had to be made. There were three possible courses of action: 1) Refrain from any action and let modelers solve their own problems; 2) Pursue a state-by-state change in the codes which severely restricted model rocket activities; 3) Lay the cards on the table with a reputable organization and work out a compromise solution acceptable to both modelers and to organizations responsible for the public safety and welfare.

NFPA-NAR JOIN HANDS

The latter course was chosen despite a number of protestations. In May, 1965, former Executive Director Jim Kukowski addressed the general meeting of the Fire Marshal's Assoc. of North America at the national convention of the National Fire

Continued on page 49



The Wall Street Special. Specifications include 20″ maximum span, and .8 oz. minimum weight, make it look a little like an airplane.

ED WHITTEN

Something different in Indoor models

THE MANHATTAN FORMULA

Designed to proposed indoor rules for a new event, the Wall Street Special and Riversider fit in between present classes and flying scale.

LET the Manhattan introduce you to the pleasures of indoor flying. This is actually a double introduction, as the Manhattan Formula itself is new on the scene and introduces a new style of indoor model. Two Manhattan Formula designs are presented here: the "Riversider," an introductory model, and the "Wall Street Special," an advanced design.

The Manhattan Formula was created as an indoor duration model to be a little different from the usual. The idea is a small, somewhat heavier model with a full fuselage that would place it somewhere between the present Indoor Cabin Classes and Indoor Flying Scale. The Formula is currently under consideration by the Academy of Model Aeronautics as a proposed contest event and record category.

After much refinement during the last two years the rules have crystalized, for the present, as follows: 1) .300 ounce minimum total weight including rubber; 2) 2″ x 3″ x 4″ minimum box incorporated in fuselage; 3) 20″ maximum wing span; 4) 20″ maximum fuselage length from prop bearing; 5) ROG from three points, two bent wheels of minimum 1″ diameter. Takeoffs are most realistic.

The 20″ wingspan keeps the model compact, while the fuselage cross section is maintained by requiring in its shape an imaginary box measuring 2 x 3 x 4″ or larger. This box, with the maximum fuselage length of 20″, makes sure the model looks like an airplane. The big question was how heavy it should be. With duration and compatibility with microfilm-covered models of prime importance, the minimum weight was not set too high but at .300 ozs., including the rubber. This is about four times the weight of the present Class C Cabin model, and allows the ship to be stronger and easily handled. It also allows a designer, if he desires, to dress up the model more like a flying-scale job, or to experiment with a higher rubber to airframe ratio and the possible use of step-up gears.

The Wall Street Special is designed to have its weight as close as possible to the .300 oz. minimum limit, and it is a true indoor endurance model compatible with present microfilm models. It uses both light condenser paper and microfilm as covering, and is a design for modelers already flying indoor who would like to try a model with a different challenge.

The Riversider, presented here in detail, is for the newcomer to indoor flying and is considerably heavier, weighing a total of .740 oz., .440 being airframe and .300 rubber. Weight and construction are close to those of a flying scale. The Riversider is definitely not compatible with microfilm models and should only be flown with the flying scale jobs and hand-

1⅛" RAD.

1/16" x 1/16" SOAKED & BENT ON FORM.

WING RIB WITH F.W.D. SECTION REMOVED.

NOSE BLOCK PRIOR TO CARVING.

1/8" SHEET

1/16" SHEET

⅛" x ¼" x .024" ALUM. SHEET (FRONT & BACK).

NOTE ~ WING & FINS MAY BE MADE WITH SQUARE CORNERS IF BUILDER PREFERS.

NOTE ~ LEFT WING PANEL IS ¼" LONGER THAN RIGHT PANEL.

LEADING EDGE

WING POST POSITIONS INDICATED BY DOTS

NOTE ~ WING IS REMOVABLE & ADJUSTABLE.

~ POSTS ARE CEMENTED TO WING & PLUG INTO WING MOUNTING TUBES WHEN ASSEMBLING FOR FLYING.

3/8"

L.E.

1 1/16"

4"

T.E.

USING TEMPLATE ~ SLICE 1/16" DEEP WING RIBS FROM 1/32" SHEET

4" RAD.

AIRFOIL DEVELOPMENT

1.) DRAW 4" RAD. CIRCLE
2.) DRAW A CHORD WHOSE SEGMENT AS ⅛" DEEP
3.) EXTEND CHORD THROUGH ARC & MEASURE OFF 4"
4.) FROM T.E. POINT DRAW LINE TANGENT TO ARC

DIHEDRAL BREAK ~ (RAISE EACH TIP 2")

(WING CENTER SECTION IS FLAT)

DIHEDRAL BREAK

SOFT COPPER WIRE

ALUM. TUBE 3/32" O.D. x ⅛" I.D.

1/16" x 1/16"

1/16" x ⅛"

1/32" x 1/16"

WING POSTS 1/16" x 1/16" (SLIGHTLY ROUNDED)

2 FRONT POSTS ARE 15/16" LONG

2 REAR POSTS ARE ¾" LONG

1/32" x 1/16"

LEFT OPEN ON TOP

1/16" x 1/16"

1/32" x 1/16"

SARAN WRAP WINDOWS

WING MOUNTING TUBES ~ MAKE 4
~ SOAK STRIPS OF 1/64" SHEET IN WATER
~ ROLL AROUND 1/16" DIA. NAIL & CEMENT
~ CUT TO ⅜" LENGTH ~ CEMENT ON END ON UPPER LONGERONS AS INDICATED

ALUMINUM TUBE ~ 3/32" O.D. x ⅛" I.D. x ⅜" LONG ~ DRILL .032" CENTER HOLE.

PROP SPARS ~ ⅛" ROUND, TAPERED TO 1/32" ROUND ~ PLUG INTO HUB FOR TIGHT FIT.

BLADES FORMED ON 4" DIA. CAN AT 20° ANGLE.

ADJUST PROP BLADES AT 45° ANGLE 2½" FROM CENTER.

C.G.

1/16" x 1/16"

1/16" x 1/16"

1/32" SHEET

1⅛" RAD.

1/16" x 1/16" SOAKED & BENT ON FORM

.024" WIRE

CUT SLOT TO FIT SPAR

1/16" x 1/16" LEADING EDGE

TYPICAL PROP CROSS SECTION

.024" WIRE

TRUE LANDING GEAR PATTERN

PROP. PATTERN 1/32" SHEET ~MAKE 2~

WHEELS ~ 2 PCS. 1/32" SHEET, CROSS LAMINATED ~ 1" DIA.

¼ Sq. PHOTO NEG. FOR BEARINGS.

0 1" 2" 3"

Riversider

A MANHATTAN FORMULA DESIGN

DESIGNED & DRAWN BY ED WHITTEN

TRACED FOR A.M. BY R. ANDERSON

COVERING ~ USE SUPERFINE OR JAP TISSUE. COVER SURFACES ON TOP ONLY; DO NOT WATER SPRAY OR DOPE.

ON FUSELAGE, WATER SPRAY LIGHTLY & GIVE ONLY ONE COAT 40% DOPE, 60% THINNER.

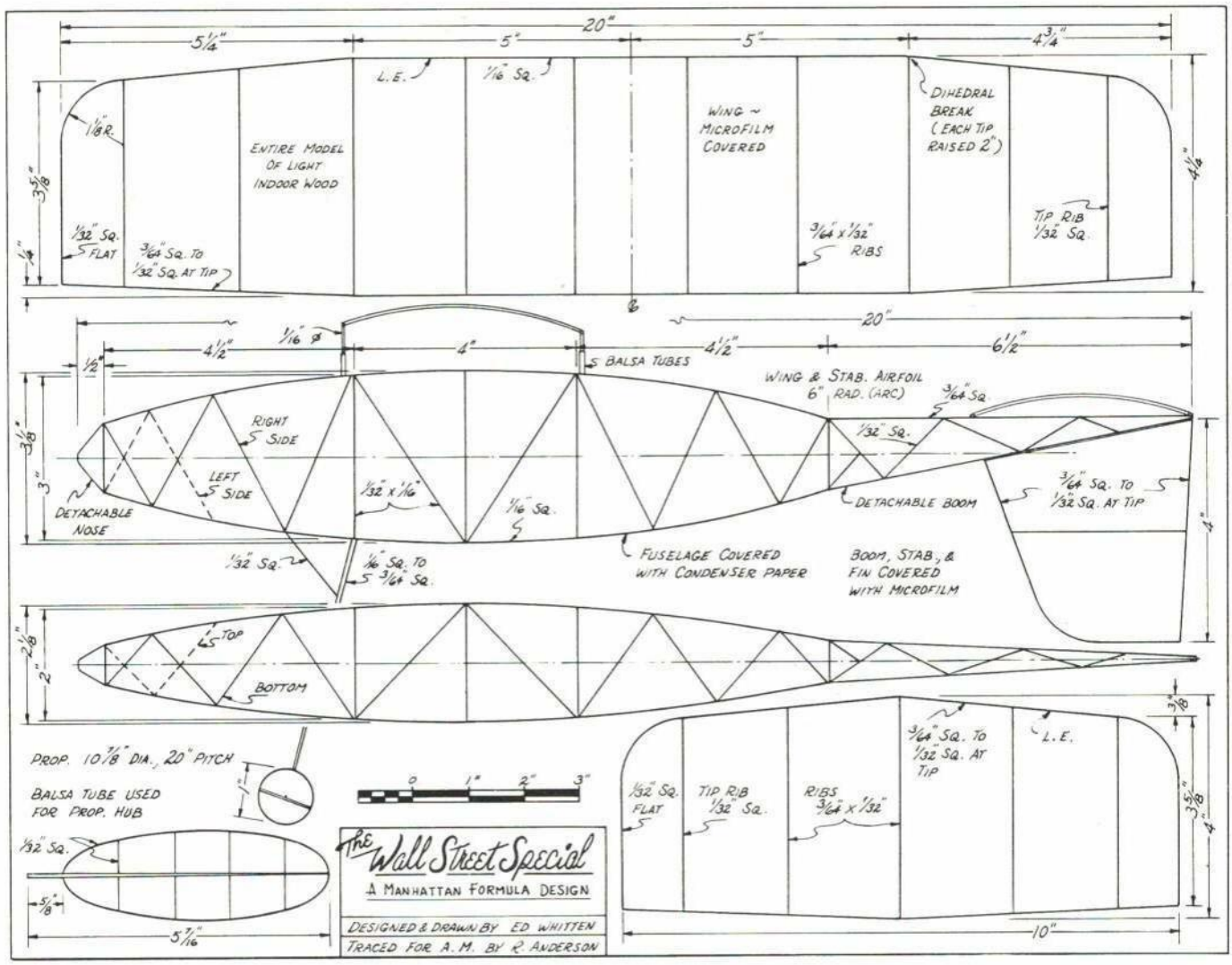
1/32" x 1/16" RIBS USE WING RIBS AND CUT FROM REAR TO FIT

1/16" x 1/16" T.E.

1/32" x 1/16"

NOTE ~ STAB. IS CEMENTED TO FUSELAGE AT 3 POINTS INDICATED BY DOTS.

NOTE-THIS IS A HALF SIZE PLAN



launched gliders. Due to this weight, the Riversider is flown with adjustments similar to those for flying scale, i.e., in right-hand circles against torque, and its takeoff and flight pattern are very realistic. In fact, one might suggest that a heavy weight requirement of .750 oz. would make a very interesting and different event in itself: a sort of flying scale model with no argument over what constitutes scale. Our goal, however, is endurance; and, therefore, the minimum weight is kept low at .300 oz.

It is expected that many different kinds of flyers will find the Manhattan Formula attractive, and our invitation to come indoors is made directly to Free Flighters, Radio Control and Control Line flyers. This Formula is for the fellow who has always thought he would like indoor flying, but has shied from microfilm and ultra lightness. It is for the old-timer who has been away from modeling for some time and is afraid all his fingers have turned to thumbs. It is for both the junior and adult beginner; and it is for the ladies who will find that indoor flying has most of the comforts of home. Part of the fun in flying Manhattans comes from the fact that rules are still evolving and designs still developing. So, join in; give indoor flying a try and start with a Manhattan.

The beginner will find the Riversider a very easy model to build and fly. All building instructions are on the drawings, *but* a couple of notes here are worthwhile. No dimensions are shown on the half-sized drawing; just measure and multiply by two when making up your working drawings. For ease in construction, all edges are straight, with the exception of wing tips and fin, and these can be made square if the builder desires.

Construction: There seem to be only two points that might require a little guidance. One is the wing mounting, the other propeller. The wing is detachable for ease in packing. The four 1/64" sheet balsa tubes are made by first soaking in water, strips measuring 3/8 by about 1/2". Roll a strip around a 1/16" diameter nail between your thumb and forefinger; hold, and after it dries a bit, trim excess with a razor and cement, continuing to hold in place on nail with fingers until dry. You'll mess up a few of these at first; it takes a little practice. Trim the tubes to length and cement on end to upper longerons as indicated on plan. When dry, insert all the way in the four 1/16" sq. slightly rounded, wing support posts. Fit should be snug, but not forced. Put a dab of cement on top of each post and place covered wing on squarely. When dry, remove wing, withdrawing the posts. Using the tubes in this manner as a jig, it is much easier to attach the posts accurately than to try to balance them unaided. The friction of posts in these tubes is quite adequate to hold wing in place when flying. Model can be adjusted by making incidence changes in wing depending on how deep posts are inserted.

Propeller: Probably, correct propeller and rubber combination is as important for long flights as the entire remainder of the model. A propeller carved from a block is an art; but one bent like this one, on a tin can, is a snap. Soak the 1/32" sheet blade blanks in hot water for ten minutes; place on can at proper angle and bind with rubber, and bake in 250 degree oven for 15 minutes. Simple! While you are oven-master, form three or four sets of blades. Take your time fitting the tapered spar. Spars should fit snugly into hub; if loose, dope on a bit of tissue around spar. Don't fly with loose blades as a touch of a blade tip on takeoff will change setting and cause the shakes. Experiment with pitch setting, making sure both blades have same angle.

