



Tom's two pretty daughters (How lucky can a guy be?) show how the top wing comes off, complete with front top deck. Good seal is mandatory.

The Bird Biplane

BY TOM STARK—In both the automotive and aviation fields, the "Golden Era" of the 1920s and 1930s is almost universally recognized as the source of the most nostalgic designs.

The author brings one up that will give any mini-prop a realistic ride . . .

► American Eagle, Buhl, Travelair, Davis, Brunner-Winkle, Swallow, Command-Aire, Great Lakes, Waco; names of airplane manufacturers of the "Classic Era" in American aviation history. These companies built airplanes to replace the weary, surplus World War I airplanes for a nation who's interest in aviation was triggered by Lindbergh's solo flight to Paris. The airplanes they produced were simple, no-nonsense craft

that had to possess performance, economy, and aesthetic appeal to potential customers; qualities that make them excellent subjects for all types of models. I decided to build a multi-proportional model of an airplane from this era but not one that has been a common modeling subject. Many hours were spent in looking at old books and magazines searching for a suitable subject. This meant, of course, that a good three-view

drawing had to be available, plus clear photographs. The search narrowed down to several promising airplanes and they were "designed" on paper and compared. The Bird came out on top, and in view of experience with the model, I'm glad it did.

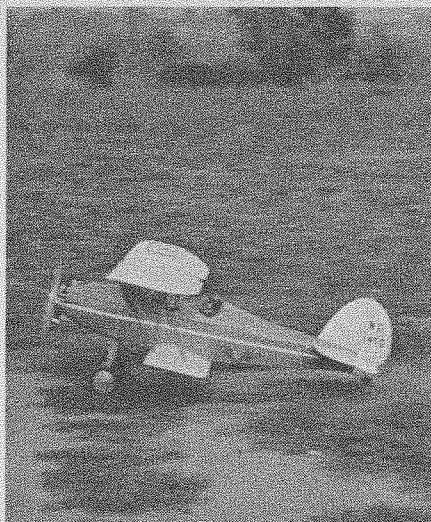
Before describing the model, a little history of the real Bird is in order. The Bird was first produced in 1928 by Brunner-Winkle Air- (Continued on next page)



"OK folks, see your town from a thousand feet in the air. Just one dollar. Who's next?" No deviation from scale on the 1930 barnstormer.



Here's a guide for applying the rigging. The author's ship is painted in a typical red and cream combination. Scale is 1 1/2" to one foot.



"Up, up, and away, whew! TW. . . ." Well anyhow, this illustrates the Bird's realistic flying ability. If you aren't turned on now, forget it!!!

