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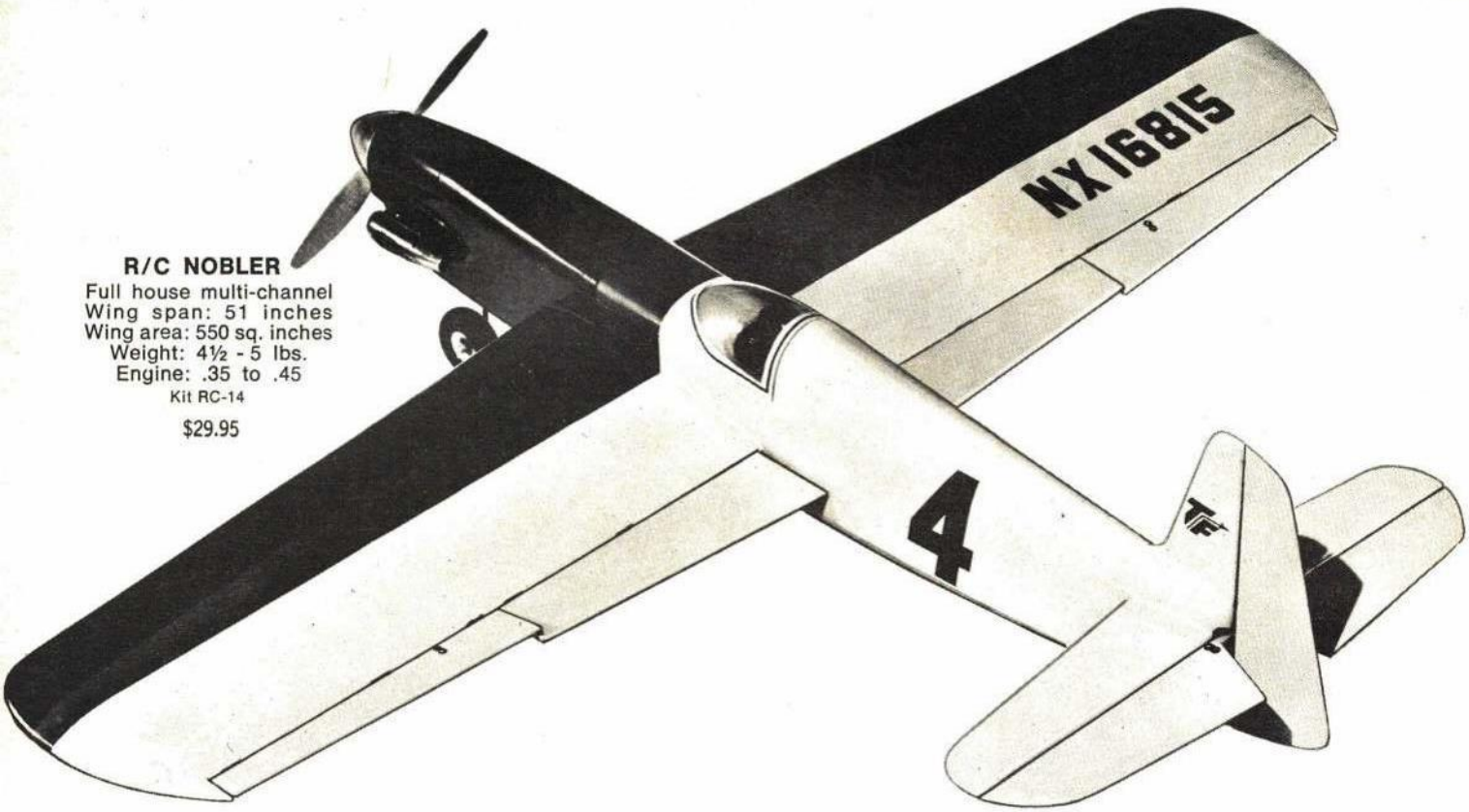

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AMERICAN aircraft modeler

COVER PHOTO: Francis Reynold's B&W scale R/C is displayed by his daughter Pat. Byron Wingett made this colorful shot of the 60-powered version of Boeing's first airplane, which took to the air 50 years ago!

WILLIAM J. WINTER — PUBLISHER

Edward C. Sweeney Jr., Editor — **Sally Barry**, Managing Editor

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STRAIGHT... ...AND LEVEL

Speaking of old-timers and the Hall of Fame, some strange models flew successfully a very long time ago.

SINCE writing last month about the impending Hall of Fame selections and forgotten pioneers, we came across a hard-cover "Model Aircraft Yearbook" written in 1937 by Philip Zecchitella. Last month's column mentioned Penaud's flight in 1872 of 172 feet and included a picture of a half-scale replica of that model, created by Christy Magrath. Prophetically, we'd stated that, no doubt, some avid historians would tell us about still older modeling exploits. The Zecchitella book does just that.

In an opening chapter, History of Model Aeronautics, he began with the da Vinci helicopter model, designed and built in the fifteenth century. Leonardo da Vinci as we know, had conceived the basic principle of the helicopter — which did not become an actuality for roughly 500 years, until Igor Sikorsky made vertical flight practical. Leonardo had thought of many things of the future. He was a man far ahead of his time.

In 1796 Sir George Gayley, an Englishman, experimented with a simple helicopter model made from whalebone, cork, and feathers. He then constructed and experimented with model gliders. The book is not clear whether or not these early-bird models actually flew but the implication is that the first practical model, a steam-powered helicopter, was flown in 1842 by an M. Phillips. This machine weighed two pounds, was all-metal, and had "four fans supported between eight arms."

To generate the steam, Phillips burned a mixture of charcoal, nitre, and gypsum. Gas-charged steam was then apparently vented at high pressure from the eight rotorblade tips. So it was jet powered! It was reported that this amazing model "rose to a great altitude and flew across two fields before alighting."

Then, in 1843, Williams S. Hensen, another Englishman, working with the American, John Stringfellow, flew a steam-powered ten-foot model weighing nine pounds. In 1879, V. Tatin demonstrated a compressed-air-powered model. Between 1890 and 1894 Sir Hudson Maxim employed models in developing the correct principles of flight. In Australia, M. Hargraves was working with a compressed-air model. In America, Samuel Langley was successful with rubber-, compressed-air, and steam-powered models. In 1896 his 15-foot steam-powered craft flew nearly a mile. Weighing 30 pounds, it was fitted with two 39-inch propellers. This model was the basis of the famous, but ill-fated attempt to take off a man-carrying machine from a track on the roof of a houseboat in the Potomac River.

We don't vouch for the accuracy, or completeness, of this account and, in fact, recall a more fully developed series of beautiful models of historic machines, prepared by the late Paul Guillow just after 1940. They were shown in a picture feature published in "Air Trails," the name those days of the magazine you are reading now.

We suppose you could term these early inventors and pioneers, model builders. However, they were not making models — which are small versions of full-scale objects — but developing reduced-scale flying machines. If the small craft operated, there was still the immense technological burden of developing life-size structures and powerplants. Nevertheless, it is interesting indeed to realize that, technically speaking, successful models were darting about, say, 100 years ago.

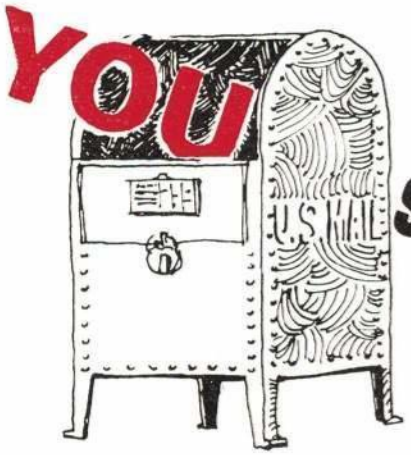
Zecchitella, however, strung it all together, beginning with the first model airplane contest on record, conducted by the Aero Club of France in 1905. The first British model airplane competition in 1907 was won by Sir A. V. Roe, later of Avro fame. In 1909 our own Percy Pierce of Philadelphia, a leader down to our own time, set a national record of 200 feet. It was beaten in 1910 by Page, whom we believe to be the famous Curtiss designer, George Page. Cecil Peoli, the chap we wondered about last month — and who died barnstorming in Japan in 1913, topped Page with a 1691-foot flight lasting $48^4/_5$ seconds. That was the first twin-pusher.

Armour Selley, who had a major model manufacturing business in the late Twenties, won with a 2800-foot flight, a 1913 contest put on by the Bamberger Aero Club of Newark, N. J. But it was a guy named John McMahon who should have, but did not, shake up the troops in 1912. He hit upon balsa wood, but flew "only" 2003 feet. The charming account ended pridefully on the great developments of the mid-thirties, and their suggestion of things to come. "Each year brings new revelation," wrote Zecchitella, "and to predict a peak of development would be an obvious editorial risk.

"Microfilm, microfilm propellers, free-wheeling, all are but an indication of what is to come. Gasoline-powered models have unearthed a vast field and the response has been terrific. . . . "

As far as we know, Phil is still around. Like the rest of us, he could not have guessed about control-line (only three years off as he wrote), glow fuel and glow plugs (then 10 years off) and, of all things, full-house digital proportional. He certainly didn't dream of plastic ready-to-fly, R/C machines.

About the time Phil was wondering about the future, Walt Good and his twin brother Bill, were at work on their famous Guff radio-control model. — The Publisher.



They also build

Thank you for printing my rebuttal in the Dec. '69 issue, but I feel that an important point was left out. Many of us (the majority) do not fly ARF planes. Indeed, some of the most beautiful scale models seen at the Nats were scratch-built. Further, many of us resent the constant bombardment about R/Cers' not knowing how to build.

There are close to 70 models in our club, and with few exceptions all are built from kits or plans. Go to any club field in this area and see for yourself. Now then, let's set the record straight! We both have been around long enough to know that prefabrication started with U-Control, spread into free-flight, then into radio-control with a logical progression to the almost ready-to-fly as new methods and materials developed.

Personally, I even abhor plastic display models. You and I used to carve them. Remember?

Dick Hill, Laurel Springs, N. J.

Since modelers always have held strong and conflicting opinions on all aspects of their hobby, especially about prefabrication and ready-to-fly, it occasionally becomes necessary to remind our readers, and our advertisers, that opinions expressed in this forum are not necessarily those of this magazine. We encourage freedom of expression, within reason. And Dick's letter is well within reason. — Publisher.

Permanent impression

I would like to commend Frank and Nancy Pierce on the article "The Silver Hill Story" in the Nov. '69 issue of AAM. Since this is also a story about the Smithsonian Institution, I have a few comments to make.

Anyone who has ever been to this Air and Space Exhibit, knows what a great place it is. I think everyone in the country should visit the exhibit.

It leaves a deep feeling that is hard to describe. You look at and admire such aviation greats as: the Wright Brothers' famous biplane, the "Spirit of St. Louis," the Bell X-1, first plane to break the sound barrier, and last but not least, John H. Glenn's "Freedom 7." The feeling that sweeps over you is a mixture of many emotions — pride in your fellow man who built and flew those birds, the peace and contentment these retired birds seem to vibrate. And most of all, you feel humble when you realize how many lives and fortunes went into making these birds realities.

I know that the exhibit makes a permanent impression because I visited it five years ago when I was nine. Now I'm 14.

Bill Becker, Hudson, N. Y.

Ten times more

Everyone is always talking about the young person's lack of participation in our sport of modeling. I am 16 years old and have been flying U/C since I was seven. I was introduced to the sport by my father who has some U/C planes dating back to 1938.

When my father first began designing and building his first planes, a piece of 1/8" balsa cost a nickel or a dime. Nine years ago when I built my first model, that same piece of balsa cost somewhere between 25 and 35 cents. Recently, I sent for plans for a large profile stunter (55"). When I went to buy the wood I was shocked. The same piece of 1/8" balsa that used to sell for a few cents, cost 50c. At those prices, the plane that I wished to build would cost $15.

I and other juniors cannot afford these outrageous prices. I know you will tell me that it is of higher quality than the wood my father bought some 30 years ago. I know this, but is it ten times better quality? It costs ten times more.

I am aware that it is not your fault and that the people at your magazine are sincerely trying to help our "cause," but how can you expect a young person to spend $15 for wood? I am omitting the facts that an engine, dope, wheels, tank, etc., would cost at least another $15. Until something drastic comes, I am just going to have to fly the 1938 wreck with the 1947 Torp 29. (Half-A isn't the same. Cheaper, but not as good.)

On a happier note, I really enjoy your 60c-magazine with the glossy pages.

Eric Schiller, Hull, Mass.

Prices in so many areas are "outrageous" these days. Whether or not a ten-times increase of costs in the last generation is warranted, as true of things like bus and subway fare increases, is a matter hard to resolve. We doubt that model suppliers are getting rich at the consumers' expense. Nevertheless, the fearsome total costs of making any but the simplest of models is a definite drawback to the younger modeler, and a recognized handicap to the present growth of the hobby. — Publisher.

Keeps plugging

I have wanted to write you for the last year or so and compliment you on doing an outstanding job on your magazine. Also I have wanted to state my opinion on several topics, but my latest bugaboo is the people who write in and ask you to publish more articles in their line of the hobby. I hope you take your own sweet time about it. Of course, two years ago when I first started, I felt like asking the same kind of question.

Also, it seems as if some of us kids are getting riled up because some other kid has an R/C set-up — probably given to him by his parents. Some parents are disturbed because their son isn't getting enough credit for his model at some contest. Some free-flighters are getting mad due to the lack of publicity for their kind of work. Some flyers are touchy about the beginner who asks stupid questions. And worst of all are the people who are aggravated over the flyer who is touchy over the beginner who is riled over the "Junior R/C Boy." I felt when I started this hobby accidentally two years ago that I would be building model airplanes, not trying for a Nobel peace prize. In two years of flying, I've hardly had a nickel donated for a plane, never had someone close at hand to run to for advice or marvel over my second-hand engine. But I have managed to progress as far as single-channel R/C. Am I gifted? No! But I try hard and seem to get along pretty well. So from one MAAC member to one AMA member: If I can do it, why can't you?

Keith Morgan, Markham, Ontario, Canada

Centerspread first

I am not going to bother you with such things as the "junior problem" and things like that. All I'm going to say is that I enjoy your magazine very much.

When I come home from school in the

Continued on page 8

"Mom, have you seen my Jap tissue?"

YOU said it!

Continued from page 6

afternoon and find the AAM magazine on the table, the first thing I do is open it up to the centerspread and see what airplane it has.

I want to congratulate you on your articles. I read them and have learned tips on building and flying.

I have been subscribing to your magazine since Aug. '67 and have enjoyed every issue.

Keep up the good work.

Joseph Graziano, Bergenfield, N. J.

Exchange from Poland

I am 24 years old, and a ship and aircraft modeler.

I would like to start correspondence on above subjects, and I would like to exchange Polish "Model News and Plans," a model publication, for foreign.

Michael Urbanowicz,
Szczecin, Broniewskiego Str. 34, Poland

Generation gap?

I have just finished the Nov. '69 issue of AAM. As usual, the magazine was informative, fun to read, and inspirational to my son and myself. We are now in Bermuda, so our only modeling competition is with the models on your magazine's pages. We try.

I am a reader and not a writer, so it isn't my place to criticize you; however, I do find fault with your editorial.

True, you have posed an immense problem, and one with many sides. You have to write in such a manner that you reach most of your listeners, intrigue them to the point that they will remember the question and ponder it, and instill in them the desire to act upon the problem to the best of their ability. I don't believe that you did this.

Your editorial left me confused, and with a definite feeling that you are facing a hopeless cause.

Raise your question, but keep it in unemotional and simple terms. We are modelers, and not subscribers to "Science Fiction Fantasy."

Aim the bulk of responsibility at the elder member of the generation gap, but give him some definite guidelines to follow. He is probably already facing the generation gap with his son, so trying to organize a number of boys into a productive group will probably snow him under. Make him think for himself, but guide his thoughts in the right direction. Where can he go for help?

As fathers, thousands thank you. We need every bit of help that you and others of your industry can give us.

Dwight Enders, FPO, N. Y.

Dad, you have something! If father-son relationships are as conscientiously considered as your own, there isn't much more, if anything, that can be done. Few individuals can take upon themselves the responsibility of forming and guiding a group. Your publisher can't. However, we do have many organized clubs which have the strength, if not the dedication, to accomplish much for the young, upcoming modeler. — Publisher.

Have a copy?

Twelve years ago, in Oct. '57, Air Trails published a construction article on an air-sea rescue boat by Warren Pugh. The plan for this craft was available as Group Plan

Continued on page 67

IS MONOKOTE *REALLY* MORE EXPENSIVE?

We, at Top Flite, are so convinced of MonoKote's superiority over the silk and dope method of covering and finishing, that we find it difficult to understand why every model builder doesn't cover his plane with MonoKote. Therefore, we hired a research organization to find the answer.

Over 800 model builders and dealers were questioned, and the results of the study indicated that the only reason more builders weren't switching to MonoKote was its *"presumed high cost."* The majority of those builders who objected to the cost, however, had never used the product. Many of the dealers, on the other hand, expressed the opposite point of view. They indicated that economy was one of MonoKote's major benefits.

LET'S LOOK AT THE COST FACTS!

A typical example of comparative costs came from Mr. Al Fuchsen, owner of Al's Hobby Shop—129 W. First Street, Elmhurst, Illinois. To compare the cost of MonoKote with an equivalent covering and finish using silk and dope, Al selected an average size plane, Top Flite's TOP DAWG. He explained his reason for selecting this plane, "if there is a cost difference, the larger the plane, the greater the spread."

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*Based on quart size prices

**Based on pint size prices

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ON THE SCENE

Flightmaster's All-Scale Meet

A paradise for scale fans, one contest for R/C, F/F, and C/L models under perfect conditions.

TERRY ALDRICH and ROBERT ANGEL
PHOTOS BY TERRY ALDRICH

Ducted-fan scale F-100 C/L model by Major Kulczyk is meticulously finished, flies well.

FOUR a.m. is a bad hour. But if you're going hunting, fishing, or to a model meet, the time is quickly forgotten in the activity of getting underway. The trip down the coast from Santa Maria to the Sepulveda Basin takes about three hours, with a breakfast stop at Santa Barbara. After a side trip to the Los Angeles International Airport, we arrived at the Basin by 9 o'clock.

The Model Airport is in an excellent setting, with acres of flat terrain. It was a beautiful October day — clear and windless — and 89 degrees about midday. Driving onto the grounds, the first thing you notice is the large permanent signs spelling out safety rules and directions.

Just as we arrived, a strange-looking para-wing flew gracefully overhead. We visited the free-flight and radio-control areas first. Wandering through the pits, we inspected the details of many beautifully finished planes. The free-flights showed considerable variety in size, shape and power, from the largest down to 020-engine size and rubber power. The R/C planes all tended to be more high-powered with 45-size engines and upward.

We were a bit disappointed to find out that *all* the scale appearance judging had taken place the night before, so that entry into the competition was not possible on Sunday — the published date of the meet. We wondered how many others, like our-

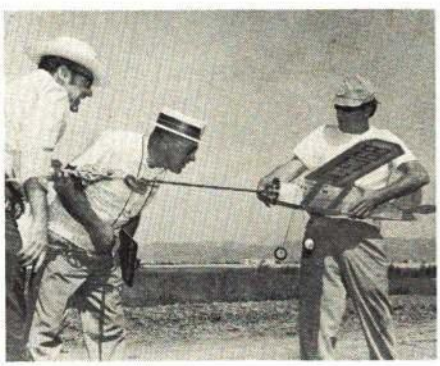
Continued on page 68

Another ducted-fan job by Kulczyk is Mirage III with scale operating retract gear.

Walt Mooney with F/F version of his real Volksplane. Cox engine inside scale motor.

Sherlock Aircraft Models foam/plastic semi-scale Lear Jet R/C made realistic demo flight.

Dennis and Don Lutz flew Cox-powered F/F Stinson Voyager and Great Lakes Special.



Bob Haight is about to wind up his rubber-powered lightweight Bellanca entry.

Beautifully detailed Nieuport 17 by Dick Adams won R/C event. Has scale oil spots!

Allen Hess displays the internal construction details of his C/L ME 110. Flew well — briefly.

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Skylark 56 Shown

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Flyangle

For added realism this rubber-powered cutie is a slightly advanced version of the basic Delta Dart.

BILL HANNAN

Off it goes into the wild-blue yonder, the North Pacific Sleek Streek prop churning away on one loop of 1/8" rubber. The intent aviatrix demonstrates just-right launching.

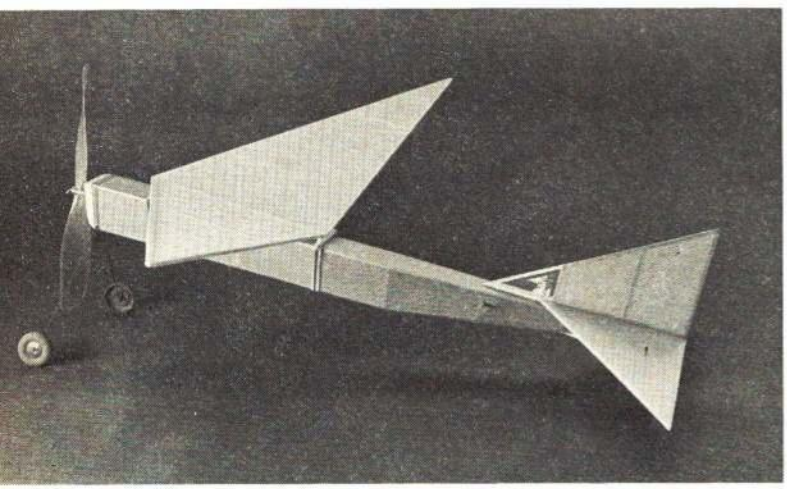
PROBABLY the most influential simple model of this decade has been the Delta Dart. Designed by AMA Technical Director Frank Ehling, the model was published in the much-lamented "Sig Air-Modeler" magazine during 1966. It was known at the time as the "AMA Racer." In April of 1967, *American Aircraft Modeler* featured plans under the name "Delta Dart," which seems to have been the most widely accepted name for the species. A modified version kitted by Sig Mfg. Co. is called the "AMA Cub." A larger, glow-engined variation called "Oily Bird" appeared in the Oct. '68 issue of *American Aircraft Modeler*, and in fact, full-size plans for it are still available through Sudden Service Plans.

"Flyangle" represents an effort to produce a slightly advanced version of the basic idea, incorporating a fuselage and other items intended to add a degree of realism. While the model is not as simple to construct as the Delta Dart, anyone who is willing to work carefully should be able to produce an attractive, flyable aircraft.

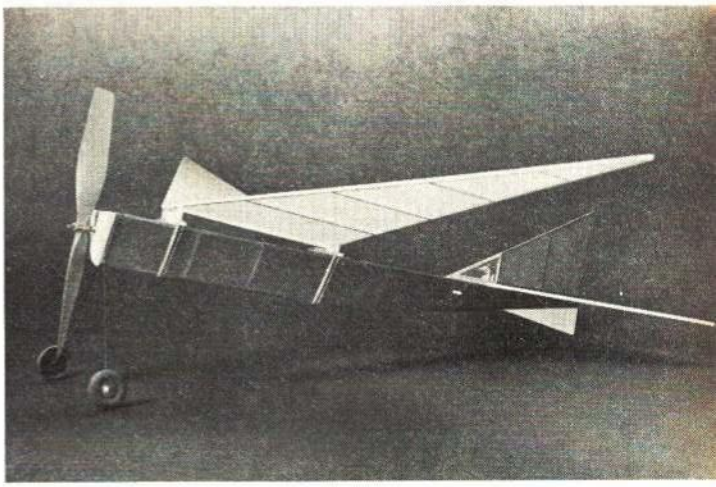
Materials: Medium-hard balsa can be used throughout, with the exception of the fuselage longeron, nose block, and wing mounts, which should be made of hard balsa. When selecting wood for the job, choose straight, warp-free pieces, which may be found by sighting down each strip from end to end.

Construction: Build the model on a flat surface in order to prevent any built-in warps. Spend a few minutes looking over the plans and photos to be sure that you understand the relationship of the parts. Since the plans are printed full-size, you may build directly over them. A sheet of

It has its good points — all over the place. Delta Dart-type wings and tail minimize dangers of warps in the surfaces. That's important if it is to fly successfully.



Simple wing mounts and rubber-band attachment show clearly here. Wing slides back and forth for making necessary corrections in balancing. Article describes how to adjust model.



waxed paper or clear plastic food wrap will keep glue from sticking to the plans.

Fuselage: Cut the fuselage top panel from 1/16" sheet balsa, and sandpaper the edges lightly to remove any roughnesses. Mark the position of each triangular fuselage former on the panel, using a soft pencil or ball-point pen. Next, cut out the various formers. Since the fuselage is constructed upside down, the top panel will actually be on the bottom during the building stage, and may be held flat against your building board with straight pins.

Glue each former in its correct location, checking that all are vertical for proper alignment. Allow the formers to dry, then add the 1/16" sq. hard balsa longeron, which will need to be cracked at the rearmost F2 former, in order to permit the change in angle at that point. Cut out and install the triangular rear rubber-peg retainers. It is easiest to make only a pin hole where the peg fits in each retainer, at first. Then, enlarge the holes to proper size *after* the retainers are installed and have dried. This will assure correct peg alignment. Add a second coat of glue to the former and peg retainer joints, as they are subject to strain when the motor is fully wound.

After the fuselage assembly has dried, remove it from your building board and sandpaper any rough places. By using a small sanding block or emery board, it is easy to blend in any edges or corners that may protrude. The time spent in doing this will make the task of applying the covering much easier.

Landing gear: The landing gear legs are bent from a piece of .025-diameter music wire, using needle-nose pliers. The wheels used on the original model were plastic, but could just as well be wood. The size is not too important, and anything from about ½" up to 1" diameter should prove satisfactory. The wheels are retained by bending the axle ends upward. For good ROG (rise off ground) starts, the wheels should revolve freely. Note that the landing gear legs are bent slightly to the rear to provide propeller clearance.

The landing gear wire is sandwiched between F1 and F1-A using plenty of glue. A clothespin or two can be used to clamp the assembly together while the glue dries.

Noseblock and prop: The noseblock can be made from a 3/16"-thick piece of hard sheet balsa, with a 1/8" hard balsa sheet triangular plug glued on, or the block may be laminated from 1/16" hard balsa sheet. In either case, the nose plug should be a snug fit into F1, so that it will not fall out during flight. The prop shaft bearing is a short length of 1/16"-diameter aluminum or brass tubing. Note that it is mounted in a *slanted* hole to provide 4-5 degrees of down-thrust. Roughen the outside of the tubing with a file or sandpaper, and glue it into the nose block. Be certain to clean out any glue that may find its way into the inside of the bearing.

The prop shaft may be formed from a piece of music wire, with the aid of needle-nose pliers. Any suitable plastic prop from 5" to 6" in diameter may be employed, but a North Pacific "Sleek Streek" prop was used on the prototype. Add enough small washers or sequins to the prop shaft so that the propeller will clear the corners of the noseblock. Also, apply a drop of oil to reduce friction.

Wings: The wing panel is constructed directly over the plan from 1/16"-sq. medium-hard balsa strips, which are held down while drying, with straight pins. Do not puncture the strips with the pins, as that would weaken them. After the wing panel has dried, it may be removed from the board, and a second one exactly like it may be built.

The wing mounts are cut from hard 1/16" balsa sheet, and glued to 1/16"-diameter hardwood dowels. These may be obtained at low cost from a drug store, by asking for "swab sticks." The rear rubber peg is also made from one.

Tailplanes: The tail parts are made from 1/16" balsa strips in the same manner as the wing panels. Note that there is an extra piece of 1/16" sq. at the lower front part of the fin. Cut the small triangular sub-fin (which also serves as a tail skid) from 1/16" sheet balsa.

Covering: There are several approaches to covering a model with tissue, but our favorite is as follows: Apply several coats of clear dope to each part of the structure where the tissue will be secured. The use of a plasticized dope, such as Sig "Litecoat" will reduce the chance of warping. Also, even though the wings and stab are only covered on the top side, it is a good plan to dope both sides of the structure to minimize warping, caused by the action of the dope drying. The small amount of additional weight is more than offset by the efficiency of good, true flight surfaces.

After the dope has been applied (usually two or three coats are required), cut a slightly oversize piece of tissue paper and place it over the framework to be covered. Using a small brush, flow some dope thinner *through* the tissue, along the previously doped structure. The thinner will penetrate the tissue and soften the clear dope film underneath enough to render it sticky. Do only a few inches at a time, and press the tissue firmly against the structure. If the tissue develops a bad wrinkle, apply thinner, pull it off, and try again. Work your way around the entire outline, then put the part aside to dry for ten or 15 minutes. The excess tissue may be neatly trimmed from the structure, with a *sharp* razor blade. Check for any areas that may have popped up or worked loose. A light application of thinner and/or dope should take care of them.

It is only necessary to cover the two fuselage sides, but we elected to cover the top also to achieve a more uniform color scheme. The wing and stab, as mentioned earlier, are covered on the top side only. The fin would only need to be covered on one side, but its appearance is much better when covered on both sides. The forward cockpit portion of the fin is covered with cellophane. Don't forget to put the paper pilot inside first.

The fuselage covering may be lightly shrunk with water, but the wing and tailplanes are left alone and not shrunk or doped.

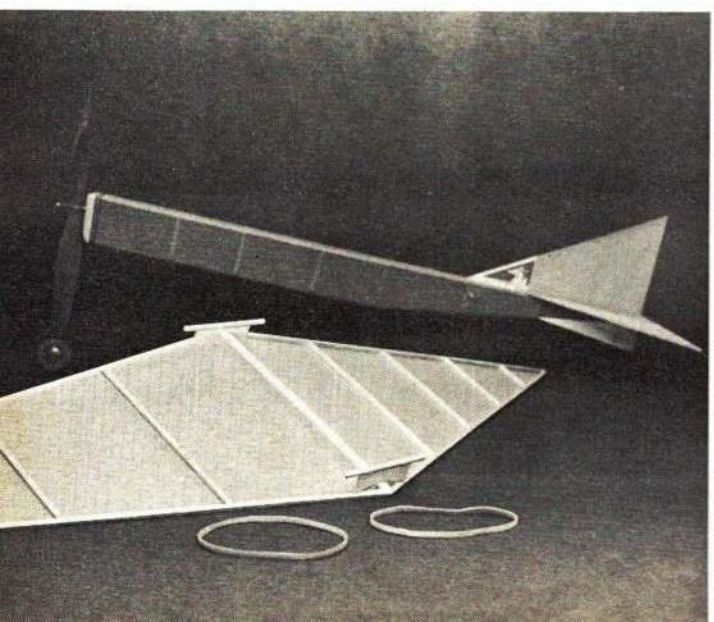
Assembly: Glue the fin onto the exact center of the stab and check to be sure that it is vertical as viewed from the rear. After the fin has dried, the tail assembly may be glued onto the fuselage. For greatest strength, a small amount of tissue should be removed from the fuselage if the top has been covered, so that the glue can grip wood rather than paper.

Sand a small flat into the rear portion of the fuselage longeron so that the sub-fin can be solidly attached.