Flying: The Riversider flies on motor run alone, and motor should finish unwinding at about the same moment she touches down on the floor. This calls for a long motor. For high ceilings, weigh out about .300 oz. of rubber and make it into loops four times the distance from prop shaft to rear tubing. Lubricate, break in, and

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APRIL 1968

model aviation

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

AMA's Junior programs: started in '63, now producing exciting results.

The current scarcity of youngsters in model aviation is about to erupt in a rash of Junior programs across the country. The groundwork was started about four years ago with a survey by the Academy of Model Aeronautics, entitled "Where are the Juniors?" The response by concerned AMA members was overwhelming — hundreds of letters were received. And much space in the model press was devoted to the subject. Practically everybody, however, said the situation was hopeless. They recited differences in the times which no longer provided incentives for youth interest in aviation, as compared with the glamorous prewar Lindbergh era when so many kids looked to the sky for a career.

AMA, meanwhile, had turned the subject on but was unable to do much other than listen — the organization was suffering from financial problems and a declining membership. And, in order to survive, the Academy took a necessary action which seemingly wiped out Junior activity for good. A membership dues increase was put into effect in 1964 and the result was a loss of about 3,000 members — practically all of them Juniors!

Then this seemingly hopeless situation began a dramatic turn. The AMA financial picture improved, due to a gain in net income from the higher dues. Academy leadership began to turn away from internal organizational problems and return to a look at basic causes of a general decline in model aviation activity. And out of the previous hue and cry concerning the Junior problem, a few persistent Academy leaders emerged and began to take some positive action.

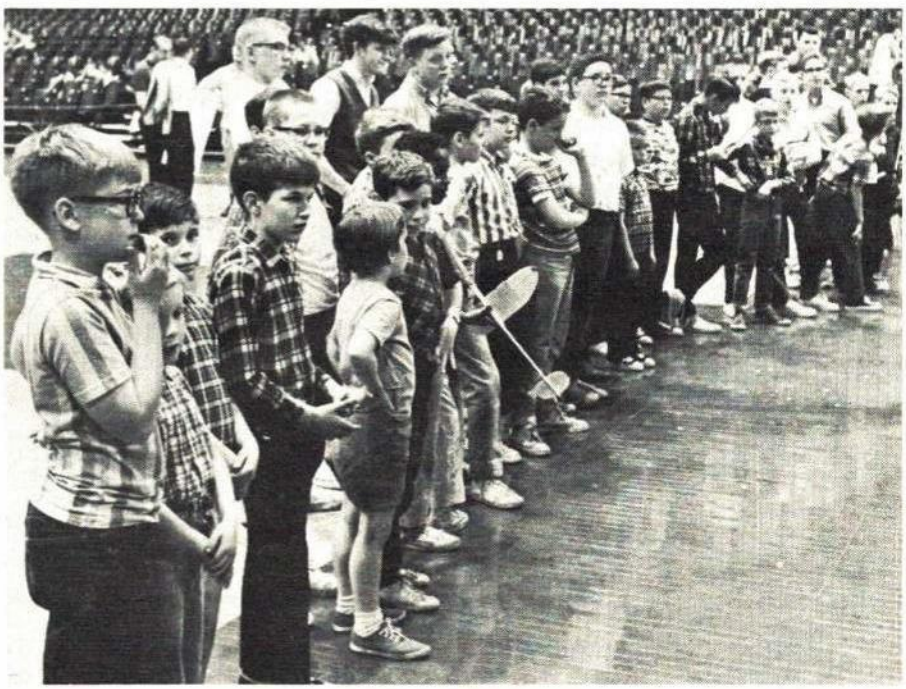
Dick Meyer, of Verona, Pa. (near Pittsburgh), was one of these. He organized some local model programs for youngsters and soon let it be known that the problem was not one of Juniors but of adults! His local activities produced swarms of youngsters. The problem was how to handle them. He didn't have much help. Most adult modelers were apathetic — they wanted to be left alone to enjoy their hobby without having to nurse a bunch of kids. But Dick was persistent and he kept Junior activities going, mostly with only himself and his wife involved as adults.

This flickering light in a sea of Junior activity darkness got the attention of Academy HQ about the time that AMA's Technical Director, Frank Ehling, had initiated his own contribution to a new Junior program. Frank had issued the original Junior survey and, after many hours of sifting through the resulting correspondence, had come up with a gimmick to light more lights of adult interest. Frank's contribution was a ridiculously simple and easy to build flying model, called the Delta Dart.

What was different about it was that kids could build and fly this model with a bare minimum of adult help. This was a key factor because it had been found that many-so-called beginner kits on the market could not be successfully completed by kids. Furthermore, Frank's model cost only pennies.

Meanwhile, Dick Meyer had also found that the market was bare of suitable model kits. He asked for help from AMA HQ and Frank offered his design. Dick and his wife scrounged materials and recruited help. Three who pitched in were: George Minnear, James Jennings, and Bill Messinger. The group got together and produced several hundred kits on their own. The kits were almost instantly successful and initiated a demand for many more. Glen Sigafoose, of Sig Mfg. Co. in Iowa, then adopted the design and produced a batch of kits at cost. The model was featured as the AMA Racer in Sig's magazine, followed shortly by plans in AMERICAN MODELER (see April '67 issue, "The plane that fooled the experts"), together with a story which told of Pittsburgh's success with the model at a special meet in 1966.

Another key event was a special meeting held in the Cleveland area in January of '67. Cleveland has been a hub of Junior activities for many years, under the leadership of AMA Fellow Chuck Tracy. Tracy's interest and unique position as aviation editor of *The Cleveland Press* newspaper enabled him to promote model aviation in that city in a manner not duplicated elsewhere. How to combine the Junior program know-how from the Cleveland and



Pittsburgh youngsters lined up for trophy awards at Allegheny Model Aeronautics Council's 3rd Annual Indoor meet. Allegheny Airlines stewardesses made presentations a memorable occasion.

Pittsburgh areas, so that others might benefit, was a primary purpose of the meeting.

AMA President Cliff Weirick invited participation by AMA officers from Ohio and Pennsylvania. Tracy served as chairman and AMA Vice-President Don Cameron was secretary. Frank Ehling attended as AMA HQ representative. Pittsburgh leader Ron Ganser was a principal speaker. Examined were such questions as: What are the basic building and flying needs of children?, Are large scale Junior competitions beneficial?, What are attitudes concerning scholarship programs?, What HQ position is needed to improve Junior activity?

The meeting tied together many loose ends concerning Junior programs. It gave direction to good intentions and ideas which had been floundering for lack of experience as to how they might best be used. Most importantly, it sifted out many individual items which could be used together on a large scale and in many communities. In short, the meeting laid the groundwork for the development of practical Junior programs all across the country.

The meeting was followed shortly by a spectacular project in Pittsburgh in early 1967, described elsewhere in this issue. The apathy barrier was crashed at this meet, with much adult help and sponsorship attracting the interest of thousands of kids over a single weekend. A key element was the leadership provided by the Allegheny Model Aeronautics Council, which brought together one or more representatives from each of the area's principal clubs. This in turn helped assure that most clubs would contribute to the total effort.

The council concept is important because it provides the means to assemble enough Junior-interested people. Few clubs have more than one or two of these kind of people, but by gathering a couple from one club, another from a second club, one or more from a third, the council is able to obtain sufficient help to put a program together. And when the council in Pittsburgh got enough people it also was able to develop plans for how its various clubs could share the project.

In effect, the council provided management of the program so that the clubs could contribute basic help. This followed AMA's successful Nats pattern of operation, dividing contest management and directorship to complement field operations with administrative support. In Pittsburgh, Dick Meyer served as program manager and Ralph Pennetti took on the job of director.

Ralph's acceptance of this assignment solved a major problem. He showed how a club which is primarily oriented to adult radio control activities could efficiently operate a contest for youngsters. As a leader of the A. R. C. S. — the principal RC club in the Pittsburgh area — he proved that the club could work for youngsters and at the same time promote itself among other adults. The meet, indoors before a large crowd of people, provided a fine opportunity for club members to be seen in their colorful shirts, to have the club name prominently displayed, and to put on RC demonstrations. The club found that the publicity generated made the effort worthwhile.

AMA's network of clubs can provide the leadership necessary to assure the future success of Junior model aviation programs - - provided the dominant RC clubs join the effort as is being done in Pittsburgh.

Members of Pittsburgh's A.R.C.S. club demonstrate radio control during indoor Junior activities. Fred Collins, left, taxies model while Contest Director Ralph Pennetti coordinates show.

The significance of this is that AMA's structure of over 400 chartered clubs is dominated by RC groups. Previously, such groups have been cool to programs for Juniors. But many club leaders have learned that to obtain and keep flying sites the support of community officials is needed. A club's encouragement of youth activities is one of the better ways to obtain such support and so Junior activities are becoming an increasingly accepted part of club planning.

Now, on many fronts simultaneously, Junior programs featuring Frank Ehling's simple model are growing rapidly. A few months ago the D. C. chapter of the National Aeronautic Assoc., the Aero Club of Washington, agreed to sponsor a citywide Junior model program developed by the Academy, called Operation Simplane. The program involves hundreds of local neighborhood groups in the D. C. Department of Recreation. An AMA chartered club, the D. C. Maxecuters, is providing basic instruction for recreation leaders to show them how to teach youngsters to build and fly Delta Darts. Next year the program is planned to expand to the suburban areas to include the recreation departments of Virginia and Maryland communities.

Thousands of Delta Darts are expected to be built and flown in Operation Simplane between now and the summer of 1969.

Also this summer, thousands more will be involved in another significant program. The Academy and the Navy are cooperating in another version of the Simplane project. This program is to culminate in late July at the 1968 Model Airplane Championships in Kansas. A Navy "Blue Angels" version of the Dart is to be offered to youngsters in that area, with a mass flyoff to take place at the Nats.

The Navy is greatly interested because the program may reverse a general disenchantment with the Nats, which over the years has turned into a basically adult activity. The possibility of attracting thousands of youngsters to a Nats program, as happened in Pittsburgh, has generated renewed Navy interest in model aviation. From a situation where the Navy has seriously considered abandoning its Nats hosting, there is now cautious optimism that if the Junior promotion works out well in 1968, many more years of Navy support for the Nats may be possible.

The basis for this outlook is that many youngsters need to be exposed to model aviation activity if an aviation interest is to be stimulated. The Pittsburgh-type approach can serve both AMA and Navy needs — the kids get a look at the Nats to see what other kinds of model flying are available beyond the Dart stage, and they also get a look at the Navy's operation and airplanes to stimulate a career interest.

And still another program is brewing. AMA is working with the National Recreation and Park Assoc. to produce materials for guidance of local recreation leaders across the country to introduce community model aviation programs. Currently being triggered by an article in the association magazine, which is a modified version of a previous AMERICAN MODELER photo feature "Where are Tomorrow's Airmen?" (Feb. '67), the program is being aided by an AMA booklet which the association will print and distribute.

That's not all. The Academy has been working with the National Aerospace Education Council to provide materials for guidance of school personnel in the estab-

University of Pittsburgh field house is the scene as youngsters and old-timer type modelers combined efforts in outstanding meet of 1967 — the first indoor model flying experience for most.

lishment and operation of model aviation clubs. NAEC's Executive Director, Walter Zaharevitz, has actually initiated such a club in his own home neighborhood. His basic tool to focus and attract interest is the Delta Dart, a batch of which was provided by AMA.

Enough? Not quite. AMA has been working with the Federal Aviation Agency. The FAA is also deeply interested in where the next generation of aviation people are coming from. This was further stimulated by the interest of the "Ninety-Nines," a prominent group of women fliers, in helping to develop a national program to attract youngsters to aviation. The Academy has offered its experience with the various Delta Dart programs to build a bigger and long range effort, with the joint support of the FAA and the women's group.

It all started in Pittsburgh and now is expanding in all directions. Youngsters and model aviation are being brought together with new energy and enthusiasm. The Dallas Aeromodelers Assoc. of Texas and the Tulsa Glue Dobbers of Oklahoma have recently enjoyed simple but successful Junior programs, as has the Coffee Airfoilers, of Tullahoma, Tenn. The story on page 22 of how the action began in Pittsburgh is a good guide to what can be done elsewhere.

The Pittsburgh story has also been put on film and copies are available to chartered clubs so that they may see how to join the effort. Don Riggs, formerly of Pittsburgh radio station KDKA, put the basic film together and narrated it. Andy Foster, of the B. I. R. D. S. club in Calif., then reworked it and had duplicates made. The film is professionally done, 16 mm with sound, about 15 minutes long. It offers any club the basis for a stirring meeting. Besides showing lots of kids having fun with simple models, the film shows how more advanced types of flying were blended in and also how many adults shared the fun.

To obtain a copy of the film a club officer should request same from AMA HQ. Remittance of $6 should accompany request — $5 will be refunded upon return of the film.

Comparison of AMA's and other insurance

There are two basic reasons why clubs seek insurance protection. The first is to obtain a flying site — either the property owner requires insurance or the club uses it as a means of assuring the property owner that he will not be liable for the clubs' activities. The other reason is to back up concern for risks involved in the club activity, with a desire to minimize the consequences of an accident.

In the first case the club is usually concerned only with what minimum coverage will serve the purpose — in other words, how cheaply can some form of insurance be provided, without real regard for whether adequate protection results. For example, an municipal body requires evidence of an insurance policy which provides up to $100,000 coverage of an accident. Nobody worries about who or what is really covered — all that matters is that a document is available whch says the club is "insured."