BIRD BIPLANE . . . CONTINUED

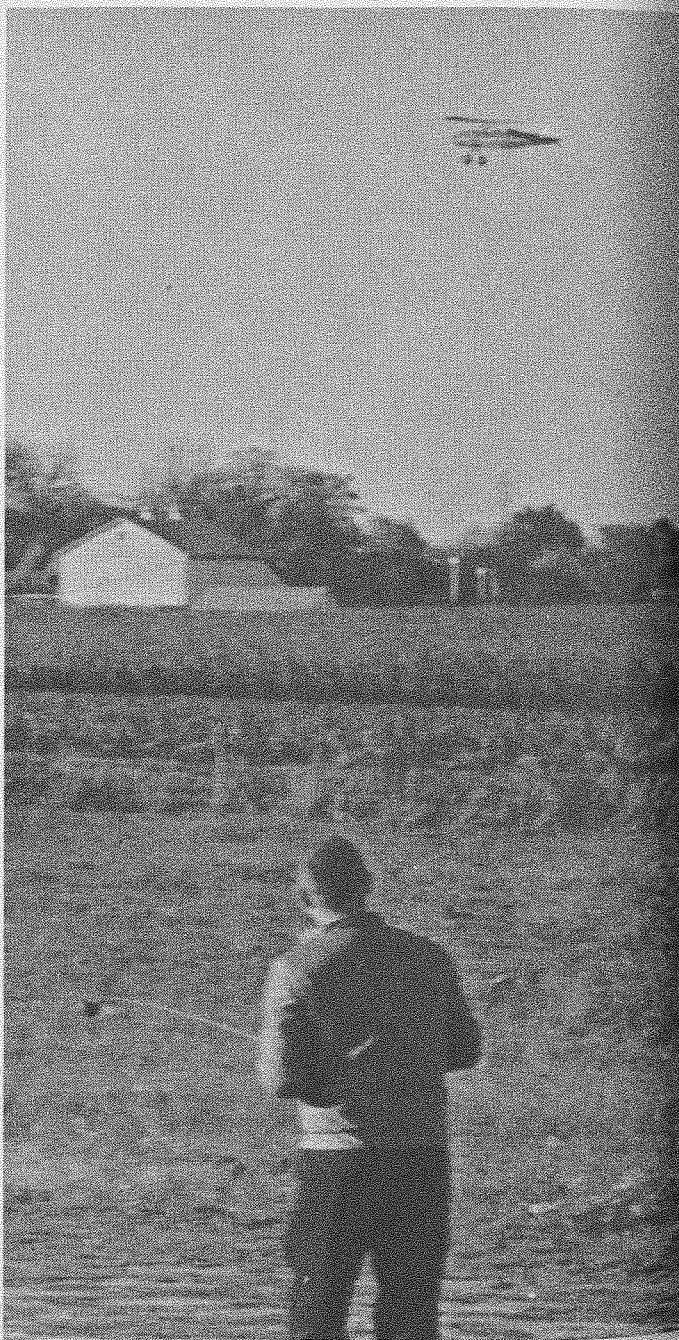
craft Corporation, though it had an immediate predecessor built in 1927 under the name Prohensic Sesquiplane. The original Birds were powered by Curtiss OX-5 engines. However, the supply of OX-5 engines became scarce so various other engines were installed. The version modeled here had a 90 horse power five cylinder radial. With this engine the Bird was called the BK.

The Bird BK was a three place airplane with the pilot sitting in the rear cockpit and two passengers in the front cockpit seated side by side. It had a gross weight of around 2150 pounds. Performance figures vary somewhat according to the source, but in general it had a top speed of around 100 mph and cruised at 80 to 85 mph which is quite good for such a large airplane with only 90 hp. Perhaps its most famous characteristic was excellent handling qualities, particularly at low speeds. This was due in part to its large thick wings.

The model is of the Bird BK type rather than a replica of an individual airplane. There never was a Bird BK with the license number NC1470, painted orange and white, with narrow wheels and a tail wheel. With the exception of the fictitious license number all these features appeared on Bird BK's though perhaps not in that combination. Areas, movements, rib spacing and basic structure are all scale. The airfoil is the only major non-scale item and it is modified only to the extent of elimination of the undercamber. As with many early airplanes, production airplanes varied a great deal in details. Many pictures of Birds show a different windshield type. The baggage compartment appears on both sides of the fuselage. More recent pictures show a different engine cowl shape but this may be due to adaptation of parts from other airplanes when the Birds were rebuilt. Several Birds are flying today.

Three-views of the Bird Biplane, drawn by Willis L. Nye, were published in the September 1955 issue of M.A.N. and recently republished in the third M.A.N. masterplan book "Best of Nye."

The model is built to a scale of 1½ inches equals one foot. This gives a wing area of 598 square inches. The weight of only four pounds plus a small engine, a .23, give scale-like performance. If a modern day class III airplane is assumed to perform like a World War II fighter, the Bird's performance by comparison is very scale-like indeed. Before you assume that scale-like performance is a nice way of saying sluggish let me assure you this is not so. The model will take off from reasonably high grass, climb at a good rate and do all maneuvers that the real airplane would do, perhaps more. (Continued on page 57)



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model supplies from Britain, West Germany and Italy and had just begun to look Westward also for a solution to their supply problem in regard to small general purpose engines of around .09 displacement. Whether they will be free to pursue this policy in the immediate future remains to be seen.