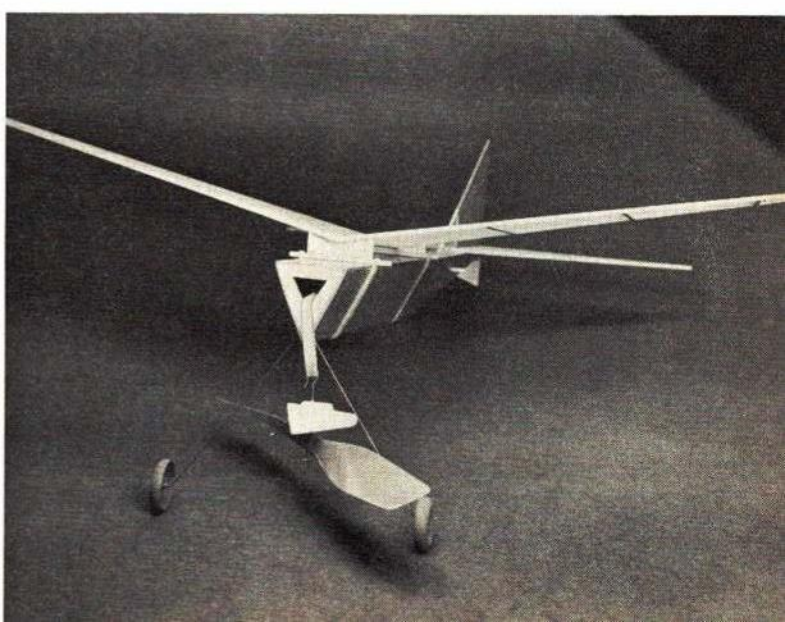
Glue the two wing panels together at the centerline, raising one tip 4" off the board for dihedral purposes. A block of wood can be used to hold the tip up while the glue joint dries, preferably overnight. When dry,

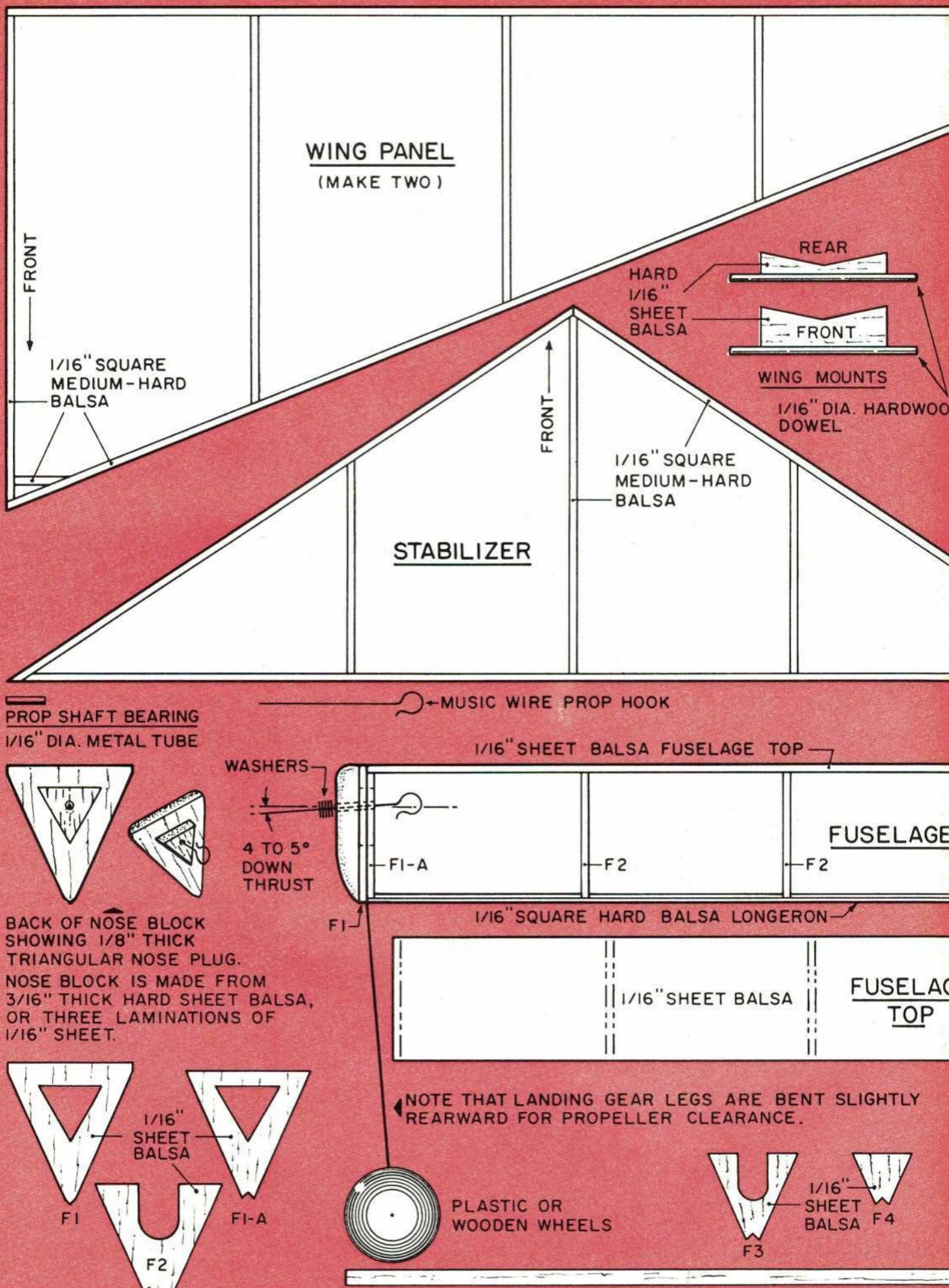
Continued on page 56

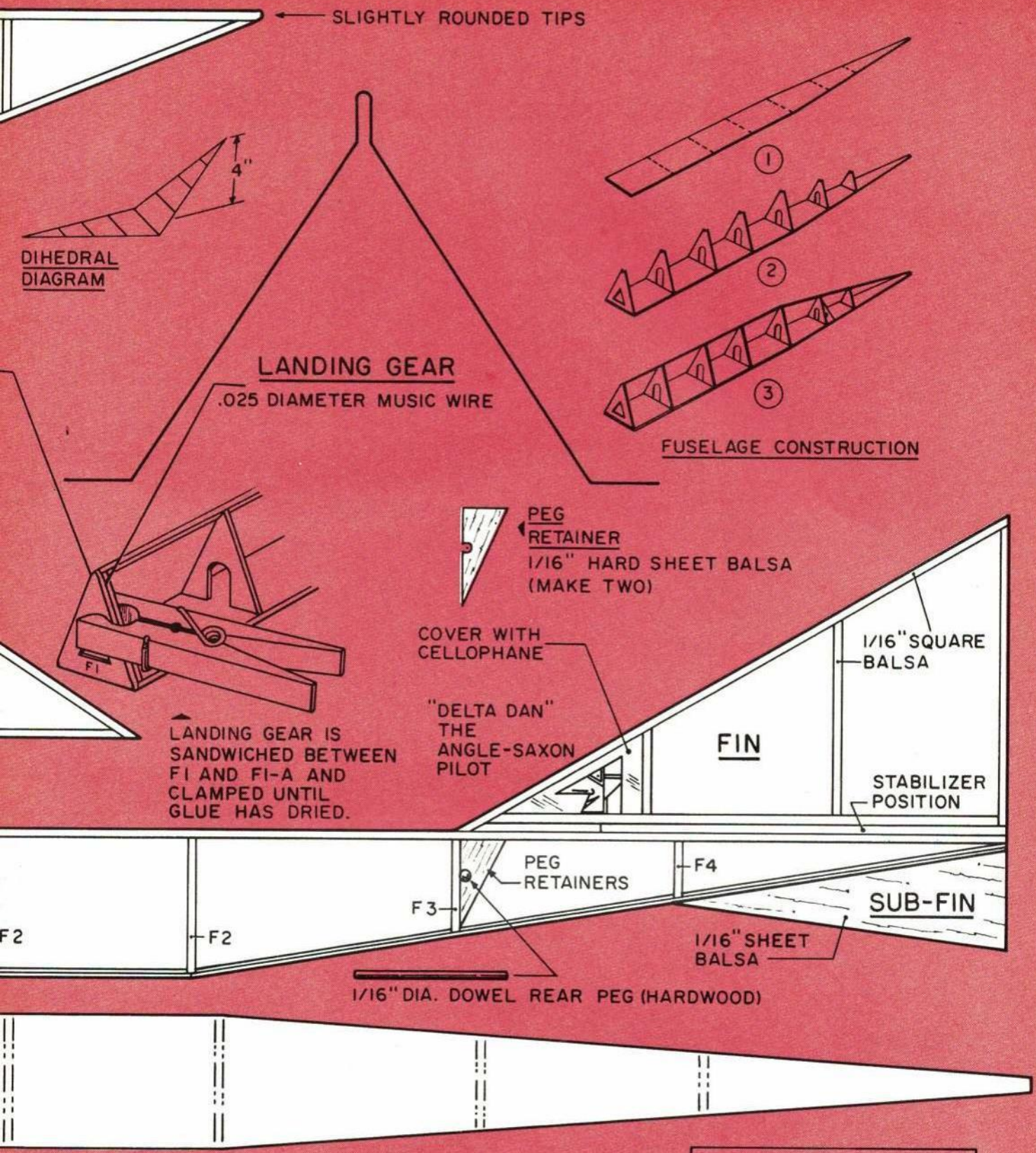
Wing frame is built directly on covering paper, as with Delta Dart. The wing mounts are 1/16" sheet balsa with 1/16" dowels attached. Rubber bands wrap around dowels and body.



Even the fuselage has a triangular motif. Because it has a flat top, it can be assembled inverted on your board. Nothing can be simpler. Rubber is inserted with a stuffing stick.




WING PANEL
(MAKE TWO)
FRONT
1/16" SQUARE MEDIUM-HARD BALSA
REAR
HARD 1/16" SHEET BALSA
FRONT
WING MOUNTS
1/16" DIA. HARDWOO DOWEL
FRONT
1/16" SQUARE MEDIUM-HARD BALSA
STABILIZER
PROP SHAFT BEARING
1/16" DIA. METAL TUBE
MUSIC WIRE PROP HOOK
1/16" SHEET BALSA FUSELAGE TOP
WASHERS
4 TO 5° DOWN THRUST
F1-A
F2
F2
FUSELAGE
F1
1/16" SQUARE HARD BALSA LONGERON
1/16" SHEET BALSA
FUSELAG TOP
BACK OF NOSE BLOCK SHOWING 1/8" THICK TRIANGULAR NOSE PLUG.
NOSE BLOCK IS MADE FROM 3/16" THICK HARD SHEET BALSA, OR THREE LAMINATIONS OF 1/16" SHEET.
NOTE THAT LANDING GEAR LEGS ARE BENT SLIGHTLY REARWARD FOR PROPELLER CLEARANCE.
1/16" SHEET BALSA
F1
F1-A
F2
MAKE FOUR
PLASTIC OR WOODEN WHEELS
1/16" SHEET BALSA
F3
F4



FLY△NGLE

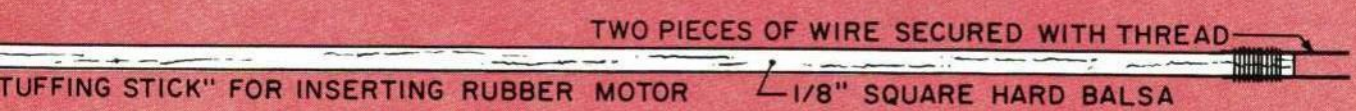
(SON OF DELTA DART)

FULL SIZE PLANS

BY BILL HANNAN

NOTE: ANY SUITABLE PLASTIC PROPELLER FROM 5 TO 6 INCHES DIAMETER MAY BE USED.

THE PROTOTYPE USED A 5 1/2" DIA. NORTH PACIFIC PROP AND A SINGLE LOOP OF 1/8" FLAT BROWN RUBBER.



One-man Air Force

Technical Sergeant Gordon E. Ford, United States Air Force, just loves these scratch-built giant scale birds.

TECHNICAL Sergeant Gordon E. Ford, 95th Consolidated Aircraft Maintenance Squadron, Goose Air Base, Canada, is a reciprocal engine mechanic. Off duty, he maintains his own private "Air Force."

Sergeant Ford's air force is not the dime-store variety, nor quite large enough to move an army. It is a large collection of model aircraft that he built to scale using military tech orders and converting feet to inches and centimeters.

Those who have assembled a model from a kit can imagine the many difficulties encountered when constructing massive scale-model airplanes from scratch. Sergeant Ford's production has outgrown the "hobby" stage. He hand-makes all the wooden parts, including most of the propellers.

He has built many such models, and presently has 17 planes in flying shape. The most impressive at the moment is the KC-135 refueling aircraft. It won him second place in a model aircraft competition last July at Lackland AFB, Texas. The aircraft carries two quarts of fuel, has an operable boom that off-loads fuel in flight. It can stay aloft for one hour, or nearly 50 miles.

Sergeant Ford's entry was defeated at the Lackland competition by a Fokker, owned by TSgt. Burt Dugan whose home base was

Top: Putting his Convair T-29 through its paces with real-life sistership in background is Tech. Serg. Ford. Convair spans 4 ft., has two 19's. Above: Boeing KC-135 jet-tanker is authentic, even to markings on the fin. Tanker spans 5½ ft., power unknown.

Transporting his fleet during station changes is a big problem in logistics. Here, the family puzzles crating a 7 ft. 3 in. Globemaster. It has two 35's, two 19's. Right: 10½ ft. Lockheed C-5A seems to grow as tall as the trees. Following Ford's standard 1/24th scale, it will have two Max 58's and two Supertigre 56's. The 12-lb. B-70 has two pusher 60's.

Lackland. Ford feels that, for competition purposes of that type, the older the aircraft and the more details, the better the chance of winning.

Ford's flight line and hangars are his back yard and basement, as well as nearly every room in the house. Models hang from ceilings in the living room, dining room and bedrooms. From Mrs. Ford's viewpoint, it makes an interesting topic of conversation at parties. It must take a lot of patience, pride and humor to contend with such a hobby, and Mrs. Ford deserves a medal for it, according to her husband.

When Mrs. Ford married her "Air Force" man, he had built only one airplane, but after watching him at work many nights she decided, "If you can't fight them, join them," and join them she did. To date, Mrs. Ford has built and flown three airplanes and enjoys helping him with the big ones. She said, "It's really an exciting experience and I think I am more excited than he is when a new model lifts off."

At present, Sergeant Ford is building a C5-A Galaxie. This model will be 10½′ long, 9½′ wide, 32½″ high, and will have its landing gear raised and lowered by radio control. The giant model will be powered by two Supertigre 56 and two Max 58 engines with throttles. It will have four-bladed propellers on each engine, and throttles will be controlled from one main point. The motors put out approximately five horsepower.

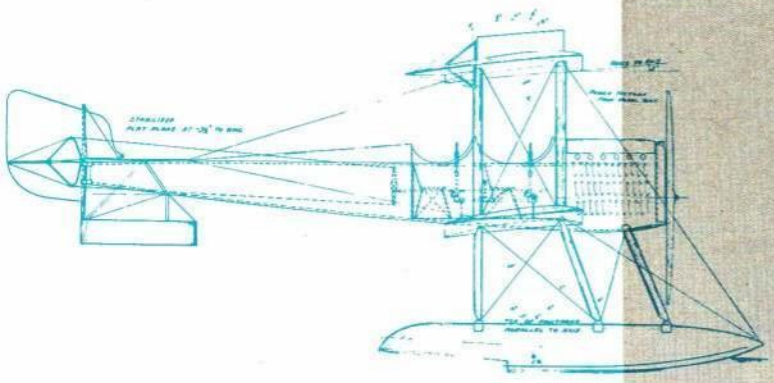
His future projects include a Ford Trimotor — a three-engine cargo aircraft, originally built around 1925 and dubbed the "Tin Goose." Also planned is an eventual in-flight refueling between two model aircraft.

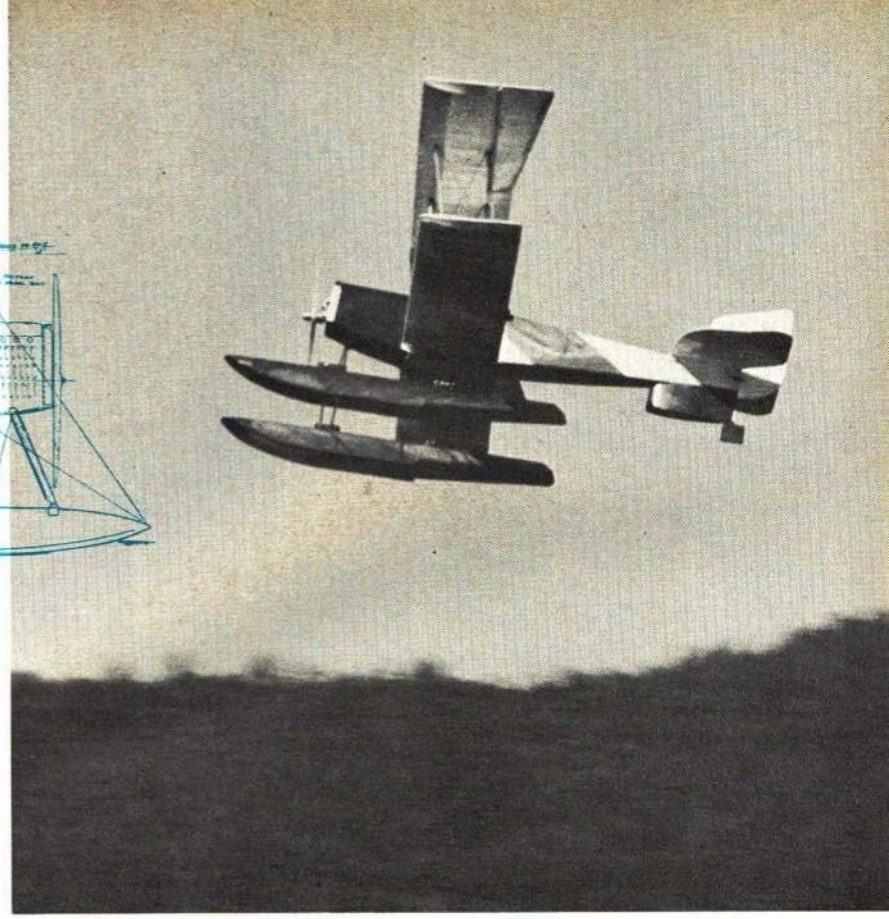
Ford has been building model aircraft for 23 years. He has had a lot of fun with them, met lots of interesting folks and exchanged correspondence with people all over the world. Getting some of the letters translated was a problem. He has even sent some to the embassies concerned whenever someone on base could not be located to translate them for him. In many cases, servicemen with wives from Germany, France, Japan, and Holland have assisted him.

A major problem that must be considered when building models of this sort is their transportation from base to base. He built his planes with detachable wings. The bigger models even divide in the middle for easier packing.

The first Wright Brothers' airplane had 12 horsepower, carried one gallon of fuel and flew just a little over 100 feet. Sergeant Ford's C5-A will have five horsepower, carry two gallons of fuel and will be able to fly approximately 50 mph, and stay airborne more than an hour.

Pride of his fleet is this 7½ lb. C-133 with throttles, flaps, brakes, blinkers, cargo-loading, off-loading ability (left). Above, Ford prepares to start an outboard 19. Inboard engines are 35's. Right: With two helpers, Ford has one of the 19's running, flips the other. He built the impressive craft when in Thailand.





With mahogany-covered floats, model looks just like full-size replica. Advantages of twin floats are additional air-rudder effect of tail float and on-water stability.

MODEL PLANE ON COVER

1916 B&W BIPLANE

This 60-powered R/C version of Boeing's first aircraft is convertible float/land plane. And it's aerobatic!

FRANCIS D. REYNOLDS

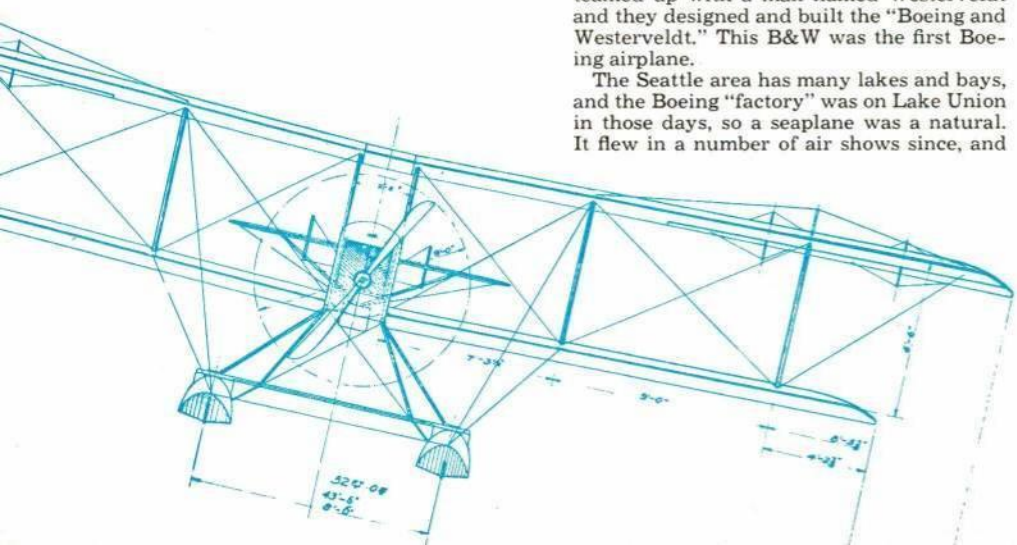
THE Boeing Company has a brand-new airplane flying around Seattle these days. So what's new about that? A glance at the specifications tells the story: Wing span, 52 ft.; length, 27 ft. 6 in.; wing area, 580 sq. ft.; gross weight, 3,200 lbs.; top speed, 78 mph; cruise, 67 mph; range, 120 miles.

It's a flying replica, built in 1966 to modern standards, of the original Boeing airplane which first flew in 1916. Two were made then — and sold to the New Zealand Flying School — but the new one isn't for sale. It was built to commemorate the 50 years of progress which have seen Boeing grow from 21 men working in an old boathouse on Lake Union in Seattle, Wash., to the world's largest aerospace firm.

And it flies. Oh, man, does it fly! The Federal Aviation Agency attests the fact — they've licensed it for experimental-exhibition use, within glide range of water. The first two were not FAA certificated because there wasn't any FAA then.

When, over 50 years ago, William E. Boeing became interested in "aeroplanes," he teamed up with a man named Westerveldt and they designed and built the "Boeing and Westerveldt." This B&W was the first Boeing airplane.

The Seattle area has many lakes and bays, and the Boeing "factory" was on Lake Union in those days, so a seaplane was a natural. It flew in a number of air shows since, and now rests in the Seattle Aeronautical Museum.



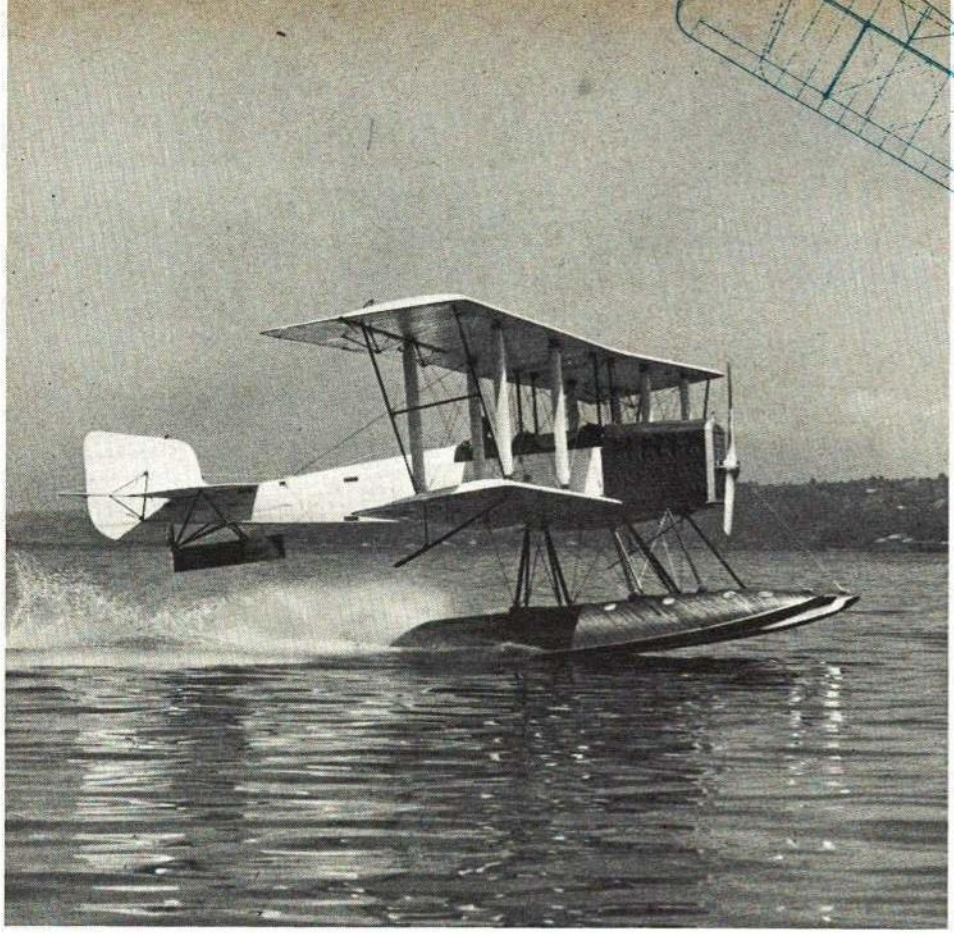
My objective was to make a rugged, practical, good-performing model, with scale appearance a secondary goal. I had no particular thoughts of competing in scale events, so I made a number of moderate changes. Since completing the model, however, I have entered it in three competitions and won a first, a third and a second in spite of the deviations from scale.

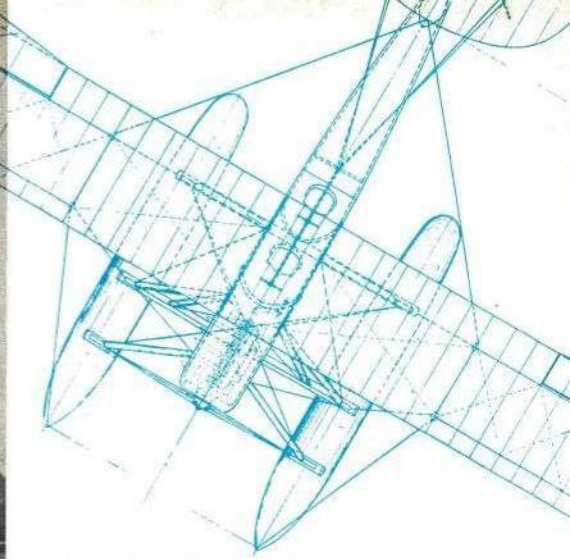
If you are a purist or a scale competitor you may wish to revert to the original lines shown in the small three-view drawing. I know it flies well as presented. I don't know how it would fly if built to the scale lines, so you are on your own. You would certainly have to weight the nose to keep the CG forward if you go to scale nose-moment arm.

The nature and approximate magnitude of the deviations from true ⅛ scale follow: Wing spans and area, reduced 10%; stab span, increased 10%; fin height, increased 17%; nose-moment arm, increased 27%; airfoil changed from RAF No. 6 to 17% symmetrical; floats, lines changed slightly to make them easier to build, and float length increased 3%.

Boeing's 1966 replica of the B&W used small wheels attached to the floats for field use, but the 1916 B&W had floats only.

The short nose of the B&W combined with a far-forward CG requirement pre-





Actually only the outlines of the B&W are preserved. Original detail drawings were lost so the structure is "modern" design. Engine is powerful aircooled type geared to 9' wooden prop. Radiator is only a grill for appearance. On July 15, 1966 Clayton Scott, a former Boeing production test pilot, flew the replica to celebrate company's 50th Anniversary. Picture shows real plane.

sents a problem. Tests show the model must balance at 20 to 25% of chord. If you make the nose to the lines on the plans (1½" longer than scale), you will still need to add 5 to 8 oz. in the nose to balance her for wheels. You can probably fly with floats without adding any nose weight since the CG of the floats is well forward.

The 7 degrees of down-thrust shown on the plans is a lot more than we are used to in modern R/C ships, but this one isn't exactly modern. With little or no down-thrust it nosed up violently when power was applied and required down elevator to keep it from stalling or looping. With −7 degrees there is no appreciable trim change with change in throttle setting.

The big down-thrust angle is probably required because of the high center of drag (big, high upper wing) and the combined effects of downwash and slip-stream on the horizontal tail. It is true that floats lower the center of drag of an airplane but the B&W model likes lots of down-thrust for either sea or land flying.

Traditionally, model construction articles give you flying tips at the end, after they have told you how to build it. But how will you know whether you want to build it if you don't know how it flies?

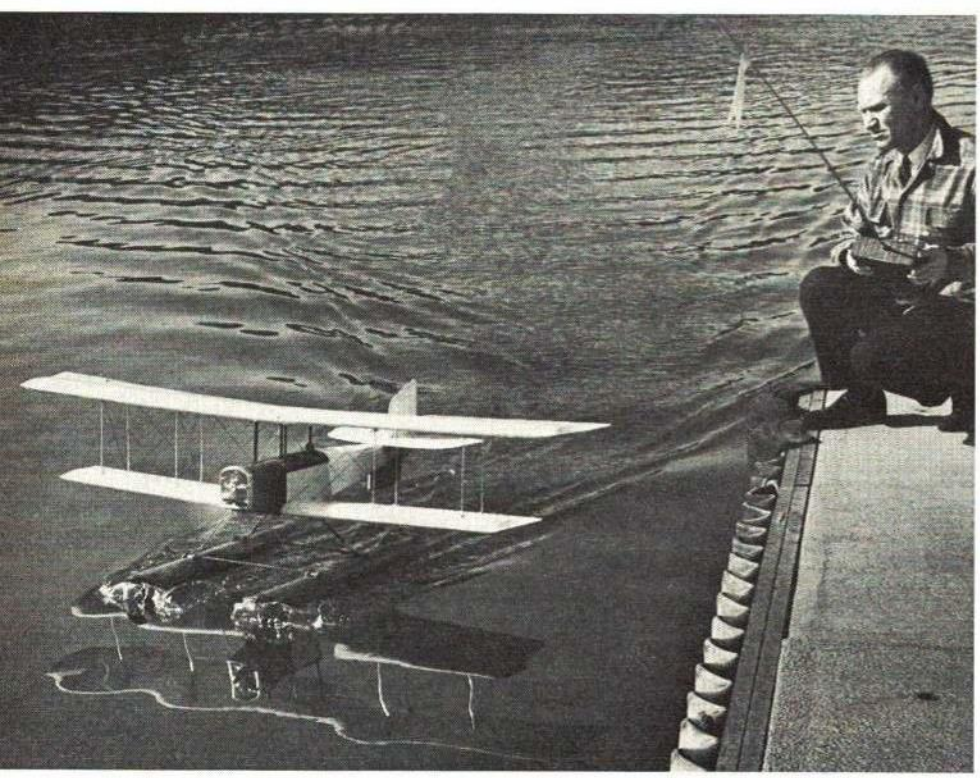
When the B&W model is balanced and trimmed as recommended, it is a reasonably stable, docile airplane, a pleasure to fly, and a fair stunter. The model will spin upright or inverted very nicely with power on, with the CG at 22%. My model will not spin with the engine idled, apparently because there isn't enough horizontal tail and tail moment to stall the wings without slip-stream to increase elevator effectiveness. It also snap rolls beautifully under power. It will loop inside and out and will fly inverted with the thick full-symmetrical airfoil shown. If you are a scale purist and don't care about inverted stuff, go back to the flat-bottom RAF No. 6. It will look more realistic, but beware of stalls on takeoff and landing.

In spite of the huge ailerons, the roll rate is low. However, with adequate down elevator to hold the model level while inverted, it slow-rolls very impressively. Be patient. It will get around after a while.

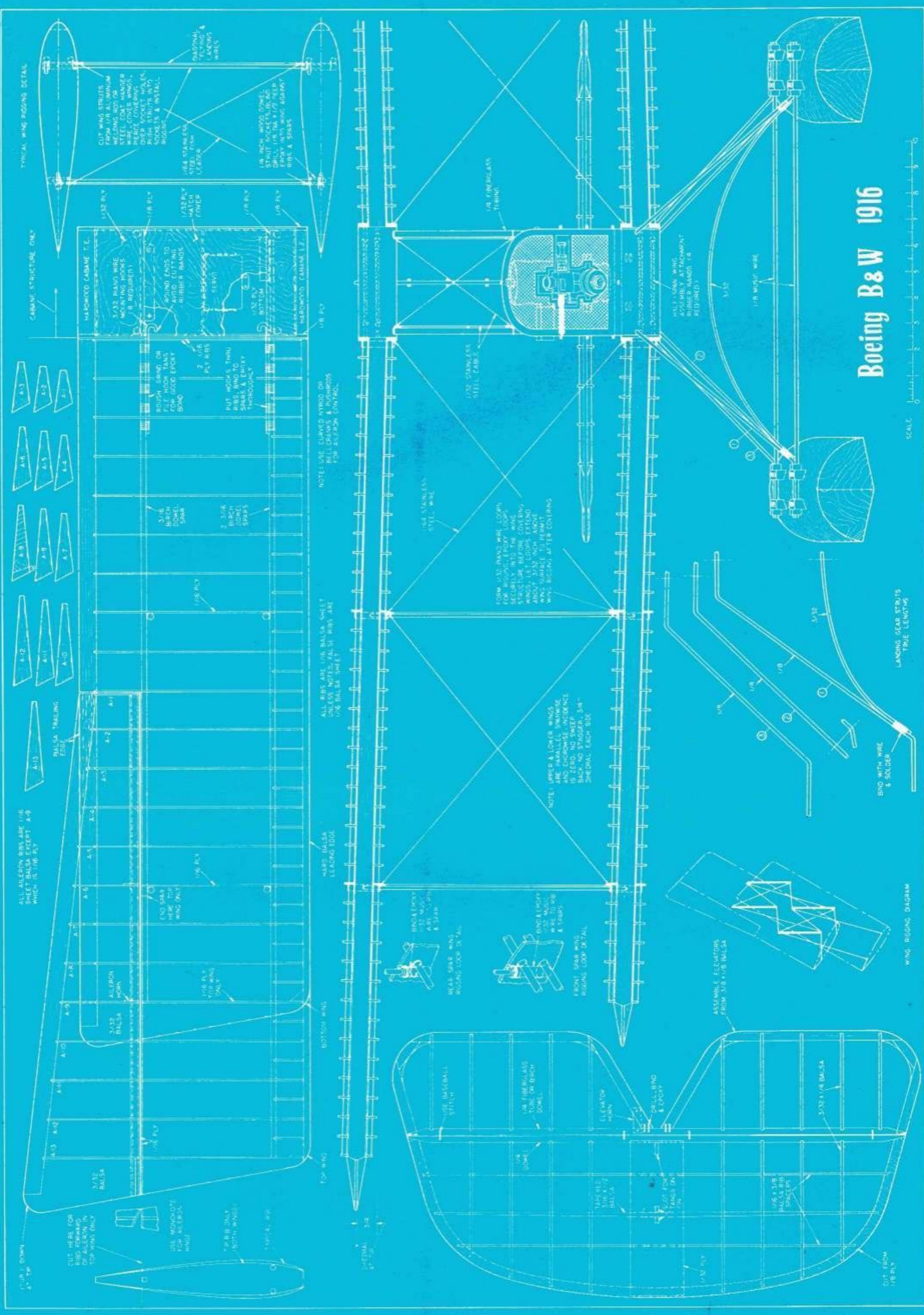
Originally, I was concerned that normal-length control horns might give too much throw to these huge control surfaces. It turned out somewhat the opposite. I've moved the control rods to inner holes on all surfaces to get more maneuverability out of the model. Don't overdo it, however. Too much angle on a control surface will stall the surface instead of increasing the aerodynamic control force further.