In the second case the kind and extent of insurance protection is looked into. The key question is not how much does it cost, but how complete it is? Also, is the protection provided during all club activity or merely for one aspect of it at one place? Furthermore, is the limit of coverage merely enough to meet a specification or is it high enough to cover a real situation?

Some clubs have what is called OLT insurance — Owners, Landlords and Tenants. This is usually a very limited type of coverage, with many ifs, ands or buts about what it does or does not cover. Until several years ago this was the form of insurance which clubs could obtain through AMA. It served the purpose of the times in providing evidence of basic responsibility and some protection.

But as experience was gained in servicing such insurance coverage a need was seen for more complete protection, for less restriction on what was or wasn't covered, for assurance that protection would not be found wanting in situations that were typical of model club activity but unusual for OLT coverage.

In 1965 the Academy of Model Aeronautics successfully negotiated a contract for a form of coverage which inherently provides more protection than OLT insurance. This is known as Blanket Liability. A comparison of this type of protection and that afforded by the standard OLT form is offered by the following, based on a letter by AMA's insurance agent:

The OLT policy covers only the club and not the liability of the individual member. This is the minimum need, at least for those clubs who require AMA membership, since the latter provides the individual protection. However, the AMA individual protection is limited to the flying aspects of club activities. It does not protect during other club connected activities.

The OLT policy is normally restricted to one specific location, whereas the Blanket Liability policy covers the activities of the club or members wherever they take place.

The OLT policy covers only liability arising out of an accident; Blanket Liability covers legal liability for losses arising out of an occurrence. There is a tricky difference involved here in which the ifs, ands or buts of OLT coverage may dilute or do away with protection when the chips are down, whereas with Blanket Liability the broadness of coverage applies — on the simple but tremendously important principle that what is not excluded is covered.

The OLT policy does not cover meets except as specific items of separate coverage at additional cost per item; under AMA's Blanket Liability, meets are covered automatically wherever and whenever held. This factor alone often makes up for the difference in OLT and BL costs, particularly when higher limits and/or the naming of additional parties as insured (sponsors or site owners) is required — a simple low cost endorsement tacked onto the basic Blanket Liability policy is all that's needed. And the club gets the benefit of rates averaging out all meets rather than the oneshot cost to cover one meet alone. Typical case: for less than $20 under AMA's current policy a club can cover all its meets during a year with higher limits ($300,000 instead of $100,000) and name the site owner as additional insured, whereas such protection is likely to cost more under OLT for just one meet.

The OLT policy does not cover accidents involving one club member to another, whereas AMA's Blanket Liability does. And while the AMA member's individual insurance provides this protection for flying accidents, it does not apply to nonflying accidents. Example: club members working together to put up a sign at the flying field, the sign — or a pole, or a banner, etc. — slips and falls on one of them.

A standard OLT policy may be modified by special endorsements (at extra cost) and some tailoring is possible to suit individual situations. However, this results in a patchwork type coverage and cannot be expected to be as effective as a policy which has been designed to AMA's special needs. The nature of OLT coverage, in defining specifically what is or is not covered, thus limits protection, whereas Blanket Liability coverage assumes protection in the absence of exclusions.

In summary, therefore, Blanket Liability coverage inherently provides broader protection than standard OLT. It provides the most comprehensive form of insurance protection available to Academy members since 1942; the best coverage available in over twenty-five years of dealing with the very special insurance problems relating to model aviation activities.

DIRECTORY OF AMA OFFICERS

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

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XI: R. D. Stalick, 2807 S. Oak St., Albany, Ore.

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XI: A. L. Grell, Rt. 1 Box 165, Tangent, Ore. 97389

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Bold type below indicates Chairman of Contest Board.

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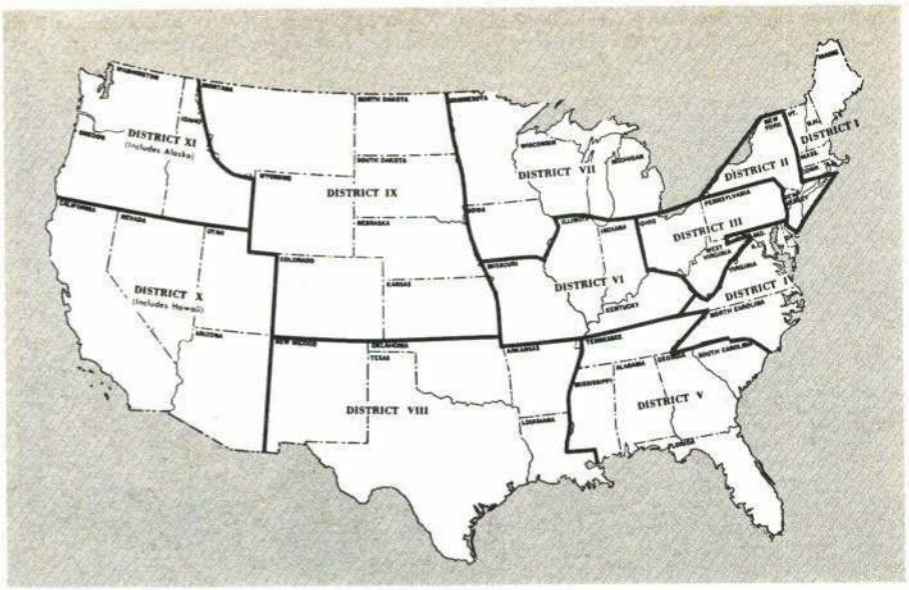
II: E. Fronczek, 34-14 Broadway, Long Island City, N. Y. 11106
III: Robert Leishman, 167 Goldenridge Dr., Levittown, Pa.
IV: J. V. Boyle Jr., 219 Shenandoah Rd., Hampton, Va. 23361
V: Jerry Wagner, 274 E. 9th St., Hialeah, Fla.
VI: C. W. Fries, 8798 Sturdy Dr., Crestwood, Mo.
VII: P. V. Klintworth Jr., 894 Brooklawn Rd., Troy, Mich. 48084
VIII: **R. Tenny, 432 Lynn St., Richardson, Tex. 75080**
IX: Frank Monts, 6519 Marjorie Lane, Wichita, Kans.
X: V. Cunnyngham, 4337 Hornbrook St., Baldwin Park, Calif. 91706
XI: D. Sobala, 12003 S.E. Taylor St., Portland, Ore.

CONTROL LINE CONTEST BOARD:

I: D. K. Cook, 148 Belair St., Brockton, Mass. 02401
II: J. G. Pailet, 30 Emerson Rd., Brookville, Glen Head, N. Y. 11545
III: Laird Jackson, 5415 Houghton Pl., Philadelphia, Pa.
IV: H. Larsen, Rt. 1, Box 30705, Manassas, Va.
V: W. D. McGraw, 1325 Carol Dr., Memphis, Tenn.
VI: R. G. Marek, 1003 Tacoma St., Carpentersville, Ill.
VII: **Howard Mottin, 2124 Common Rd., Warren, Mich.**
VIII: G. M. Aldrich, 3219 Shady Springs, San Antonio, Tex. 78230
IX: J. R. Mason, 2214 S. Pine Crest, Wichita, Kans.
X: J. E. Barr, 7418 Collett Ave., Van Nuys, Calif.
XI: Keith Loutocky, 1419 S. 48th, Tacoma, Wash.

RADIO CONTROL CONTEST BOARD:

I: H. A. Thomasian, 369 Brigham St., Northboro, Mass. 01532
II: R. Noll, 96 Pine Knoll Rd., Endicott, N. Y. 13760
III: George Kane, 209 Barbara Lane, Warminster, Pa.
IV: W. C. Northrop Jr., 56 Holly Lane, Newark, Del.
V: Don Coleman, P.O. Box 436, Citronelle, Ala. 36522
VI: D. R. Burt, 3048 Central St., Evanston, Ill. 60201
VII: Loren Tregellas, 3003 S. Everett, Wichita, Kans.
VIII: C. Summers, 7132 Shook Ave., Dallas, Tex.
IX: James E. Northmore, 28207 Grand Duke, Farmington, Mich.
X: **G. E. Nelson, 8638 Patterson Pass Rd., Livermore, Calif. 94550**
XI: R. Brooke, 17845 3rd Ave. S.W., Seattle, Wash.



1967 Election Results, For '68-'69 Officers

Total valid votes cast: 2,980 (Approx. 13% of membership)

SEC-TREAS.	**Earl Witt**	**2199**
	Others (26)	34
VP — DIST. I	**Cliff Piper**	**265**
VP — DIST. III	**Eva Biddle**	**224**
	W. Weisenbach	199
	A. Seidowski	184
	Ron Morgan	152
VP — DIST. V	**Jim Kirkland**	**247**
	Jim Perdue	195
	R. Chidgey	1
VP — DIST. VII	**J. Josaitis**	**399**
	C. Welliver	16
	Dave Keats	11
	Others (5)	7
VP — DIST. IX	**Stan Chilton**	**40**
	M. DesJardins	30
	Bill Giesking	22
	Ray Combs	20
	Others (16)	28
VP — DIST. XI	**Bob Stalick**	**145**
	Others (3)	3

Name in bold type is officially elected, with term of office beginning January 1, 1968.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

FEBRUARY

Feb. 17-18 — Buckeye, Ariz. (AAA) 18th Annual Southwestern Regional Model Airplane Contest for FF, CL, & RC. Site: Airport. Q. Webster CD, 3318 E. Sheridan, Phoenix, Ariz. 85012.

Feb. 18 — Lincoln Park, N. J. (AA) 8th Annual Snowbird CL Challenge Meet. Site: G.S.C.B. Club Field. A. Cangialosi CD, 131 Horseneck Rd., Fairfield, N. J. 07006.

Feb. 24-25 — Sebring, Fla. (AAA) P.B. Aircadets Model FF & CL Meet. Site: Airport. A. Bursey CD, 2336 Redwood Rd., W. Palm Beach, Fla. 33401. Sponsor: **Sky Pirates.**

Feb. 25 — 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.**

MARCH

March 9-10 — Kerman, Calif. (AA) First Annual Northern California FF Championships. D. Galbreath CD, 702 Anderson Rd., Davis, Calif. 95612. Sponsors: **Capitol Condors & Oakland Cloud Dusters.**

March 9-10 — Los Angeles, Calif. (AA) B.I.R.D.'s Open RC Meet. Site: B.I.R.D.'s Field. J. Bridi CD, 23625 Pineforest Lane, Harbor City, Calif. 90502. Sponsor: **B.I.R.D.'s Inc.**

March 10 — Aurora, Colo. (A) Magnificent Mountain Men Indoor Meet. Site: Central H.S. G. Larrabee CD, 3203 W. Saratoga, Englewood, Colo. 80110.

March 24 — Sacramento, Calif. (AA) Northern Calif. FF Council Meet. Site: Condor's Field. J. Pond CD, 2162 43rd Ave., San Francisco, Calif. 94116. Sponsor: **S.F. Vultures.**

March 30-31 — Pittsburgh, Pa. (AA) 4th Annual Allegheny Indoor Air Meet. Site: Pitt Univ. Field House. R. Pennetti Jr. CD, 3918 Brandon Rd., Pittsburgh, Pa. 15212.

March 31 — Fresno, Calif. (A) Fresno Monthly Meet for FF. Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr. W., Fresno, Calif. 93702. Sponsor: **Fresno Gas Model Club.**

APRIL

April 20-21 — Sebring, Fla. (AAA) Florida State Championships for FF & CL. Site: Airport. J. Wagner CD, 274 E. 9th St., Hialeah, Fla. 33010.

April 21 — 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.**

April 28 — Sacramento, Calif. (AA) Northern Calif. FF Council Meet. Site: Condor's Field. W. Bowen CD, 1415 Midvale Rd., Lodi, Calif. 95240. Sponsor: **Stockton Gas Model Club.**

MAY

May 25-26 — Sumter, S. C. Iris Festival RC 1968 Invitational Meet. Site: County Airport. J. Bradham CD, 35 Morgan Ave., Sumter, S. C. 29150. Sponsor: **Sumter M.A.C.**

May 26 — 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.**

May 26 — Sacramento, Calif. (AA) Northern California FF Council Meet. Site: Condor's Field. W. Schnathorst CD, 647 Hunt Way, Davis, Calif. 95616. Sponsor: **Sacramento's Capitol Condors.**

May 26 — Tucson, Ariz. (AA) Spring CL Invitational Meet. Spec. Events. Site: Rodeo Park. T. Snow CD, 909 E. Ellis, Tucson, Ariz. 85719. Sponsor: **Cholla Choppers M.A.C.**

May 30 — Union, N. J. (AA) 14th Union Model Airplane Invitational CL Meet. Spec. Event. Site: Swanstrom Pl. F. DeCicco CD, 53 Broadview Ave., Maplewood, N. J. 07040.

BIG NEW NATS!

Planning for the 1968 National Model Airplane Championships is underway to make this one of the best ever. Plan now to come.

NEW NATS DATES!

August 3-8, Naval Air Station, Olathe, Kansas (near Kansas City).

Model Rocketeer

Continued from page 41

Protection Assoc. The main purpose of Kukowski's appearance was to make the organization aware of the progress being made by the NAR and model rocket manufacturers in reducing the untold number of amateur rocketry accidents in the U. S. and to offer a solution to the dilemma faced by the fire marshals and public safety authorities. The NAR also sought their assistance in developing an acceptable standard for model manufacturers and model rocketeers.

Unknown to the host group was the planned attempt by a western state delegation to introduce a resolution condemning model rocketry and calling for the NFPA to take action against it by an official declaration.