Alone among the countries of Eastern Europe, Czechoslovakia has, through MVVS, the official model development center, endeavoured to continue to provide its leading model builders with power units appropriate to their requirements. Currently, they make four types. The MVVS 2.5TR-Super is the best East European team-race diesel and the .35 cu. in. MVVS 5.6AL is the only C/L stunt engine worthy of note to be found east of the Iron Curtain. The MVVS 2.5RL is one of the best .15 high performance glow engines for speed and free-flight. Recently, it has appeared in a tuned pipe version. The pipe is of welded steel with a vitreous enamel finish. Internally, the engine's cylinder porting has been changed to conform to the requirements of the pipe.

Czechoslovakia is the only East European nation to make engines suitable for R/C multi: these are the MVVS 10 R/C and the TONO 10 R/C—both .60's—plus the .35 cu.in. TONO 5.6 R/C. Again, the Czechs, unlike their Eastern neighbors, have not only attempted to embark on R/C equipment production, both single and (non-propo) multi channel, but have organized an excellent biennial international R/C multi event at Karlovy Vary, knowing, of course, their own slim chances of success but delighting in the opportunity of seeing such experts as the West Germans, Bauerheim, Bosch, Kaseberg and Schmitz in action.

If we may be forgiven for ending on a

purely personal note, we would like to say that, as a result of our meetings with Czechoslovak modelers at many World Championship contests, we have learned to like and respect them immensely for their sense of sportsmanship and fair play. We know that a great many of their fellow contestants have felt the same way and we are sure that many will join with us in the earnest hope that happier times will not be long delayed in returning to them.

Bird Biplane

(Continued from page 28)

The original model didn't fly "right off the drawing board". In fact it was quite troublesome to get to fly at first, so please follow the instructions carefully and avoid learning how to trim it the hard way. The first flight was close to disaster all the way. It kept wanting to fall off on one wing or the other during climb. This characteristic lessened at level flight trim but the airplane still was touchy. I was afraid to bring it in slow for fear of a stall or spin, so the landing was fast and resulted in a hard somersault in the grass. The next flight resulted in a stall-spin crash from about 25 feet shortly after take off. It was a very scale-like crash and even the wreckage looked real, which was little consolation.

Reviewing the first two flights in my mind while I was reconstructing the wreckage lead me to conclude that the Bird was underpowered and tail heavy. The original .19 was replaced by a .23 and the center of gravity was moved forward one inch (to the position shown on the plans) by addition of ballast. The next flights were greatly improved. Loops, spins, slow rolls, snap rolls and cuban eights were performed with ease. However, it was still touchy on take-off and "go-arounds". Finally, the original propeller size, a 9 x 6, was changed to a 10 x 3 1/2. The difference

on take-off was spectacular. Completely gone was the characteristic of wanting to fall off on a wing at low speed. The airplane became as easy to fly as any trainer.

The Bird model was never intended to be used as a show piece or special-occasion model. It was built rather for day to day flying and has done this very well. It was the only airplane I flew for three months this season and it logged flights as consistently as most non-scale models.

Building the Bird should present no problems for the experienced modeler. The original was completed in 30 days except for painting. Only the unusual parts of building it will be described as most of the necessary information is on the plans. However, a careful study of the photographs will aid in rigging details, wing attachment methods and color scheme.

The fuselage is basically a built-up box. The entire top, from the headrest forward, is attached to the wing, giving wide open access when removed. Build both sides over the plans in the classic manner. Join the sides and add bulkhead #2 with the landing gear attached. Then build up the nose from $\frac{1}{2}$ inch sheet and blocks. There are $1/16 \times \frac{1}{8}$ strips on the outer sides of the main longerons which keep the covering from sticking to the longerons resulting in a much smoother covering job. The $3/32$ inch plywood floor was used on the original model as a mount for Controlaire servos. If you have servos the mount through holes, cut such holes in the floor and raise it to the point where the servos fit easily in the fuselage. The tongue is somewhat unusual in the U.S. as a method for attaching wings but it is no problem to build and is very trouble free in use. (Popular in England).