You will find that this Boeing B&W model responds to rudder for turning nearly as well as it does to ailerons. It will fly when controlled by either alone. Try using both in "coordinated" turns like a full-scale ship. Don't bank and turn too tightly close to the water or ground. It may stall out. Don't expect it to fly like a hot pattern ship. Ex-

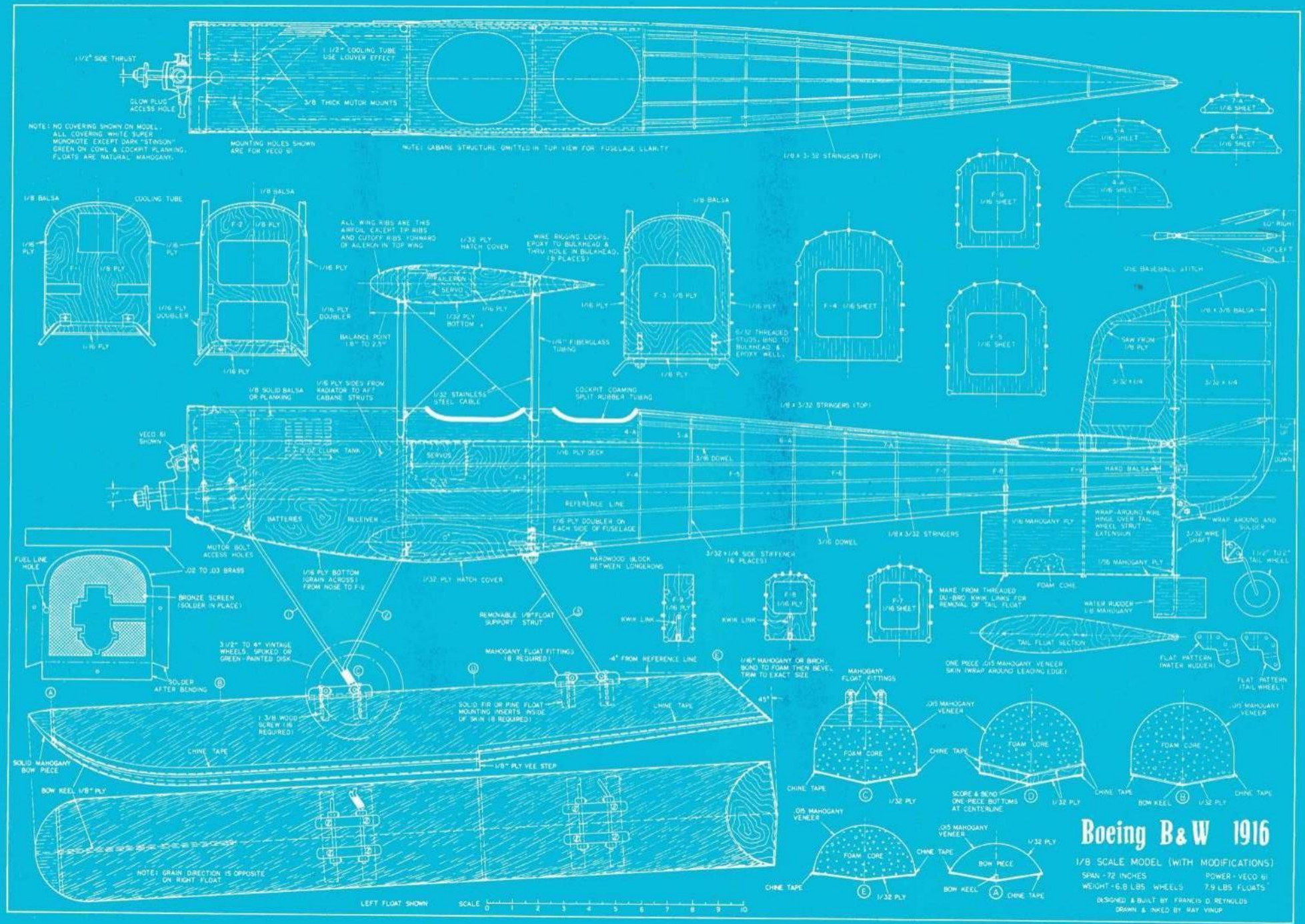
Continued on page 59

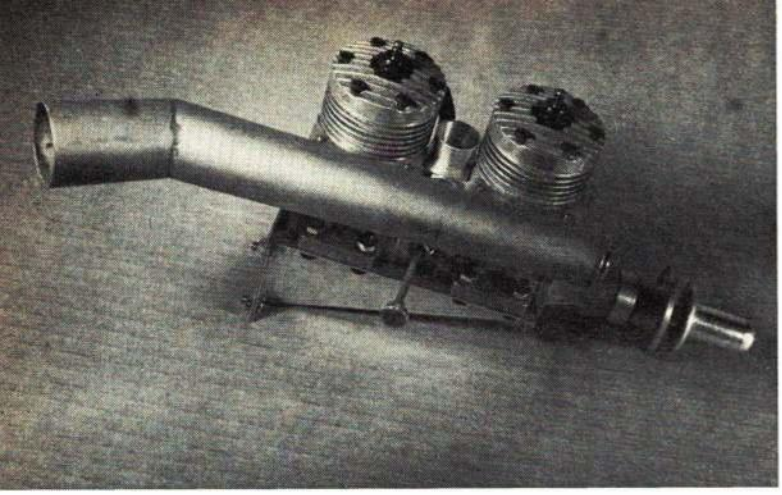


Author taxies the model past at just over half throttle. Note the rear float has lifted out of the water and steerage is by air rudder alone. Water handling is great.

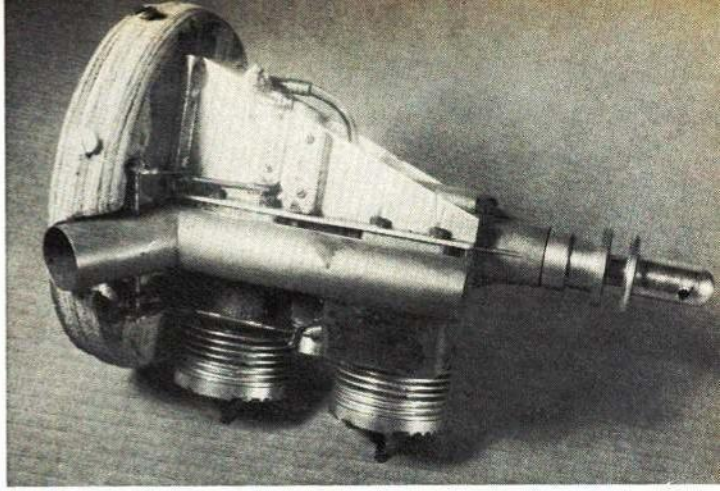


FULL SIZE PLANS AVAILABLE — SEE PAGE 60


Boeing B&W 1916
1/8 SCALE MODEL (WITH MODIFICATIONS)
SPAN - 72 INCHES
POWER - VECO 61
WEIGHT - 6.8 LBS. WHEELS 7.9 LBS. FLOATS
DESIGNED & BUILT BY FRANCIS D. REYNOLDS
DRAWN & INKED BY RAY VINUP
NOTE: NO COVERING SHOWN ON MODEL. ALL COVERING WHITE SUPER MONOKOTE EXCEPT DARK "STANSON" GREEN ON COWL & COCKPIT PLANKING. FLOATS ARE NATURAL MAHOGANY.
NOTE: CABANE STRUCTURE OMITTED IN TOP VIEW FOR FUSELAGE CLARITY
NOTE: GRAIN DIRECTION IS OPPOSITE ON RIGHT FLOAT
LEFT FLOAT SHOWN
SCALE 0 1 2 3 4 5 6 7 8 9 10
1/2" SIDE THRUST
1 1/2" COOLING TUBE USE LOUVER EFFECT
GLOW PLUG ACCESS HOLE
3/8 THICK MOTOR MOUNTS
MOUNTING HOLES SHOWN ARE FOR VECO 61
1/8 X 3/32 STRINGERS (TOP)
1/8 BALSA
COOLING TUBE
1/16 PLY
1/16 PLY DOUBLER
F-1 1/8 PLY
F-2 1/8 PLY
F-3 1/8 PLY
F-4 1/16 SHEET
F-5 1/16 SHEET
F-6 1/16 SHEET
F-7 1/16 SHEET
F-8 1/16 PLY
F-9 1/16 PLY
3-A 1/16 SHEET
4-A 1/16 SHEET
5-A 1/16 SHEET
6-A 1/16 SHEET
ALL WING RIBS ARE THIN AIRFOIL EXCEPT TIP RIBS AND CUTOFF RIBS FORWARD OF AILERON IN TOP WING
AILERON & SERVO
1/32 PLY HATCH COVER
1/32 PLY BOTTOM
BALANCE POINT (1.8" TO 2.3")
WIRE RIGGING LOOPS, EPOXY TO BULKHEAD & THRU-HOLE IN BULKHEAD, (8 PLACES)
1/8" FIBERGLASS TUBING
6/32 THREADED STUDS, WIND TO BULKHEAD & EPOXY WELL
1/2" RIGHT
1/2" LEFT
USE BASEBALL STITCH
1/8 X 3/8 BALSA
SAW FROM 1/8 PLY
3/32 X 1/4
1/8 SOLID BALSA OR PLANKING
1/8 PLY SIDES FROM RADIATOR TO AFT CABANE STRUTS
1/32 STAINLESS STEEL CABLE
COCKPIT COAMING SPLIT RUBBER TUBING
VECO 61 SHOWN
2 1/2 OZ. TANK
SERVOS
1/16 PLY DECK
3/8 DOWEL
HARD BALSA
REFERENCE LINE
BATTERIES
RECEIVER
1/16 PLY DOUBLER ON EACH SIDE OF FUSELAGE
1/8 X 3/32 STRINGERS
1/16 MAHOGANY PLY
WRAP AROUND WIRE HINGE OVER TAIL WHEEL STRUT EXTENSION
WRAP AROUND AND SOLDER
3/32 WIRE AXLE
1 1/2" TO 2" TAIL WHEEL
FOAM CORE
MAKE FROM THREADED DU-BRO KWIK LINKS FOR REMOVAL OF TAIL FLOAT
WATER RUDDER 1/8 MAHOGANY
TAIL FLOAT SECTION
FLAT PATTERN (WATER RUDDER)
FLAT PATTERN (TAIL WHEEL)
FUEL LINE HOLE
.02 TO .03 BRASS
BRONZE SCREEN (SOLDER IN PLACE)
SOLDER AFTER BENDING
MOTOR BOLT ACCESS HOLES
1/16 PLY BOTTOM (GRAIN ACROSS) FROM NOSE TO F-2
1/32 PLY HATCH COVER
KWIK LINK
REMOVABLE 1/8" FLOAT SUPPORT STRUT
3 1/2" TO 4" VINTAGE WHEELS SPOKED OR GREEN-PAINTED DISK
MAHOGANY FLOAT FITTINGS (8 REQUIRED)
4" FROM REFERENCE LINE
1/16" MAHOGANY OR BIRCH BEND TO FOAM THEN BEVEL TRIM TO EXACT SIZE
3/32 X 1/4 SIDE STIFFENER (16 PLACES)
3/16 DOWEL
1/8 X 3/32 STRINGERS
ONE PIECE .015 MAHOGANY VENEER SKIN (WRAP AROUND LEADING EDGE)
SOLID FIR OR PINE FLOAT MOUNTING INSERTS INSIDE OF SKIN (8 REQUIRED)
1 3/8 WOOD SCREW (16 REQUIRED)
CHINE TAPE
45°
SOLID MAHOGANY BOW PIECE
BOW REEL 1/8" PLY
1/8" PLY VEE STEP
MAHOGANY FLOAT FITTINGS
.015 MAHOGANY VENEER
FOAM CORE
1/32 PLY
SCORE & BEND ONE-PIECE BOTTOMS AT CENTERLINE
BOW PIECE
BOW REEL
A
B
C
D
E



If you want sheer power with the wonderful sound of a twin, this is one way to have it. This is a .70 made up of two .35's with exhausts on the same side. It turns a 12-6 at 12,000 rpm!



Here a set of .29's are mated to produce a .596 which also turns 12,000 on the 12-6 prop! Seems these engines like that speed. This mill will be used in an exact-scale C/L C-119 with 82" wing span.

How to make your own Twin

This simple conversion kit provides more power with reduced frontal area — a boon to the serious scale modeler

J. WARREN KOHLER JR.

IN the past, there have been a number of "twins" or two-cylinder engines in the modeling field. In the commercial line there have been the "OK," "Elf," "Bantam," "Taplin," and the "K&B/Allyn." A number of home-builts have also been made using McCoy 60's, Dooling 29's and Cox parts.

My reason for building a twin is to have an engine with sufficient power but with reduced frontal area for use in scale models. A K&B 29R is 2½" high when measured from the horizontal centerline of the prop, and 1 7/16" in diameter at the cylinder head. A McCoy 60 is 3¼" tall from the prop centerline and 1⅞" in diameter at the head. Note the outline drawings comparing these engines in Fig. 1.

The displacement of the K&B 29R Series 64 is .298. When coupled as a twin, you have an engine with a displacement of .596, which is close enough to a 60 to meet any basis of comparison. Another reason that engines such as the McCoy, Dooling, and K&B Series 64 are chosen for coupling, is that these engines have both front and rear crankcase covers that are removable.

To my knowledge, I have been the only modeler to utilize the K&B Series 64 engines in making a two-cylinder engine.

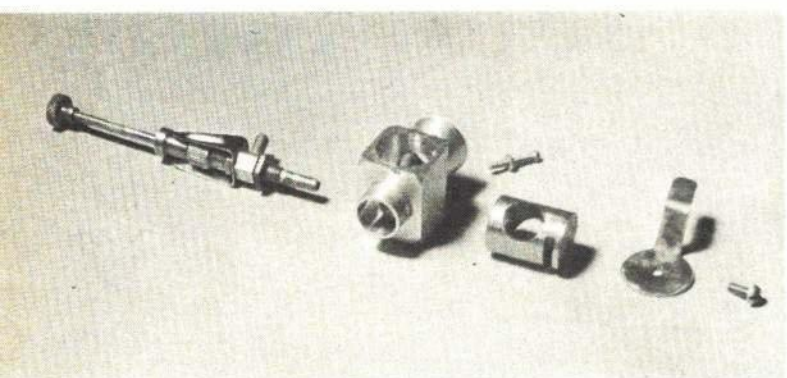
The work I have done was on a South Bend bench lathe and a Cincinnati milling machine. It would be possible to make most of these parts on a Unimat lathe, but I think this would be pushing the capability of this unit. My engine-coupling kits were built in spare time without tabulating the total time expended. I have shown the drawings to four top-grade machinists and have been given a time estimate of between 40 and 60 hours per complete kit. If you desire to farm out the job, you will have to use your local shop labor rate to estimate the cost.

I will not describe step-by-step construction details, because this conversion kit is an advanced machine-shop project. Anyone who would consider construction of a twin engine will need to have a reasonable background of machine-shop experience, and will have his own preferred method of working.

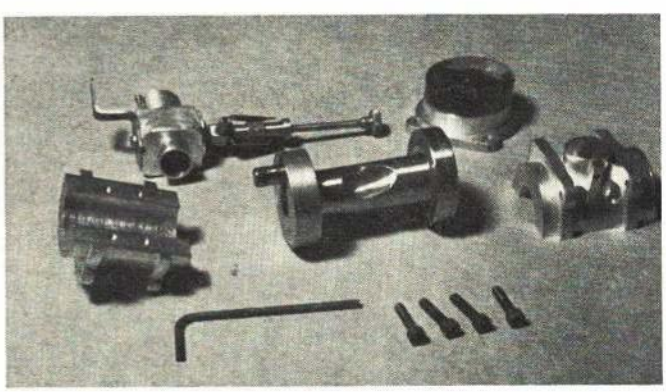
I will, instead, touch on some of the highlights in the construction of my engines.

I have built three twins, two using K&B 29R engines and one using K&B 35 engines. A good feature of this type of engine is that you can set it up to have the exhaust on either or both sides of the twin. With the 29's planned for use in a scale C-119 using semi-scale exhaust stacks (scale location, but slightly larger than scale diameter to eliminate back pressure), I have the front cylinder exhausting on the right side and the rear cylinder on the left. The 35 exhausts through a single stack on the right side. The 29's operate inverted, and the 35 upright.

All the twins use the 29 crankshaft and front housing. This slightly derates the 35 because the stroke of the 29 is .675" and the 35 stroke is .720". There is no apparent difference, for the twin 35 is a real powerhouse. They all wind a 12-6 prop around 12,000 rpm at high speed and will throttle down to about 5,000 rpm with a reasonably smooth range in between. I ran a number of tests with props ranging from 11-4 to the above-mentioned 12-6. It doesn't seem to



Cylinders must be pretty close together so a home-made scaled-up K&B throttle is used. It can be much improved with an angled barrel slot which could change fuel mixture with throttle opening.



These are the parts of the kit for all engine sizes. South Bend bench lathe and Cincinnati milling machine were used. A Unimat also would do. Note K&B .45 back plate and balance rotor.

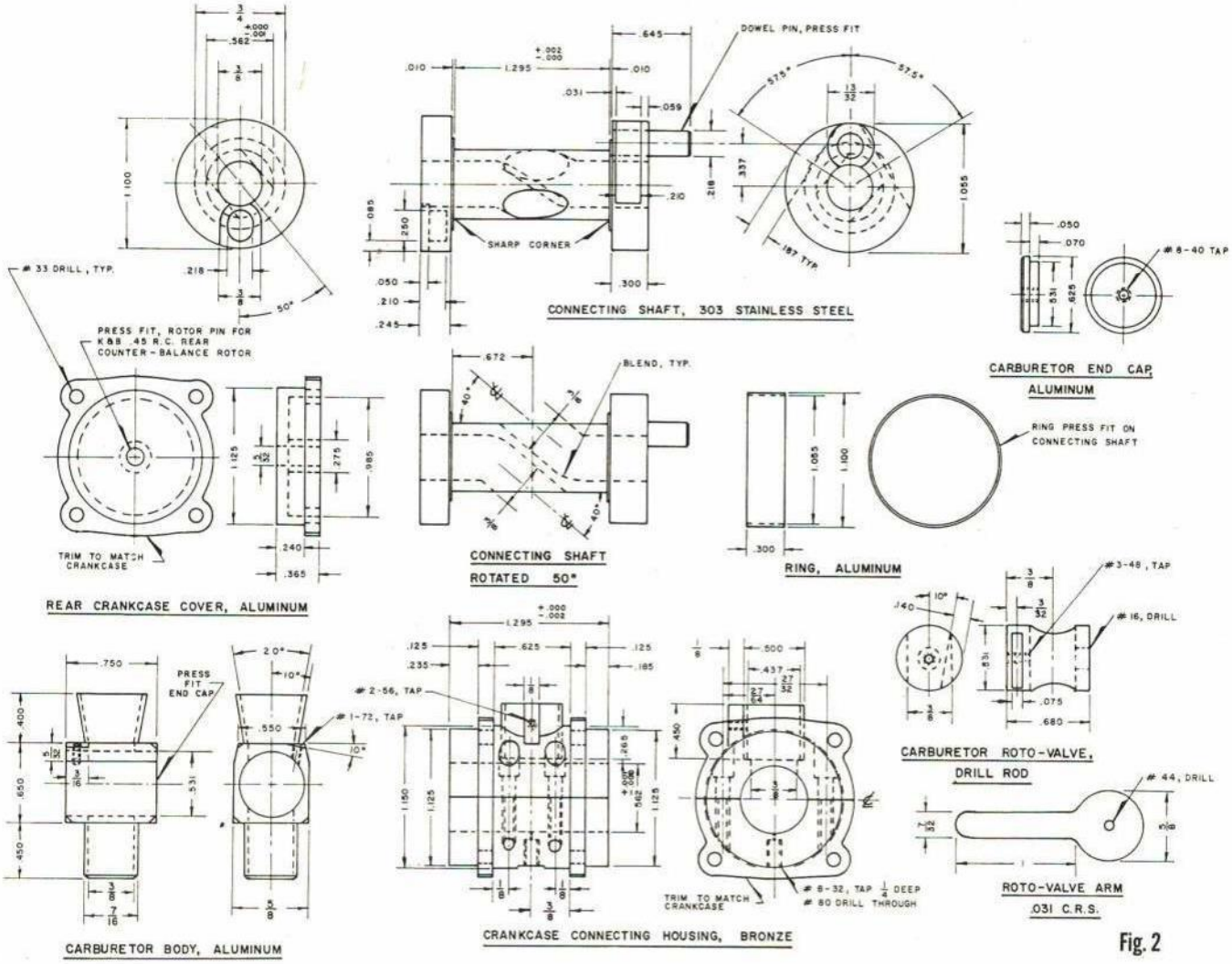


Fig. 2

make any difference — these are the speeds that these engines like, and that's that.

I have tried various carburetors. The standard 29R carburetor is fine for flat-out high-speed running with a pressure tank. Since scale applications would gain more points with some form of two-speed operation, I tried the K&B variable-speed carburetor. This combination worked fine as far as controlling speed with a suction feed tank but high rpm was limited to about 9500. The throat of the carburetor was just too small to permit the engine to breathe properly for higher revs. Finally, I have used a scaled-up version of the K&B carburetor and borrowed the K&B needle valve. In the two 29 versions, this scaled-up carburetor is coupled with exhaust restrictors (butterfly valves in the exhaust stacks) and a pressure switch that changes from a pressure fuel system at high speed to suction feed at low speed. This last system is by far the most satisfactory. The designed space between the cylinders is just too small to fit special carburetors such as Kavan or Webra. Their design is just too large to fit in. Any attempt to increase the distance between cylinders would lengthen the shaft port and increase the crankcase volume; and, I'm afraid, would mess things up in general.

A hardness check of several standard K&B crankshafts averaged 20 on the Rockwell C scale. The 303 stainless steel that I specify was chosen because it is close to this hardness and relatively easy to work and would not require any special treatment.

The choice of a plain bronze bearing for

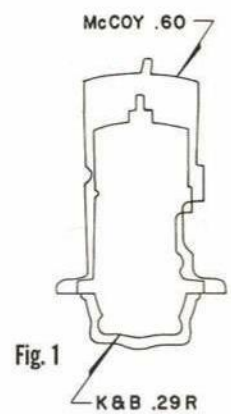
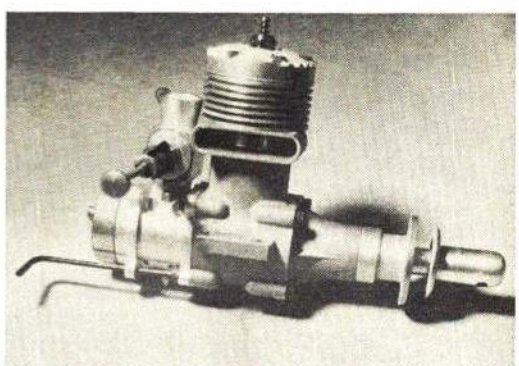
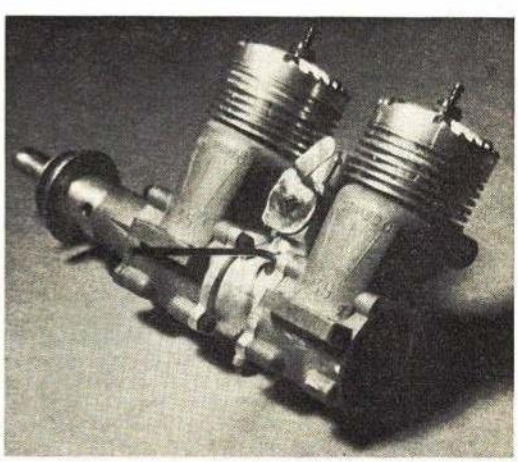


Fig. 1

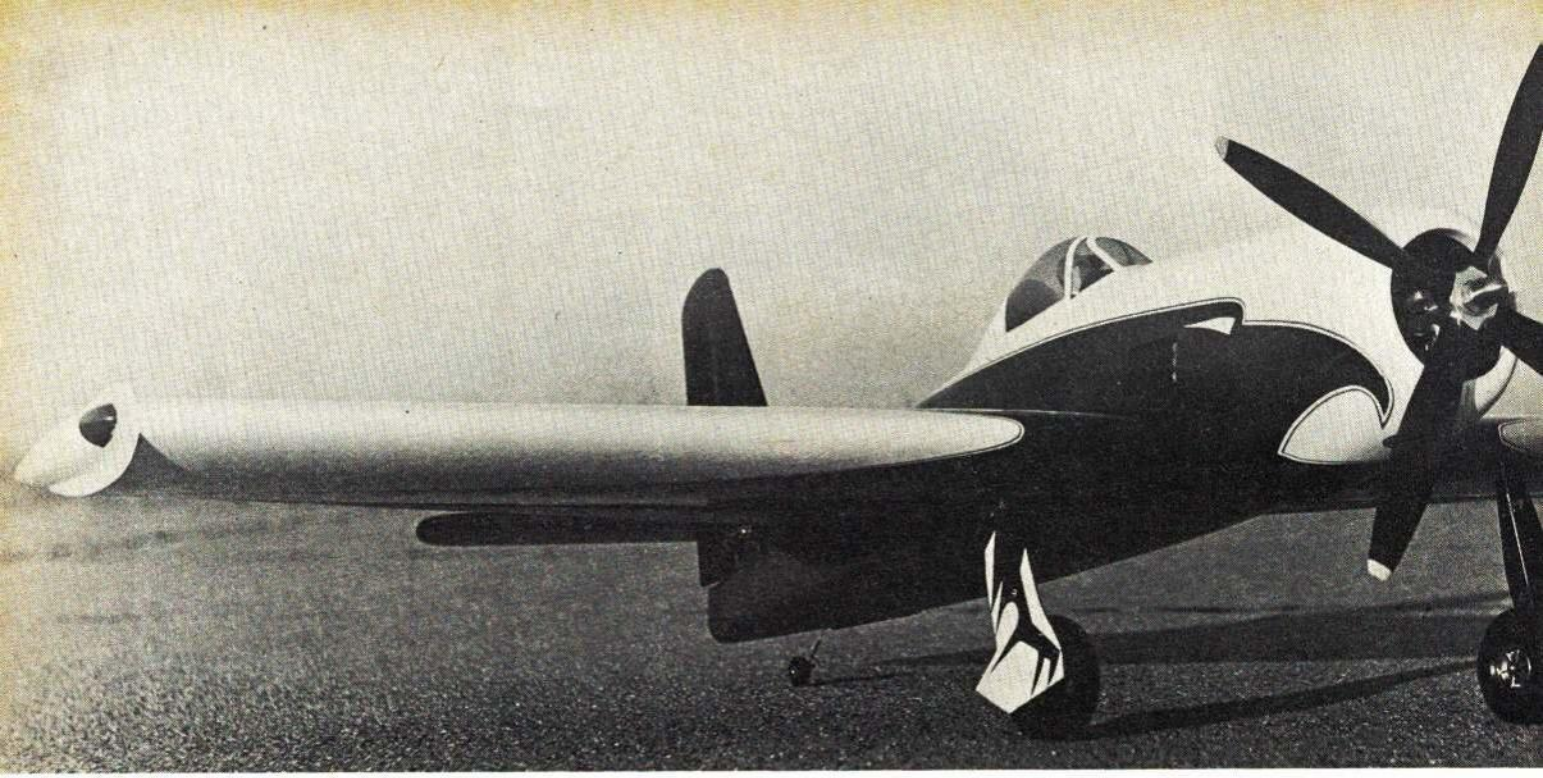
the connecting shaft was dictated by several factors. Any attempt to use regular ball-bearing races would necessitate the removal of one of the connecting shaft flanges. Attaching it positively to the shaft would require more work than I felt was worthwhile. The other possibility would require a split ball bearing. I looked into this possibility and found that split ball bearings are very expensive and, additionally, I could not find any that would meet

Continued on page 58





Right, above: How screws are tightened to front motor. Hex-drive screws recommended. Rear cylinder conrod connects directly to in-between shaft which engages rotor of .45 back plate. Lack of ball bearings has not proved detrimental after lots of running.



The Bearcat

AL RABE

STUNT design is in a rut. The proven moments and areas to which we have all been slavishly adhering only represent what has already been tried and found to work. These self-imposed limits have virtually stopped the development of stunt ships since the Nobler. Yes, I know that it takes a whole winter to build next year's hope for glory, but when I have something hanging on the wall that flies, I tend to get awfully reckless with my spare time and have been known to follow some pretty weird tangents in an effort to improve the looks and performance of stunt ships. With my Mustang and Bearcat, I feel that I've begun to hit pay dirt. The indications are that as long as simple rules of aerodynamics are followed and competition construction techniques are used (build it straight and light), nearly anything can be made to fly competitively. What better way is there to prove a point than to build a successful but unlikely airplane.

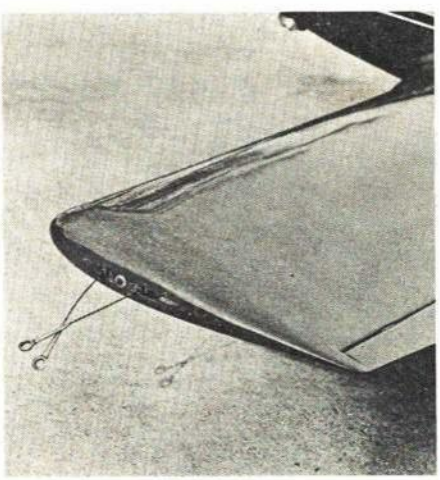
The opportunity to build that different airplane came about a month after the 1967 FAI team selection. Dick Mathis dropped over for the evening to show his movies of the '67 Nats stunt event and the FAI ships at St. Louis where he judged. Afterward, we talked long into the night about stunt ship design and his research paper "The Psychology of Stunt Judging." After interviewing the '67 Nats stunt judges and tabulating the scores, Dick concluded that the appearance of the airplane strongly affects the judges scoring. Dick felt the optimum design for best scores should be either sleek and sensual like a Detroit automobile stylist might build or a semi-scale type, preferably Navy. As a matter of fact, Dick thought the Bearcat would be hard to beat if it could be made to fly.

Dick's words were prophetic. At the '69 Nats, the Bearcat placed an undeserved second. There was no doubt that the judges loved the Bearcat as my scores were considerably higher than my flying deserved. In this, my second year of competition, the pressure was getting to me and I was a nervous wreck. Because of my poor showing, some of the big names in stunt thought the Bearcat only an average airplane at the Nats competition level. Tain't so. She's a grand machine and I'm proud of her. In spite of possessing a new Mustang which flies somewhat better, I still prefer to fly the Bearcat. She is a happy design and competitive on any level with a competent pilot.

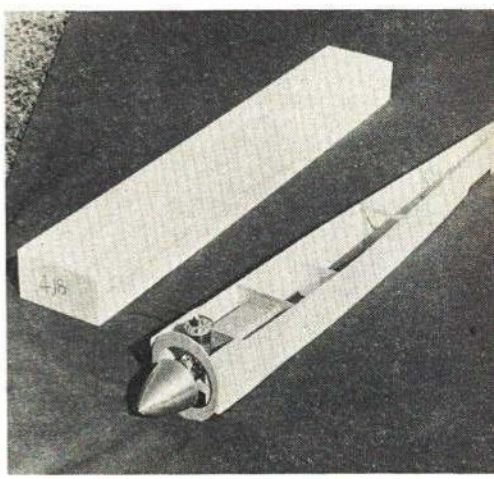
I am frequently asked how any airplane as fat as the Bearcat could possibly stunt competitively. The answer, "the drag increase is slight," is difficult to swallow unless a person has some understanding of the nature of drag. Some explanation of drag is worthwhile as it should encourage the development of radically different, better looking, possibly better flying stunt ships.

Aerodynamic drag has two major components. The first component of drag is induced drag or that drag which is created when you make lift. This induced drag is low at low angles of attack and very high at high angles of attack as in a corner. The other major component of drag is parasitic drag which opposes the movement of any body through the air. Parasitic drag also has two components, skin friction and profile drag or drag due to shape or form.