The NAR appearance, without a doubt, prevented a negative report on model rocketry. Rather than condemning model rocketry, a decision was withheld and a resolution was approved that would establish discussions between the NAR and the NFPA Pyrotechnics Committee.

The NFPA invited G. Harry Stine to join the Pyrotechnics Committee and to assist in establishing a guideline for a code concerning model rockets. Two years later a tentative Code for Model Rocketry was passed without dissent by the NFPA national convention. During that time the model rocket manufacturers were kept abreast of the situation and later invited to assist the committee in any changes which would improve the code. More refinement of the code has been in progress and a finalized version of the Code for Model Rocketry will be voted on in May, 1968.

WHAT NOW?

Upon final approval of the Code for Model Rocketry by the NFPA, implementation of the code can follow a number of courses. A number of states automatically adopt all NFPA codes, relying on the NFPA as the final determining factor. Other states must take the code and, through the efforts of the state fire marshal and other interested citizens, have the code legislated. In still other states, citizen groups, with the NFPA code as a guide, must "see the bill through" the state legislature. Where local option is the rule, it must be done on a county or city basis.

SUMMARY

One thing is clear. The efforts of the NAR in this all important problem must be made known to all model rocketeers. The course taken has been criticized, but in a final analysis it has proven to be the only one with foresight. The cooperation of the manufacturers has been outstanding and appreciated.

But we must remember one thing. There will be more attempts to restrain model rocketry in the future. The NAR must remain strong and unified so that the progress to date is not erroded.

Starjet

Continued from page 26

pushrods are bent to the form on the plan and then attached to the bellcrank. Small washers should be soldered to the ends of the pushrods to retain them. The leadouts can be made from either $\frac{1}{32}$ dia. music wire or flexible leadout wire. These should be wrapped and soldered after attaching to the bellcrank. Following assembly of the bellcrank with the leadouts and pushrods, the unit can be mounted to a piece of $\frac{1}{8}$ plywood. Be sure to cut out the plywood under the sliding portion of the bellcrank, and do not glue into place until the unit works back and forth abso-

lutely freely. This will prevent problems with the throttle later on. Glue the mount with bellcrank installed into the wing, and reinforce and shim into place with scrap balsa. The throttle pushrod should come out through the top of the leading edge, and a small piece of 5/32 dia. brass tubing can be glued around it to serve as a bearing. The top planking and wing tips are now glued on. This completes the preliminary assembly of the wing.

Fuselage: It is constructed from ½ thick medium-grade balsa. The ⅛ plywood doublers and maple motor mounts can be cut out to the size shown on the plan. Be sure to extend the doublers back to the position shown on the plan so this will give a more rigid mount for the engine. Remember, this is a throttled engine and goes through a wide range of vibrations that must be absorbed by this structure. The entire nose assembly, consisting of doublers, maple motor mounts and balsa fuselage should be glued together with epoxy glue and clamped firmly together until the glue is set. A slot is cut in the rear of the fuselage; a piece of ½ x ⅜ maple is epoxied into it. When this is set, a ⅛ dia. hole is drilled in the center and a piece of ⅛ O.D. brass tubing is glued into the hole. This will serve as a bearing for the tail hook. Add a piece of ½ soft balsa for the cockpit. Then take the fuselage assembly and sand all over to an oval cross section, except at the rear where the stab will be glued on. The plywood nose section can easily be sanded using a sanding disc in a ¼ drill.

Slide the wing through the fuselage to the center section being careful not to damage any ribs, but do not glue in place yet. First, install the 3/32 landing gear wire to the mounts in the wing with J bolts. If you use perfect J bolts, it will be necessary to cut off part of the ends so they will not dig into the plywood mounts. I prefer the 3/32 dia. wire because it gives more spring to the gear to take the landing shock, but ⅛ dia. can be substituted for a stiffer landing gear. Add the final piece of 1/16 sheet covering to the wing and extend this out to the No. 3 ribs so that it encloses the landing gear. When this is dry, apply a ½ wide strip of epoxy glue completely around the centerline of the wing and slide the fuselage over it. Add another small fillet of glue completely around the wing fuselage joint. Hold the fuselage in a vise until the glue is set and make sure the wing is at a right angle to the fuselage sides.

Tail surfaces: The stabilizer and elevator should be cut out to the size shown on the plan. For the time being, cut out the elevator as one piece. Use a good hard grade of balsa because a soft stab will sometimes flutter in the wind. The 1/16 dia. M.W. C horn is installed in the elevator by first drilling two oversize holes, then filling with epoxy, followed by pushing the C wire into them. When the glue is set, trim away the center section of the elevator. Round the leading edge of the stab and taper the elevator and sand to the final shape. Install cloth tape hinges and a nylon control horn with its nylon backup plate; the stab assembly is complete. Then, rough out the rudder from a piece of 3/16 sheet noting the grain direction. Sand the rudder to an airfoil shape. Then while the fuselage is still held in the vise, glue on the tail group with epoxy checking alignment. The rudder has no offset.

Miscellaneous: When the glue is set on all joints, reinforce the wing-fuselage and the stab-fuselage junctions with either fiberglass and resin, celastic, or nylon tape and epoxy. This step is important for good durabiliy. Take a piece of 3/32 dia. music

wire and blend the tail hook to the shape shown on the plans, following closely the hook portion. One of the secrets of a good lightweight hook is the $\frac{1}{4}$ dia. bend at the end of the hook. When this bend is kept small, the hook will never spring open, no matter how hard a landing you make. The slower the landing speed, the better. The hook can be retained in the fuselage bearing by a $\frac{3}{32}$ wheel collar for ease of removal. If you wish to have a spring-loaded hook in the down position, the $\frac{1}{33}$ M.W. hooks can be added to the tail hook and fuselage and tension provided by a small rubber band. A down stop can be fabricated by simply drilling a $\frac{3}{16}$ dia. hole in fuselage and gluing in a dowel pin so that it will stop the hook in the desired position.

The nose gear is also removable but for a different reason. This gear takes the majority of the landing load and can be bent out of shape by repeated bad landings. It is a simple matter to install a new gear or to remove the old one and bend back into shape without damaging the plane. Make the nose gear out of $\frac{1}{8}$ dia. music wire only. After bending to the shape of the plan, it is installed using nylon landing gear clips. I used Don's custom streamline 2" dia. wheels, available from Don Hoyer, in Xenia, Ohio. Washers should be soldered to the landing gear wire to retain these wheels.

Painting: I recommend a butyrate dope finish, the easiest and fastest to apply. First, apply two coats of Talc-and-dope mixture to the wood surfaces, sanding when dry and followed by two coats of clear, and then the color. I used Jap tissue to cover the wings with three coats of clear followed by the color. GM-weight Silkspan works well too. My paint scheme was achieved by brushing on two coats of gray, then brushing on the dark green shapes. The edges of the green were then air-brushed to blend better, and coat of clear sprayed over the entire surface. Star and bar decals and your AMA number complete the job.

Engine and tank: The simplest way to mount the fuel tank is rubber bands and wire clips. Drill four holes at the edge of the tank and push through two $\frac{1}{32}$ wire C retainers. Bend the ends over as shown.

I prefer blind nuts for mounting the engine. These should be steel; brass nuts strip too easily. No right thrust is needed. If desired, add thin washers under the front mounting bolts. There are a variety of engines that suit this plane. If you do not have one with a throttle, purchase one of the RC 35 engines. It will save a lot of work and will last for many years. If you use an RC engine, install the transfer bellcrank shown on the plans. This will provide the right amount of pushrod travel and transfer the motion to the right direction for an RC engine. Be sure to break in the engine thoroughly before attempting to compete with this plane.

Conclusion: This design and the proposed event offers an opportunity to those competitors who lack the finances and resources required in "scale" carrier. By retaining the same basic wing and fuselage structure, but changing the shape, a variety of fighter-type planes could be produced. These encourage originality, but follow the basic structure presented. In this manner, the good flying characteristics of this plane would be retained but a variety of designs could be produced. Starjet has achieved in competition, using a Fox 35 and Super Sonic 100 fuel, high speeds in the 60-70 mph range, and low speeds in the 20-30 mph range.

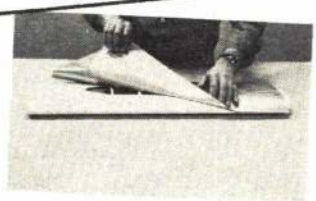
TOP FLITE

Introduces Brand New

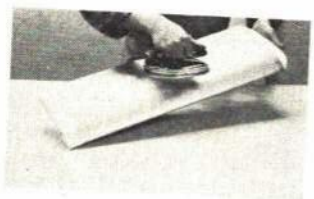
SUPER MONOKOTE™

(Patent Pend.)

The NEW, IMPROVED Covering with the Built-in Finish

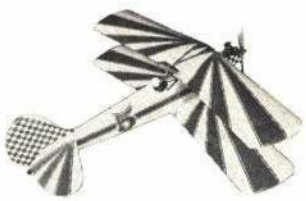


Just lay new DRY Super MonoKote on your solid or open-frame structure and bond it **permanently** with a warm iron. With Super MonoKote there is no need to cover open areas with silkspan.



After you have eliminated all wrinkles and loose areas with a warm iron, Super MonoKote will stay **skin tight** even when subjected to extreme heat and cold changes.

Because both the finish and dry adhesive sides of Super MonoKote are completely fuel-proof, you need no other materials to seal seams, they will not loosen . . . even in the firewall area.



Because Super MonoKote eliminates doping, sanding, sealing and polishing and has a built-in smooth, ultra high-gloss finish, **you'll get a far better finish, in less time, with far less work.**

NEW SUPER MONOKOTE GIVES YOU ALL THESE ADDITIONAL BENEFITS, TOO!

LIGHT . . . is 2/3 lighter than an equivalent silk and dope finish.

STRONG . . . has a tensile strength of 25,000 Lbs. per Sq. In.

PUNCTURE RESISTANT . . . has many times the tear-strength of silk and dope finishes, yet should it puncture, instant, almost invisible repairs can be made on the field with Regular MonoKote.

ODORLESS . . . New Super MonoKote is completely odorless, eliminates irritating smells and dangerous fumes.

MOISTURE PROOF . . . STAIN PROOF . . . FADE PROOF . . . **FUEL PROOF.**

NEW SUPER MONOKOTE IS AVAILABLE IN 6 ULTRA HIGH-GLOSS FINISHES

only $1.35 per running foot 26" width

- Missile Red
- International Orange
- Piper Yellow
- Jet White
- Mustang Aluminum
- Sky Blue

NOTHING COMPARES WITH SUPER MONOKOTE FOR COVERING AND FINISHING!

New Super MonoKote, because of its dry adhesive backing, will not adhere to itself, thus it is fast and simple to apply, and is easier to work around compound curves. Another important benefit of new Super MonoKote lies in the fact that it comes in rolls 26" wide and can be purchased by the running foot . . . you buy just the amount of each color you need, so there's no waste.

REGULAR MONOKOTE FOR TRIM AND FIELD REPAIRS

Regular MonoKote has a "wet" adhesive backing that strongly bonds to new Super MonoKote and regular silk and dope finishes without need of heat.

REGULAR MONOKOTE IS AVAILABLE IN 9 ULTRA HIGH-GLOSS FINISHES

only $1.25 per running foot 26" width

- Missile Red
- International Orange
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- Piper Yellow
- Midnight Black
- Insignia Blue
- Mustang Aluminum
- Jet White
- Aztec Gold

TESTED AND ACCLAIMED BY MANY OF THE WORLD'S BEST KNOWN MODELERS

Maynard Hill

SUPERB FINISH IN FRACTION OF TIME

Super MonoKote is a modern material that will be widely used on all types of models. It is easy to apply, durable and provides a superb finish in a fraction of the time needed for conventional methods.

Ken Willard

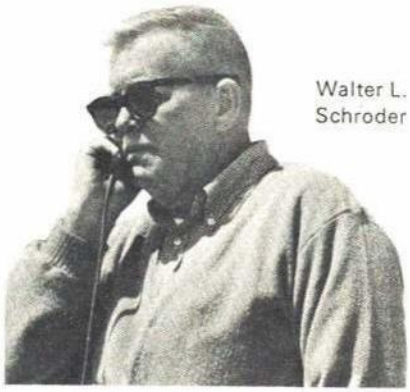
TOUGH . . . FUELPROOF . . . EASY TO CLEAN

Super MonoKote covers a model easier and faster than any other covering material, yet it gives your model a high gloss, professional appearing finish that you can be proud of. It's strong and tough, easy to clean, fuelproof, and simplifies patching over repair jobs. I now use Super MonoKote on all my models, and recommend it.

Dr. Walt Good

A TRULY BEAUTIFUL FINISH

The new Super MonoKote has given my Aeromaster biplane a truly beautiful finish. The dry nature of the undercoating and the thinness of the film make it very easy to apply, even around sharp corners. I highly recommend Super MonoKote to the modeler who wants a beautiful finish in the shortest time.



Walter L. Schroder

DOES EVERYTHING A COVERING SHOULD

When asked why I liked working with the new Super MonoKote, my answer was simple and direct, "Its new dry adhesive makes it the simplest material to cover with that I have used as yet. It works evenly and smoothly around corners and curves and when shrunk, it *holds its tautness.*" When a covering material does all it is required to do and then adds a bonus of a fine-looking, colorful machine, it rates tops in my shop.

Dale Willoughby

STAYS TIGHT OVER OPEN FRAME

Super MonoKote has been tested for over a year on my radio controlled gliders. The red and orange colors in one mill thickness applied over open framework on both wings and tail surfaces were repeatedly exposed to extremes in heat and cold, but showed no creeping nor wrinkling tendencies. I consider Super MonoKote to be the best all-round model covering material and my choice for the "BIG SAILOR," a radio controlled glider design created for World Records Trials.