The wings are conventional except for the rib construction. Each rib consists of

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#7 NO. AMERICAN OV-10A

Famous Vietnam 'COIN' Counter Insurgency Airplane is a natural subject for radio control and Frank Capan of the Valley Fliers developed the scale design to the point where it was able to take 4th at 1967 Nats in California. Scale was tough that year and 4th is a very creditable win. Big with two engines it will stop every eye on the flying field—a real challenge but the two 36" x 60" blueprints fill in all the details. Plan set only \$3.00, outside U.S.A., add 50¢.

#8 FAIRCHILD 24

Magnificent replica of one of aviation's true classics of the air, the Fairchild 24 by Woody Woodward. If you thought his Rearwin Speedster was tops just wait until you see the 36 x 77 inch blueprints for this plane. Cover photo this issue displays '24' in all its original colors and when finished it will have you at or near the top in any R/C scale event. Plan set only \$3.00, outside U.S.A., add 50¢.

#9 Bird Biplane \$2.50

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a 1/16 x 1/8 strip on the bottom and a 1/16 sheet upper portion. The spar is laid on top of all the 1/16 x 1/8 strips after they are cemented in place and then the rest of the rib is installed. This is the painless way to locate spars through the center of wing ribs. The tongue box is essentially a sandwich. Starting at the lower surface is an 1/8 balsa plate. This is followed by an 1/8 inch plywood plate and 1/4 inch balsa spacers. Another 1/8 inch plywood plate is cemented on top of the spacers and the tongue box is formed. It is topped off with a 1/4 inch balsa plate which is sanded to the airfoil shape.

The cockpit cowl is built right on the completed fuselage with wax paper separating it so it won't stick to the fuselage. Pin the longerons, which are spruce or bass, to the fuselage. The formers are added to the longerons and then the wing struts epoxied in place. The wing is also epoxied to the struts at this time. Once the epoxy is hard the sheet covering and block are added.

No attempt is made to show equipment installation on the plans since there is so much variation in equipment types. It is only required that the installation follow good building practice and that the airplane balance point is maintained within 1/4 inch of the position shown on the plans. Ailerons should move differentially, 25° up and 20° down. The elevator should move 30° up and down and the rudder about 25-30° each way.

Cover with any light fabric type material. In order to keep weight down, a minimum finish is recommended. Don't cover the parts planked with sheet balsa since fabric will cause these areas to dip between formers as the dope ages.

Before getting into flying, a few variations should be discussed. This is not a single channel airplane since it doesn't

turn well with rudder only. There is no dihedral. However, with the addition of dihedral and an increase in stabilizer size it would probably fly satisfactorily with single channel or galloping ghost. For three channel proportional outfit the ailerons and rudder should be coupled or dihedral added if rudder alone is used. One of the new, light weight proportional outfit would reduce the weight to around three and one half pounds which would be light enough for good performance with a .19. If you build heavy you might want to go to a .29 engine. In this case use firmer grades of balsa throughout and spruce for the fuselage framework. The airplane should not exceed five pounds or performance would suffer regardless of engine size.

Carefully check for warps and balance before flying. Adjust the wheels for as straight a roll as possible. Use a low pitch propeller, 4 inch pitch or less. Make sure that all surfaces are neutral. Begin your take-off roll with a little back pressure on the elevator. Make rudder corrections very gingerly since the tread is narrow and ground loops are easy. Relax the back pressure as the plane builds up speed. In grass, use only enough elevator to prevent the nose from dropping. It should lift off by itself once it gets flying speed. Keep the angle of climb shallow; remember, this airplane flies scale-like and the original had only 90 hp. Once you are airborne there is no trick to flying it. Aileron-only turns are normal and the ailerons are effective almost up to stall. Snap rolls are slow to get started but once started are quite rapid. Slow rolls are slow and need elevator correction to keep from losing altitude. Loops are easy and can be very tight. Hammer-head stalls are a pure joy since the rudder gives straight yaw.

A bit of technique is required for

landing. Power-off, the Bird comes down steeply but slowly. Use lots of up elevator to flare out and try to make all landings three point to minimize nose overs, especially when flying off a grass field. When landing dead stick, you'll need even more elevator, since there is no propwash over the tail. At the time of touch down, full up elevator is not unusual on a dead stick landing.