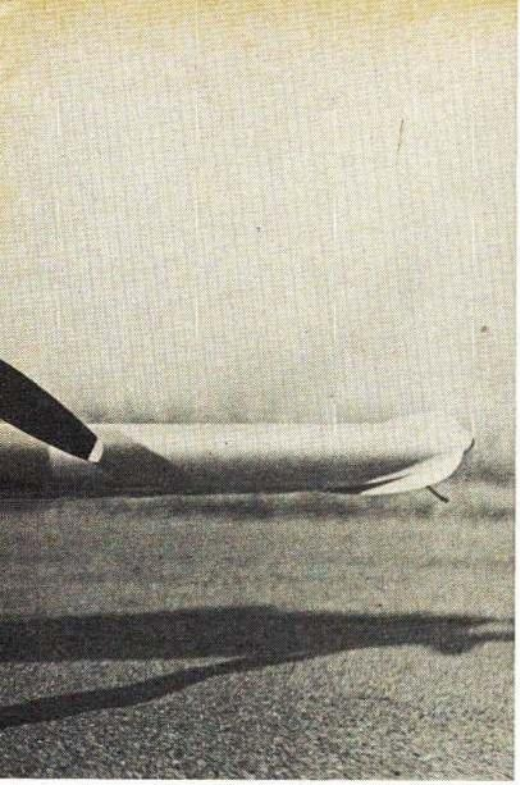
To understand some of the elements of

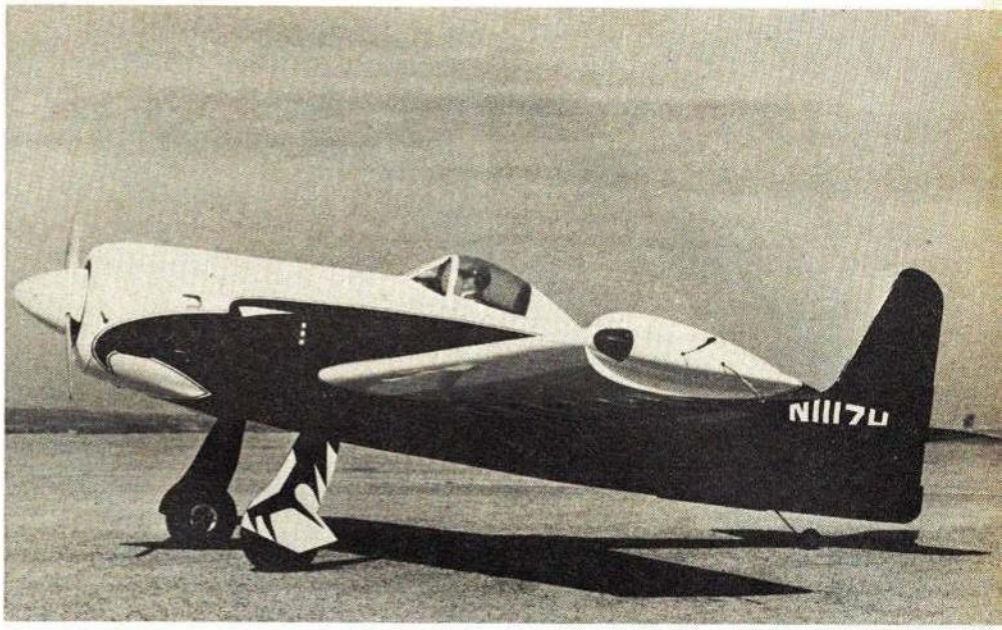


Leadouts on new Bearcats have up-line in front and are adjustable to get proper line tension under different conditions.



The rounded egg-shaped fuselage can be molded from sheet balsa, planked, or carved from lightest-weight contest-grade blocks.





Grumman's powerful Bearcat could do Immelmann takeoffs, beat a jet to 10,000 ft. One holds world's piston-engined speed record. Al's model proved a "fat" fuselage no handicap to a stunter. Has many special features, nearly scale appearance.

One of the most talked about ships at the NAT's, this C/L stunter is a great competitor.

induced and parasitic drag and how they affect stunt ship design let's compare the Bearcat's drag to a Nobler's drag. No accurate data is possible without wind tunnel or flight test, but some useful approximations can be made.

Induced drag is a by-product of lift. Since most of us use about the same airfoils and fly at about the same speed, induced drag is quite similar for each of our airplanes. The exception to this is the heavier airplane which requires more lift to fly. When a stunter corners, the induced drag probably triples at least, and the extra lift requirements of the heavy airplane are magnified to the point that it will noticeably lose more speed than a light airplane. Induced drag varies from being approximately equal to parasitic drag in level flight to approximately three times greater than parasitic drag at high angles of attack.

Parasitic drag is somewhat more complicated. At the cockpit, the Bearcat is 8½" high and 4½" wide compared to the Nobler's 5½" and 1⅝". The fuselage frontal area of the Bearcat is 25 sq. in. compared to the Nobler's 10 sq. in. In aerodynamic terms, the fact that the Bearcat has 2½ times more fuselage frontal area isn't significant. The same data is used, however, to compute total surface area which is the skin friction element of parasitic drag. With a few quick calculations, we find the Bearcat has 65% more fuselage surface area (wetted area) than the Nobler fuselage but remember, we are looking for total wetted area. When we also include the wing, tail, landing gear, etc., in our computations, we find that the Bearcat has only 18% more wetted area than a Nobler. Half of this 18% is due to the larger wing. If the Bearcat were built to Nobler size, it would have less than 10% more wetted area.

Profile drag is harder to pin down as some shapes, regardless of wetted area, drag more than others. For example, the exposed wheels of a stunt ship probably have as much parasitic drag as the entire fuselage and more parasitic drag than the wing. Poor fillets, protuberances and inefficient cowlings can increase profile drag by an additional 50%.

According to Hoerner, rectangular fuse-

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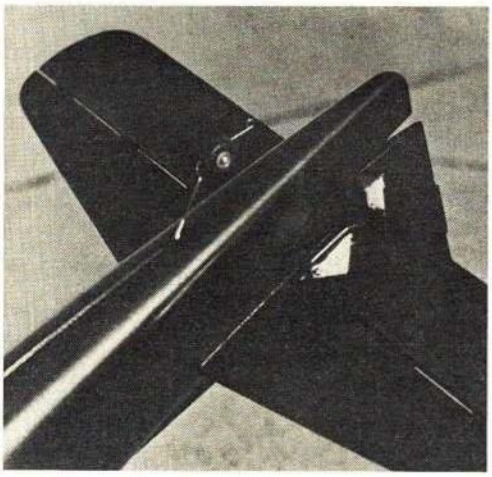
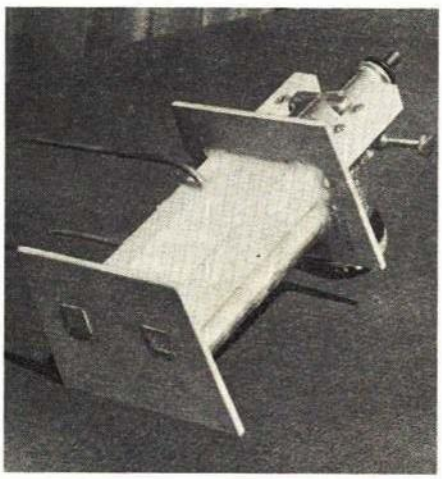
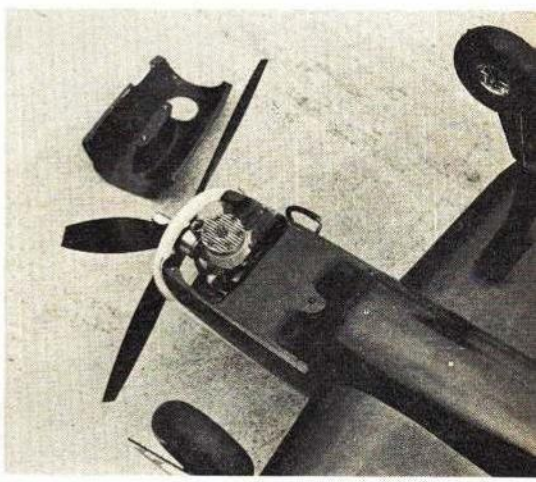


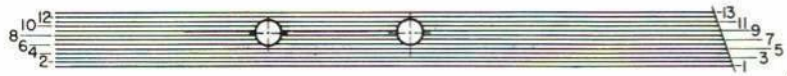
Rudder is linked with elevator to control propeller gyroscopic precession and prevent bobbling in tight corners. Use R/C horns.



Engine mounts, tank, and forward bulkheads are fiberglassed unit which resists vibration and fuel soaking. McCoy engine on this one.



Engine is completely accessible with belly cowl removed. Note rounded center support in cowl and exhaust extension piece.



RIB HOLE PUNCH TEMPLATE

NOTE:

FOR ENGINE OFF-SET IF DESIRED. MOVE ENGINE MOUNT & TK. 3/16" INBOARD ON BULKHEADS 'B' & 'C'. THIS WILL ALLOW 2° OFF-SET WITH PROP-SHAFT ON FUSE. ℄

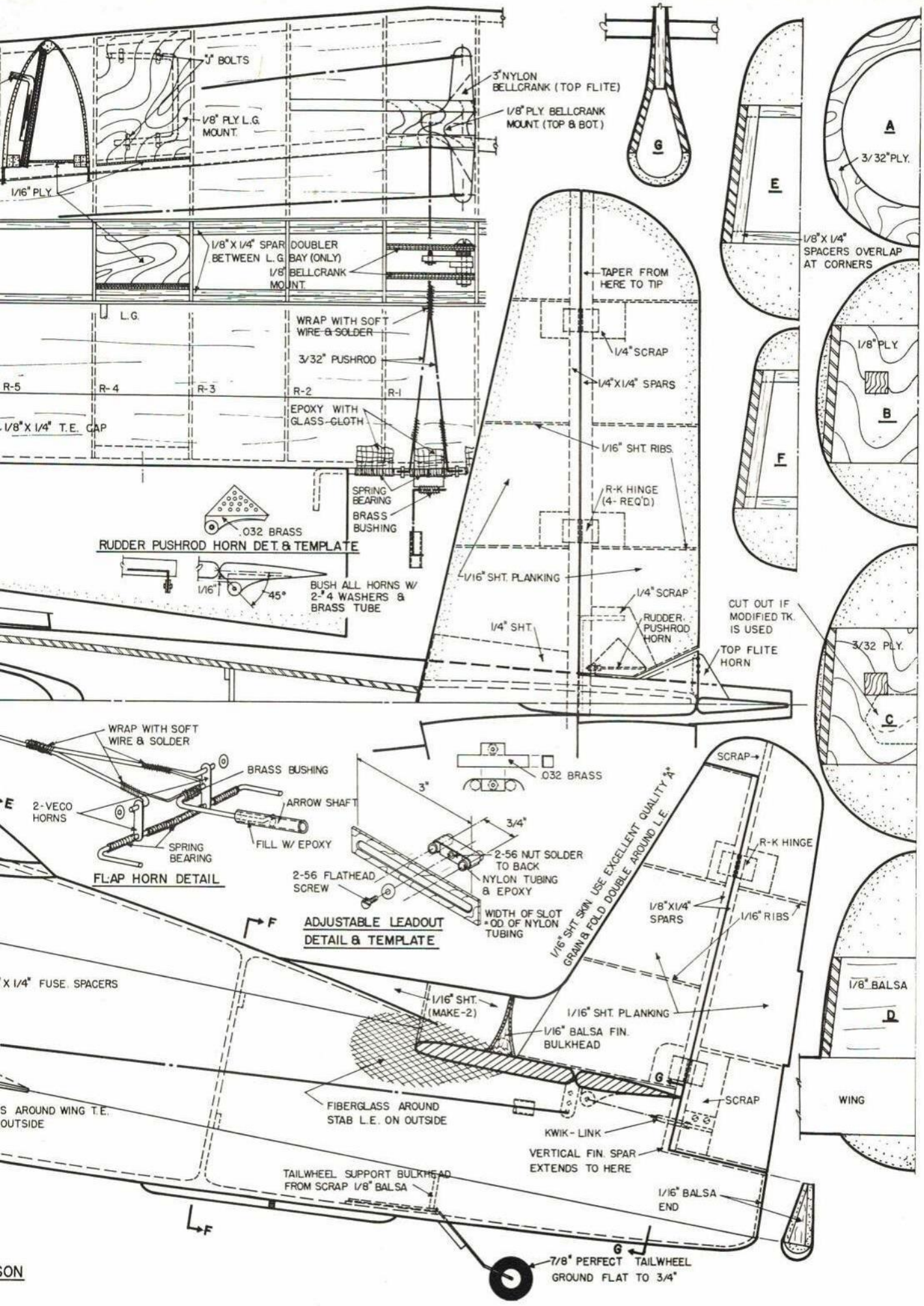
BEARCAT

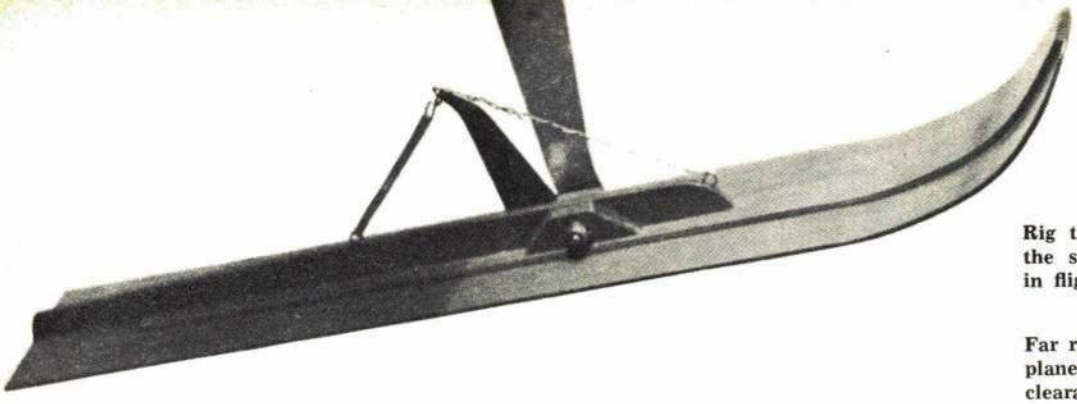
by

AL RABE

DRAWN BY: CHARLES

FULL SIZE PLANS AVAILABLE — SEE PAGE 60


"J" BOLTS
1/8" PLY L.G. MOUNT
1/16" PLY
3" NYLON BELLCRANK (TOP FLITE)
1/8" PLY BELLCRANK MOUNT (TOP & BOT.)
1/8" X 1/4" SPAR DOUBLER BETWEEN L.G. BAY (ONLY)
1/8" BELLCRANK MOUNT
L.G.
WRAP WITH SOFT WIRE & SOLDER
3/32" PUSHROD
R-5
R-4
R-3
R-2
R-1
EPOXY WITH GLASS-CLOTH
1/8" X 1/4" T.E. CAP
SPRING BEARING
BRASS BUSHING
.032 BRASS
RUDDER PUSHROD HORN DET. & TEMPLATE
1/16"
45°
BUSH ALL HORNS W/ 2-#4 WASHERS & BRASS TUBE
TAPER FROM HERE TO TIP
1/4" SCRAP
1/4" X 1/4" SPARS
1/16" SHT. RIBS
R-K HINGE (4- REQ'D)
1/16" SHT. PLANKING
1/4" SCRAP
1/4" SHT.
RUDDER PUSHROD HORN
CUT OUT IF MODIFIED TK. IS USED
TOP FLITE HORN
G
E
A
3/32" PLY.
1/8" X 1/4" SPACERS OVERLAP AT CORNERS
1/8" PLY.
B
F
3/32 PLY.
C
WRAP WITH SOFT WIRE & SOLDER
BRASS BUSHING
2-VECO HORNS
ARROW SHAFT
SPRING BEARING
FILL W/ EPOXY
FLAP HORN DETAIL
.032 BRASS
3"
3/4"
2-56 NUT SOLDER TO BACK
NYLON TUBING & EPOXY
2-56 FLATHEAD SCREW
WIDTH OF SLOT = OD OF NYLON TUBING
ADJUSTABLE LEADOUT DETAIL & TEMPLATE
F
SCRAP
1/16" SHT. SKIN USE EXCELLENT QUALITY "A" GRAIN & FOLD DOUBLE AROUND L.E.
R-K HINGE
1/8" X 1/4" SPARS
1/16" RIBS
1/8" BALSA
D
X 1/4" FUSE. SPACERS
1/16" SHT. (MAKE-2)
1/16" SHT. PLANKING
1/16" BALSA FIN. BULKHEAD
S AROUND WING T.E.
OUTSIDE
FIBERGLASS AROUND STAB L.E. ON OUTSIDE
SCRAP
WING
KWIK-LINK
VERTICAL FIN. SPAR EXTENDS TO HERE
TAILWHEEL SUPPORT BULKHEAD FROM SCRAP 1/8" BALSA
1/16" BALSA END
7/8" PERFECT TAILWHEEL GROUND FLAT TO 3/4"
SON



Rig the skis to keep the model level on the snow and parallel to fuselage while in flight. Nose of ski lands first.

Far right: Skis can be used on R/C or C/L planes and with any type gear. For prop clearance, longer gear legs may be needed.

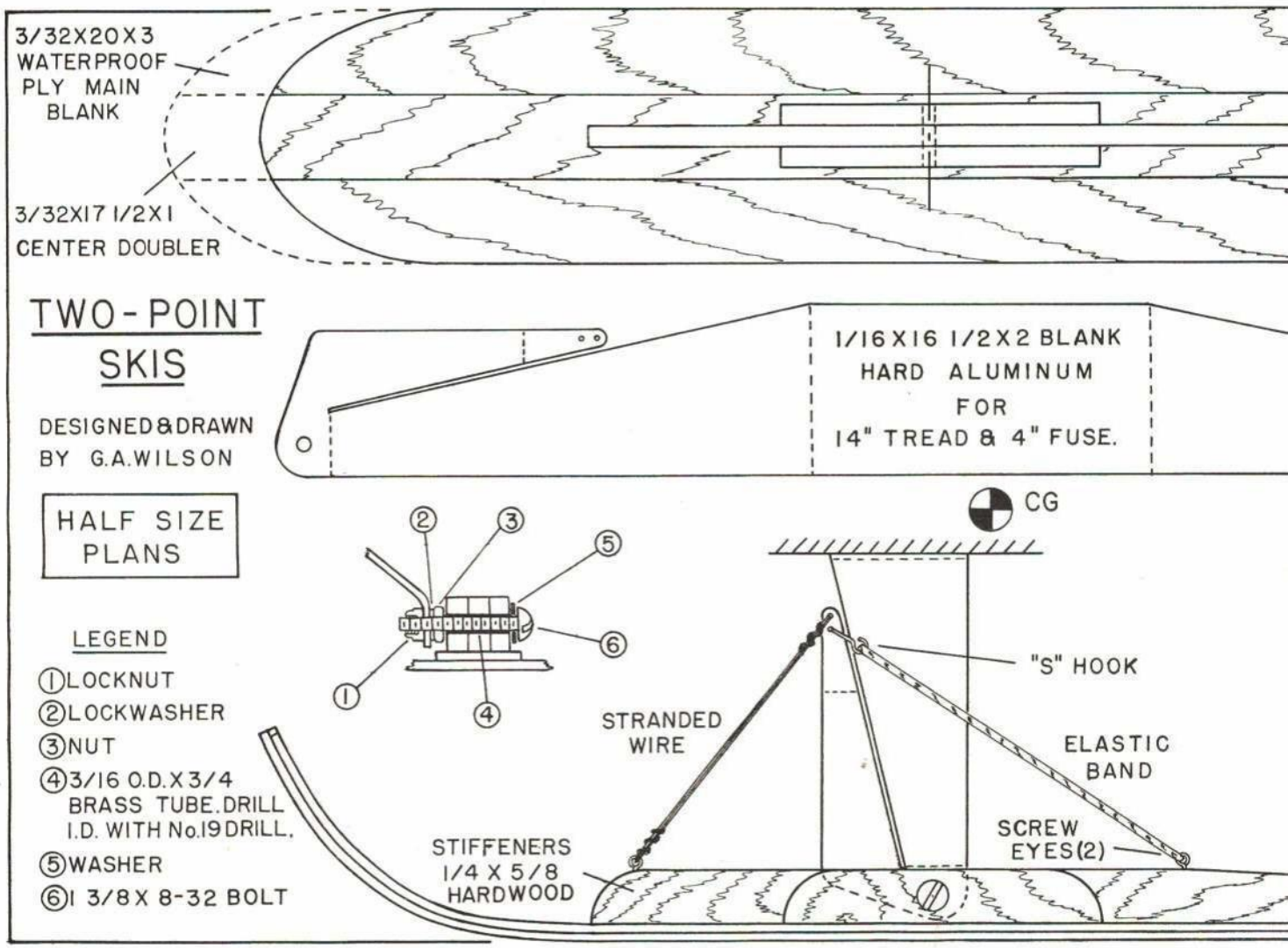
Two-Point Skis

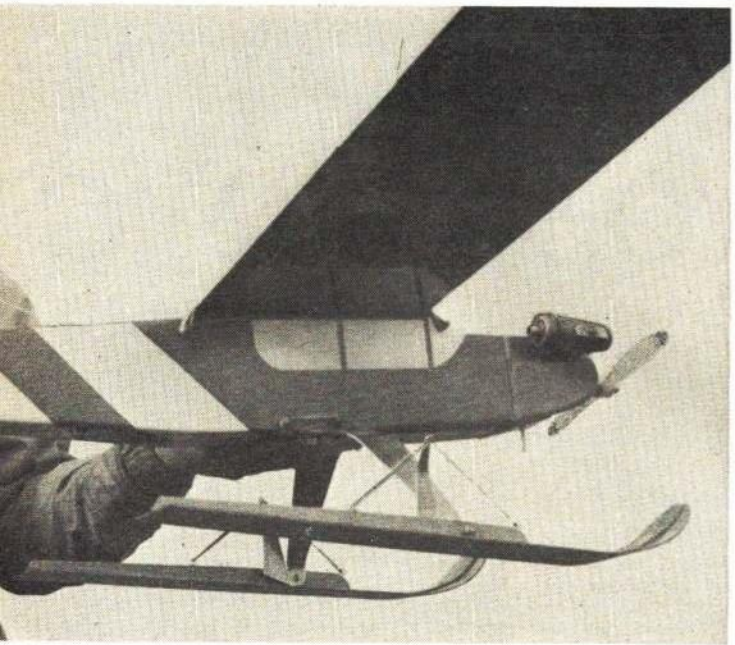
Snow? Then try these well-tested skis on your model and keep flying.

GEORGE WILSON

LAST year radio-control modelers in the Boston area flew most every weekend, regardless of season. Snow came late, and until February, frozen fields or ponds provided near ideal flying conditions. After the snow arrived, it provided the landing surface and skis were used to level out the rough surface. With skis, the last deterrent to year-round flying (short of a storm) was removed.

The skis described are based on a design by Tom Ekstand, published in the Dec. '68 issue of AAM. The innovation in the design shown here is primarily in the mounting of the skis. The gear described allows the model to stand upon the skis without support from a nose or tail ski. Additionally, the gear provides an effective means of connecting the springs and ties necessary to level skis during flight.

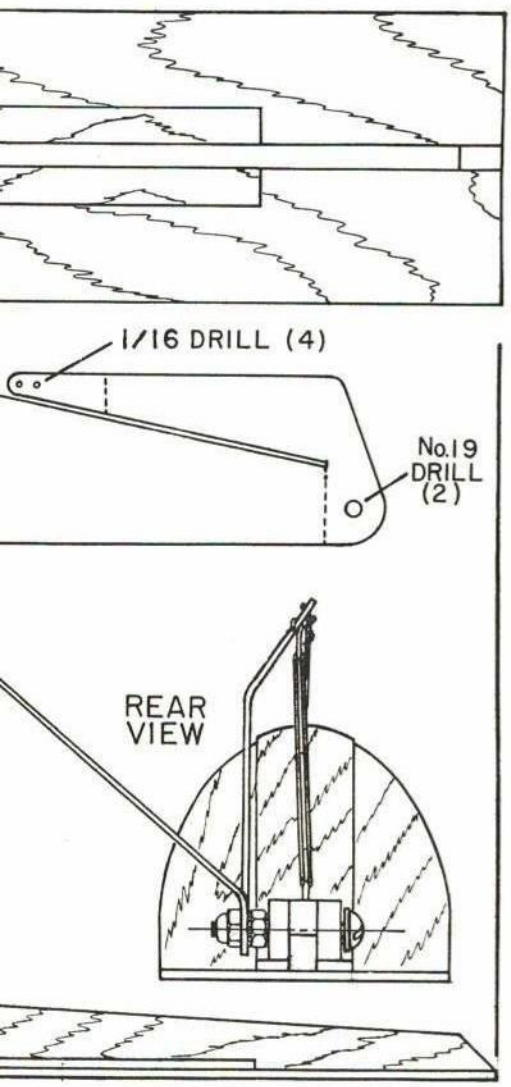




How they work: The skis are mounted so that the center-of-gravity of the airplane is slightly behind the point at which the skis pivot. Without the elastic band and stranded tie wire, the model would rest its tail on the snow. The stranded wire from the gear strut to the front end of the ski prevents this from happening by limiting the amount that the airplane can rotate in that direction. The elastic band from the gear strut to the rear end of the ski pulls the rear end of the ski upward during flight and tends to prevent nosing over when the airplane is on the ground.

The length of the stranded wire is adjusted to give the wing the positive incidence needed for takeoff. During the takeoff run, the nose will pull downward against the force from the elastic band and, when takeoff speed is reached, a touch of up control will cause the necessary rotation for takeoff.

When landing, the rounded front of skis will contact first. The stranded wire will go slack, and the elastic band will stretch. This will allow the bottoms of the skis to become parallel with the snow and absorb the landing force over their broad bottom surface. We haven't come up with an idea for ski brakes yet, but when the skis are used on hard snow or ice, they would be very nice to have.



How to build: The surfaces of the skis are made from 3/32" aircraft (waterproof) grade plywood. The front bend in the main piece and the plywood center doubler is made by boiling the sections to be bent in water, letting them soak in the hot water for half an hour and then bringing them to a boil again just before the actual bending operation. At this point the plywood will bend easily. Put the pieces on a flat surface and slide them toward a vertical surface (the wall, back of your work bench, etc.), letting the tips curl upward until they are 2½" from the horizontal surface. The center doublers should be curled slightly more than the main surfaces.

Weight the pieces down just behind the bends, making sure the flat sections are snug against the horizontal work surface. Use plenty of weight. Wait at least 12 hours (preferably 24 hours), and let the pieces dry thoroughly. Application of heat will accelerate the drying. The plywood center doublers are joined to the main pieces with epoxy glue. Use clamps and weights to hold them together while the epoxy hardens. If you curled the center pieces as instructed, weights on the horizontal part, and one clamp at the tip of each ski, should do the trick.

The hardwood (spruce may be used) center stiffeners are then cut and epoxied to the top of the skis as shown in the plans. These pieces add strength, keep the back end of the skis flat and provide a firm method of attaching the skis to the struts. At this point, give the skis two coats of Hobbypoxy Formula II which has been thinned with about 20% thinner or isopropyl alcohol.

The strut material is hardened aluminum or dural. Make sure the grain in the metal runs lengthwise to assure maximum flexing strength in that direction. The aluminum cuts easily with a hacksaw. Most wood-cutting bandsaw blades will cut aluminum. Don't try to make the bends too sharp or you will weaken the aluminum. Use a vise with rounded jaws or use metal or hardwood jaw-liners which have at least 3/16 radius bending edges. Adapt the bends and total gear length to suit your particular fuselage width and the distance between the skis (tread) you want.

The hardware for attaching the struts is detailed on the drawing and is easily installed. Don't by-pass the brass bushing that goes through the top of the skis. This pivot bearing takes lots of abuse and will insure that the skis stay parallel to each other and pivot freely. It should be noted that the gear strut assembly can be reversed to help put the CG where it belongs.

The length of the stranded wire from the gear strut to the front end of the ski must be adjusted after the skis are mounted on the airplane. Fix each end securely so that a failure doesn't occur. If the tie breaks, the ski will be pulled upward in the rear by the elastic band and cause drag in the air and a relatively impossible landing situation.

The skis may be attached to a low-wing airplane that uses the standard wire gear found in most popular stunt designs by substituting the skis directly for the wheels. The wire and elastic band rigging can be attached to a screw-eye in the bottom of the wing near the point that the landing gear strut enters the wing.

Results: The skis have served well on a "Klutzbug" and an "Apprentice." No special precaution need be taken over those used with land gear.

When flying off ice with skis or standard land gear, the airplane may have a tendency to weathercock if it isn't traveling directly into the wind. This is surprising when it first happens and is difficult to correct by control action. Usually takeoff occurs without any problem and, once it's happened to you, you will learn to live with it.

Don't get frost-bitten and have fun in the snow!

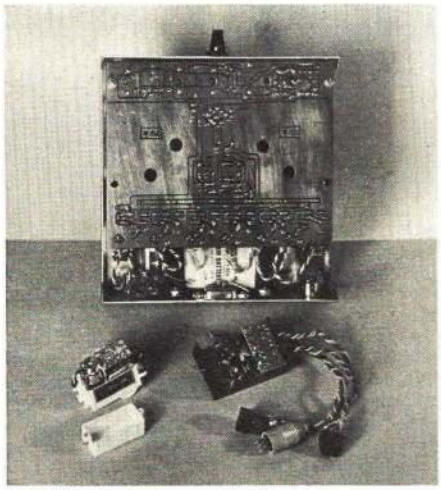
R/C TECHNICAL FEATURE

Orbit 6-12 IC

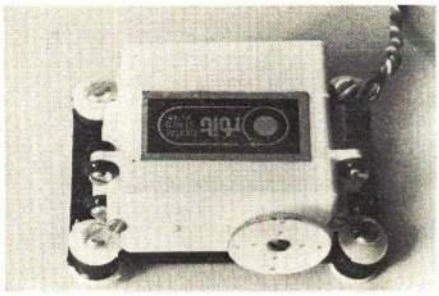
A Blue Ribbon Review

FRED MARKS

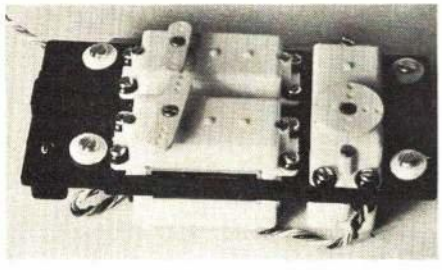
Auxiliary functions of six-channel set are white levers conveniently located below sticks. All main controls are trimmable.



Neat, careful construction. Small PC board in receiver is decoder and wiring terminal.



Littlest Orbit servo is PS-4D which uses special thin motor. Thrust is 3½ lbs.



Over 75 individual items come with basic set, including this three-servo mounting board.

ORBIT electronics has been a well-known manufacturer of radio control systems dating to the early days of reed equipment. For all those years, Orbit has been synonymous with the name Bob Dunham. He was one of our champions for years and a leader in the R/C design field.

Recently Orbit took on a new dimension. It is now a Datatron Company. Mr. William Semple is now president of Orbit and Bob Dunham concentrates on equipment design. This new stature gives to Orbit, the backing of a larger computer-oriented company which permits an infusion of computer technology (particularly integrated circuitry) into their designs, and should ensure a stable base for service for Orbit systems over the years.

The Mark II 4-8 IC and 6-12 IC digital systems are the latest in the long line of Orbit developments. The MK II 6-12 reviewed is a two-stick, six-channel digital system consisting of the transmitter, receiver, four PS-4D servos, a 500-mah nickel-cadmium battery pack and a most complete set of accessories. There are over 75 accessory items, including mounting grommets, mounting trays, etc. Even the frequency flag and a clip to hold it are provided.

The system is packed in a sturdy cardboard shipping box. Upon opening it, a form-fitted styrofoam case is found. Before opening the styrofoam container, a "how to" book is found in a recess in the container top. Read it completely before delving into the equipment. This booklet is an excellent introduction to modern, digital R/C. (Available from Orbit for 50 cents it is an excellent buy for anyone not familiar with R/C who contemplates purchase of a digital system.)

The system was removed from the styrofoam container and its features noted. The transmitter and receiver cases are constructed of aluminum, clad in the distinctive Orbit black vinyl. The system tested was on 75.640 mHz (Green-White), thus a quarter-wave length antenna was provided. (27 mHz sets come with a center-loaded antenna.)

The transmitter is equipped with Orbit's own stick assembly, which has electronic trim, knurled aluminum sticks, which are smooth and easily manipulated. The set had aileron and elevator on the right, throttle and rudder on the left (Mode 2), as I am used to, but can be obtained with the aileron and throttle on the right and elevator and rudder on the left (Mode 1). Auxiliary channel controls are conveniently located below the two sticks. A single-stick (three axis) transmitter is also available with rudder control via a knob at the top of the aileron-elevator stick. An RF output meter is located at the top of the transmitter face. A series charger is built into the transmitter for charging the transmitter and airborne pack simultaneously. Charging is indicated by a lamp visible at the bottom of the transmitter — the "angry red eye." The transmitter is 6½ x 6¾ x 2" and weighs a comfortable 2½ lbs.