Don Dewey

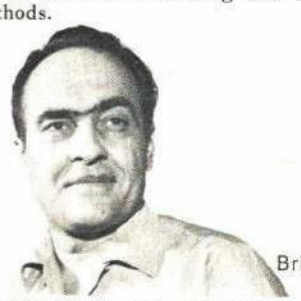
COVERS COMPOUND CURVES WITH EASE

There is absolutely no question that Super MonoKote is the fastest known method of finishing a model aircraft. Super M-K is easy to apply, adheres uniformly and covers compound curves with extreme ease. RCM does not hesitate to put its tested, approved and recommended stamp on this new material from Top Flite.

William C. Northrop, Jr.

NO WRINKLING . . . NO SLIPPAGE

With the development of Super MonoKote, Top Flite has at last fulfilled *all* of the requirements for a one-shot model airplane covering material. There is no wrinkling, no slippage, no softening of the adhesive by glo fuel, no "fly paper" stickiness while handling. Having tested Super MonoKote for more than a year, I'm sure that like me, once you've tried it, there'll be no returning to outmoded covering and finishing methods.



Dario Brisighella

SAVES TIME AND WEIGHT

I'm careful and finicky about finishing my planes. It usually takes me 30 to 40 days (about 4 hours per day) to cover and finish with silk and dope. Using Super MonoKote I can cut this down to 7 days . . . less than ¼ the time. Another big advantage is a weight savings of about 1 lb. 3 oz. on my biplane. I'm sold on Super MonoKote . . . it's great!

TOP FLITE MODELS, INC. 2635 S. WABASH CHICAGO 16, ILL.

Canard Pointers

Continued from page 30

Another good rule of thumb in deciding how big to make the horizontal stabilizer, or length of the fuselage, is to satisfy equation 6. All variables are as defined earlier. For a conventional airplane, with a horizontal tail area to wing area ratio of 1:5, this equation says the distance between the aerodynamic centers of the wing and tail should be about 2.5 times the wing mean aerodynamic chord.

An additional reason for using swept or delta wings is that they exhibit a beneficial dihedral effect. When an airplane is in a roll, it tends to side-slip to the inside. Dihedral creates a rolling moment, tending to roll the airplane upright. Swept and delta wings exhibit this characteristic. For example, the wing on my canard has no dihedral, but the 35-degree sweepback provides dihedral effect. An advantage in using a swept or delta wing and no dihedral is that the airplane will exhibit the same dihedral effect when upright or inverted. Still another advantage is a beneficial effect added to the airplane's directional stability.

Incidence angle of the horizontal stabilizer should be about 2-5 degrees greater than that of the wing. The rule, used primarily so that the airplane tends to pitch up when there is zero wing lift, has a good side effect. When approaching a stall, the horizontal stabilizer stalls first and falls through before the wing stalls. This is what makes a canard have gentle stalls.

Choice of landing gear type and location is almost arbitrary. It would probably be a good idea to have the main gear well back to protect the prop. The nose gear can be most anywhere on the fuselage. It could be considered as ballast and moved about to get the CG in the right place.

That's it. I hope you are able to design your own canard after reading this. Let me hear about your success or failure.

Pittsburgh's Answer

Continued from page 22

established and many such teams were formed at the field house, thereby introducing young boys to each other on a mildly competitive level. Airplanes for the Pre-Fab event were all-balsa cabin models, constructed from Top Flite or Carl Goldberg kits. Wood parts could be sanded but printed proof of the original parts was required. Propeller, nose block and rubber motors could be of original design. Minimum weights required were .5 and .7 oz.

The Flying Scale for Senior and Open was flown by the recently adopted AMA Indoor Rubber Scale Rules. Since none of the 14 Junior contestants were able to produce the required scale drawings, they were judged on the basis of workmanship and flying ability.

The O & P (Originality & Performance) event was another event aimed toward the Junior flyers but also included Seniors. All that was required was construction and performance of any original design, or unique modification to an established design. Some of the entries in this event were modified paper stick designs, twin-boom versions of all-balsa ROG models, flex wing tractor, and pusher flying wing.

Although performance was required (each model did fly) the event was judged on the basis of the originality of the airplane, its flight performance and the ability of the builder to answer questions pertaining to its design.

This event drew 17 entrants ranging in age from eight to 19. The special awards in this event were Junior Science Scholar-

ships to Buhl Planetarium for Junior contestants and three hours flight instruction for Senior contestants.

All official flying started at 10:00 a.m. and the trophies were awarded at 6:00 p.m. requiring a very rigid time schedule. Whenever the Junior events were flown, the floor was reserved **strictly** for Junior flyers.

Static display booths representing Radio Control, Control Line, and outdoor Free Flight models were manned by various modelers, to present all phases of model flying to the spectators. While the Flying Scale and Originality & Performance models were being judged, demonstration flights of the more specialized indoor models (Ornithopter and Autogyro) were presented by the Pittsburgh Aeromodelers. Radio Control taxi and engine control were demonstrated by members of the Greater Pittsburgh ARSC. Various modeling dignitaries were introduced to the public.

All pre-contest administration and contest officiating were performed by the member clubs of the Allegheny Model Aeronautics Council, namely the Greater Pittsburgh Aeronautics Radio Control Society (RC), The West Hills Aeronautics Kontrol Society (UC) and The Pittsburgh Aeromodelers (FF).

Timing and crowd control duties were performed by members of the Civil Air Patrol. Scale judges were members of the Pittsburgh Chapter of the Experimental Aircraft Association and the Pittsburgh Aero Club. Countless others provided invaluable assistance to help make this a truly air-minded meet.

Finally, on Saturday, May 13, 1967, 100 proud winners were rewarded with a 30-minute airline flight around the Greater Pittsburgh area. Can you remember what that would have meant when you were a Junior? Pittsburgh did it — will you try?

Scientific

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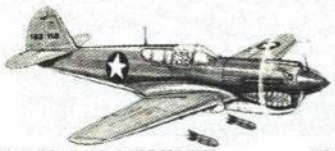

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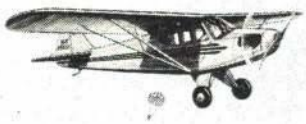

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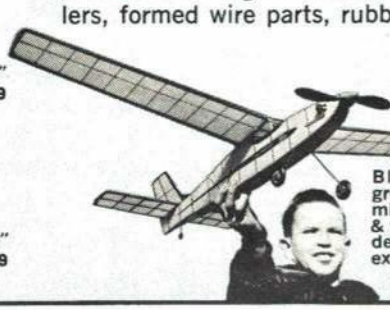

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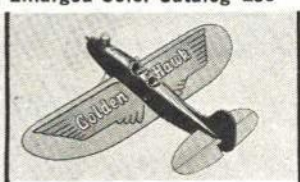

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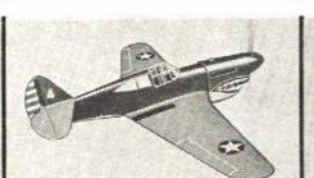

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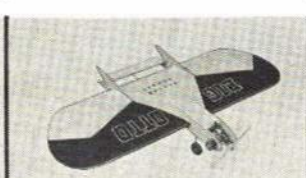

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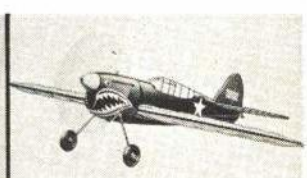

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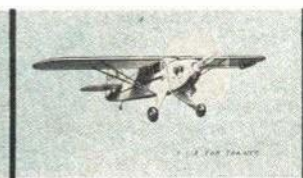

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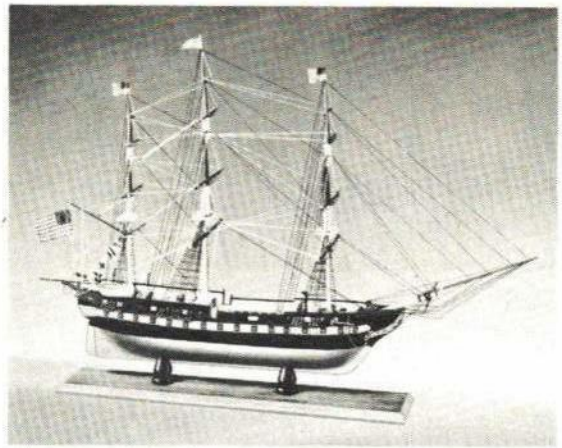

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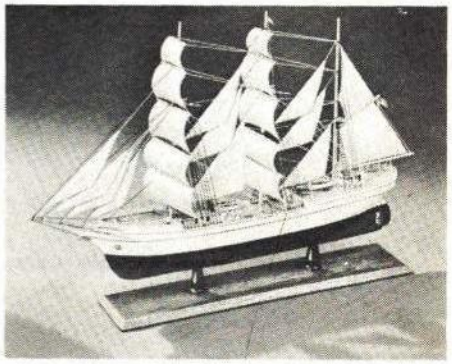

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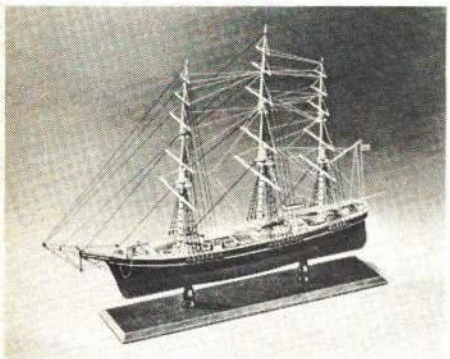

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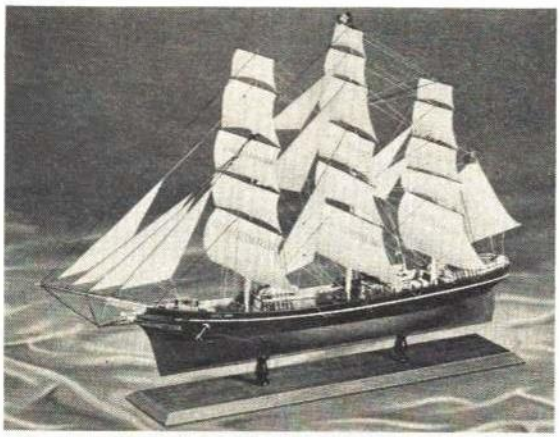

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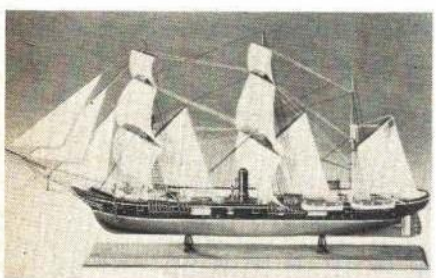

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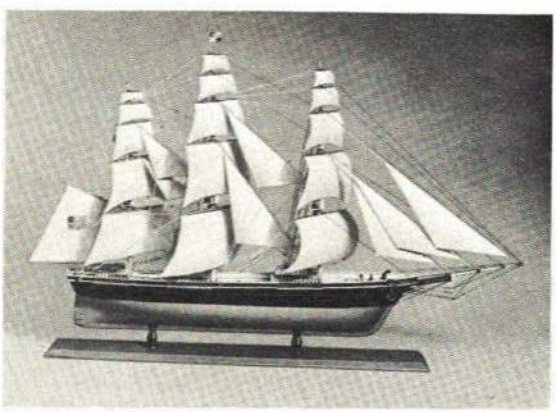

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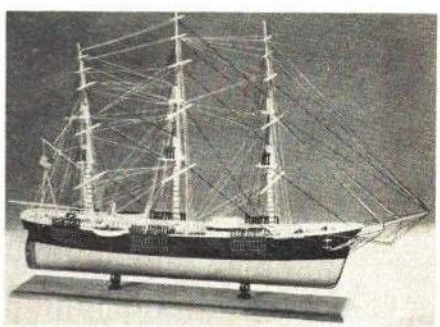

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Getting Started in RC

Dry Batteries: Eighth in a series

HOWARD MC ENTEE

DRY batteries are the prime power source in huge numbers of RC models today. Let's discuss them a bit. Firstly, how are they made? Generally, there is a zinc cup which holds all other components, and is the negative or minus pole. Lining the cup is a porous separator, and within this is the mixture of active chemicals, with a carbon rod in the very center. The rod is always topped with a brass cap, and is the positive or plus pole. Dry cells are not really dry at all; the chemical mixture must be moist in order to function. As cells grow old, they tend to dry out, and when completely dry they are useless.

According to proper nomenclature, a single unit is called a "cell," per sketch A. But any assembly of more than one cell is termed a "battery." In popular usage today, however, battery is often used for just a single cell.

The cells we use most are those intended for powering flashlights, and the most widely used sizes are the "penlight" or size AA cell (about 9/16" dia. x 2" long); the "medium" or size C cell (about 1" dia. x 1 15/16" long); the large or size D cell (1 11/32" x 2 13/32" long). In very small models, we might find the AAA cell, (13/32 x 1¾") or the size N (about 7/16" dia. x 1 3/16" long). Most of the 9-volt batteries available are made with various sizes of flat cells.

Many RCers don't realize that most every dry cell maker produces two, three or even more types in the AA, C and D sizes, tailored to special purposes. What you buy in the corner drug store are termed "general purpose" cells; they will do a fair job for most purposes. But camera stores stock photoflash cells, designed to provide a high current for very short intervals with long rests between. You can get "industrial" cells suited to heavier duty uses, or "radio" cells for in-between duty. Most of the special purpose cells cost more, but are worth it for our uses; the photoflash type is not suitable.