The Bird is at its best flown low. Its tight turning radius and low speed make this easy and safe. If you watch full scale air-shows with this type of airplane you'll notice that turn-arounds are Hammerhead stalls, split "S's" or other maneuvers that result in turning 180 degrees followed by a speed increasing dive. This brings the airplane past the crowd low and with speed built up for the next maneuver. This same technique is excellent for a model airplane like the Bird. The spectators love it and so will you.

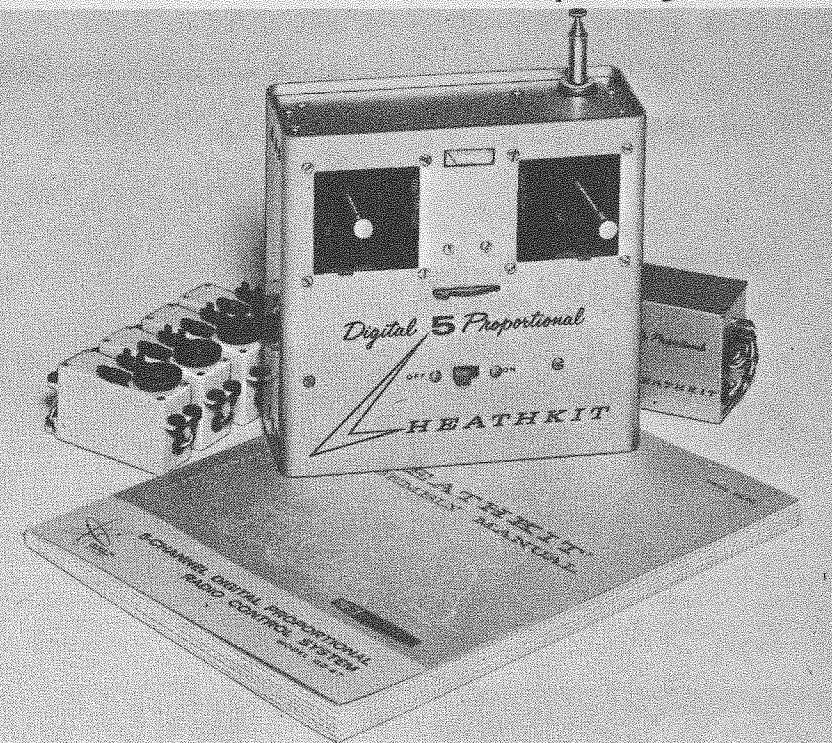
10th Rocket Championships

(Continued from page 16) about flying their birds. About 75% of the models were powered with low-power engines that didn't take them much higher than 20 to 30 meters (75.62 and 98.43 ft. 1 meter = 3.281 ft.) before deploying their parachutes. These low altitude "chicken" flights detracted greatly from the realism of the Scale event.

When the smoke had cleared out of the sky, the Senior winner of the North American Rockwell trophy in Scale was that old AMA-NAR contest type, Bryant A. Thompson, Vice President of the NAR. The irony of the Senior Scale competition in which your reporter placed second was the fact that Tommy built and flew an Honest John M-31 built from the Centuri kit at my suggestion and using my scale data on the bird! In Leader Division Scale, the trophy was taken by Jim Stevenson, 17, of Alexandria, Virginia flying an ASP-I, while the Junior Division was won by Mike Poss, 17, of Los Angeles, California with a super-detailed Blue Scout Junior.

Sparrow Class Boost-glider Duration was the next event, and this was a mess. The objective is to boost VTO under rocket power and recover as a glider with total flight duration being the competition score. During the past 12 months, model astrophysics has converted entirely to the metric system so that our USA rules will be totally compatible with the FAI rules and because we felt that metric is coming in due time anyway. As a result, all model rocket engines have been slightly altered in power to conform to the FAI classifications, and Wallops was the first opportunity any of us had had to use small metric engines. The new metric Type A is about equivalent to the old Type 1/2A, and most contestants had trouble matching the new power and time delay to their gliders. The results included low-altitude, over-the-top flights with transition to glide taking place in a vertical dive from which most boost-glider designs will not recover since they must use 0-degree wing and stab incidence in order to boost properly. We are going to have to go back to very light models with 1.5 square decimeters of wing area or less for this category. In fact, the Junior Division Beech Aviation trophy for this competition was taken by Johnny Drake, 14, of New Canaan, Conn. with my 1964 design. Unicorn-B, having 1.3 sq. dm. wing area, Phil Slaymaker, 17, of Rochester, N.Y. took the Leader Division while Casey Kukowski got his "long time coming" B/G trophy in Senior Division flying a modified Jestrab. Times were bad—57 seconds, 44 seconds, and 59 seconds in Junior, Leader, and Senior divisions re-