The receiver dimensions are 1½ x 2¼ x ⅞". A double-tuned front end is followed by a conventional 455 kHz IF strip. A rugged 1/16" glass-epoxy printed-circuit board contains the RF, IF, and pulse amplification circuitry. The decoder is an integrated-circuit design, mounted on smaller top deck which also serves as the wiring terminal board. Power connection to the receiver is through an in-line plug used also for charging. The power pack, switch harness, and the female end of the power plug are a single assembly. The 500-mah pack may be purchased in either a square or flat configuration. The servos connect to the receiver via two ½ x 7 1/16" plug blocks. Elevator, rudder, and throttle are in one block; aileron and auxiliary channels are on the other.

The system is available with either the PS-3D MK II servos or the PS-4D servos. The difference? The PS-3D is slightly larger, has ½-lb. more thrust and has a dual-rack output as well as rotary wheel output, while the PS-4D has a rotary output only. The PS-4D is, to my knowledge, the smallest digital servo now available. Including mounting lugs, it is 1⅞" long, by 1 9/16" wide; including the output wheel, ¾" wide. The small size is achieved by using a smaller diameter motor than that used in the PS-3D servo. Output thrust quoted by Orbit is 3½ lbs. The servos accept a positive going pulse of a nominal 1.5 milliseconds plus, and minus 0.5 millisecond for control. The power supply required is a center-tapped 4.8V pack.

Accessories provided include: A three-servo mount tray and an aileron servo mount with all hardware needed to mount them; a fitting for internal (to the model) operation of the power switch; three output mechanisms for each servo, i.e., a wheel and two styles of output arms; charging cords; frequency flag; and plastic retainer clips which are designed to prevent inadvertent plug disconnect.

A relatively straightforward set of tests was run. The entire system was placed in a deep-freeze and the temperature stabilized at zero degrees F. There was no measurable change in performance from that at room temperature. The sticks were still smooth, range was unchanged, and speed was the same.

Next, the system was placed in an oven and stabilized at 160 degrees F. Only mad dogs and Englishmen go out in that kind of heat! The only change in performance was a barely perceptible reduction in the speed of one servo. (Model interior temperature can run considerably higher than ambient,

Continued on page 66

GETTING STARTED IN R/C

Simplified answer to "How does the superhet receiver work?"

HOWARD McENTEE

RECEIVERS are grouped into two main classes — the super-regenerative type (also called super-regens, or just regens) and the superheterodyne (often abbreviated to superhet). The former are generally simpler. They can have less parts, and cost less. They may be lighter and smaller. They are generally very sensitive. But their real drawback is that they are *very* broad tuning. For example, a regen tuned to 26.995 MHz will usually respond to any other frequency in the Citizens Band — be it from another R/C transmitter, or from a CB phone transmitter.

In these days of crowded flying fields, and much CB phone interference, regens are at a real disadvantage. Those starting in R/C should purchase only equipment based upon a superhet receiver. Regens are useful for special purposes — extremely light and tiny planes, indoor flying, etc. They are no longer practical in general.

Superhets cost more, are larger and weigh more because they require parts not needed for regens — namely a crystal and several I.F. "cans." Other than these components, the parts count for superhets and regens is reasonably similar but the cost is slightly higher in the superhet.

Superhets are considerably more sensitive to "electrical noise" generated in a model — sparking at brushes of servo motors, rattling metal linkages, etc. However, we have learned to live with these problems and the cures are well known. Also, superhets aren't as noise-sensitive as they once were.

Let's see how a superhet works in very broad and non-technical terms. (See expanded block diagram showing the main components.) All the blocks must have battery power, of course, but we eliminate the power supply leads for simplicity. Starting with the antenna at far left, we route the incoming signal to L1. If the receiver has what is called a "double-tuned" input circuit, L1 is coupled direct to L2 by a capacitor C1 as we show, or by other coupling means. This sort of input circuit is quite widespread in R/C receivers. In some, there is a transistor coupling the two inductors. This gives quite a boost to the signal, but is not absolutely necessary. Some superhets have only a single input inductor; the antenna would be connected direct to L2 and L1 would be omitted. The two inductors, however (with or without an RF transistor between them), can give much sharper input tuning.

The first box in the lineup is the mixer, so-called because it mixes the incoming signal with that from the high-frequency oscillator, directly below it. The mixer also contributes some amplification. The H.F. oscillator works at a frequency slightly different than the incoming signal — in superhets, usually 455 KHz different. It can be either 455 KHz higher or lower than the signal frequency. In either case, the mixer has an output of 455 KHz, and this is greatly boosted by the intermediate-frequency amplifier (or I.F. Amp.). In most superhets, the I.F. Amp. consists of three transformers (T1, T2 and T3) and two transistors. The latter are represented by the boxes labeled IF 1 and IF 2. Most of the amplification in a superhet occurs in the I.F. Amp., and this circuitry also contributes most of the selectivity.

Our receivers are all held on frequency by a crystal, which controls the H.F. oscillator. To change frequency we must change this crystal. Many superhets have no externally tunable circuit for the oscillator; the crystal itself acts as an extremely sharp-tuned circuit, and is what holds the receiver in exact step with the transmitter. When you change frequency, however, it is wise to retune the inductor connected to the antenna, which is L1 in the circuit we show. Generally, no other circuits in the receiver will require retuning (this includes L2, T1, T2, and T3, though all are generally variable).

The second detector (so called because in older days the mixer was known as the first detector — a term seldom heard now) is often just a diode, but can be another transistor. It converts the radio frequency it receives from T3 (remember that at this point the R.F. is actually 455 MHz, and is known as the I.F. frequency) into audio frequency. A pair of sensitive earphones will let you hear this A.F. at the output of the second Det. You could not, of course, hear a signal with these phones at any point in the circuit to the left of the second detector.

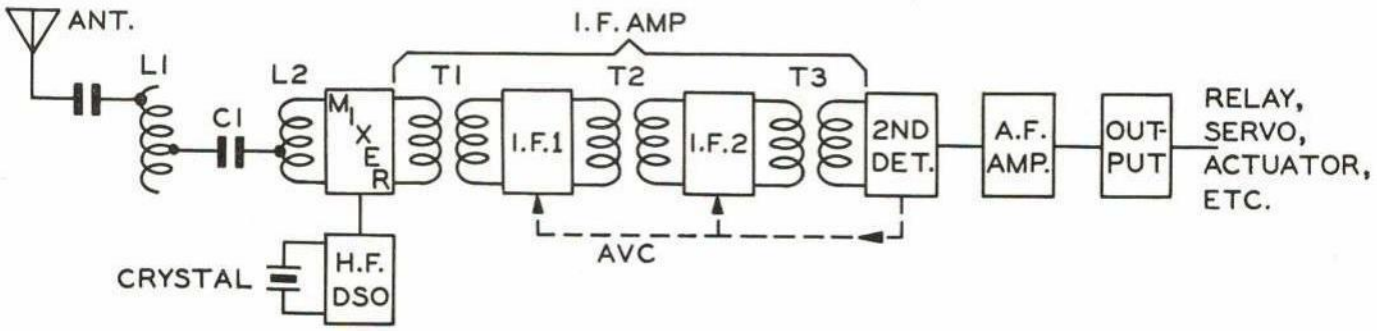
This detector also has the function of producing automatic volume control voltage. This AVC is fed back to IF 1 and IF 2 (and also to the R.F. transistor, if there is one) and serves to cut down receiver sensitivity when the incoming signal is strong. Thus, a fairly even level of signal is always applied to the audio frequency amplifier. Some superhets have added means of reducing extra strong signals — like when you hold your transmitter antenna right alongside the model. These are sometimes called "overload prevention" circuits.

The A.F. amplifier and the output stages vary quite widely, depending upon what control system the receiver drives — analog, digital, propo actuator, escapement, etc.

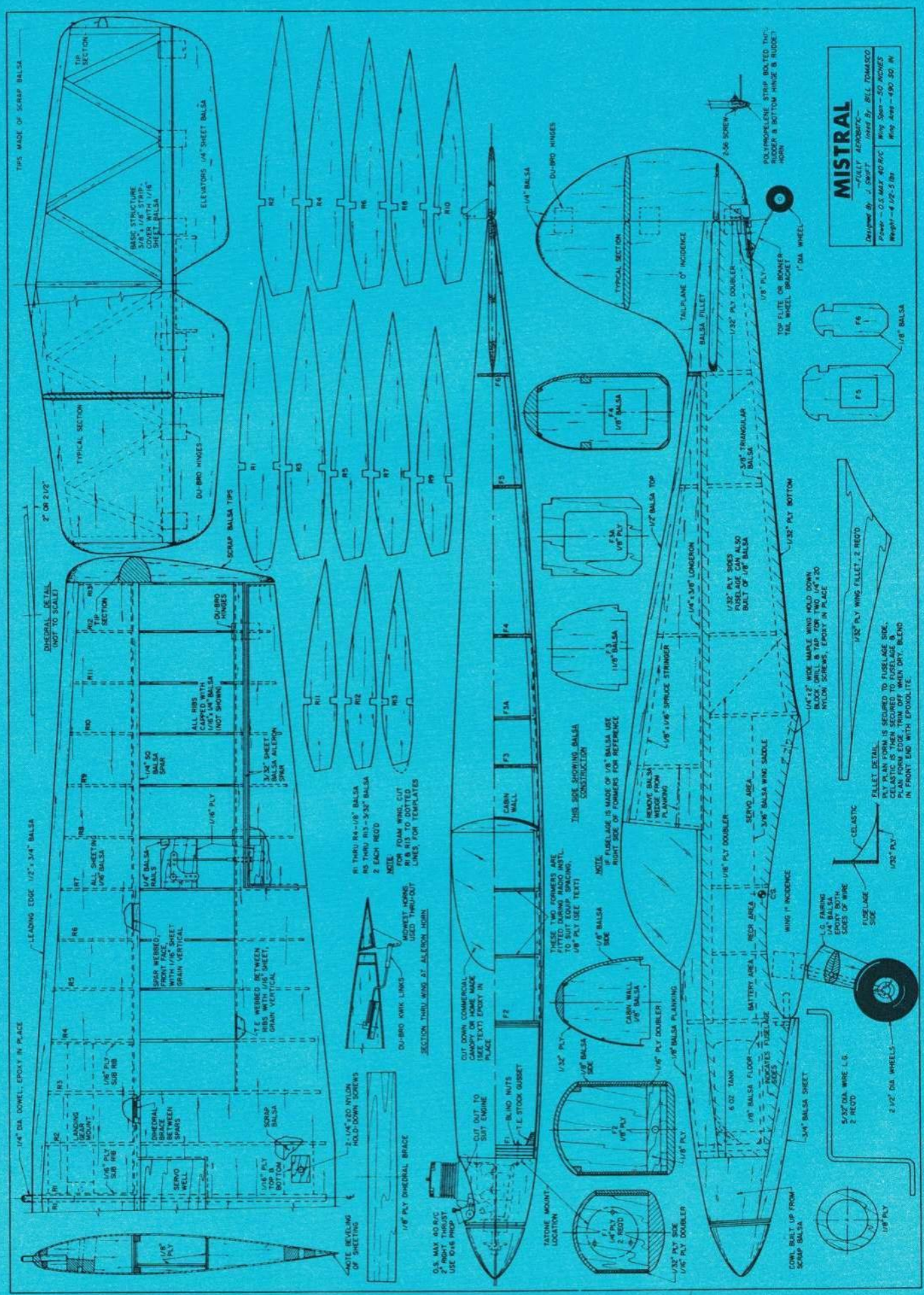
When two R.F. signals are mixed, as in the front-end of a superhet, several other frequencies are produced, besides the 455 MHz that we want. This can lead to "spurious responses" on other than our desired frequency — the exact frequency emitted by our matching transmitter. Only the "image" need bother us in most cases, however. Let us say the transmitter is tuned to 26.955 MHz; for a 455 KHz I.F., the receiver oscillator would need a crystal on either 26.540 MHz (oscillator tuned *lower* than signal or 27.440 MHz (oscillator *higher* than signal). In the former case, a strong signal on 27.440 MHz could bother the receiver. In the latter case, the interfering signal would have to be on 26.540 MHz. Note that the image must always be twice the I.F., and on the *other side* of the transmitter frequency from the receiver oscillator.

On the 27 MHz R/C spots, the image always comes from a transmitter in some other service than Citizens Band. This is not always true on the 50 and 72 MHz spots, however. Image interference has sometimes been the cause of a problem when a modeler was certain there was no incoming signal on his transmitter frequency. It is well to be aware of this potential problem, therefore, even though it probably hasn't clobbered too many planes!

For a reader of "Getting Started in R/C" series, this discussion may be a bit technical. However, we are often asked, how does a receiver work? And why use a superhet? In the future, we will also review transmitters, servo amplifiers, and decoders in a similarly simplified manner.



Definition: superheterodyne receivers mix two frequencies together to make a beat frequency which can be filtered, demodulated and decoded.



FULL SIZE PLANS AVAILABLE — SEE PAGE 60

MISTRAL

Realistic looking, home-built-type sport model is quite maneuverable on 40-size engine.

J. SWIFT

I like building originals — I get a charge having the only one of its kind at the field. Kit-building is not for me. I just don't have the patience looking for those little pieces. "Mistral" is the result.

I was looking for a low-wing tail-dragger that would resemble a home-built. After the original was built, modifications made another model desirable — hence No. 2. No. 1 model was powered by a 30-sized motor and flew off the board. Stunts were easily done with this ship. However, I wanted to clean up the lines and reduce drag; the result was No. 2 Mistral. A 40-motor with a muffler was chosen. Streamlining paid off and I had a fast maneuverable ship that would not run me into debt with fuel bills.

I get depressed when I see repetitive construction articles. Nevertheless, there are certain parts that will be easier to build with a little explanation.

Fuselage: I used 1/32" ply but balsa can be used. Cut out sides and doublers and glue together using a good contact glue. The longerons and triangular stock are glued next. Longeron is not flush with the top of the side (see plan).

Formers are prepared next. F is 3/8" ply drilled for fuel lines and Tatone motor mount. F1 and F2 are epoxied to fuselage sides. While glue is curing, the stabilizer can be built. This is straightforward, and requires no comment.

Draw the rear ends of this fuselage together and trim triangle stock to allow a piece of 3/16" balsa to be used as a tailpost. Glue together and add the remaining formers. The two formers for the radio equipment are not glued in yet.

The motor mount is fastened with blind nuts. A little epoxy on the mount plate prevents loosening due to vibration. Temporarily mount the motor and drill holes for throttle linkage. (A long piece of sharp music wire helps.) The tank also can be mounted at this time. I don't use hatches. Use neoprene fuel tube, with a heavy "clunk" in the tank. Bind the tubing with thin copper wire to prevent its working off the feed and clunk.

Now the motor is mounted. Place 1/8" ply ring on crankcase, fit a prop and spinner, get some bits of scrap 3/32" balsa sheet and place them between spinner and ply ring. Tape ring to spinner using masking tape. Fit bottom balsa nose fairing between ply ring and F2 (see plan). A piece of 1/2" sheet balsa is epoxied between F1 and ply ring on crankcase side of the nose. When glue has cured remove spinner, prop, and motor, then plank top of fuselage in front of cockpit wall.

Two stringers are glued to top of turtleback and two pieces of 1/32" ply, rough-trimmed to shape, and glued to the longerons only. When dry, clamp top edges of ply to the stringers then cut a vee-notch as shown. Trim notch until the sides contact all the edges of the cabin wall. When satisfied with the fit, glue the sides to formers and stringers. Reinforce the back of the notch with a bit of scrap wood.

After it has dried, sand top edges straight, then glue top block in place. A piece of 1/4" sheet balsa is glued between fuselage sides to give a seating for the tailplane which is glued on next.

Cut and shape fin; glue in place with a fairing block on each side. Decide where pushrods are going to exit, cut out slots, and then glue on fuselage bottom. Carve and sand blocks, radius corners, then sand fuselage smooth.

Wing: Construction is straightforward. Plans are clear. The ailerons are cut out after wing is built. The leading edge of the ailerons is beveled and a piece of 1/16" ply glued inside where the control horn locates. The bevel is now sheeted over, giving a light-weight box-type aileron.

The aileron housings are trimmed back farther (two layers of sheet). This is to accommodate the new sheeting that is glued on the aileron and on the housing. Glue sheeting in place and this will form the hinge post.

The dowel hold-down peg is glued in the L.E. of the wing and holes drilled for the nylon screws (reinforce the holes with thin ply). Bellcrank mounts are installed with hardware; pushrods from 16 SWG wire are made up and installed. Tips are shaped and glued; then the wing is ready for covering.

A small piece of maple 1/4 x 2 x 3 1/2" is

Continued on page 76

Forty-powered R/C planes have many advantages. For example: they are light, compact, easy to carry, use less fuel per flight, and cost less to build than 60-powered types. Yet they have all the flyability of the big ones. Note muffler extension to keep exhaust away.

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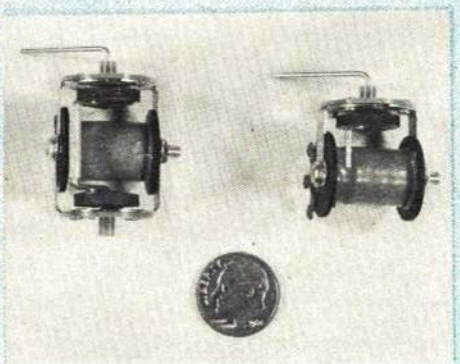

Baby series with dime for size comparison

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ADAMS ACTUATOR COMPARISON CHART

TYPE	GRAM WT.	MILLIAMP 2.4 V	DRAIN 3.6 V	SIZE LESS SHAFT	RECOMMENDE USE
Baby Regular	17	110	*	1 x 1 1/8 x 3/4	.010 - .020
Twin Baby Regular	22	110	*	1 x 1 3/8 x 3/4	Hot .010 - .0
Single Standard	29	220	330	1 1/4 x 1 3/8 x 1	.049 to .10
Twin Stomper	43	220	330	1 1/4 x 1 3/4 x 1	Hot .049 - .2

* NOT RECOMMENDED FOR USE AT THESE VOLTAGES

RAND

Rand Rack and Actuators and Paks are n
manufactured by Ace R/C at Higginsville, M
souri. The changeover was made earlier, a
production has been moved.

Herb Abrams will continue as the desig
and consultant for the Rand manufacturing p
tion of Ace R/C, and this will assure you of n
Rand items of quality and leadershp in n
fields that you have come to expect.

The only thing that has been changed ab
the Rand products is the location of their ma
facture. The same high quality, the same ima
nation, and the same dependable performan
that you have come to expect from all Ra
products will be carried on.

R/C MULTITESTER

A Multitester designer for RC. This Mu
tester is distributed by Graupner for the Eu
pean countries and is made especially for th
in Japan. It was selected over all others
Graupner as a top RC meter. This gives an ir
cation of the quality and preciseness. T
identical meter now is made for Ace R/C
distribution in the United States.

DC milliammeter ranges of 100 and 500 M
DC volts of 3.5, 7, 14, and 250 volts. Measu
resistance in 2000 ohms and 200,000 ohr
2,000 ohms per volt.

Handy pocket size. Measures 3⅝ by 5 by
inches. Complete with test leads.

No. 22K5—Ace Multitester.....$13

HEAVY DUTY NICKEL CADMIUM

This unused surplus nickel cadmium wet
is ideal for starting or any application wh
"oomph" is required. It measures 2 5/8" w
by 4 1/2" tall, and is only 3/4" thick. Ra
from various sources at from 5 to 7 amp
hours, depending on drain, this is a husky u
May be charged with the Ace H-D Charger
the Dual Vari-Charger.

Each cell has been filled with electrol
and charged--AND is guaranteed.

No. 38K72—5-7 AH Nickel Cad Wet Cell $3.
(Orders under $5.00 add 50c handling)

VOGT THROTTLE RESTRICTORS

These are a must when you want to tame
Cox .010 or .020. Simply set to position for
desired RPM and you have a tame power pl
that is just the ticket for the new mini sc
and semi-scale planes. Be sure to order
correct one for your engine—not interchangea
No. 16K105—Vogt Restrictor for .010.....$2
No. 16K173—Vogt Restrictor for .020..... 2

The Most Exciting News in RC!

PULSE PROPORTIONAL COMES OF AGE --

The reception of our Commander R/O series could only be called fantastic--from California to New York, from Texas to Michigan, from Colorado to Illinois, from Mexico to Maine, from Oregon to Florida--there are satisfied users everywhere. AND the list is growing!

Acceptance is from beginners--BUT a lot of it is coming from the digital pros as well! One of them writes: "I never realized how much fun simple R/O flying could be until I bought one for my daughter--now it looks like I'll need another for her!" . . . "No long trips to flying fields--just short jaunts to the neighboring areas; and my fuel bills are low" . . . "I am 16 and just completed my 10th successful flight with a Whiz Kid, Commander R/O equipped. Great!!!" . . . .From a California dealer: "One of my customers has sold his "X" brand digital and all his big equipment. He's sold on R/O fun flying!" From Carl Goldberg: "Just a word to let you know how much I've enjoyed flying your Ace Commander Rudder-Only Stomper in our Ranger 42. . ." And so it goes!

A number of clubs are talking about Rudder-Only or SAC (Single Axis Controlled) contests for next year!

The Commander series of Packages from Rudder, to Ghost, to Fast Pulse are all designed around Transmitters engineered by Don Dickerson. Each is designed for its specific function.

The airborne packs of the Commander systems are built around the Commander Superhet. Used as a DE unit in the R/O packs, it has been redesigned for a 3.6 volt input and Single Ended (SE) output for the Ghost and Fast Pack. Thousands of these receivers are proven in the field.

The Commander Series is completely wired, tested and guaranteed. It will not be available in kit form immediately. Transmitter battery, 9 volt of the M1603 or equivalent, is required.

Recommended chargers for the nickel cadmium battery packs used in the airborne units are shown at right.

A Commander package can be your doorway to fun--whether you are a novice wanting to get into Radio Control; or an old hand wanting a change of pace.

Our 1970 catalog lists Combos of our Rudder-Only series with Owen Kampen's Whiz Kid and Carl Goldberg's Ranger 42--the proven way to go R/C for $100.00 and less!

Just for fun--join in the trend with your own "proud bird with the go-go tail!"

R/O CHARGERS

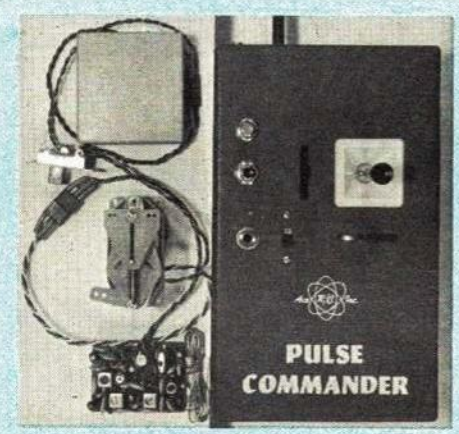
We have transformer isolated chargers which are designed expressly for the Commander R/O units. These are complete with line cord, charging plug and jack, and are available in two models. Each charger will give full charge with 14 to 18 hours of charging time. Completely wired and tested.

No. 34K4—Commander R/O Baby Charger 4.95
No. 34K5—Commander R/O *S Charger 4.95
*S - Standard or Stomper

VARI CHARGER

If you want a more universal type of charger for your nickel cadmium battery supplies the Vari-Charger has much to recommend it. It features a high quality transformer and will charge up to 5 or more cells in series with up to 150 milliamp current. Charging rate is adjustable from 20 to 150 mils, with easy-to-use chart.

No. 34K21—Ace Vari Charger Assembled 9.95
No. 34K22—Ace Vari Charger Kit 7.95



COMMANDER R/O PULSE PACKS
Ideal for Beginners and Sport Flyers

Rudder-Only has been proven to offer the most fun and satisfying experience per dollar invested of any of the R/C systems available today. Now, with the new Commander R/O Pack you are assured of the fact that you can start with simple rudder only, and at a later date upgrade your equipment to Galloping Ghost or Fast Rate Decoded systems.

The R/O Packs feature the Dickerson transmitter described above with the Rand single axis stick, and the Commander DE 2.4 volt superhet receiver. Has an Adams actuator of the size of your choice, depending upon your aircraft, with nickel cadmium batteries wired with an on and off switch. AND each pack will save you $10.00 if you bought the individual items separately.

The R/O Baby is for .010 to .020 jobs, has two 225 MA nickel cadmiums, and the regular Baby Adams actuator. The airborne weight is 2.5 oz.

The R/O Standard uses the LV single Adams actuator for more power for .049 to .07 size. Uses larger capacity nickel cads. Airborne weight is 4.5 oz.

The R/O Stomper used the LV Twin Adams actuator for up to .15 or can be boosted for use with .19. Airborne weight is 4.9 oz.

(Charging equipment extra)

No. 10G15—Commander R/O Baby $69.95
No. 10G16—Commander R/O Standard 71.95
No. 10G17—Commander R/O Stomper 74.95
All 27 MHZ, except 27.255. Specify.

COMMANDER GHOST PULSE PACK
Provides Rudder, Elevator, Motor

Using the same basic Dickerson Transmitter but with two axis stick control, the Ghost uses pulse width and pulse rate and full on-off for control. Receiver is new Commander SE designed specifically to feed into a Rand GG Pack, 3.6 volt nickel cads. This system should be used in planes of .09 and up.

(Charging equipment extra)

No. 10G18—Commander Ghost Pack $109.00
All 27 MHZ, except 27.255. Specify

You can convert your new Commander series Rudder Only System (Blue-Grey vinyl case only) to either of the two systems shown above. This means as you gain experience you can step up without obsoleting your original investment.

COMMANDER FAST PULSE PACK
Retains Elevator During Motor Signal

The system here is an electronic decoded one which allows a much faster pulse rate and rudder and elevator just quiver. You have FULL control of elevator response on motor command--An Ace EXCLUSIVE! Up to .29.

Receiver is new Commander SE, Rand Dual Pak, with 1 amp 3.6 V nickel cads.

(Charging equipment extra)

No. 10G19—Fast Pulse Commander $139.00
All 27 MHZ, except 27.255. Specify

No. 10E116—R/O Factory Conversion to Ghost System above $45.00

No. 10E117—R/O Factory Conversion to Fast Pulse System $75.00

NEW HANDBOOK-CATALOG
For the Fun Flyer and Tinkerer

Our NEW Handbook-Catalog is bigger and better than ever. We specialize in equipment for the Beginner, Sunday and Fun Flyer. More items for the do-it-yourselfer; more products from most major manufacturers, in addition to many Ace exclusives. Greatly enlarged HANDBOOK section. Last year this was called "bible for R/C", "a MUST!" by R/C editors. Price is just $1.00 POSTPAID. This is completely refundable on your first order! And that order also puts you on our mailing list for our newsletters and R/C Data Service—acclaimed the world over. You can't lose—send your buck on a round trip today. It could be the best dollar you ever spent!

Important: For overseas delivery on catalog or Binder please add 50¢ for additional postage.

ACE RADIO CONTROL • BOX 301 • HIGGINSVILLE, MO. 64037

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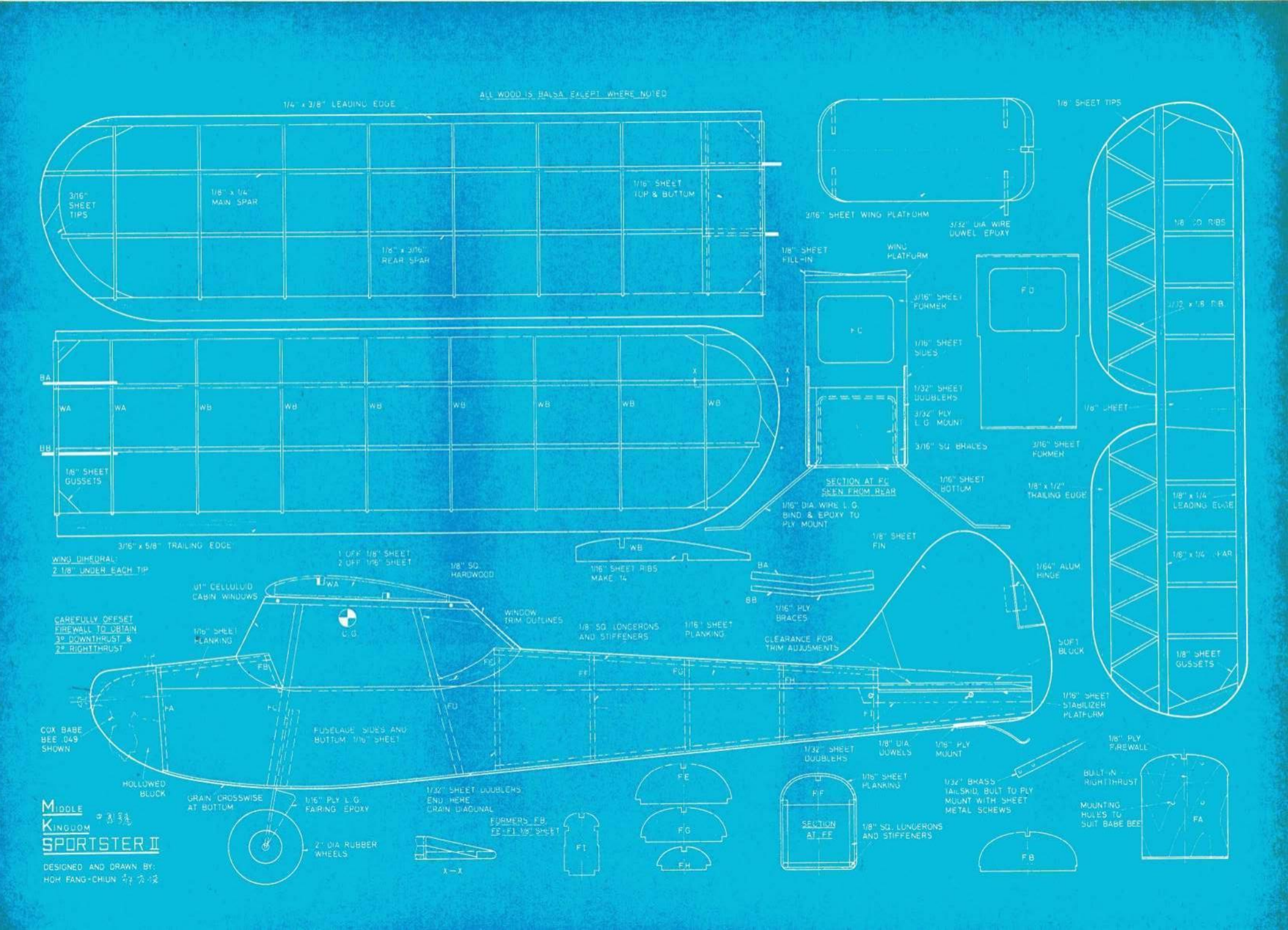
ADDRESS _____

CITY _____ STATE _____ ZIP _____

QUANTITY	STOCK #	NAME OF ITEM	PRICE	TOTAL

My BankAmericard #

Guaranteed delivery anywhere. Orders over $5.00 sent prepaid. Orders under $5.00 please add 50¢ for postage and packing.


ALL WOOD IS BALSA EXCEPT WHERE NOTED
1/4 x 3/8" LEADING EDGE
3/16" SHEET TIPS
1/8" x 1/4" MAIN SPAR
1/8" x 3/16" REAR SPAR
1/16" SHEET TOP & BOTTOM
3/16" x 5/8" TRAILING EDGE
1/8" SHEET GUSSETS
BA
BB
WA
WB
3/16" SHEET WING PLATFORM
3/32" DIA WIRE DOWEL EPOXY
1/8" SHEET FILL-IN
WING PLATFORM
3/16" SHEET FORMER
1/16" SHEET SIDES
1/32" SHEET DOUBLERS
3/32" PLY L.G. MOUNT
3/16" SQ. BRACES
SECTION AT FC SEEN FROM REAR
1/16" DIA. WIRE L.G. BIND & EPOXY TO PLY MOUNT
1/16" SHEET BOTTOM
FC
FD
1/8" SHEET TIPS
1/8" SQ. RIBS
1/32" x 1/8" D.B.
1/8" SHEET
3/16" SHEET FORMER
1/8" x 1/2" TRAILING EDGE
1/8" x 1/4" LEADING EDGE
1/8" x 1/4" SPAR
1/8" SHEET GUSSETS
WB
1/16" SHEET RIBS MAKE 14
1/8" SHEET FIN
1/64" ALUM HINGE
BA
BB
1/16" PLY BRACES
SOFT BLOCK
1/16" SHEET STABILIZER PLATFORM
WINDOW TRIM OUTLINES
1/8" SQ. LONGERONS AND STIFFENERS
1/16" SHEET PLANKING
CLEARANCE FOR TRIM ADJUSTMENTS
WING DIHEDRAL: 2 1/8" UNDER EACH TIP
1 OFF 1/8" SHEET
2 OFF 1/16" SHEET
1/8" SQ. HARDWOOD
.01" CELLULOID CABIN WINDOWS
CAREFULLY OFFSET FIREWALL TO OBTAIN 3° DOWNTHRUST & 2° RIGHTTHRUST
1/16" SHEET PLANKING
C.G.
FB
FC
FD
FE
FF
FG
FH
FI
FA
COX BABE BEE .049 SHOWN
FUSELAGE SIDES AND BOTTOM 1/16" SHEET
HOLLOWED BLOCK
GRAIN CROSSWISE AT BOTTOM
1/16" PLY L.G. FAIRING EPOXY
2" DIA RUBBER WHEELS
1/32" SHEET DOUBLERS END GRAIN DIAGONAL
FORMERS FB, FE-FI 1/8" SHEET
X—X
1/32" SHEET DOUBLERS
1/8" DIA. DOWELS
1/16" PLY MOUNT
1/16" SHEET PLANKING
SECTION AT FF
1/8" SQ. LONGERONS AND STIFFENERS
1/32" BRASS TAILSKID, BUILT TO PLY MOUNT WITH SHEET METAL SCREWS
1/16" PLY FIREWALL
BUILT-IN RIGHTTHRUST
MOUNTING HOLES TO SUIT BABE BEE
MIDDLE KINGDOM 中劇院
SPORTSTER II
DESIGNED AND DRAWN BY:
HOH FANG-CHIUN 何方俊

Pert and saucy, this functional cabin job may remind you of many real planes — Cessna Bird Dog, for example. As shown at left, it could be a homebuilt at some country airport. Anyway you look at it, right, it's a "happy" airplane.