All dry cells will produce about 1½ volts with no load, when new. How do we get more voltage? By hooking two or more in series, as in sketch B. Note that the plus of one (brass cap) is wired to the minus (zinc case) of the next; this can go on for any number of cells, and the total voltage is 1½ times the number of cells in series. We sometimes need more current capacity, without higher voltage — as for a couple of large cells wired for heating engine glow plugs. Here we use the parallel connection, per sketch C; the two plus ends go to one lead, the two minuses to the other. This retains the 1½ V of a single cell, but more than doubles the ampere capacity.

It is difficult to compare the "ampere-hour" capacity of dry cells with that of rechargeable types such as nickel-cads; this is because dry cell useful life depends greatly on how long they are used at a certain current, and *how long they can rest between uses.* You can drain a good nickel-cad cell at heavy current right to the end of its capacity, and it will still bounce back full of pep after a full charge. But a complete drain of a dry cell generally ruins it.

Thus the longer you can let dry cells rest, the better will be their life. Lower current drain increases life. So if your drain is fairly heavy it's wise to use two cells in parallel to split the drain between them (which will give somewhat more than twice the life you would get by draining *each cell separately*). When a set of cells is connected in series, the current drain is the same for *each* cell in the series; but when they are in parallel, *divide* the drain by the number of cells.

Dry cells should be stored in a cool dry place. Cool because even when not in use, there is continuous chemical action within the cell; this action can drain the cell completely, even though it is never put into actual use. Storage in a refrigerator will extend cell life greatly; for even longer term storage you can put them in a home freezer. In either case, it's wise to put the cells into a container with a tight top, since both the refrig and freezer tend to dry out anything kept within. Even though dry cells are pretty well sealed, they *can* dry out in time. Cells that have been in the refrig should be allowed to warm up for half an hour before use; those from a freezer should have an hour or two of *gradual* warming.

It is useless to test cells without a load. With no drain on them they can read a full 1½ V, yet be close to the end of their life. You can get small battery testers for a couple of dollars that are useful for the purpose, since they do put a reasonable

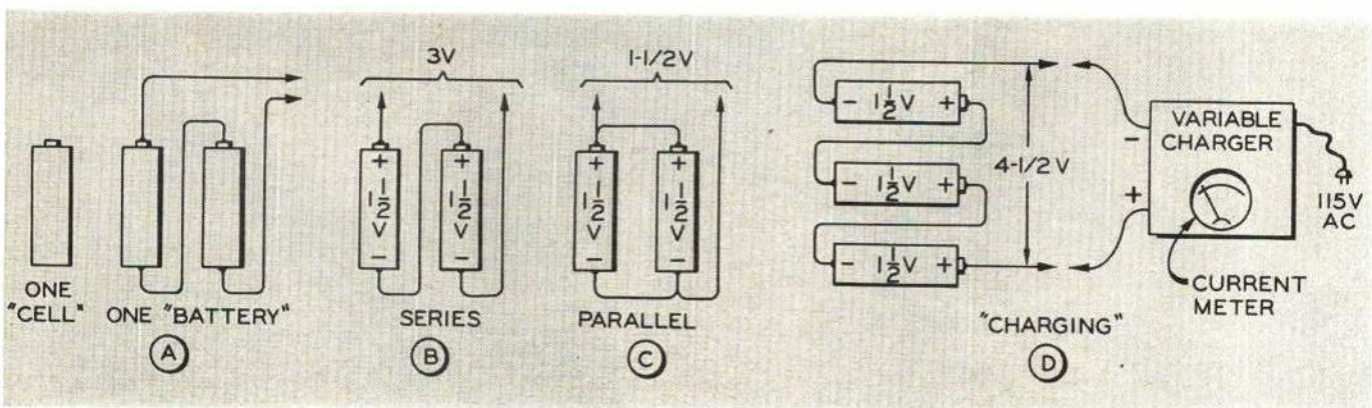
load on the cells (even though they aren't very accurate). Or check the cells or battery under the load it has in normal use; for example, check receiver cells with the switch on and a tone coming from the transmitter. Under load, cell voltage drops, of course, but the receiver maker generally specifies how low it can drop *under load* of his receiver, before replacing the cells with fresh ones.

As dry cells are discharged, the zinc case is eaten away on the inside — a normal action. Eventually, the zinc will be eaten through in one or more places, whereupon the cell is no longer usable. Also when this occurs, the corrosive chemicals leak out and can ruin battery holders and other metals they contact. Thus, never leave a dry cell in equipment for long.

You may hear about charging dry cells, and units are sold for this purpose. They really can't be charged at all, but by applying current to them, the rest period between uses can be shortened. If you try this, hook them as in sketch D — charger plus to the brass cap, minus to the case. This is a tricky operation, and most modelers simply won't bother with it. If you want to get into charging — get nickel-cad cells that are designed for it!

So-called "alkaline" dry cells can stand considerably heavier drain than the normal types, and for longer times. They are well worth the extra few cents cost for RC work. These cells have in the past been found even more apt to cause corrosion of adjacent metal — so watch them very carefully for signs of this. Mercury cells are a specialized form that have not seen much use in RC; they are not widely distributed, are heavy and rather expensive.

One last note. Many RCers feel battery holders are not too reliable (they *can* be, if properly used), and prefer to solder directly to the ends of dry cells. If you do this, clean the cell ends very well and use a hot clean iron; hold it on the cell end (especially the minus end) only long enough to assure a good connection. Quite a few dry cells these days have an extra metal disc on the negative end, that can be a real trouble source. Remember, these cells are generally designed for use in flashlights, where fairly heavy end-to-end pressure is applied. This pressure is generally sufficient to produce good contact between the added end cap (which is just held in place by the rolled-over cardboard cell outer case) and the zinc container. With soldered battery packs, there is little or no end pressure —and there is often a poor connection at this point. The added end caps are almost always shiny plated metal; the actual zinc cell case, however, usually has a duller appearance, or is sometimes frosty-looking. Check any cells you use for this negative end disc — and remove any you may find. This could prevent a crash or flyaway!



Four Keys To The Sky

Continued from page 19

tional control they later devised a movable rudder surface.

Others had tried out these ideas, independently or in pairs, but the Wrights were the first to devise a system of control employing all three movable surfaces — the aileron, elevator and rudder. They were also first to link the aileron and the rudder together, providing stability in the bank and turn. Later, this became the strong point of their patent rights in numerous suits and court battles. On this point, alone, they won the distinction of being called the "inventors of the airplane."

Most of these experiments with the various control combinations were carried out first on large kites and a biplane glider flown as a kite from high elevations around Dayton. But in 1900-01 they took their machine to Kitty Hawk, N. C. an isolated spot near Cape Hatteras, on the Atlantic coastline where the U. S. Weather Bureau had told them the winds should be excellent for gliding.

The first Kitty Hawk gliders: The Wrights went to Kitty Hawk for the first time in September of 1900, set up camp near the U. S. Coast Guard station there in the beach, and assembled their first man-carrying glider. The machine had a wing span of about 17 feet, an area of about 160 square feet and it weighed about 50 pounds. Constructed of spruce frame, wire and glue, with wing surfaces covered with sateen, it embodied two innovations which, so far as was known, had never been tried: 1) There was a front rudder or elevator to control pitch and yaw; 2) There was a unique truss arrangement for warping the wing tips (the first attempt at the aileron) for lateral balance, the machine had no empennage or tail of any kind, and there was an uncovered frame section on the lower wing (it was a biplane design) where the operator lay in a prone position — his feet manipulated the wing warping mechanism!

Their first experiments with this machine were conducted gliding down the slopes of a 100-foot-high sand dune called "Kill Devil Hill," because the winds here were stronger and they soon had discovered their machine needed the increased air pressures to accomplish desired lift with a man aboard. Orville later recalled, "This was the first indication we had that, perhaps, some of the tables on air pressures (Lilienthal's and Chanute's which they had used as a guide in designing the glider) were possibly in error. The machine required a much stronger wind than the tables called for to lift its own weight and that of the operator."

In all, from September until near Christmas of 1900, they flew the glider as a kite for about ten minutes and in free glides for about two minutes. Both took turns riding the kite, or making the free flight glides.

"It was much less time than we had hoped to have in the air, because of the varying wind conditions," Orville explained. "But even so the results were encouraging. The wing-warping at the tips worked far better than we had hoped for in maintaining lateral balance. The front elevator was highly satisfactory in its response to the slightest movement, and gliding itself was most exhilarating. . ."

"What ever happened to that first glider?" I asked him.

It was one of his favorite stories. "We gave it to Bill Tate, who operated the life-saving station, and I think he used the frame for kindling," he said wryly. "And Mrs. Tate used the white satin covering to make some dresses. She used to remind

us that it was much too fine a material to be used for such a contraption as a flying machine!"

The irony is, the first glider belonged as a museum piece in any collection depicting the progress of man's conquest of the air, for on the strength of its performance, the Wrights decided to build a larger machine and return the next year for more experiments.

They were back at Kill Devil Hill again the following summer (June, July and August of 1901) with a larger machine. This Kitty Hawk glider, of the same basic configuration as the first one, had a wing span of 22 feet and weighed about 100 pounds, the largest machine that anyone had so far attempted to fly. About the only visible difference, other than size, between the two gliders, the first and second, was that the larger machine had an increased curvature (camber) in the airfoil sections. The Wrights believed this would give them the added lift they needed.

During this season's series of tests they broke all existing records for gliding distances, and stayed aloft longer than any of their predecessors. Although the machine did not have all the stability and control of the first glider, they were satisfied that their system of control could work on larger gliders. But they did run into strange phenomenon. Using their wing warping technique — presenting a steeper angle of wing surface to the wind on one side than on the other (the angle of attack or angle of incidence, in technical terminology) they found that instead of causing the machine to rise, as they expected, it sometimes resulted in dangerous descent.

From this unexpected characteristic, they concluded that something else was needed to control the equilibrium. They were also of the opinion that a changing of the center of the air pressures on the various surfaces was what caused the erratic behavior of their glider. "We were almost convinced now," Orville declared, "that the accepted tables on air pressures were unreliable, those of others and our own included. We were certain there was needed a more scientific approach to the problem, and we truthfully didn't know how to go about it. At this point we seriously thought of giving up."

Wilbur was more positive. Returning from Kitty Hawk he made the remark to Orville, "Man will never fly, not in a thousand years!"

Chanute who had witnessed their flights at Kitty Hawk in 1901, gave them encouragement and urged them to continue. It was his greatest contribution to aviation. He talked Wilbur into giving his famous speech, and that, as we know, because of the various reactions which the Wrights took as an affront to their integrity, resulted in their making the wind tunnel experiments. And the wind tunnel results were so encouraging that they decided to build another glider and continue further experiments at Kitty Hawk in 1902.

The Victory glider: Their wind tunnel experiments which lasted about two months during the autumn of 1901, by Orville's own admission, were a great turning point in their thinking. These tests were far more exhaustive than most history books record. The Wrights own papers, handwritten and meticulously kept, revealed that they had tested biplane, monoplane and even triplane wing arrangements; they tried staggering the wings and even putting one wing ahead of the other in the same plane as in the Langley machines; they tried wings of different thicknesses and chords. The test objects were small sections, none more than about seven inches in span, and they were made of metal,

highly polished to provide undisturbed airflow over the surfaces.

One of the most important results of these tests, according to Orville, "was what we learned about the relationship of the span to the width or chord, in wing profile." This (aspect ratio) they learned was most efficient when the span was much greater in proportion to the chord, a discovery contrary to some previous published data. "The truth was," Orville pointed out, "we found so many discrepancies in much of the previous published data that to satisfy our own curiosity we decided to forget all about it, and design our next machine around our own figures."

This they did, and in September of 1902 they were back at Kitty Hawk for the third time with a machine which differed in several respects from their previous design attempts. Orville called it The Victory Glider because, "we were so sure of success based on the wind tunnel data."

The new glider had a wing span ten feet longer than did the 1901 machine, but oddly it had very little more total wing area. On the basis of their wind tunnel tests they had changed the "aspect ratio" making the span six times the chord instead of three as on the previous machine. They had also added an empennage; two fixed vertical rudders supported on boom sticks aft of the wings. A different method of controlling the wing warping was also devised, a cradle-like arrangement permitted the operator to change the wing tips by hip movements.

During September and October of 1902 with this machine they made more than a thousand glides, in winds up to more than 35 miles an hour and for distances of the length of two football fields. No one had ever tried gliding in winds of such velocity before, and this was considered a supreme test of their control techniques. Moreover, on occasion, they found the glider "standing still and soaring, emulating bird flight, without a tendency to descend," as Orville put it. Such performance had never before been accomplished by other experimenters. In these moments, the sailplane was born, and soaring as a sport, although the Wrights were too busy thinking of other things to pay much attention.

They were having a strange control problem which caused minor mishaps. Under certain conditions the machine would fall off on one wing, and cartwheel, digging the wing tip into the sand. They called it "well-digging," but it was really the first tailspin. Try as they might, it seemed impossible to correct.

Then, Orville came up with the idea of making the twin rudders movable, so they could counteract the movement. By doing

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Model of the Month

this, it was possible to direct air pressures onto the high wing, augmenting the wing warping, and bring the machine level. The twin rudders were replaced by a larger single, hinged vane, and the wing warping and rudder movement linked together, operating in conjunction with each other. This did not stop the machine from its well-digging tendency under certain conditions, but it did permit righting the maneuver and maintaining controlled flight.

They had unlocked another secret door to the sky with their tried and proven system of elevator-aileron-rudder control. They could fly in winds and calms; maintain positive control and take corrective measures when necessary. Plus the fact that they were now sure of their tables and calculations; convinced these data or formula could be applied to design a much larger machine capable of carrying the weight of a powerplant, operator and a payload.

So certain they were on the right track, the 1902 glider became the basis for their specifications and drawings which they sent to the U. S. Patent Office in the spring of 1903. Meanwhile, they already had started work on a power-flyer.