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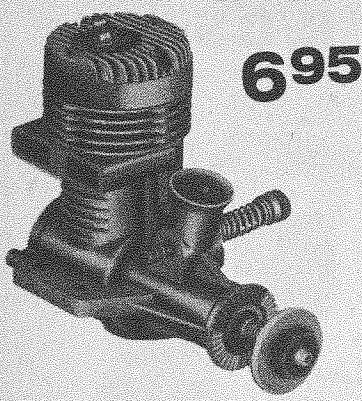
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spectively. Tommy Thompson heaved his bird up in a hand launch to show the gang what could be done . . . and lost it over the trees at 2:55 in a thermal! We hung our heads in shame and closed the range for the day.

August 21st was a wild day with three events scheduled. First on the launch racks was Class 2 Scale Altitude devoted to scale model rockets which must achieve as high an altitude as possible with a maximum of 10.0 Newton-seconds of power; Class C engines, that is. (Model rocket engines are classed on the basis of power output, thrust-times-duration, or total impulse. Thrust force in the metric system is measured in Newtons after Isaac of the same name. There are 4.46 Newtons in one pound of thrust.) This is a good event with much room for trade-offs and compromises on the part of the contestant. The points awarded your model in scale judging (1000 possible max) are added to the achieved tracked altitude in meters. There is a maximum weight limit of 120 grams, but no minimum weight. So you can trade off scale qualities against altitude performance characteristics if you want . . . or go for broke on both.

This was a beautiful event! These altitude scale models really perform, especially with the Estes and Flight Systems Class C engines. Altitudes in excess of 300 meters were common, and the realism is outstanding. Besides, in this one I beat Tommy Thompson's Honest John with my Honest John! The McDonnell Douglas Trophy for Leader Division went to Talley and Jeff Guill of New Canaan, Conn. while Mike Poss took his second trophy of the meet with a fine Thiokol Tomahawk model.

In the course of flying this event, there occurred something that is destined to become legendary. Somebody had a scale Nike-Tomahawk, which is a Wallops bird. It flew just as NASA launched a real Nike-Tomahawk from Wallops Island 5 miles away. One of our tracking station operators locked his theodolite on the real bird instead of the model . . . and needless to say we did not get a tracking closure when one station tracked a model that went about 200 meters while the other one tracked the real thing that goes 100 miles up!

The real event of the day was Egg Lofting, which is just what its name implies: an event to see who can fly a fresh egg to as high an altitude as possible . . . and recover it without breaking it! This sounds easy, and it is for some rocketeers but not for others. Over 60% of the eggs flown at Wallops bit the dust. The disqualified broken egg flights were due to tangled chutes mostly, although there were a number of birds powered by the FSI F7-8 "steam machine" with its low thrust and 10-second thrust duration. These "steam machines" are tricky even without a 2-ounce egg as a payload, and a number of them took off cross-country to deposit their eggs in the Atlantic Ocean or in the nearby copperhead-infested swamps. Carl Gurnsey, 14, of Camp Hill, Pa. got his egg up to 373 meters and down unbroken to win the Junior Division General Electric Trophy while Paul Conner, 21, of Riverdale, Md. achieved 322 meters for Leader blue ribbon and Dr. Gerry Gregorek of Ohio State University's Aero and Astro Department turned in a record 408 meters in Senior Division.