M. K. Sportster

Easy flying free-flight with pleasing lines does nice ROG's on 049 power.

HOH FANG-CHIUN

FREE-FLIGHT sport models are rather rare nowadays. Magazines no longer regularly carry features on this type of design. And from kit manufacturers new creations, if any, turn up sparsely. Reason for this, of course, is the availability of small, lightweight radio-control systems. Designs originally intended for sport free-flight purposes simply became controlled free-flighters guided with these functional, low-cost outfits. However, for those of you who are fascinated by the charming flying of free-flight sport models, this machine should be what you have been waiting for.

The M.K. Sportster is a pleasing ship, both in shape and in handling. Once properly trimmed, the model possesses a most realistic and stable flying performance. Also, the large-diameter wheels located well in front of the center of gravity, provide safe takeoffs and landings at any reasonable field.

The model measures 39" in wingspan and approximately 205 sq. ins. in area. Suitable powerplants would be engines up to Half-A size. Any engine above 049 in capacity is not recommended because a big engine in a light machine always makes the flight adjustment much more tricky. Besides, there is no need to employ a big powerplant in a model of this category. Even if you install a 049, choose a mild one. The prototype was powered by an 03 (0.5cc) diesel engine. Swinging a 6 x 4" propeller, this little engine provided more than ample power for the flights, including unassisted takeoffs from grass surface.

Construction-wise, the M.K. Sportster is quite straightforward. The plan, showing Mark II of the design, differs from the prototype only in minor aerodynamical improvements and slight structural modifications.

Incidentally, the letters "MK" in the model's name stand for Middle Kingdom. Middle Kingdom or Middle Land actually is what China is called by the Chinese. Ancient Chinese thought their land was lying in the center of the earth, so in this way the country's name was originated.

Construction

Wing: Each half is built separately, joined at proper dihedral angle when ready for center balsa sheet covering. Pin down the unshaped leading edge, bottom spar, trailing edge and tip frame pieces on the plan, protecting the latter with wax paper. Be sure the notches are already cut in the trailing edge. Incidentally, when cutting these notches, make them a little undersize for a tight fit to the ribs. Cement all ribs in place except the center one. Note that rib WA is shallow by $^1/_{16}$" on both top and bottom to allow for sheeting, so place scraps of $^1/_{16}$" pieces beneath it for proper elevation. Add top spar while the panel still is on the board. Allow sufficient time (preferably overnight) for cement to thoroughly dry before removing from the work board.

Follow the same procedure for the other half. To incorporate dihedral, bevel-sand butt ends of each panel so they meet at correct angle. Use plywood dihedral braces to check alignment. When tight joints have been obtained, glue center rib and braces in position, holding the latter with spring-loaded wood clamps until cement dries. Add center-section sheeting, complete the tips as per section view X-X and sand the entire wing.

Fuselage: Select two sheets of $^1/_{16}$" medium balsa, preferably quarter-grain stock for the sides. Laminate $^1/_{32}$" sheet doublers to the sides as per side view. Note that the forward doublers should have wood grains run diagonally to obtain true flat surfaces. To locate doublers in place, use contact cement for instant and warpless assembly. Glue $^1/_8$" square balsa longerons and stiffeners to sides aft of cabin.

Cut cabin bulkheads FC and FD. Glue fuselage sides to FC and FD and allow to dry. Be certain that the joints are at right angle. To lock fuselage, draw and cement sides at rear. Check alignment before glue sets, realign if necessary. Pull sides in at nose with two pieces of hardwood and rubber bands. Carefully tilt firewall FA to obtain 3 degrees down-thrust and 2 degrees right-thrust.

Proper amount of thrust off-setting is obtained easiest by the following procedure: Cut front ends of both fuselage sides to indicated down-thrust as shown on the plan. To incorporate right-thrust, shorten $^1/_{16}$" at front end of starboard fuselage panel. Locate the firewall flush with fuselage ends, using white glue for this installation. Construct landing gear assembly and epoxy it behind former FC. Install engine blind nuts on backside of the firewall before planking front top. Add the remaining formers, etc. and complete the structure as shown. Note that slot in the tail for stabilizer is made approximately $^1/_{16}$" oversize to allow incidence changes which might be required for flight trimming. Shape and sand the entire body, round off all corners liberally. Construct fin and double cement it in place.

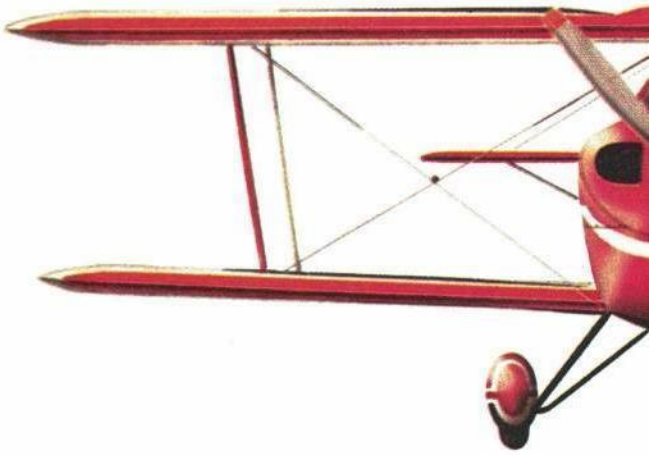
Horizontal tail: The stabilizer has been left until last. This unit is used to balance out the model. It takes quite a bit of weight in the nose to compensate a hanging tail, but only a slightly lighter stabilizer to accomplish the same thing. Should the model be decidedly nose-heavy (improbable), a harder and therefore heavier grade balsa should be used. It certainly is much wiser to use added structural strength than dead weight.

Construction of the stabilizer is self-explanatory. Note that the trailing edge is standard triangular stock. Pre-cement all butt ends to ensure a strong surface.

Finishing: Apply two coats of thinned clear dope or sanding sealer to all exposed wood; lightly sand the last coat. For all-round protection, cover the entire model with silkspan. Run grain length-wise on all surfaces. To save weight, use colored material, at least on wing and stabilizer. Colored material instead of painting with colored dope is preferred also with regard to future repairs. Now give the entire model several coats of clear dope until a slightly shining surface has been reached. To obtain a smooth finish, wet-sand between last coats.

To cover cabin windows, first make patterns of thick paper. When satisfied with the fit, cut window panels from sheet celluloid. Carefully cement windows to cabin frames, using epoxy glue for best result.

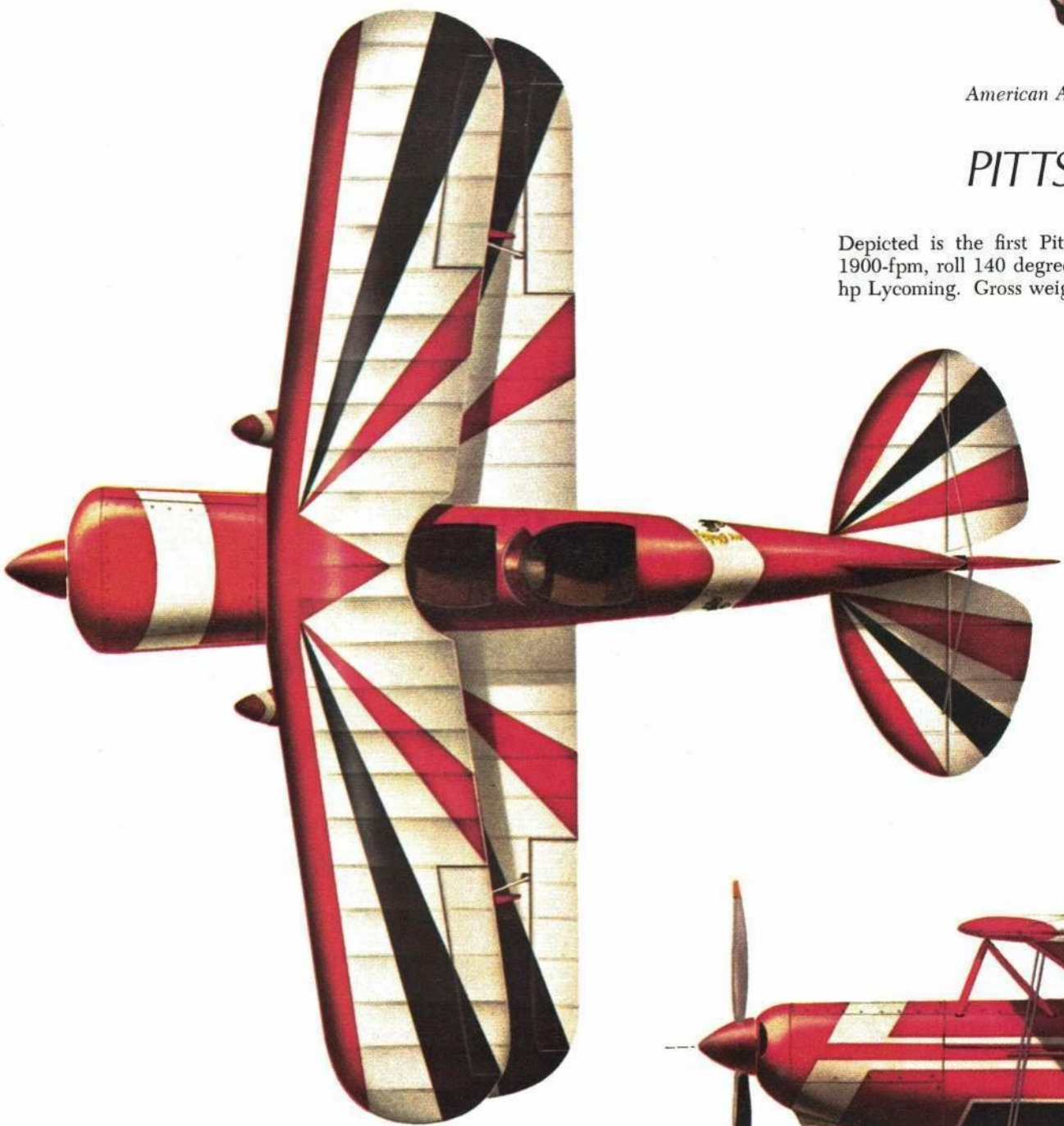
Continued on page 56

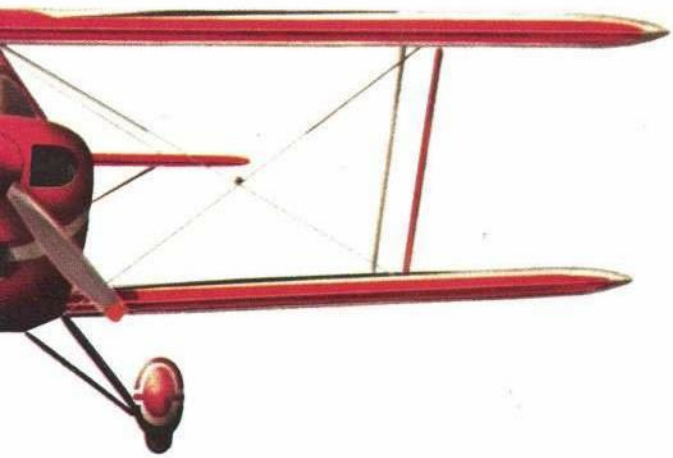


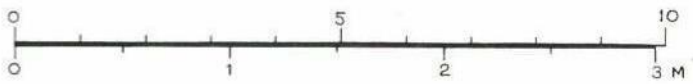
American Aircraft Mode

PITTS S-2

Depicted is the first Pitts Special T
1900-fpm, roll 140 degrees a second,
hp Lycoming. Gross weight 1450 lbs.



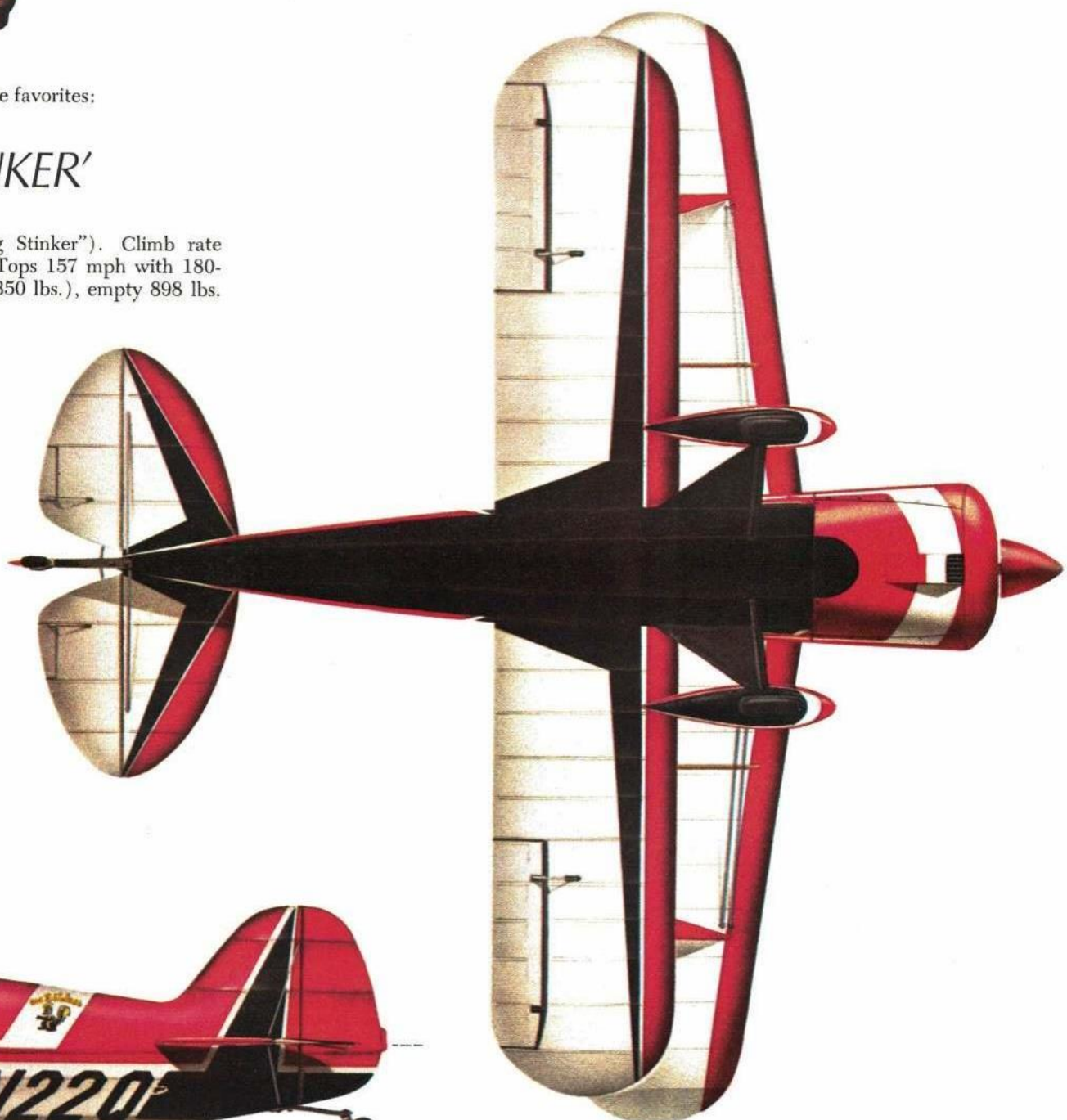




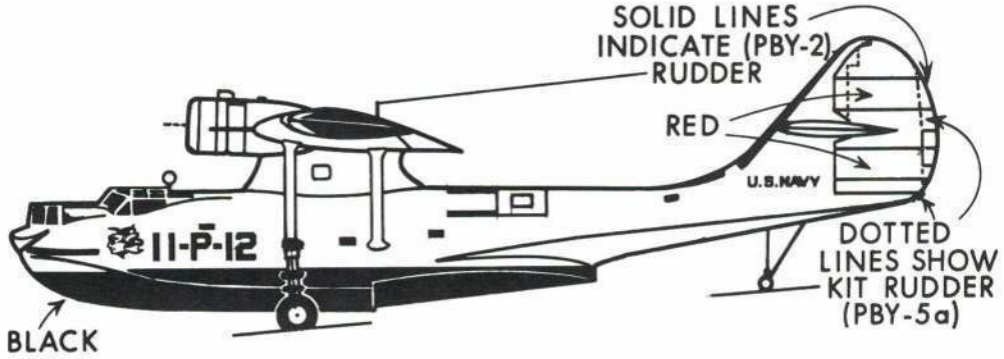
lbum of all-time favorites:

G STINKER'

(S-2 "The Big Stinker"). Climb rate
sed for 9G's. Tops 157 mph with 180-
robatic gross 1350 lbs.), empty 898 lbs.



BJÖRN KJELLSTEDT



The PBY-2 Catalina

Lumbering long-distance flying boat meant rescue to thousands of pilots throughout WW-II. Here is original seaplane-only version; dolly is for display.

DICK BRANT

WHILE a number of PBY variants appeared during the production life of the Catalina, the only one issued, so far, by the kit manufacturers is the amphibian PBY-5a. The PBY-5a enjoyed the longest production run and certainly saw the most combat service of any of the Catalina variants, but I thought that one of the earlier, non-amphibian Catalinas would make an interesting addition to a model collection. Of the available kits, I chose Revell's 1/72-scale PBY-5a for conversion back to a PBY-2. The following references were most helpful in making this conversion: 1) Profile No. 183, "The Consolidated PBY Catalina." 2) Air Classics, Vol. 4 No. 3, "Taps for the Big Boats." 3) Air Classics, Vol. 5 No. 1, "Track of the Cat."

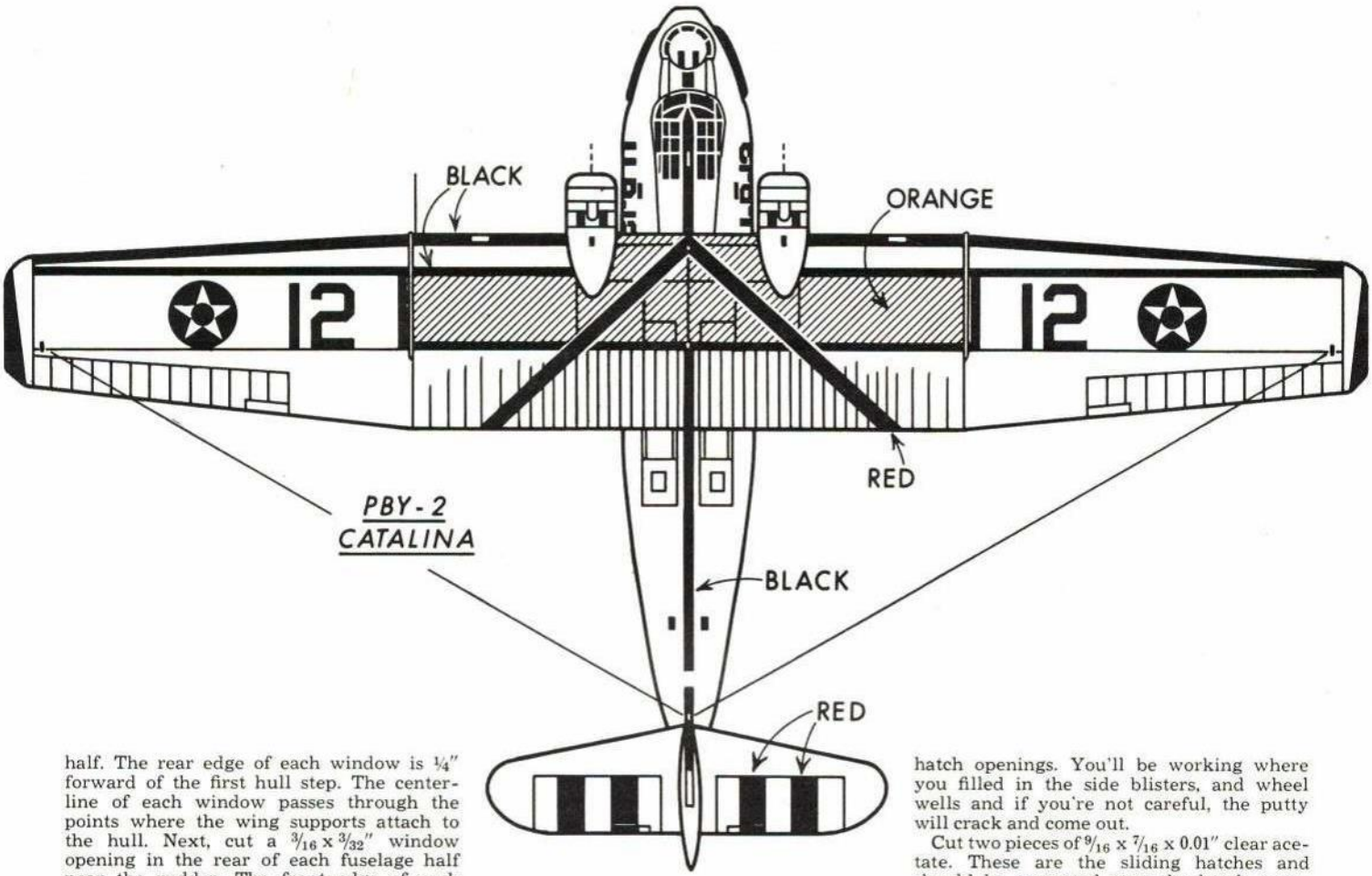
The most noticeable modification to the PBY-5a kit is the filling in of the wheel-well and side blister openings. Glue thin styrene sheet on the insides of the fuselage halves to cover the openings. When this is thoroughly dry, build up the openings with Duratite plastic wood. When this is dry, sand the patched areas to conform with the contours of the fuselage exterior and do a final filling with an automotive body putty such as Green Stuff or Sears Spot and Glazing Putty. Because of the amount of patching and filling being done to the fuselage, it would be difficult to preserve the rivet and panel detail. For this reason I sanded the entire fuselage to a smooth finish with No. 500 wet sandpaper.

While waiting for glue and putty to dry during the stages of fuselage modification, work can proceed on the wings. Wing assembly is accomplished according to the instructions with the kit. A word of caution on the Revell kit, however. If the alignment pins are used when assembling the wings, a slight anhedral will result.

After the wing is assembled, fill the carburetor intake notches on the engine nacelles and sand smooth with No. 500 wet sandpaper. Then spray the entire wing with AMT Hot Rod Primer. After this dries, the wing can be rubbed smooth with 000-grade steel wool. Any remaining seams or flaws should be filled and sanded.

The PBY-2 has some additional windows that are not found on the PBY-5a. Cut a 1/4 x 3/32" window opening in each fuselage

For the conversion back to the PBY-2, author selected a Revell 1/72-scale PBY-5a. Most eye-catching "mod" is filling in of wheel wells and side gun blisters.



half. The rear edge of each window is ¼" forward of the first hull step. The centerline of each window passes through the points where the wing supports attach to the hull. Next, cut a $^{3}/_{16}$ x $^{3}/_{32}$" window opening in the rear of each fuselage half near the rudder. The front edge of each window is 2¾" from the rear-most tip of the rudder trailing edge; the top of each window is ¼" from the upper fuselage seam.

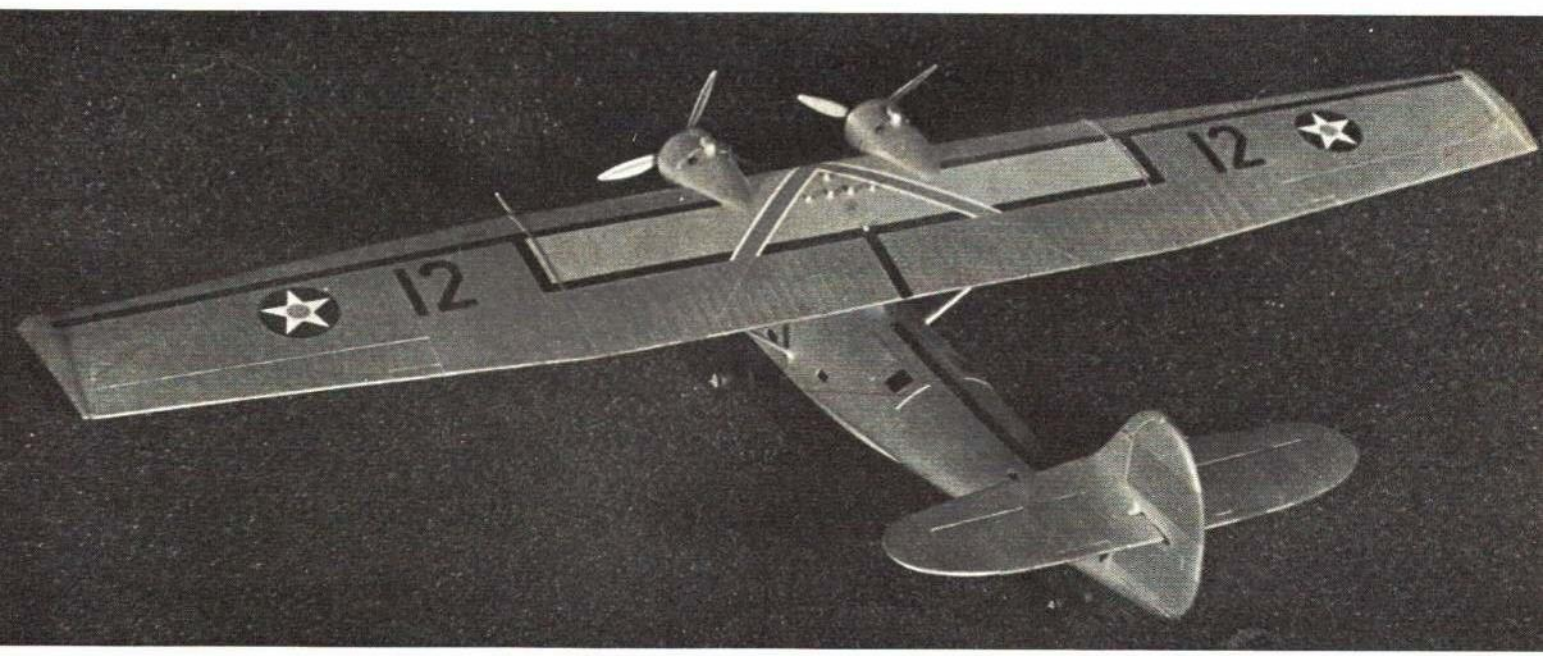
The sliding hatch openings are $^{5}/_{16}$ x ½" holes cut in each fuselage half. The rear edge of each hatch opening is 4 $^{7}/_{16}$" from the rear-most tip of the rudder trailing edge; the top of each opening is ¼" from the upper fuselage seam. Be very careful when you cut out the front window and hatch openings. You'll be working where you filled in the side blisters, and wheel wells and if you're not careful, the putty will crack and come out.

Attached to roll flying boat onto land or into water, beaching gear is made from brass rod and flat stock.

Cut two pieces of $^{9}/_{16}$ x $^{7}/_{16}$ x 0.01" clear acetate. These are the sliding hatches and should be cemented over the hatch openings. A contact cement, such as Walther's Goo, does a good job on this. After the sliding hatches are in place, mask off ¼ x ¼" windows on each hatch. The windows should be masked off on both the inside and outside of the fuselage.

The cockpit interior can be assembled as per the kit instructions. Examination of photos of actual PBY interiors will show that the kit cockpit is not entirely accurate,

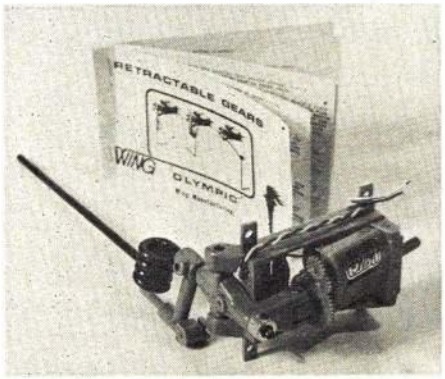
Continued on page 54



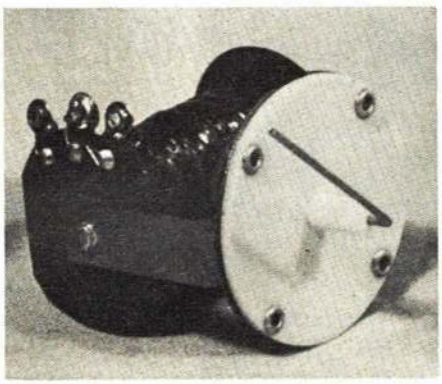
Huge wing area and distinctive markings enhance value of model in any collection. On real aircraft, small, outer floats retracted to form wing tips in flight.

NEW PRODUCTS CHECK LIST

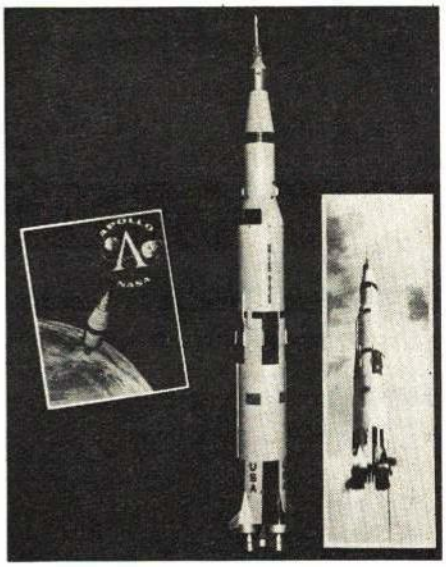
Write the manufacturers for more data; tell them, "I saw it in American Aircraft Modeler."



Wing Manufacturing / Retractable gears. Olympic series includes **Standard, Contest,** and **Nose Gear** unit (shown). Recommended for planes up to 8½ lbs., units have built-in circuitry to suppress RF noise, deliver 8 lbs. thrust. 3.6 v. Nicad powered. Price per unit, $18.00. Rechargeable Nicad battery, $9.95. Dust cover, 95c. **Wing Mfg.,** Box 256, Elmwood Park, Ill. 60635.



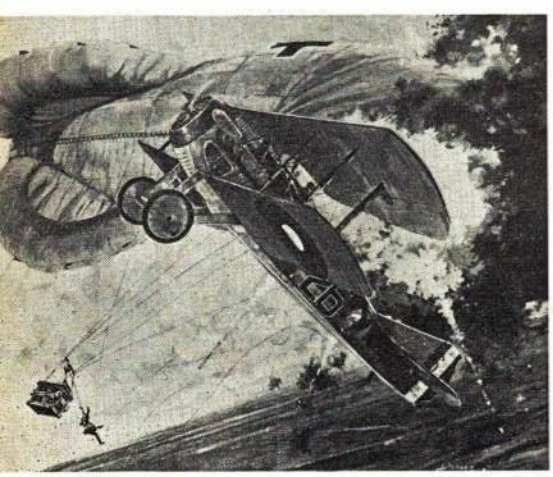
ACE R/C Inc./Adams magnetic actuators. Effective January 1, ACE became sole licensed manufacturer of this popular line of single-channel proportional actuators. With possible exception of the AR, intended for very small craft and dry batteries, the regularly advertised line is already in production, ACE R/C, 203 W. 19th St., Higginsville, Mo. 64037.



Estes Industries Inc./ Moon Rocket. 43½" true scale **Saturn V,** three-engine power with molded plastic tower, capsule, decals, paint, etc. plus technical report on clustering and 12-page book on Apollo program. Also, display engines. Price, $9.95. **Estes Industries Inc.,** Box 227, Penrose, Colo. 81240.

Randy's Model Aero./ Motor fuel. Good quality, inexpensive, **Custom Blend** provides fuel specifically for R/C, Sport and Stunt, Rat Race, Super Rat Race, and Speed 50 and 60. Methyl alcohol and nitromethane base. R/C-fuel $4.80 gallon. **Randy's Model Aero.,** 340 Diana Drive, West Carrolton, Ohio 45449.

Jack Stafford Models / Aircoupe. R/C model of famed lightplane, kit includes injection-molded cowl and formed canopy. All sheet-balsa and plywood construction with stressed wing and fuselage, formed landing gear, all wood parts sawed and sanded. Excellent scale trainer for 35 to 60 engines. Price, $42.95. More data, send stamp to **Jack Stafford Models,** 12111 Beatrice St., Culver City, Calif. 90230. Dept. (a).