Next month: "The Practical Flying Machine." How the Wright Brothers designed and built the first successful heavier-than-air, man-carrying, power-driven airplane. Problems with finding a suitable engine and "air screw" or propeller. The first power flight at Kitty Hawk in 1903. Orville Wright's "ten greatest moments in the history of flight."

Manhattan Formula

Continued from page 44

use a winder. Use right thrust and a little right rudder for the turn against torque. For very low ceilings, keep your Riversider's airframe weight light; reduce the number of strands of rubber by half and fly with torque, letting out some turns before launching.

Source Materials: AMERICAN AIRCRAFT MODELER is making an effort to present models that can be built and flown without difficulty. It would be well for the younger beginner, in order to develop his building and flying skills, first to build and fly a couple of AMA Delta Darts presented in April 1967 issue. An Easy "B" Indoor Stick model was featured in the Oct. 1967 issue.

Write to the National Indoor Model Airplane Society, P. O. Box 545, Richardson, Texas 75080 and ask about their activities and the activities of indoor flyers in your locality. Also ask for a free copy of their publication, **Indoor News and Views.**

The original Riversider was built from

regular outdoor balsa wood such as supplied by SIG Manufacturing Co., 401 South Front St., Montezuma, Iowa. Your Riversider can be, too, but performance can easily be improved by using lighter weight indoor wood, and indoor wood must be used to build the Wall Street Special. We recommend you write to both of the following two supply houses for their catalogs of indoor supplies: Micro-X Products, 1671 East 34th St., Lorain, Ohio, and Micro-Dyne Precision Products, P. O. Box 65774, Los Angeles 65, Calif.

In connection with forming the propeller blades, it is suggested that the builder study the article by Max Chernoff in the 1964-65 **Model Aeronautic Year Book,** Model Aeronautic Publications, P. O. Box 135, Northridge, Calif. An alternate style of propeller can be made by following instructions given with drawings for the IMAC's "Dinky Dip" in the 1959-61 **Year Book.**

Those modelers who find the Riversider leads them on to further thoughts about flying scale models should contact the North American Aviation Flightmasters, 19361 South Mesa Drive, Villa Park, Calif. 92667, regarding their publication **Flying Scale News & Views.**

Your experiences and opinions about the Manhattan Formula are considered of value. The author would like to hear from all of you who take any degree of interest in this style of model. Write Ed Whitten, P. O. Box 176, Wall Street Station, New York, N. Y., 10005.

AMA PROTECTS ITS CLUBS WITH INSURANCE COVERAGE

STERLING SELLS INTEREST IN COMMAND MASTER R/C

Balsa Corp. Will Also Market Coverite

All rights to the manufacturing, production and distribution of Command Master radio equipment and Coverite covering fabric have been sold to Balsa Corporation of America, 501 E. Wister Street, Philadelphia, Pa. 19144. Balsa Corp. will fulfill all radio guarantees. Balsa Corp. is expanding facilities for better service. All communications, orders, etc. from distributors, dealers and consumers should now be sent direct to BCA since Sterling Models is no longer connected in any manner with these fine products.

Count Down

Continued from page 41

chemical out through the discharge orifice until the chemical supply is exhausted. The check valve in the nose tip traps air in the upper portion of the nose cone and, as the vehicle ascends into the thinner upper air, this pressure continues to expel the chemical. The discharge orifice size is calculated to expel the chemical at such a rate that it becomes exhausted shortly after the vehicle reaches apogee. The entire vehicle is permitted to impact with no attempt being made to separate or recover the vehicle.

Photographs are made by the two trajectory cameras at six second intervals for a period of five minutes. These photographs, when reduced by photogrammetric data reduction techniques, provide profiles of wind velocity and shear.

Weights: Gross (takeoff): 1560.7 lb.; Propellant: 764 lb.; Burnout: 796.7 lb.; Payload: 144.0 lb.; Empty: 652.7 lb.; M-5 Nike booster: 431 lb.; Fins: 69.2 lb.; Nose assembly: 152.5 lb.

Performance: (80-deg. launch angle): Burnout time: 3.5 sec.; Burnout altitude: 6294 ft.; Burnout acceleration: 47.2g; Apogee: 75,200 ft.; Apogee time: 65 sec.; Splash time: 147 sec.; Splash range: 56,500 ft.

Propulsion: Hercules Corp. Nike booster M-5 (X216A2): Thrust: 48,700 lb.; Duration: 3.5 sec.; Propellant: solid.

Color data: (Wallops flights): Flat white overall. Three fins fluorescent red, one fin fluorescent yellow. UNITED STATES in letters 8" high, stenciled in black on both sides of vehicle in horizontal position interdigitated between fins and centered along booster body.

Data sources: Nike M-5 booster and fins from Thiokol Chemical Corp. Astro-Met Division Drawing No. R-00150. Vehicle description, history, performance data, and dimensions from NASA Langley Research Center "Flight Plan for Model W67-3604 Through W67-3670," dated June 6, 1963. Color data from NASA color photo L-63-6297 and from NASA Wallops Station Memorandum, "New Color Scheme for Wallops Test Vehicles," dated January 23, 1964. Additional details from NASA photographs L-61-8048 and L-65-4760.

Note to modelers: Because of the small fin area set forward of the boattail, the Nike Smoke should not be made with a body tube diameter of less than 0.9". Some dynamic instability (pitch-roll coupling) has been experienced with this model with a Centuri #8 tube for a body, balsa nose without nose weight, and powered by a Type 1/2A.8-2 engine; the addition of a nose weight is recommended for a model in this scale.

The Nike Smoke model may also be used for trajectory and aerodynamic studies because its subsonic drag coefficient is known. Drag coefficient during thrusting is 0.45 and during coasting is 0.85. Calculated performances can therefore be compared against measured flight performances.

The Nike Smoke scale model is suitable for the following events: Scale, Scale Altitude, Space Systems, Super Scale, and Predicted Altitude.

Do *not* attempt to duplicate scale flight using titanium tetrachloride! This chemical forms droplets of hydrochloric acid upon contact with the water vapor in the air!

Centuri Engineering Company has kitted the I. Q. S. Y. Tomahawk (October 1967 Countdown. Kit KC-40 goes for $2.25. This is an excellent beginner's scale model which should not be sniffed at by competition flyers; it took more points at NARAM-9 than any other scale design. The I. Q. S. Y. Tomahawk can be flown in all types of scale competition, including the new NAR Space Systems event. By leaving out the engine mount for the 18 x 70 mm engine, you can fly the bird with an FSI engine . . . a real cloud-cutter with that power plant! It can also be converted to a payload-carrier for competition work. Your scale substantiation data can be the October 1967 Countdown article, which is available as a back issue if you didn't get it.

Model Rocket Industries T-20 tube fits an FAI-NAR Payload like a glove fits a hand. Furthermore, the T-20 tube (so-called because it has a 20 millimeter o.d.) is light. An Estes BT-20 tube will slip-fit inside of it, too.

Talley Guill's Dubnica Payloader (Countdown, September, 1967) can be made with an MRI T-20 tube throughout, giving it the same o.d. from the base of the nose cone to the tail. This eliminates the difficult transition piece because a simple balsa nose block is substituted instead. Carefully made, the T-20 Talley-Bird has somewhat better aerodynamics which will permit it to hoist an FAI-NAR Payload perhaps another 100 ft. (30 meters). The launch lug

can also be glued directly to the side of the T-20 instead of sticking out on a standoff like a built-in headwind.

The Tenth Anniversary of the Space Age

To commemorate the Tenth Anniversary of the Space Age on October 4, 1967, the General Electric Missile & Space Division invited the NAR National Champions to visit their Valley Forge (Pa.) Space Technology Center. Charlie Duelfer, Bill Bloch, Greg Scinto, Joe Persio, and Mark Mercer, accompanied by NAR Trustees Harry Stine and Jim Kukowski, spent the day at Valley Forge with G. E. space engineers viewing the NIMBUS-B to be launched early in 1968, the hypersonic shock tunnel, the space environmental simulation chambers, and the NIMBUS ground station. Following lunch, the NAR model rocketeers returned the favor by flying over a dozen model rockets from the helicopter launch pad outside the Valley Forge Space Technology Center. They then met with G. E. Vice President Hilliard W. Paige, and Charlie Duelfer presented Paige with a scale model Thor-Agena-B which had flown and been recovered that day; the Thor-Agena-B modeled by Duelfer had launched the G. E. Discoverer-13, first space capsule ever recovered from orbit.

"When you finish school, come back and see me," Paige told them. "The aerospace industry is going to need all of you fellows that we can get!"

This was the first time that a major aerospace company had ever invited NAR model rocketeers to both tour their facilities and also fly models. Both the NAR Champions and the G. E. space scientists parted with great respect for one another. And it showed that model astronautics, born with the Space Age in 1957, has come along as rapidly and as successfully as astronautics itself.

Three generations of rocketeers were together that day — rocketeers who had flown the German V-2 rockets from White Sands, present-day NIMBUS and Discoverer satellite engineers, and the model rocketeers who will be the astronautics engineers ten years from now.

Two new, honest-to-Wernher scale models are now available in kit form. These are real scale, not semi-scale.

Estes Industries Saturn-Ib is worth its $9.50 price, if you are an advanced modeler looking for a real challenge. It is a highly detailed scale model. (Photos appeared January issue.) It has been accurately scaled from NASA drawings. For those of you who wish to get scale substantiation data so that you can fly Saturn-Ib in contests, write to the Public Affairs Office, NASA Marshall Space Flight Center, Huntsville, Ala. and ask for a set of the special modelmaker's drawings of the bird which they have prepared for model rocketeers.

A.M. Reviews

Continued from page 9

off the flow of reinforcements and supply."

Applying this to Vietnam, General Ridgway continues, ". . . results to date have repeated this lesson: rails and bridges are repaired and functioning within a few days of a bomb attack, and infiltration routes have not been cut off. Yet we still hear calls for saturation bombing that will, its proponents insist, cut off North Vietnam from the south.

General Ridgway points out a number of other lessons learned from Korea and draws important conclusions. However, this review is concerned only with air power aspects.

NEW IN RC

Development is complete on a **tiny super-regen receiver** to be marketed in kit form by **Ace Radio Control (Box 301, Higginsville, Mo. 64037).** Receiver was developed by midwestern RCer Bill Albin for use in the tiny scale planes he favors. It is intended especially for "single-ended" propo uses — that is, for single-coil actuators with no center-tap. It has been used mainly with the tiny Bentert actuators. With the smaller Bentert unit and smallest practical batteries, total RC equipment weight (airborne) is held down to about ¾ oz. or less. Receiver will operate standard magnetic actuators like the Adams; they must be spring-loaded to one side. Rx is mounted on a tiny circuit board 1 1/16" x 1 3/16" and is only ½" high; weighs a trifle over .2 oz. Full information on constructing this receiver will appear in the May issue, **American Aircraft Modeler.** Kit will include circuit, parts, placement drawing, PC board and full instructions, price about $12.95. Rx covers entire 27 mHz. tuning range and requires Tx modulation around 800 Hz.

New **1968 Catalog** also from **Ace RC (Higginsville, Mo. 64037)** includes this year a 24-page section of general RC notes and hints (glossary of terms, soldering and simple propo data, nickel-cad and servo motor information, etc.) in addition to 68 pages of catalog proper. Cost is $1, refundable on first order, and has become one of the "bibles" of the field. New items, kits, components too numerous to list here have been added.

Royal Electronics Corp., (2101 S. Leyden, Denver, Colo. 80220) now has three versions of their **Galloping Ghost transmitter.** GG-1 is the original, intended for normal GG operation with a single servo. GG-2 has provisions for both high and low pulse rate, so you can fly normal GG, or switch to high pulse rate for such servo systems as Rand Dual-Pak. GG-3 produces only the high pulse rate, for those not interested in single servo GG flying. Concern will carry full parts and various kits for the Royal Digital propo systems in versions from two up to six channels; servo kits will be offered with mechanical parts of Orbit, Bonner or Kraft servos, but the electronics parts to match the Royal Digital control system.

New and rather completely revised **third edition** of the **RC Primer by Howard G. McEntee (published by Kalmbach Pub. Co., 1027 N. 7th St., Milwaukee, Wisc. 53233)** is now available at hobby shops or from mail order RC suppliers. The 64 pager includes latest info on FCC rules and getting a license to operate an RC Tx. Includes more information on propo systems and components than the second edition, and has

increased emphasis on equipment that operates with semi-conductors. Illustrations of commercial gear of the latest type are scattered profusely through the book. Generally, the material is arranged in the same chapters as before, but updating is evident on every page. Best of all, the price has been held down to the previous $2, no mean accomplishment in this age of rising costs.

Plans for big Cub mentioned in **RC World**, in **April** issue, may be had from **Nelson Model Products, Inc., (8638 Patterson Pass Rd., Livermore, Calif. 94550)** for $8 per set. They are on two sheets 3 x 5 ft. in size. Wing is two piece; plane weighs 12 lbs. with full-house propo.

Many additions have been made to the line of ARF planes of **Dee Bee Electronics** (West Lambs Rd., Pitman, N. J. 08071). Stinger II is essentially the same as original model, but improved adhesives and production methods have upgraded it; kit costs $55.95, for this 67" span swept-wing job. New Thunderbird is somewhat similar, but utilizes inverted fully cowled engine for sleeker appearance. Fuselage is slightly longer than Stinger II, but wing area is same, at 676 sq. in. Ambassador is a redesign of Don Brown's FAI RC plane, but in plastic ARF form; has 70" span non-swept wing, 700 sq. in. area and is shoulder-wing style with upright engine; can be flown with any control system from rudder only to full house! Electron also has an unswept tapered wing, but it's a low winger. Same general specs as Ambassador otherwise, and only full-house controls recommended. All four planes are same price: $55.95. All can be assembled in a few hours time, as they require minimum work.