Spot Landing is where you must bring your model back as closely as possible to a given point on the ground with its recovery device fully deployed, and it's a "fun" event that found its way into the

Ninth Championships and is probably here to stay because it relieves competition tension. We had no new members of the Royal Order of Pole Hangers this year, but some contestants came close to hanging the chute on the pole. The Raytheon Trophy for Junior Division went to Loren Fagen, 16, of Earlham, Iowa who landed 16 feet from the pole. Charles Gordon, 17, of Laurel, Md. dropped in 12 feet from the pole for the Leader Division trophy, and Jim & Judy Barrowman cinched Senior Division with a 33-foot distance laid in with Judy's practiced eye tilting the launcher correctly. Spot landing birds aren't unusual; many are kit models. The secret is knowing exactly what your model

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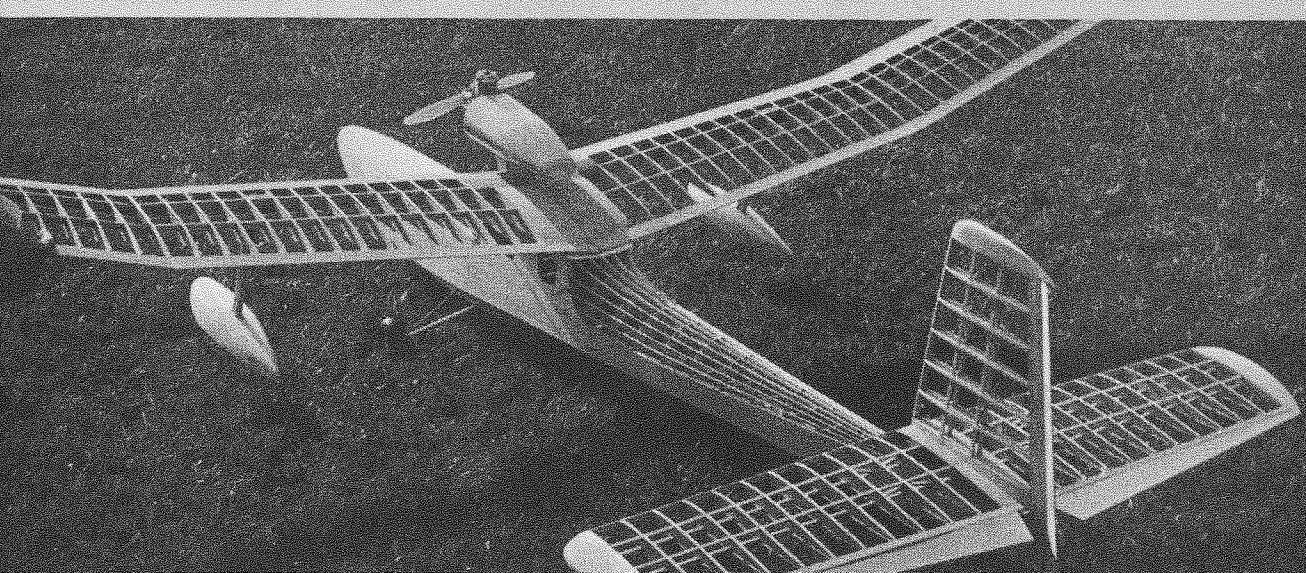
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E. Total distribution (Sum of C and D)	67,900	65,888
F. Office use, left-over, unaccounted, etc. after printing	16,780	20,280
G. Total (Sum of E & F should equal net press run shown in A)	84,680	86,168

I certify that the statements made by me above are correct and complete.

JAY P. CLEVELAND, Publisher



“...a labor of love”

These were the words of Dick Hill of Laurel Springs, New Jersey after completing this scratch built "Custom Privateer". Dick went on to say, "I used Ambroid Cement thru-out this model and have absolutely no worry of a structural failure. It is vital in a model with this size wing, that the joints withstand tremendous

flexing and stresses." If your brand is AMBROID you are using the finest money can buy. If not, then try a tube on your next model or repair job. For the construction of all wooden models, it just cannot be surpassed!

AMBROID LIQUID CEMENT

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will do under any wind condition.