Angel Mini-Flite Co./ Air-combat paintings. Series of six 16 x 20" combat paintings from WWI. Beautiful full-color prints on non-glare art paper with self-matting border, each print comes shipped in polyethylene tube. Features Spad vs. balloon, DVII and Albatros vs. S.E.5, Sopwith Triplane vs. bomber, etc. Cost $2 ea. or six for $8.95. Color brochure, 10c. **Angel Mini-Flite Co.,** 340 Broad St., Box 437, Fitchburg, Mass. 01420.

Centuri Engineering Company / Products catalog. New 16-page full-color catalog of **Centuri** sport flying and super-scale rockets, **Saturn V, V-2,** etc. Free from dealer or write: **Centuri Engineering Company,** Box 1988, Phoenix, Ariz. 85001.

MARCH 1970

MODEL AVIATION

Official magazine

A.M.A. NEWS

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

District Meetings — AMA Democracy in Action

Most AMA members have never met or had any contact with AMA officers. Communications between them has, therefore, been poor, and many misunderstandings are prevalent about how AMA operates. To correct the situation, the concept of AMA district meetings was developed and has been outstandingly successful wherever tried. The scheduling of many more such meetings, on a regular basis, is now being encouraged. The immediate goal is at least one such meeting a year in each of the eleven AMA districts.

The object of such meetings is to bring together all AMA district officers — the area vice-president, associate vice-presidents, Contest Board members, contest coordinators, and any AMA committee members in the area — plus as many AMA members and chartered club representatives as possible. No formal presentations are necessary. The basic idea is to introduce everyone, then have a free-wheeling question and answer session with maximum discussion between officials and the audience.

Such a meeting was held last October in the St. Louis area. This was the second AMA District VI meeting in less than a year, brought about by enthusiastic response to the first one. The second was equally successful, and already a third one is scheduled for May of 1970.

In the October meeting, representatives from clubs were present as were most AMA district officers. District VI Vice-President **Gosta Johnson** led the meeting which discussed practically all aspects of AMA operation. A highlight of the meeting was the unanimous assertion by all AMA district officers that they had full authority and responsibility for decision-making in their areas of appointment or election.

They refuted a common misconception which brands such officers as mere figureheads or rubber-stampers of Headquarters' decisions. The officers pointed out that they were volunteers and free to vote and participate fully in all decision-making processes. They also indicated that comparatively few AMA members bothered to contact them with constructive proposals, suggestions, or comments. It was obvious that more understanding and helpful communication was produced at one district meeting than many months of correspondence.

The October District VI meeting also provided an excellent example of immediate problem solving. Discussion had indicated the difficulties of contest coordination in the midwest, with particular regard for the fact that RC meets involved different distance and participation factors than typical for free flight or control line. Vice-President Johnson, responding to constructive discussion of the problem, appointed a separate RC Coordinator (**Al Signorino**) right at the meeting. This initiated a new concept in district meet coordination where one officer would be responsible for FF and CL scheduling, another for RC, and both to work together concerning those meets which involve all three categories.

Perhaps the most significant outcome of the meeting was the realization that volunteer AMA members are responsible for practically all policy making decisions, with Headquarters serving only as an administrative office to handle the paperwork and coordinate communications between the over one hundred elected or appointed officers serving AMA. Helping to prove the point was the showing of a new film of the Headquarters operation (now available to AMA chartered clubs) which clearly showed the administrative nature of the operation.

The District VI meetings are similar to those which have been held in the northwest for several years. Under the leadership of AMA V.P. **Bob Stalick,** District XI has done the pioneering of such meetings. Its meetings have also featured the open give and take between AMA members and officers. The District XI meetings are annual, scheduled in winter when the weather is better for talking than model flying. This seems to be the key to good attendance, as attempts to hold meaningful meetings at contests or other model flying activities have not been very successful.

The examples in Districts VI and XI suggest that other areas should consider holding similar meetings. It would be helpful for AMA members to indicate to any district officers their interest in such meetings. A good start is for AMA members to look at the Officer Directory (page 52) to learn who their district AMA officers are and where they live. It's also helpful to look in the AMA rule book at the chart of organizational structure and also at the other rule book pages which have the AMA bylaws and other details of what AMA is and what it does — many AMA members seem surprised that the information is there!

Meanwhile, another similar type of meeting is being explored. At the annual Toledo RC Conference, which attracts thousands of AMA members each winter, many AMA officers are usually present. It is hoped that as many as may be on hand, from all parts of the country, can be assembled in a special meeting open to all modelers. Again, the idea is for members and officers to communicate, exchange ideas, answer questions, and promote understanding. It's to show that the AMA leadership is made up of, and is responsive to, the membership.

The "who's who" of St. Louis meeting attendees: **AMA District VI officers:** Vice-President **Gosta Johnson** (Chicago), Associate

Continued on page 52

Bill Crame photo

Attendees of last October's District VI AMA meeting listen as AMA Executive Director John Worth responds to a question from the audience. Present at the meeting were most elective and appointive Dist. VI officers as well as representatives of area AMA chartered clubs and AMA members, only a portion of which are shown in photo. Another meeting is planned for May 1970.

Election for 1970-71 AMA Officers

Earl Witt, Chambersburg, Pa., received 3,086 votes to be reelected AMA secretary-treasurer for the 1970-71 term. In addition, there were write-in votes for 26 other candidates.

The election, for which all AMA members were mailed ballots, was concluded on November 17, 1969. At stake were the national position of secretary-treasurer and regional vice-presidential positions in AMA Districts I, III, V, VII, IX and XI.

District V.P.'s elected:

I — Cliff Piper, Pittsfield, Mass., 299 votes (4 write-ins for others).

III — Ron Morgan, Scotland, Pa., 335 votes (**Laird Jackson** received 302 votes, 6 write-ins for others).

V — Jim Perdue, Tullahoma, Tenn., 269 votes (**Jim Kirkland** received 100 write-in votes, 6 write-ins for others).

VII — Jack Josaitis, Dearborn, Mich., 320 votes (**L. Couture** received 24 write-in votes, 8 write-ins for others).

IX — Stan Chilton, Wichita, Kans., 132 votes (8 write-ins for others).

XI — Robert Stalick, Albany, Ore., 151 votes.

The total vote represented about 12% of the AMA membership, comparable to previous years. The next AMA election, in the fall of 1970, will be for national AMA president and regional District II, IV, VI, VIII and X vice-presidents for the 1971-72 term.

Record Reviews

A report of selected recent record holders highlighting the designs and equipment used.

CL B Speed national AMA record, Junior age class: 163.57 mph, established by Danny Bartley, High Point, N. C., on May 3, 1969.

This original design model, named Orange Peel, was powered by a Supertigre 29 RV. ABC engine swinging a Top Flite 7" dia. by 10" pitch prop. The engine used a Fireball cool plug, pen bladder fuel tank, exhaust elbow, K&B carburetor. The engine had been freed-up.

The model has a 20" wingspan, 2½" center chord, symmetrical airfoil. Stab span is 9". A Harter pan was used for the 15½" fuselage. Control was provided by a Stanzel Monoline handle and H & R torque unit. The model was finished with orange Hobbypoxy.

FF FAI Power national AMA record, Senior age class: 18 minutes, 58 seconds, established by Paul Andrade, Walnut Creek, Calif., on August 30, 1969.

This record was set by a model built from the FAI Viking kit of Carl Goldberg Models powered by a Super Tigre G15RV engine, Fireball glow plug, Cox 8"D x 4"P (gray) prop, Seelig engine/dethermalizer timer.

Model was covered with Aristo-Craft Jap tissue and finished with Fuller nitrate dope. A Perfect No. 6 tank was used for the fuel of 80% alcohol and 20% Bakers castor oil.

CL Navy Carrier Class I national AMA record, Junior age class: 472.90 points, established by Joe Dishongh, Jr., Tucson, Ariz., on May 8, 1969.

Dishongh's model is the Bell XFL-1 Airabonita constructed from *Model Airplane News* plans. The model has a 30-inch wingspan and weighs 32 ounces.

The model was powered by a rear rotor K & B 40 RC, Fox glow plug, swinging a 9-7 Tornado nylon prop. Fuel was K & B 1000 carried in a modified Perfect No. 13 tank. Control was by the J. Roberts system. The model was built from Sig balsa and finished with Hobby Poxy.

Indoor FAI Stick national AMA record, ceiling category III, Senior age class: 14 minutes, 14 seconds, established by Daniel J. Domina, Hillside, N. J., on June 29, 1969.

According to the record holder, the model is a slightly modified "Top Cat III" which he built from articles appearing in *Model Airplane News* and *Indoor News and Views*. It has a wing of 25.5" span, 4½" major chord, and stabilizer of 12" span, 3.6" major chord, elliptical planform for each. Motor stick of 12" is tungsten-bracked, aft of which is the 9½" tail boom, then the rudder. The condenser paper-covered prop is of 16" diameter, 25" pitch, and is powered by a 16½" loop of .070" Micro X Pirelli.

Except for the prop, the model was covered with microfilm made with a formula of 40% nitrate dope thinner, 60% nitrate dope, and 4 drops of TCP per ounce of formula. Sig balsa was used in construction as was NIMAS dacron bracing. Less rubber, the model weighed .042 oz.

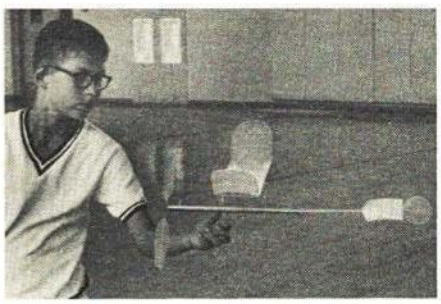
This model made a flight of 15 minutes, 56.6 seconds earlier in the day which would have been a higher record but for the timing deficiency later discovered. Unfortunately the mike-covered prop used for the long flight was broken later, necessitating the substitution of the paper-covered prop which did not serve as well.

CL ½A Proto Speed national AMA record, Junior age class: 80.69 mph, established by Terry Herron, Wichita, Kans., on June 8, 1969.

Terry's model, designed by himself, has a wing of 19¼" span by 2½" chord, stab span of 6½" x 1½" chord, and fuselage length of 12". It was built from Sig wood, Cox proto pan, and finished with Hobby Poxy. It weighed 5½ ounces.

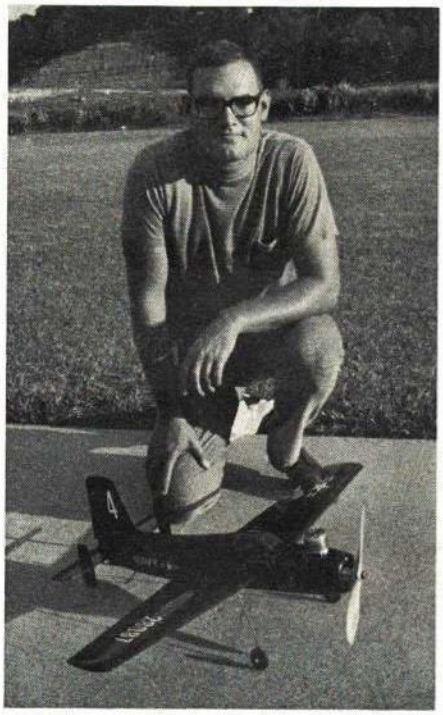
Engine was the Cox .049, polished, using his own mix fuel and swinging his own fiberglass prop of 5" diameter by 5" pitch. Fuel tank was of the bladder type from surgical tubing. Single line control was provided by a Stanzel ½A Speedmaster model unit and Stanzel handle.

Indoor Paper Stick national AMA record, ceiling category I, Junior age class: 9 minutes, 52 seconds, established by Robert Dunham II, Tulsa, Okla., on June 21, 1969.



A design of Robert's father, this model has a wingspan of 24", 3⅞" major chord; stab span of 11", 3⅜" center chord; circular rudder of 2½" diameter; motor stick length of 12", 8½" boom; prop of 14" diameter, 26" pitch — a single spar type with helical pitch. Model was constructed from Micro Dyne wood and microfilm, covered with condenser paper. Power was two strands of Pirelli .04" x .06" — 15" length. Weight of model is .103 ounce. During the record flight the model "scrubbed" the ceiling for most of the time.

CL Navy Carrier Class II, Senior age class: 571.50 points, established by Edwin Gross, Jr., on August 3, 1969.



Model was a 45-ounce Grumman Guardian designed for Carrier model competition by Gross. It has a 36" wingspan.

Power was a Rossi 60 equipped by Bill Johnson with a fuel meter and slide. It used a Fire Ball cool glow plug, Clarence Idoux Brand X fuel, 3-oz. Veco pressure tank, Rev Up 10"D x 8"P prop. Control was with a Bill Johnson custom J. Roberts system.

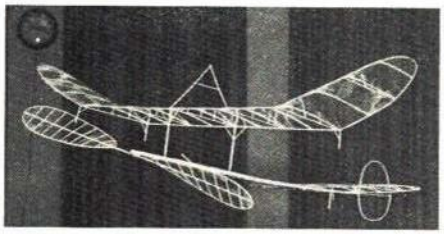
Among other products used in constructing the model were K & B wheels, Sig balsa and plywood, Ambroid glue, Hobby Poxy glue, Hobby Poxy finish.

CL C Speed national AMA record, Junior age class: 175.88 mph, established by Danny Bartley, High Point, N. C., on May 3, 1969.

The design of John Bartley, model has a wingspan of 24", 3" center chord, symmetrical airfoil; stab span of 11", 2½" center chord. Fuselage length is 17¾", Harter full pan. The model weighed 31 ounces, was finished with Hobbypoxy.

Engine was a freed-up Supertigre 65 RV ABC with Fireball cool plug, 9"D x 13½"P Rev-Up prop, pen bladder tank. Control was with the H & R torque unit and Stanzel Monoline handle.

Indoor FAI Stick national AMA record, AMA ceiling category I, Open age class: 19 minutes, 43.5 seconds, established by Thomas F. Vallee, Laurel, Md., on October 19, 1969.



The model, of Vallee's own design, has a wingspan of 25.25", 5½" center chord, smooth curve airfoil of .25" camber and high point at 40% of chord. The stabilizer has a span of 12" and 5" center chord. Fuselage length, to T.E. of stab, is 20". The prop is of monospar design, 16" D x 32" P.

Micro Dyne spar stock was used in the wing construction and .012" Micro Dyne C-grain balsa in the motor stick. Covering was Micro Dyne Type B microfilm. Power was supplied by a 14" loop of .060" Pirelli rubber. Model weighed .028 oz.

This model also established a record of 18 minutes, 48 seconds, for FAI Stick in the FAI ceiling category.

1970 RC & FF Rules

The AMA Contest Boards for Radio Control (Bill Northrop, chairman) and Free Flight (Joe Boyle, Jr., chairman) announce the following changes to rules effective January 1, 1970.

Radio Control

Pattern. The existing 1969 Pattern Event Rules remain in effect, unchanged, for 1970. However, the FAI Pattern has been added as an alternate *or* additional category for the top end of competition. It will be called Class D, and will have Novice and Expert subdivisions.

Scale. Prefabricated primary fuselages, regardless of material, have been ruled out for RC Scale. In addition, the builder and the flyer must be one and the same person — no team entries. The wing loading restriction for Class II Scale has been eliminated.

Pylon Racing. Sport Pylon will remain unchanged. In Formula I and II, pre-processing will be allowed. The minimum weight remains at 5 pounds. The two-minute engine start has been clarified to save operation time, and a statement will be added to the rules which eliminates the builder-of-the-model rule.

Free Flight

General. Entry and use of two models will be allowed for Unlimited Rubber and Rocket-powered models; entry will be permitted only once in each event (or class) at each contest. Also, flights for outdoor national records must be made between sunrise and sunset of a single calendar day, and Coupe D'Hiver has been changed from provisional to official status.

HL Glider. The max flight limit for Outdoor Hand-Launched Gliders has been reduced to two minutes.

Indoor. For Indoor Cabin cross-section compliance, the cross-section will be taken at some point on the fuselage which contains the rubber motor. For all Indoor Rubber classes, contestants henceforth will be allowed a total of five flights, all of which are official regardless of duration.

National Records. New flight records were started January 1, 1970, for Outdoor HL Gliders, Coupe D'Hiver rubber models and FAI powered models. Existing records for other categories carried over to 1970.

AMA News Bits

Calif. Tries Small Field FF Rules

We don't know what made them try it — maybe the '69 Nats FF events with 3-minute limits supplied the idea — but **Tom Hutchinson** says the San Valeers Mini-Contest with its 2-minute flight limit was a huge success. The contest by the **AMA chartered San Valeers** was held at the L.A. area Sepulveda Flood Control Basin, a contest location avoided by many flyers when 5-minute maxes were used. "You can't blame them," said Hutchinson, "since the odds were pretty good on going off the field on any max after 10 am. Even the 3-minute maxes were risky after noontime."

The gas event was run with 7-second engine runs in conjunction with the 2-minute max. Models were hand-launched for the first three flights, then maxed-out models were VTO'd for remaining flights instead of reducing engine runs. All the models flown in the Mini-Contest were regular 15-second types, and the best ones could readily max in the early morning. **Bob Vinson**, flying a ST 15-powered model put in nine 2-minute maxes before dropping one.

"The turnout was large enough (46 entries in three events) to convince us that we may have hit upon a good combination. Many people commented that we ought to do this more often, and we probably will. Who knows, the Cal-Western may be revived, now that it's been shown that free flight contests can be flown at the Basin subject to the appropriate restrictions," said Hutchinson.

AMA Opposes RC Boating on 72 mc

At press time AMA was in the process of filing a rebuttal to the Federal Communications Commission's notice of proposed rule-making which, if adopted, would expand allowable use of the 72-76 mc band to radio control operation of any kind of model, be it airplane, boat, car, etc. A claim made in the FCC proposal is "that members of the radio control modeling fraternity who race model boats and cars have exactly the same problems as those flying model airplanes." Not so, claims AMA's rebuttal. Model airplane operation seldom interferes with boats because of ground to ground transmitting conditions, but boat operation is much more likely to interfere with airplanes — a model up high is more susceptible to interference than one down low. A further contradiction is the fact that interference to an airplane is more dangerous than to a boat or car — the latter do not fall out of the sky.

By means of the AMA Monthly Mailing to chartered clubs, AMA members and clubs were urged to file comments with the FCC by the December 18 deadline.

"Mr. Open" Passes On

An interesting historical note from **Al Lewis:** "Had a call from Dan Clini (of Springfield, Mass.) who is working in, or running, a spin-off company from the Ernest Whalen enterprises (heat-treating of steel, etc.). In course of conversation, Dan reported that Whalen had died (as you may know). He credits E. W. with being "father" of the Open Class. Seems that E. W. was concerned, 'way back there somewhere, that the older chaps were being invited out of competition because there was no place for them, that potential leaders were being lost as a result. So instead of just a Jr/Sr breakdown (or whatever it was known as at the time), the over-21 group was set up."

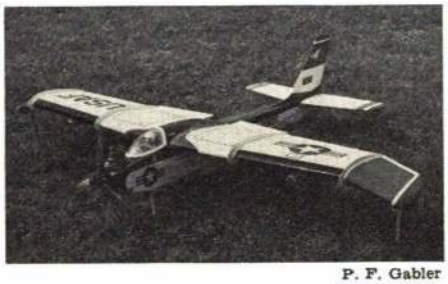
As many of you know, Al Lewis was AMA president in 1938 and then was AMA

Bob Denny

Univ. of Md.

"Mirth of July" Meet by the AMA chartered DCRC Club had interesting team pattern event. Members of 3-man teams performed prescribed maneuvers in fly-by style. AMA President John Patton, extreme L in L photo was among participants. The Univ. of Md. loaned its Cole Activities Bldg., upper R, to the DC Maxecuters for an indoor contest. Dan Belieff, R, launches "mike" model.

Jim Clem



P. F. Gabler

G. H. Schellhardt, L, Springfield, Mo., launches ½A FF Witch-Doctor X — active contest flyer. "The Thing", R, won detail award for Byron Trent, Daytona Beach, Fla., in the RCACF 9th Annual at Orlando. Jim Bonanno, Des Moines, Iowa, took RC Scale first at Omaha with scratch-built P-63A.

Andy Dickson

Frank H. Pierce

executive director from 1939 until World War II and for a brief stint afterwards. Currently he is editor of *Air Progress* magazine.

Solves Label Problem

That old bugaboo of club newsletter editors, addressing the papers after they are printed, has been solved by **Charley Reed**, editor of the **AMA chartered Kansas City Radio Control Association** monthly *Contacts*. He and other newsletter editors have found that they can get club members, who have access to certain dry copiers, to duplicate typed address lists on gummed paper which then can be clipped and pasted on the newsletters. Reed has gotten the poop on Xerox copiers — says that dry gummed paper can be used on the smaller copiers, but the larger ones print on the self-gummed labels made by Xerox. Sure saves on the handwriting!

RC Flyoff with One Plane

Writing in *Watts New*, publication of the **AMA chartered Fresno Radio Modelers** (Calif.), **Brian Ehmke** says that the **AMA chartered Valley Flyers** hosted one of the best and most interesting RC aerobatic meets of the year. National RC Champion **Larry Leonard** directed the contest and selected his judging staff from the Experts in attendance.

A special feature was a flyoff between the five top scorers, all using the same airplane! The Valley Flyers had a Lanier Citron for the event, and Kraft Systems had donated three transmitters — a single stick and a mode 1 and 2. Reportedly the ship had a sagging engine, but it was interesting to watch how the flyers compensated for this and other problems. **Leonard** came out tops in the flyoff with 682 points, followed by **Salkowski**, 672, **Oddino**, 628, **Smith**, 590, and **Ehmke**, 582. Ehmke is a Novice division flyer.

Official Shutter Bug

Seems like many club members have movie cameras, and they frequently do shoot model airplane subjects if they have their cameras handy and they are loaded with film — but this is on a catch as catch can basis. Now, we hear that the **AMA chartered Antelope Valley Tailwinds** club of Lancaster, Calif., has taken action to assure a regular program of movie-taking. According to *BLOW*, monthly paper of the club, the group has purchased an 8mm camera and projector. The results of the first movies taken with the club equipment must have been good, for **Al Grogan** was voted in as head shutter bug.

Glassy Instrument Panels

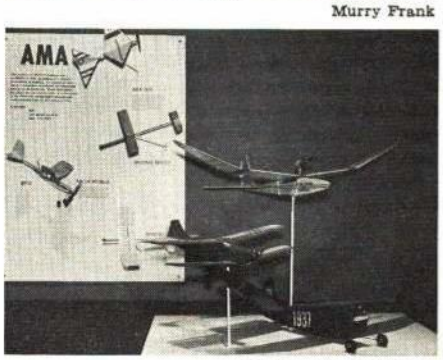
The president of the **AMA chartered Houston Radio Control Club** gave members an interesting tidbit of information on how to simulate glass-like covering on scale model cockpit instruments. Trick is to glue the instrument boards together with epoxy, using enough so it will ooze up and fill the holes cut for the instruments. When dry, the epoxy will have the appearance of glass. This information came from an article written by **Don Williams** in the club's paper, *Feedback*.

FF Team Finals

Albuquerque, N. Mex., has been selected as the site for the Team Finals planned for the 1970 Labor Day weekend. The best three flyers in each of the Wakefield Rubber, FAI Power and A-2 Nordic events will comprise the 1971 U. S. World Championship teams. The site for the Team Finals was chosen by a vote of qualified finalists from nearly a half-dozen cities, coast to coast. The first vote was indecisive, but clearly Albuquerque and Taft, Calif., were the front-runners. In the second and final vote, Albuquerque led Taft by 41 to 33. Even though the site is at approximately 5,200 feet elevation, Albuquerque flyers indicate that, likely, retrimming of models will not be necessary.

Murry Frank

Ed Lavergne



Smithsonian Institution

Upper L: With appropriate western hat, Greg Hissem (Wichita, Kans.) accepts Senior CL Championship award from Frank Paxson who represented the several Exchange Clubs which sponsored the Southwest Model Airplane Championships. Above: Members of the Pequannock (N. J.) Township High School MAC are active in CL, FF, RC and Rocketry. James Parra, extreme R, is Club Advisor. Left: Thousands and thousands of visitors to Smithsonian Institution's National Air Museum, Wash., D.C., saw a display of model airplanes this past summer prepared jointly by the museum and AMA HQ. Below L: Supertigre 56 original CL Stunt Crusader by Phil Johnson, Laurel, Md., is a good flyer. Below R: At Ft. Worth Plainsman contest in Oct., J. B. Murphy flew FF "Big Momma".

John Thornhill

Murry Frank

Many of the photographs in the AMA News section were contributed by AMA members. If your favorite type of model is not pictured, most likely none was received. Your assistance is requested in submitting interesting photos on all subjects, together with sufficient information for captions and photographer's name. Send photos (which cannot be returned) to Picture Editor, AMA HQ, 1239 Vermont Ave., N.W., Washington, D. C. 20005.

Watch Those NFFS Birds

Dell Marchant, writing in the *Minneapolis Modeler* paper of the **AMA chartered Minneapolis Model Aero Club,** says that he has discovered the reason why he lost his Class A FF Gas model high in the sky even though it had dethermalized. "I had been greedy and attached three NFFS 'birdie' decals to the model. This rendered the pop-up stab useless in the thermal this generated. So remember," said Dell, "no more than two birdies on a model!"

Introduce Yourself

. . . is the enjoinder to members of the **AMA chartered Barons Model Airplane Club** given by **Dick Carson,** president and also editor of the club newsletter, *Monacle.* "Why not go up to that stranger at the field or in one of the hobby shops and introduce yourself. Invite him to a session of the club (meeting or flying) and get him acquainted. I have found fellowship certainly brings on membership. Membership is the life fluid in our organization, and as it becomes stronger we each, individually, become so. New people bring new ideas, different solutions, better activities and welcome friends."

Earl N. Webb

With regret, we advise of the passing of **Earl N. Webb** in mid-1969. He had been instrumental in modifying Merco 49 and 61 engines for much longer life spans. These engines were used by **Maynard Hill** on several of his FAI World Record attempts.

MAAC Using AMA Cub

Word from AMA's counterpart up north, the **Model Aeronautics Association of Canada,** is that last December and January they put on a Junior program patterned around the AMA Cub rubber-powered model, but with MAAC wing imprints and MAAC material in the kits. Special trophies were provided for the 10 best performances in the program from throughout Canada.

Also, the MAAC has revised its dues structure for 1970. The rate for Juniors was lowered from $3.00 to $2.00, while the Open rate went from $6.00 to $8.00. Seniors pay $4.00. Canadians interested in MAAC membership may secure an application by writing to P. O. Box 10, Islington, Ont., Canada.

Poker Chips for FF Contest

Lee Polansky, president of the **AMA chartered San Valeers** club (Calif.), says they have tried using poker chips as an aid to "time a flight, fly a flight," in local club meets. The gimmick is to pay your timer with a poker chip so that he will then have a chip to pay for his next flight. The club bought a hundred low cost chips and printed "San Valeers" on the center of each before using them.

"With this kind of setup it is possible for two or three flyers that want to fly and not anyone of them with a chip to pay the other," said Polansky. "In that case simply give the other guy credit, and he will pay you a chip later in the day." He credits the **AMA chartered Dallas Cloud Climbers** (Tex.) with the idea.

RC Club Encourages Youngsters

Members of the **AMA chartered S.I.R.S.** (Central Illinois Radio Society) recently amended the constitution of the club to allow youngsters under age twelve into the club membership. Such members will be required to have an AMA license, pay one-half the regular membership dues, be sponsored by an adult member of the club, and will need to have an adult member present and responsible the entire time they are flying at the field.

Modelers from the Sooner state and five others came to Oklahoma City last October 18-19 to compete in 29 static display events plus nine control line flying competitions. Randy McGee was Contest Director of the AMA sanctioned First Annual Model Fair.

Under sponsorship of the Oklahoma Science and Arts Foundation, the fair with over 2,000 paid admissions was judged to be a huge success. The Second Model Hobby Fair has already been set for October 17-18, 1970. More space is planned for static displays and audience participation in the AMA Cub building and flying event.

Too many prize winners to list all or show their pictures — here are a few. At upper left is Larry Hampton, Arlington, Tex., who flew this tin-can-wing CL model a half lap for "odd flying thing" first place. In RC Scale Pat Massey, Ponca City, Okla., upper right, weathered stiff competition to place first with his WW I Bristol. Below left, Jim Belson's Climax I won the FF design competition. Below right is Alan Bushe, Oklahoma City, right in photo, who took Open CL Goodyear; with him is flying partner Lester Burry. In addition to manufacturer displays and flying exhibitions, a big part of the Hobby Fair was a flying contest for the AMA Cub rubber-powered model inside a large building at the Oklahoma City Fair Grounds. Building instructions were provided to more than 500 youngsters the day before the contest.

AMA News Extra .....

RADIO CONTROL AEROBATICS WORLD CHAMPIONSHIP TEAM PROGRAM

The three-man U.S. RC Aerobatic Team for the 1971 FAI World Championship in England will be selected by means of a Team Finals flying competition planned for the weekend of September 26-27, 1970, at a reasonably central U.S. location. To be admitted to the Team Finals will be approximately 30 qualified flyers from throughout the U.S., plus the 1969 Aerobatic Team which is automaticallly qualified. The Team Finals entry fee is expected to be in the area of $10 to $25, depending upon the degree of sponsorship which may be obtained.

Two Ways to Qualify for the Team Finals:

1. By accumulating points at AMA sanctioned meets (other than the Nats). Approximately 20 flyers may qualify for the Team Finals by this means. The system of point accumulation (similar to that used for the 1969 Masters Tournament sponsored by the Radio Control Industry Assn.) provides for an "Event Point" base of one point per contestant entered (in either Class C Expert or Class D Expert) at each AMA sanctioned AA or larger meet held from May 2 through September 7, 1970. Winning first place earns 50% of the Event Points, second earns 30% and third earns 20%--no points below third. Also, 10% of the Event Points are added if a muffler was used as is required for FAI RC World Championships, and an extra 10% of the Event Points are added if the event was Class D (FAI). Thus, a second place contestant with a muffled engine in a Class D event with 50 entrants would earn 15 + 5 + 5 = 25 points. In the unusual case that both Class C and D Expert events are held at one contest, and a flyer places in both, he may submit certification forms for both, but only the higher point score will be credited.

Entry in this part of the program may be made in either of two ways: a. By mailing $5 Advance Entry Fee to AMA HQ identified as "RC Team Selection", postmarked no later than May 1, 1970; b. After May 1 and up to and including Labor Day, September 7, 1970, by sending $20 Late Entry Fee to AMA HQ.

Program participants who mail in entry fees will recieve certification forms which they will need to have signed by Contest Directors of meets in which the contestant has placed in the top three. A Late Entry, as per "b", will be permitted to have points counted for one, but only one, meet in which he placed prior to the program entry--all other points must be scored in meets held after the date of entry postmark. It will be the contestant's responsibility to obtain certification for placing in these meets and submitting same to AMA HQ.

2. By National Contest performance. The 10 top Nats RC Pattern flyers who have paid a special $10 FAI Team Fee (in addition to regular Nats entry fees), prior to Nats flying, will be qualified for the Team Finals. Such fee is to be paid at the Nats prior to the start of the Pattern event. The special fee will not apply to the point system part of the program, nor will point system fees apply toward the Nats special fee. Nats placing will not count toward the point accumulation part of the program.

NEW CONTROL LINE RULES FOR 1970

Speed: A new anti-whipping rule provides for two whipping fouls in an event to disqualify all flights in that event. ½A Proto Speed: When this event is conducted as a Junior-only profile event, then only two-line control systems shall be allowed. B Proto Speed: Profile models will be permitted, but only for Junior contestants in Junior-only or combined events. Class C Speed: For Juniors only, engines will be limited to those of from .301 to .400 cu. in. displacement. Sport Speed was adopted as a supplemental event, designed to encourage the beginning speed flyer in an event where commercially available engines and fuels will be competitive; main requirements are for commercially available engines (including all component parts) which have no intake or exhaust extensions and are of .1525 cu. in. displacement maximum, two-line control having 52½' line length and .012" wire diameter, sport-type fuel to be supplied by the Contest Director.

CL Scale: New minimum control wire diameters will follow those specified for Stunt when models weigh under four pounds; 4-10 lbs. the minimum two-line wire diameter is .018" (.024" single); over 10 lbs. the minimum two-line diameter is .021" (.031" single). Stunt: The minimum diameter of the control line(s) according to engine displacement was revised to .018" one-line, .012" two-line for .201-.250 cu. in.; .020" one-line, .015" two-line for .251-.440 cu. in.; and .024" one-line, .018" two-line for .441-.650 cu. in. (no change for engines up to .200 cu. in.). Navy Carrier: The Contest Board has issued an interpretation regarding the landing signal: The signal of the pilot's intent to land shall be given as the model crosses the deck beginning his lap prior to landing; if other than a hand signal is used, the pilot shall describe his signal to the official immediately prior to each of his flights. Dive Bombing and Strafing: New minimum control wire diameters will follow those specified for CL Stunt.