FLY SAFELY
STAY AWAY FROM POWER LINES

Undeniably Lucky

Continued from page 23

Building Procedures: Wash all parts in lukewarm detergent suds. Rinse in clear, lukewarm water until no detergent suds remain. Rinse small parts in the tea-strainer and allow all to dry on absorbent surface (blotter, newspaper, or preferably paper towels).

After parts are dried, then small parts may be painted, as follows: Wheel tires, flat black with small amount of white added to simulate rubber-tire color. Wheel centers, tail-wheel fork, hub, and engine cylinders, aluminum. Propeller blades: flat black with yellow tips; armor plate, inside wheel wells, cockpit, and seats: zinc chromate (yellow-green); crankcase: dark gray; main wheel struts: medium gray with small amount of silver added to create a metallic look (as in a casting). Inside tail-wheel door: zinc chromate. Main-wheel doors: gray outside, zinc chromate inside. File and fit canopy and paint metal portions of canopy olive drab. Pilot: yellow Mae West jacket; helmet: light brown; parachute and straps, olive drab; shoes and gloves: black. Face: flesh color. Goggles: lenses silver, straps gray.

While these parts are drying, you can start the major assembly of parts, as follows: Cement fuselage, wings and stabilizers as per kit plans. After cement is thoroughly dry, fill in all crevices and cracks with spot putty or duratite. When dry, sand smooth all parts with #600 wet or dry. In my estimation, the panel lines on the wings and fuselage are too heavy, so I again used wet or dry and cut them down quite a bit, leaving only a faint ridge to indicate the panel lines. Spray entire plane gray. After completely dry, go over any rough spots (such as places where wing joins fuselage; centerline joints, etc.), with wet or dry.

Cut masking tape in wavy-line pattern (as per kit drawing) for demarcation line between uppersurface olive drab, and undersurface gray. Spray white bands ⅜" wide on rudder and stabilizer, as per kit drawing; also paint cowling white, as per drawing. After white is dry, mask off all white areas and spray olive drab on entire upper surface of plane, down to the wavy tape line, including wings, fuselage, top, and sides, etc.

At least three complete sprayings are required to obtain a sleek, medium-gloss finish, with wet and dry sandings between each application. Johnson's Lucky was sandpapered and waxed to increase its speed, so a smooth, semi-gloss finish is essential. After the olive drab is dry, remove masking tape, then again sand with wet or dry and blend in areas where white and olive drab meet. An obvious ridge is to be avoided.

Assemble propeller and when completely dry, install engine and propeller in cowling and attach to plane. Cement tail and main wheels into position. Cut decals as close as possible, using sharp #11 X-acto blade. You will find that it is worth your while to acquire the skill necessary to cut each center separately and remove all inside portions of decals, so that no clear decal film will show on your finished model.

After decals are dry, install pilot and cement canopy in open or closed position. (If you cement canopy in closed position, you will never have to be concerned with removing the dust which will accumulate in the cockpit.)

In view of the illustrious history of this plane and pilot, I do consider it a most worthy addition to your collection. From an historic standpoint, Major Johnson claims the distinction of being in the select

group of top U. S. Air Force aces. Many of our highest wartime honors were bestowed upon him: the Distinguished Service Cross; Distinguished Flying Cross with eight Clusters; Silver Star; Purple Heart; Air Medal with four Clusters, plus British and French decorations.

I again wish to thank Mr. Johnson for his courteous cooperation in supplying me with the invaluable photos and supporting information which enabled me to construct an authentic replica of the Lucky and to share the information concerning it with my readers.

RC World

Continued from page 35

plastic tube of your Nyrod linkage extends unsupported for a considerable length, and you fear it could buckle under load, cut a piece of bike spoke long enough to strengthen the unsupported area, turn part of the threaded spoke end into the movable Nyrod tube, use the remainder of thread to hold the end link. This prevents all bending tendencies.

From *DC/RC* (Wash., D. C.) *Newsletter*, it's suggested that the new X-acto "hot knife" is perfect for cutting aileron servo compartments and other "holes" in foam wing cores; knife tip is replaceable by a soldering iron tip, and the unit works fine in this mode too. . . . From *Worksheet* of the Western Ohio RKS (Dayton) comes suggestion that Sears Roebuck filled epoxy (cata. #9G80605, two 5 oz. tubes for $1.89) is a fine epoxy cement, and it makes beautiful fillets with little effort. After trying countless balsa fillers, editor of this paper concludes talcum powder and dope is still the best; he uses equal parts of talcum, dope and thinner. We've seen several flyers

clean planes with spray Fantastik, which seems to do a fine job; but we've read of tests where this material will dull or attack certain plastic and other surfaces if left on for a considerable time. So if you use it, better wipe it right off.

Competition

600 pylon class: After having voted to drop this Goodyear Pylon category completely, the Contest Board apparently had a change of heart and it is now back in the AMA rules. Initially the IMPRA was very lukewarm (to say the least) about this category; now that the 450 sq. in. class is firmly established, however, editor Ed Shipe has concluded that we really need the 600's, since the 450's are pretty much for the experts. There is some expectation that Goodyear races limited to the 600 category will be held at the 1968 Nats; this will have to be on a non-official basis, but if there is a reasonable turnout of 600 planes, and they can show good racing possibilities, the C. B. might consider adopting the 600 event as part of the official AMA rules. If not, it will probably be dropped completely.

The new rules: As might be expected, some real doubts are being expressed in club papers about the new stunt competition rules. These have essentially eliminated our old Classes 1 and 2; all AMA competition will henceforth be open to any type of plane with any kind of controls. An editorial in the *Mile Hi Newsletter* (Denver) asks why we don't just go all the way and adopt the FAI stunt routine for AMA competition; it is pointed out that while we have won the FAI RC World Championships so far, the Europeans are catching up fast. If the FAI pattern were official here, it would give us a much larger reservoir of multi flyers experienced in this pattern. We know some U. S. flyers oppose the FAI pattern because it has no "ground maneuvers," but these could be added, for U. S. comp flying.

Meanwhile, we learn that only Class C of the new rules will be flown officially at the Olathe Nats; thus, unless you are an expert flyer with a super-hot plane, you are wasting your time trying to fly in the Nats! The advocates of the old Class 1 and Class 2 are endeavoring to set up unofficial events in these classes at Olathe; if they are successful, the events will doubtless be flown on an after-hours basis. Class 1 and Class 2 rules are still to be in the rules book, and may be used officially at any AMA sanctioned meet this year.

The mirth of July: This name has been given to the forthcoming DC/RC 14th Annual RC meet, which is traditionally held over the 4th of July weekend. Eschewing formal multi stunt competition completely (is this *your* form of protest against the new rules, fellas?!), four "mirth" events have been scheduled. They are:

1) the FAI 1.7 meter plane race; 2) DC/RC gliding event for powered or unpowered planes; 3) a soaring glider competition; 4) a World War I vintage models event. The FAI 1.7 event is a new one, experimental rules for which were set up at the fall CIAM meeting. Planes must have a minimum wing span of 1.7 meters (66.9") and maximum fuel tank capacity of 50 cc (1.69 fluid ounces). Other specs require airfoil thickness of at least 15% of chord over the entire wing, maximum engine size of 60 cu. in., fixed landing gear. No scale appearance specs are involved, there are no weight, wing loading or engine type restrictions other than those in the general FAI sporting code.

While minimum span is 1.7 meters, wing area is tied in with engine displacement; required wing area = 310 + (1016 x displacement in cu. in.). This works out to an area of 604 sq. in. for use with a 29 engine. That 604 sq. in. includes the areas of *both* wing and stabilizer. The race is conducted via 20 laps around two pylons placed 250 meters apart.

With the fuel tank size restriction, it's apparent that each plane will have to make one or more pit stops. Thus we have something like an "RC free flight team race." As noted, these rules are experimental, and flyers in all countries have been asked to try them and make suggestions for modification, if the need is proven. The DC/RC meet is the first we've heard that will schedule the FAI 1.7 meter event.

The #2 event is something like RC free flight duration in which any plane can participate. Event #3 is strictly for soaring gliders. It is run according to rules the avid glider contingent of the club has set up. Event #4 was inspired by the huge success of the Rhinebeck WW I meet last fall, and Dick Allen who CDed that affair for the IBM RC club has been asked to act as honorary C. D.; he will advise Bill Northrop who will run this event. Maynard Hill will be C. D. for the entire "Mirth Meet," get further info from him (2001 Norvale Rd., Silver Spring, Md. 20906).

RC Bees glider meet: Very successful affair was sponsored by this Santa Cruz,

Calif. club on Oct. 15. Wind was so low that only lightweight planes could stay aloft for short flights. There was supposed to have been a 10-lap pylon race on a 500′ course. Apparently this race wasn't even attempted, but the contestants spent their time formulating plans for an RC Glider Assoc. of Northern Calif. Jerry Nelson (8638 Patterson Pass Rd., Livermore, Calif. 94550) who sent this info, says the model glider categories will be based somewhat on those in the full-size field (with which he is completely familiar, as he is an expert glider pilot), with gliders of 100″ or less in the "Standard" class, and those over 100″ span in Open.

Model gliders to 2″/foot scale will fit into these two classes nicely. Jerry sent a list of the 31 fliers who showed up for the meet, and who had some 40 gliders between them. Most were on multi propo, but there were a couple of reed jobs and single-channel rigs. We recognized many kit gliders in the list, and of course, several originals. Gliders are really hot in this area; several contests are scheduled in 1968.

RC air show: Two day affair sponsored by the Remote Control Assoc. of Central Florida, at Orlando, Oct. 21, 22 included eight events. Winners were: Most Loops, Tom Drake; Most Spins, Dr. Bill Lyle; Limbo, Fred Stephens; Carrier, Fred Stephens; Scale, Major Hal Ludlow; Open Pylon, Tom Drake; Goodyear Pylon, Walt Schoonard; Touch & Go, Ralph Foley. Prizes were also awarded for: Worst Crackup, Len Glasser; Best Finish, Bryon Trent; Craftsmanship, Ted Schoonard.

One for the Road

Successful air show: RC events at the Golden Anniversary of Scott AFB, Sept. 2, were coordinated by the Centreville Cadets

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RCC (c/o Stanley Anders, 120 Williamsburg Dr., Belleville, Ill. 62221), who received much support from such area groups as the Spirits of St. Louis, Signal Chasers, MacRCMAC and Campus RCC. The RCers joined the Thunderbirds and other full-size aerial teams to thrill a crowd of some 100,000 visitors at the Base, and had two hours for their share of the program. Besides the actual flying, a static display of planes aroused much interest. Regular multi planes went through their stunt paces, but such unusual jobs as Charles Litzou's PT-17, Earl Witte's Praying Mantis and Bill Campbell's Gipsy Moth were much appreciated. The gang got a real boost, hearing the Thunderbirds pilots remarking on the skill of the RC fliers!

Pylon man goes scale: Best known for his introduction of Goodyear Pylon racing to RC, and his previous long line of successful stunt planes, Jerry Nelson has gotten the scale bug. Pix herewith show a *big* Cub, which is to 2½" scale — that comes out to 88" span. Kraft KP-6 propo and an OS 80 engine keep it in the air. Besides the usual full-house controls, Jerry has also fitted working flaps, and a tow hook release for gliders. Coupled rudder-ailerons are normally used, with rudder only for takeoffs. As pix show, plane is extremely realistic, has scale dihedral. Jerry says it's a ball to fly.

The tow cable release has been used to pull several RC gliders aloft, the biggest being his KA6E. This glider has 12′ span, weighs 8 lb. The Cub tows it up with a good climb rate. Also flying from the Nelson field is a semi-scale Mooney 21, a 70" span job with Enya 60 and Kraft KP6; it was designed especially to do the maneuvers that will be utilized in AMA competition this season. The Mooney got Jerry a third place at a fall stunt meet. (It will appear in AMERICAN AIRCRAFT MODELER. — The Editor.)

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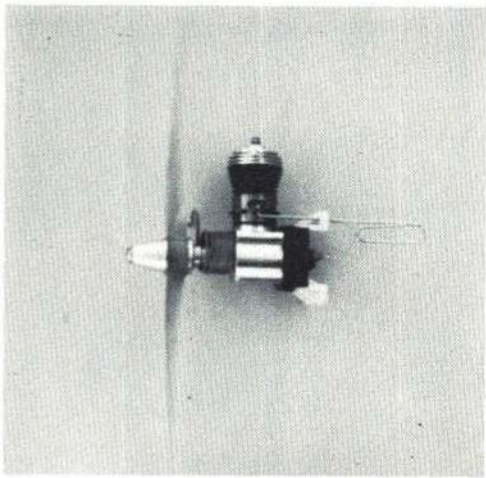

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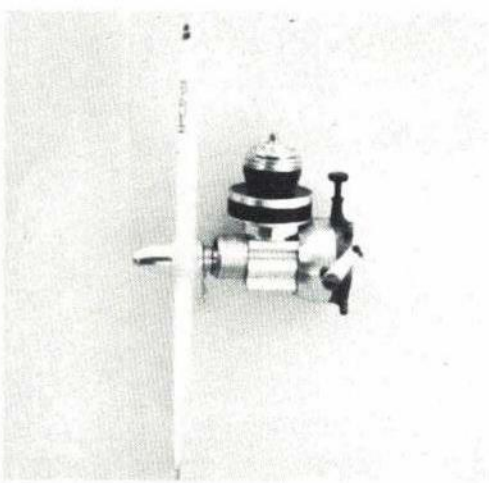

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