Thursday, August 22nd, saw the first time Space Systems has been flown at a National championships. This is a new event requiring a scale model sounding rocket or space vehicle with its own scale launcher and firing system. You must launch carrying the NAR-FAI 29-gram payload within a pre-determined launch window time, go as closely as possible to a predicted altitude given previously, and land within a given area. A very complex event to fly and score, but an event which very closely approximates the conditions, decisions, compromises, trade-offs, and pressures that are faced by a Project Engineer on a real space vehicle at Wallops or the Cape. In the middle of this event, we had to hold while NASA launched a real Scout for a RAM re-entry test. But in Junior, Leader and Senior Divisions, respectively, the winners of the Lockheed Trophy were Charles Duelfer, Alan Malizia, and yours truly.

Swift Class Boost-glider Duration fared better than the earlier Sparrow Class because Type B engines were permitted. Some reasonable times were turned in with quite straightforward designs based on FlatCat, Jestrab, Start, and Falcon. Andy Elliot, 14, of Silver Spring, Md. clocked 101 seconds for first in Junior; Bruce Blackistone, 18, also of Silver Spring, chalked-up 131 seconds with a design Tommy Thompson swore would not fly; and Jim Kukowski took his second B/G trophy with 94 seconds in Senior Division.

Class 1 Parachute Duration was flown in a zero-thermal environment, and times were not very high. Kevin Stumpe, 16, St. Anegar, Iowa, kept his bird aloft 253 seconds for the Honeywell Trophy in Junior Division; Leader and Senior win-

ners were Phil Slaymaker with 116 seconds and Bryant Thompson with 177 seconds. This doesn't sound like a difficult event until you realize that you've got to bring your model back to win!

The final day, August 23rd, was occupied with the Research & Development competition, a unique contest category to model aerodynamics. Anything goes, and the objective is to stimulate the progress of the hobby. R&D certainly does this. This year, the written reports will be available through NAR Technical Services to provide even wider distribution of information. Connie Stine, 14, won the Junior Division Westinghouse Trophy with a complete study of the compatibility of various types of paints. In Leader Division, the going was rougher, because if you didn't have access to a computer or wind tunnel, you were out in the cold. Mark Mercer took first in this age division with his development of a highly accurate wind tunnel, while Talley Guill snagged second place with a highly complex mathematical analysis of the boost and glide phases of B/G flight. In Senior Division, the technical content is exceedingly high indeed. Dr. Jerry Gregorek of Ohio State took first with a detailed analysis of aerodynamic drag on models performed in the Ohio State wind tunnel.

It is hard to communicate to non-rocketeers the very high technical content of model aerodynamics in general. It's certainly a cut above model aerodynamics. (There's a number of our model people who will give you a good argument regarding this. Ed.) Once a rocketeer gets beyond his first few models, he begins to dig the math and graphs that are available from the manufacturers and the NAR; equations don't scare model rocketeers.

When all the points were added up and the trophies presented by representatives of the sponsoring aerospace firms at the Awards Banquet, the national champions emerged to receive the coveted Bendix Trophy which has left the air races and landed in model aerodynamics. As Junior National Champion, we have our first girl, Connie Stine, who won her Bendix Trophy by persistent and consistent competition flying all year long. In fact, it was a battle between Connie and Johnny Drake, both of the New Canaan Space Pioneers, for the Bendix award, and Johnny came in second only by virtue of the outcome of the R&D event. The Leader National Champion is Robert Mullane, 18, of Harrison, N.J. who is another consistent competitor and devotes considerable time to NAR affairs as well. Yours truly copped the Senior Championship operating under the philosophy that he will continue to compete for it until some other Senior continues to take it away . . . and finally some Seniors have gotten mad enough to try!

The championship club pennant went to the New Canaan Space Pioneers, making it nearly a clean sweep by the Connecticut rocketeers.

In spite of the fact that the competition was hard and demanding all across the board, the Tenth Championships was a "fun" nationals with good sportsmanship all around. Not a single protest was filed. And many of the winning performances will be tendered for USA and FAI records. Everybody who is anybody in model rocketry was there, including Dr. Willy Ley, Vern Estes, Leroy Piester, Tim Skinner, Irv Wait, and numerous others. The "underground" songs of the NAR came to light, bull sessions went on until all hours, and NASA Wallops Station Director Robert Krieger again voiced his offer to the young rocketeers: "Come back and see us when