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

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

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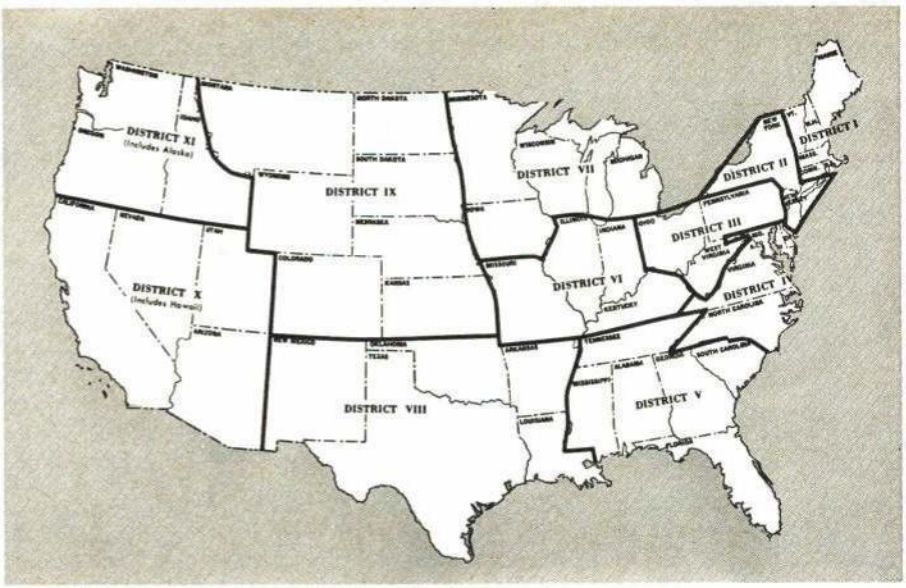

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Follow AMA Rules

District Meetings

Continued from page 45

V.P. **John Blum** (Granite City, Ill.), FF & CL Contest Coordinator **Whalon Webb** (Harvey, Ill.), RC Contest Coordinator **Al Signorino** (Bridgeton, Mo.), Control Line Contest Board Member **Art Johnson** (Rockford, Ill.), Radio Control Contest Board Member **Bud Atkinson** (Blue Springs, Mo.). **National officers:** AMA Safety Committee Chairman **Ed Henry** (Berkeley, Mo.), AMA Executive Director **John Worth** (Washington, D. C.). **Former AMA officers:** previous District VI V.P. **Bill Weaver** (St. Louis, Mo.), previous District VI FF Contest Board Member and Safety Committeeman **Carl Fries** (Crestwood, Mo.). **Other area leaders: Bob Underwood** (St. Louis, Mo.), **Art Schaefer** (St. Louis, Mo.), **Travis McGinnis** (University City, Mo.). **Clubs represented: McDonnell** (RC), **Aero Angels** (CL), **Yellow Jackets** (CL), **Signal Chasers** (RC), **Model Masters** (CL), **Thermaleers** (FF), **Phantom Flyers** (CL), **Sky Steelers** (CL), **Spirits** (RC), **Thunderbolts** (CL), **Throttlemasters** (RC), **Hot Heads** (CL), **Aeromodelers** (CL), **Kansas City** (RC), **Greater St. Louis Model Association** (all interests).

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

Feb. 7-8 — Green Bay, Wis. Winter FF Jamboree. Site: Frozen Green Bay. R. Cowles, CD 2424 Ducharme Lane, Green Bay, Wis. 54301. Sponsor: **Green Bay R.U.F. Club.**

Feb. 21-22 — Buckeye, Ariz. (AAA) Southwestern Regional FF, CL & RC Model Airplane Championships. Site: Buckeye Airport. J. Valenta, CD 3041 E. Shangrila Rd., Phoenix, Ariz. 85028. Sponsors: **Air-Zona MAC, Arizona RC Society.**

May 3 — Council Bluffs, Iowa (AA) Midwestern CL Spring Warm-up. Site: Iowa School for the Deaf. J. Dreier, CD 1918 Avenue R, Council Bluffs, Iowa 51501. Sponsor: **Balsa Busters.**

May 23-24 — Sumter, S. C. (A) 1970 Iris Festival RC Invitational Meet. Site: County Airport. R. Thompson, CD P. O. Box 621, Sumter, S. C. 29150. Sponsor: **Sumter Model Airplane Club.**

June 6-7 — Nashville, Tenn. (AAA) 7th Annual RC Midsouth Championships. Site: Percy Warner Park. B. Reuther, CD 216 Vaughns Gap Rd., Nashville, Tenn. 37205. Sponsor: **Middle Tennessee RC Society.**

June 14 — Council Bluffs, Iowa (AAA) 7th Annual CL Midwestern Model Airplane Meet. Site: Iowa School for the Deaf. D. Hutcheson, CD 317 Spencer, Council Bluffs, Iowa 51501. Sponsor: **Balsa Busters.**

June 17 — Valley Park, Mo. (AAA) Greater St. Louis Modeling Assn. FF, CL & RC Meet. Site: Buder Park Model Field. J. Blum, CD 2417 Glen Pl., Granite City, Ill. 62040.

Aug. 29-30 — St. Charles, Mo. (AA) Thirteenth Annual McDonnell RC Meet. Site: Conductron Plant. W. Feldmeier, CD 2955 Clearview Dr., Normandy, Mo. 63121. Sponsor: **McDonnell RC Club.**

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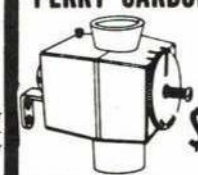

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PBY-2 Catalina

Continued from page 43

but after the model is assembled and painted, it would be difficult to tell the difference.

The interior of the fuselage can now be painted with Pactra Chromate Green. After the paint is dry, remove the window masking from the *interior* of the sliding hatches. Do not remove the masking tape from the exterior of the sliding hatch windows. Cement all windows in place. You'll need four additional windows for the new window openings that were cut into the fuselage. Plexiglas is a good material to use for the additional windows.

Cement the fuselage halves together, clamp, and allow the fuselage to dry thoroughly before working any more on it.

Remove the PBY-5a rudder. The cut should make the vertical stabilizer look like the PBY-2 vertical stabilizer. Make a PBY-2 rudder from 0.1" sheet styrene. Cement the new rudder in place. Build the rudder up to the contours of the vertical stabilizer by using Duratite and body putty. After the vertical stabilizer and rudder assembly have been sanded smooth, new rudder and trim tab lines should be scribed on to the rudder.

Cement the nose gear doors into place in a closed position. Fill the gaps around the doors and sand smooth.

Cement the horizontal stabilizers into place. Fill in any seams.

Attach the cockpit canopy to the fuselage. I've found that a white glue (such as Elmer's) is easier to control than styrene cement when attaching clear styrene parts to a model. After the canopy has been attached, mask off all of the windows on the fuselage and the turret top. Paint these masked areas with Pactra Interior Green.

Drill two 1/8" holes in the wing leading edge. The holes should be 1/2" from the outboard edge of the engine nacelle. The center of each hole should be slightly below the seam on the wing leading edge.

Cut four 9/16 x 3/32 x 0.01" plastic strips. These strips are the runners for the sliding hatches and should be attached to the fuselage in front of the sliding hatches.

Fabricate two new intake scoops from 0.08" thick sheet styrene. Glue one of these scoops to the top of each engine nacelle. Drill out the exhaust stubs on each engine nacelle.

Assemble the rest of the plane according to the kit instructions except for the loop antenna, forward turret, engines, cowlings, and propellers. These items go on after the model has been painted and decals have been applied.

Beaching gear can be made from brass rod and flat stock. The supports on the main gear are made from 7/8" lengths of 1/16" diameter brass rod. The tops of these supports should be bent inward so that they come in contact with the bottoms of the forward wing struts. Slight indentations should be cut into the points where the forward wing struts attach to the fuselage to help the beaching gear stay in position. The two main beaching gear supports are joined by soldering them to a 1 3/4 x 1/16 x 0.02" piece of brass. This piece should be shaped to the contours of the hull bottom. While the actual beaching used for the pre-amphibian Catalinas was not joined together, I found that the connecting piece was necessary for strength. Solder a 1/2 x 0.02" diameter piece of brass rod to the center point of the connecting piece. Drill a small hole (0.03") in the hull to receive this addition to the connecting piece, and the main beaching gear will stay in place rather nicely. The rear beaching gear is made from 1/32" diameter brass rod. All beaching gear axles are 0.02" brass rod. Wheels can

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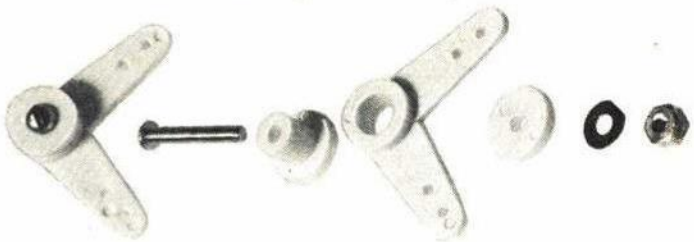

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be obtained from old kits or from dime store toys.

I finished and marked my PBY-2 the same as the one shown in Profile 187, "The Consolidated PBY Catalina." I used gloss paints for the orange visibility panel, the black hull and float bottoms, and the overall silver finish. The red chevron, white chevron outline, red elevator and rudder stripes, and black outline strips were cut from solid color, gloss finish decals. The "U. S. NAVY" that appears near the rudder is from an A.I.R. decal sheet. The national markings and all other letters and numerals are from Micro-Scale decal sheets. The VP-11 squadron insignia was handpainted on a piece of decal film. After assembly (but prior to removing the masking tape from the windows) the whole model, except the propellers, was sprayed with Walther's DDV Flat Finish. When all paints are dry, attach the engines, propellers, and cowlings to the nacelles. Then glue the loop antenna to the top of the greenhouse. Make an aerial from fine wire, string it from wing tip to rudder, to wing tip, and your PBY-2 is ready for display.

M. K. Sportster

Continued from page 39

Use masking tape to hold celluloid sheets in place while glue sets. Finally, epoxy wing dowels ($^3/_{32}$" dia. wire) in position.

Flying: Before flight attempts, check center of gravity location and be sure that the model absolutely is free of warps. Test-glide the model before flying with power. Hand-launch the model — preferably over tall grass. If any sign of "hanging flight" or nose-heaviness, correct it by slight alteration in stabilizer incidence. Not more than $^1/_{16}$" shimming should be permitted. Beyond that, correct by lead ballast to shift CG location.

For initial power-flights, use engine running at reduced speed. Time your engine run so first test is made with not more than 8-10 seconds of fuel. Flight-trim the model for a moderate climb and a slight turning tendency. For high-wing cabin designs, the normal flight pattern is left under power and right during glide. Do not forget to put your name and address on the model.

Flyangle

Continued from page 15

add the wing mounts. The rear (short) mount glues on the underside of the wing trailing edge, while the front (tall) mount glues on the underside of the small cross-pieces just aft of the wing leading edge. After the mounts have dried, put a little extra glue into the crack along the bottom side of the wing dihedral joint.

The wing is held in place on the fuselage with two rubber bands. **CAUTION:** Do not use excessively strong rubber bands, or the lower longeron may be broken. Only a small amount of tension is needed to hold the wing securely in position.

Flying: Check the wings and tail surfaces to be sure that they are not twisted. Happily, the nature of triangular planforms is such that warps do not cause as serious a problem as would the same amount of deflection on a normal wing design, but severe warps or twists should be eliminated.

The power requirements of individual models vary, depending upon the choice of propeller, and the weight. Ours performed well on a single loop (two strands) of $^1/_8$" flat brown rubber, but it is recommended that you try different sizes and brands until you arrive at the best combination for your particular aircraft. A stuffing stick is the easiest way to insert the rubber motor. It consists of a hard balsa $^1/_8$"-sq. strip about

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a foot long, with wires bound and glued on one end. With it, the rubber loop can be inserted from the front of the model. If this system does not work well for you, you may prefer the old-timer's approach of leaving one fuselage space uncovered behind the rubber retaining peg. A small weight on a piece of thread may then be used to pull the rubber loop through the fuselage.

Since the model is rather light, test flying should be performed on a calm day, and if possible, over a soft landing field of some sort. Even an ordinary lawn is more gentle to models than such unyielding surfaces as asphalt or concrete! When gently launched from shoulder height in a slight nose-down attitude, the model should neither dive nor stall. If it does dive, slide the wing forward on the fuselage. If the model stalls, slide the wing toward the tail. A ⅛" movement should be enough to make a noticeable difference. If the model tends to fall off on one wing, a simple cure is to affix a small lump of modeling clay to the opposite wing tip.

When a fair glide has been achieved, try winding in 50-60 turns of the prop and giving the model a gentle hand launch. It is likely that a little right-thrust may be needed. This is obtained by inserting a sliver of wood between the nose block and F1, so as to point the propeller slightly toward the right, as viewed from the rear of the model. Additional down-thrust might also be needed, and a sliver of wood at the top of the nose block will provide it. As power is increased, small changes in the wing position and/or thrust shims may be indicated. Perform only one adjustment at a time, so that you will know what *not* to do, if things get worse! Once your adjustments are just right, it is suggested that the thrust shims (if any) be glued permanently in place, and that a mark be drawn on the fuselage to record the best location of the wing. This is so that if the wing is shifted or dislodged, it can be returned to the correct position.

Remember to give "Delta Dan" part credit for your good flights — you can tell by his nose that he is a sharp pilot!

Make Your Own Twin

Continued from page 25

my size requirements for these kits. The bronze bearing could be used with an aluminum connecting housing but would require some special keying or similar device to hold the bearing halves properly in place.

I could not find 1¾" diameter bronze bearing material for the crankcase-connecting housing. To overcome this, I used a piece of 1¾" brass and silver-soldered a 1" diameter core of bronze in place before machining. The ½" diameter sleeve and ⅛"-square rod for the carburetor attachment housing and screw boss were soft-soldered in place.

The rear crankcase cover of the standard 29R incorporates the disc rotary valve, both of which are used to "pack" the crankcase. The rear cover of the 35 is very deep and serves the same purpose. I had planned to use an aluminum or plastic plain rear-rotor plate to serve in "packing" the rear crankcase. I found that the K&B 45 R/C engine has a rear counter-balancing rotor that does fit in the 29R or 35 crankcase. The only modification required is to widen the crankpin slot to .218" to accommodate the crankpin of the connecting shaft. I have found very little vibration in any of the three engines.

All the screws used on these engines are hex-drive cap screws. When attaching the crankcase-connecting housing to the crankcases, you will need to cut down a hex wrench to fit between the flanges of the

connecting housing. All other tightening is plain and simple.

In running the engines, I have tested them in an E-Z-Just stand holding only the front crankcase without undue vibration noted. I would recommend, however, that you fasten down both crankcases. It is possible to start by hand-flipping, but this can be tiring. I find that I can start both 29R twins in 30 seconds using an electric starter. Attach glow leads in parallel, close needle valve, spin starter and open needle valve until the engine fires. You have only to hear it to know when both cylinders are firing — this cannot be described.

There is only one undesirable feature of a twin with a single carburetor. As you probably know, very few engines operate on exactly the same carburetor-needle valve setting. You are limited to the latitude of needle-valve adjustment permissible because one cylinder will starve before the other, and then the reverse will be true, that one cylinder will be too rich before the other. For best results, I borrowed a stunt used by some of the Carrier boys and have a small battery keeping the plugs hot during operation with variable speed.

The pure power of these twins with alternate firing is worth all the time involved in making the conversion kit.

1916 B&W Biplane

Continued from page 21

pect her to fly somewhat slowly (about 40 mph), gracefully, and realistically antique, and you will love her.

This model has a poorer glide ratio and higher sink rate than one might expect for its relatively light wing loading — perhaps because of the drag of all the rigging and the floats. Therefore, plan your approaches on the high side, especially if coming in dead-stick. Trying to stretch the glide by holding the nose too high is a "no no." But when you are nearly down, it will take all the elevator you've got to flair it out well, so pull the stick clear back and don't be too slow about it or the plane will "bounce."

At full power it lifts off readily and makes a gentle climb-out just like full scale. Don't be in a hurry to get it airborne. Too much up elevator before it has good flying speed, or when the engine is too rich or sick, will result in a snap-roll. Use an 11-6 prop with a 60, not an 11-8. My Veco 61 is quite adequate for this model but an even larger engine would be interesting. If you have an 80, try it.

Fly the model partly throttled back when you are just cruising around. A throttled engine is a quieter engine, with or without muffler. A screaming unmuffled 60 isn't exactly scale sound for a low-powered 1916 "aeroplane," but the sound of a muffled engine purring along partly throttled fits this big classic bird very well.

The water rudder coupled to the air rudder, and extending below the tail float, is not to scale. If you don't like the looks of the water rudder, leave it off. You can steer while taxiing with the air rudder only, but you may have more trouble taxiing cross-wind. At low taxi speeds, short bursts on the throttle will put blasts of slipstream on the air rudder, which greatly helps to turn the model.

The float cores (including tail float) are hot-wire cut from wing-quality plastic foam. Each core is initially cut like a wing core, with a template on each end of the block. The curvature of the bottom at the bow, the step and angled-up bottom aft of the step, and the angled transom, are then wire-cut by taping templates and straight-edged rulers or strips of metal on the sides and bottom.

The grooves for the wood inserts can be whittled with razor blade, saw and chisel,

Continued on page 62

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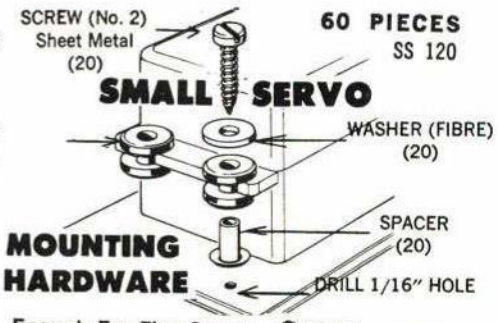

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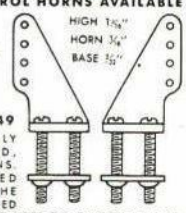

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For clean fool-proof coupling. Designed for use on the Du-Bro Kwik-Link. Brass. 1 1/4" overall with 3/4"—2-56 thread. 1/16" opening for piano wire or cable. **Cat. No. TC-25**

DU-BRO SOCKET HEAD BOLT & BLIND NUT SETS

For those who prefer socket head bolts. 4 ea. bolts, flat washers, lock washers and blind nuts plus one Allen wrench per set. (11 pcs.) Two sizes:

SET 98¢

Cat. No. SH4—4-40 x 1"
Cat. No. SH6—6-32 x 1"

LONG WRENCHES

6 INCH REACH

Allen-type for those hard-to-reach places. Fits all Du-Bro socket head cap screws. Fine for bench and field box

LW98, pair . . 98¢

The Original DU-BRO KWIK-LINK

EACH 49¢

Control Yoke Assembly for any control linkage. Allows easy removal for on-the-field adjustments. 4" rod. Split coupling sleeve. **Cat. No. KL-49**

12" KWIK-LINK Cat. No. KL-12 49c

DU-BRO KWIK GLOW KG-200 GLO-PLUG CONNECTOR

THE IDEAL GLOW PLUG R/C ENGINE CORD SET. SLIM 1 1/4" BY 3/8" ONE PIECE BRASS BARREL SNAPS ON TO PLUG. NO FLIMSY SPRINGS OR CONNECTIONS. WIRES FIRMLY ANCHORED IN TOUGH PLASTIC — CAN'T JERK OUT. EXCELLENT ACCESSORY FOR TODAY'S KIND OF R/C MODELER. ENGINES, .10 AND UP. APPROX. 24 1/2" LONG.

KG-200 WITH ATTACHED BATTERY LUGS $2.00

DU-BRO BLIND MOUNTING NUTS ★

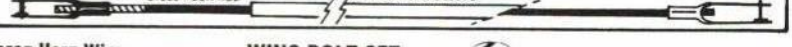
Can be used on 1/8" plywood (without sticking thru) and thicker. 4 per pkg. 4 thread sizes:

Cat. No. BN256 (2-56)
Cat. No. BN348 (3-48)
Cat. No. BN440 (4-40)
4 EACH 20¢

Cat. No. BN632 (6-32) 4 for 25c

Du-Bro NY-STEEL KWIK-ROD ASSEMBLY KR30® ★

No Shrink, No Stretch. Free-running, micro-adjustable at control horn. Great strength, simple and easy to install. Hot, wet or cold days won't affect trim setting. Best available. Complete 31" assembly with Kwik-Links. ONLY $1.49



DU-BRO SERVO MOUNTING HARDWARE PACK

Hardware for one servo—4 ea. bolts (3-48), washers, spacers and blind nuts. **Cat. No. SM-55**

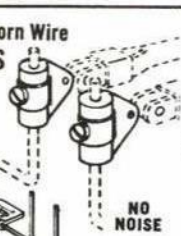
SET 55¢

FIVE PACK ALSO AVAILABLE:
Ideal for multi-channel—enough hardware for 5 servos. **Cat. No. SM-239 $2.39**

Strip Aileron Horn Wire CONNECTORS

Natural nylon fittings simplify servo link hook-ups

AH79 . . 79¢



AILERON HORN WIRES

Set of 2 horn wires and 2 mounted nylon bearings

LB89 . . 89¢

WING BOLT SET

Nylon bolts and threaded blocks. 22 PIECES

WB2 . . $1.25

GEAR STRAPS

LANDING GEAR FASTENERS 12 PIECES

GS25 ONLY 25¢

2 EACH 75¢

DU-BRO KWIK-LINK CLEVISES

The tried and true spring steel clevis used on the Du-Bro Kwik-Link. Ideal for any control linkage. **Cat. No. KL-75**

P.S. For best service, see your dealer. If not available write direct.

or can be hot-wire cut much more neatly with formed copper-house-wire "bits" in a solder gun operating at reduced voltage. Epoxy the wood inserts into the core slots and sand the surfaces flush before skinning.

The float skin I used was .015 thick hardwood veneer (single ply) with a paper layer on the back to keep it from splitting. I found it in a local hardware store where it is sold to do-it-yourself furniture makers. If you can't get mahogany, take what you can get and stain it mahogany. If you can't locate any thin veneer, cover the float tops with 1/64 or 1/32 model plywood or with 1/16 balsa and paper or silk. Stain them mahogany and varnish. Polyurethane varnish is very good with any skin material (Surethane, Varathane, etc.), but regular exterior or spar varnish will do, or clear butyrate dope. Apply two good coats of varnish on the inside of the veneer before you cement it to the foam cores. Observe this or you will have a sorry looking pair of floats after a few flights. Water will get inside and swell the veneer, causing it to wrinkle badly.

To stick the wood skin on the cores, use your favorite foam-wing-skinning cement; 3M's Scotch Grip No. 77, or 3M Fast Grip No. 30, are good. Core Grip does not adhere well to the urethane varnish on the veneer. Don't use anything that couldn't dry inside the skin such as white glue or model cement. Some cements would dissolve the foam.

The deck fittings are fastened with wood screws into wood blocks cemented into the foam beneath the top skin of the floats. By removing these screws, the floats may be taken off the strut assembly. Before skinning, wrap a piece of paper around the top of each float, label the papers "left" and "right" (float), mark the position of the step and transom bottom corners on the paper, and punch through the paper into the float mounting holes in the top blocks. Save these paper templates to locate the positions to pierce the skin and expose the screw holes after skinning. Remember to carefully vacuum-clean the core assembly before applying the contact cement. Any dust on the surface will reduce the bond strength.

After skinning the floats, put reinforcing and sealing tape on the joints between the sides and the bottoms. This is ½"-wide cotton seam binding from the dime store. Dye it to match your float skin, fold and iron it flat along its centerline to crease it, then bond it to the joints with the varnish or dope you finish the floats with. Put about four coats of finish over everything, including the tape.

Besides the simplicity, light weight, and good strength of foam-core floats, they have the added advantage of being permanently buoyant. This kind of foam is closed-cell. Any joint leaks can let water into small spaces between foam and skin and add

SIG FIRST IN BALSA AND MODEL SUPPLIES

2 New SIG R/C kit designs

SIG 'AAA' BALSA — NEW PRICE LIST

SHEETS

36" LENGTHS

1/32 x 2	20c
1/16 x 2	23c
3/32 x 2	26c
1/8 x 2	31c
3/16 x 2	36c
1/4 x 2	46c
3/8 x 2	52c
1/32 x 3	32c
1/16 x 3	32c
3/32 x 3	40c
1/8 x 3	45c
3/16 x 3	54c
1/4 x 3	72c
3/8 x 3	85c
1/32 x 4	45c
1/16 x 4	45c
3/32 x 4	49c
1/8 x 4	63c
3/16 x 4	72c
1/4 x 4	80c
3/8 x 4	1.08
1/32 x 6	98c
1/16 x 6	98c
3/32 x 6	1.12
1/8 x 6	1.17
3/16 x 6	1.26
1/4 x 6	1.40
3/8 x 6	1.70
1/32 x 8	1.25
1/16 x 8	1.25
3/32 x 8	1.35
1/8 x 8	1.40
3/16 x 8	1.55
1/4 x 8	1.75
3/8 x 8	1.95

48" LENGTHS

1/32 x 3	43c
1/16 x 3	43c
3/32 x 3	54c
1/8 x 3	60c
3/16 x 3	72c
1/4 x 3	89c
3/8 x 3	1.24
1/16 x 4	62c
3/32 x 4	68c
1/8 x 4	80c
3/16 x 4	94c
1/4 x 4	1.05
3/8 x 4	1.38
1/16 x 6	1.35
3/32 x 6	1.46
1/8 x 6	1.56
3/16 x 6	1.68
1/4 x 6	1.87
3/8 x 6	2.20

36" LENGTHS

CONTEST 4-6 LB. STOCK

1/32 x 3	37c
1/16 x 3	37c
3/32 x 3	45c
1/8 x 3	50c
3/16 x 3	59c
1/4 x 3	78c
3/8 x 3	92c

C-GRAIN 8-12 LB. STOCK

1/32 x 2	26c
1/16 x 2	28c
3/32 x 2	31c
1/8 x 2	36c
3/16 x 2	41c
1/4 x 2	51c
3/8 x 2	57c
1/32 x 3	6c
1/16 x 3	36c
3/32 x 3	44c
1/8 x 3	49c
3/16 x 3	58c
1/4 x 3	76c
3/8 x 3	89c

V-H STOCK 12 LB. OR MORE

1/16 x 3	36c
3/32 x 3	44c
1/8 x 3	49c
3/16 x 3	58c
1/4 x 3	76c
3/8 x 3	89c

STRIPS

36" LENGTHS

■ 1/16 SQ.	3c
1/16 x 1/8	3c
1/16 x 3/16	4c
1/16 x 1/4	6c
1/16 x 3/8	7c
1/16 x 1/2	10c
1/16 x 3/4	12c
1/16 x 1	15c
■ 3/32 SQ.	5c
3/32 x 3/16	5c
3/32 x 1/4	6c
3/32 x 3/8	7c
3/32 x 1/2	10c
3/32 x 3/4	13c
3/32 x 1	17c
■ 1/8 SQ.	5c
1/8 x 3/16	5c
1/8 x 1/4	7c
1/8 x 3/8	10c
1/8 x 1/2	12c
1/8 x 3/4	16c
1/8 x 1	20c
■ 3/16 SQ.	8c
3/16 x 1/4	10c
3/16 x 3/8	12c
3/16 x 1/2	16c
3/16 x 3/4	19c
3/16 x 1	22c
■ 1/4 SQ.	13c
1/4 x 3/8	15c
1/4 x 1/2	18c
1/4 x 3/4	24c
1/4 x 1	30c
■ 5/16 SQ.	15c
5/16 x 3/8	20c
5/16 x 1/2	25c
5/16 x 5/8	30c
5/16 x 1	35c
■ 3/8 SQ.	18c
3/8 x 1/2	28c
3/8 x 3/4	32c
3/8 x 1	40c
■ 1/2 SQ.	27c
1/2 x 3/4	36c
1/2 x 1	45c
■ 5/8 SQ.	32c
5/8 x 1	42c
■ 3/4 SQ.	42c
3/4 x 1	52c

48" LENGTHS

■ 1/8 SQ.	7c
1/8 x 1/4	10c
1/8 x 1/2	16c
■ 3/16 SQ.	11c
3/16 x 1/2	22c
3/16 x 3/4	26c
■ 1/4 SQ.	18c
1/4 x 1/2	24c
1/4 x 3/4	32c
■ 5/16 SQ	20c
■ 3/8 SQ.	24c
3/8 x 1/2	31c
3/8 x 3/4	42c
■ 1/2 SQ.	36c
1/2 x 3/4	49c

36" LENGTHS

SHAPED L.E.

3/8 x 1/2	28c
1/2 x 1/2	32c
3/4 x 3/4	50c
1 x 1	72c

SHAPED T.E.

1/8 x 1/2	17c
3/16 x 3/4	20c
1/4 x 1	26c
5/16 x 1-1/4	31c

TRIANGULAR CUT

1/4 SIDES(X)	17c
3/8 SIDES(X)	22c
1/2 SIDES(X)	26c
3/4 SIDES(X)	36c
1 SIDES(X)	48c

BLOCKS

3" LENGTHS

■ 1 SQ.	6c
1 x 2	12c
2 x 2	16c
1 x 3	16c
2 x 3	23c
3 x 3	36c

6" LENGTHS

■ 1 SQ.	12c
1/2 x 2	14c
3/4 x 2	18c
1 x 2	22c
1-1/2 x 2	26c
2 x 2	30c
1/2 x 3	20c
3/4 x 3	28c
1 x 3	31c
1-1/2 x 3	38c
2 x 3	42c
3 x 3	70c
1/2 x 4	30c
3/4 x 4	35c
1 x 4	40c
1-1/2 x 4	52c
2 x 4	62c
3 x 4	90c
1/2 x 6	44c
3/4 x 6	50c
1 x 6	59c
1-1/2 x 6	82c
2 x 6	92c
3 x 6	1.35

12" LENGTHS

■ 1 SQ.	22c
1/2 x 2	28c
3/4 x 2	35c
1 x 2	42c
1-1/2 x 2	50c
2 x 2	60c
1/2 x 3	38c
3/4 x 3	54c
1 x 3	60c
1-1/2 x 3	73c
2 x 3	89c
3 x 3	1.35
1/2 x 4	59c
3/4 x 4	67c
1 x 4	79c
1-1/2 x 4	99c
2 x 4	1.20
3 x 4	1.79
1/2 x 6	86c
3/4 x 6	99c
1 x 6	1.15
1-1/2 x 6	1.60
2 x 6	1.84
3 x 6	2.69
1/2 x 8	94c
3/4 x 8	1.17
1 x 8	1.50
1-1/2 x 8	1.75
2 x 8	2.16
3 x 8	3.10

18" LENGTHS

■ 1 SQ.	31c
1 x 2	63c
2 x 2	90c
1 x 3	92c
2 x 3	1.35
3 x 3	2.03
1 x 4	1.18
2 x 4	1.80
3 x 4	2.70
1 x 6	1.73
2 x 6	2.75
3 x 6	4.00
1 x 8	2.25
2 x 8	3.25
3 x 8	4.65

24" LENGTHS

■ 1 SQ.	44c
1 x 2	84c
2 x 2	1.20
1 x 3	1.20
2 x 3	1.80
3 x 3	2.75
1 x 4	1.58
2 x 4	2.40
3 x 4	3.58
1 x 6	2.30
2 x 6	3.65
3 x 6	5.36
1 x 8	3.00
2 x 8	4.30
3 x 8	6.20

★ SECOND GRADE SHEETS

36" LENGTHS

1/32 x 3	18c	1/8 x 3	25c
1/16 x 3	18c	3/16 x 3	29c
3/32 x 3	22c	1/4 x 3	38c
		3/8 x 3	48c

PLANKS

36" LENGTHS

■ 1 SQ.	60c	1 x 3	1.75	3/4 x 6	2.95
1/2 x 2	85c	1-1/2 x 3	2.20	1 x 6	3.45
3/4 x 2	1.05	2 x 3	2.65	1-1/2 x 6	4.75
1 x 2	1.26	3 x 3	4.05	2 x 6	5.50
1-1/2 x 2	1.50	1/2 x 4	1.75	3 x 6	7.00
2 x 2	1.75	3/4 x 4	2.00	1/2 x 8	2.80
1/2 x 3	1.08	1 x 4	2.25	3/4 x 8	3.50
3/4 x 3	1.67	1-1/2 x 4	2.95	1 x 8	4.50
		2 x 4	3.55	1-1/2 x 8	5.25
		3 x 4	5.35	2 x 8	6.50
		1/2 x 6	2.56	3 x 8	9.25

NEW BALSA ADDITIONS

SHEETS — 36" LENGTHS
5/32 x 3 x 36 50c
1/20 x 3 x 36 32c   5/16 x 3 x 36 76c
TAPER CUT SHEETS (TO 1/16" EDGE)
1/4 x 3 x 36 74c   1/4 x 4 x 36 82c
ROUNDED-EDGE PLANKING
5/32 x 1/4 x 36 LENGTHS 8c EACH
ROUNDED-EDGE (Aileron & Elevator)
1/4 x 1 x 36 40c   1/4 x 2 x 36 55c
3/8 x 1 x 36 45c   3/8 x 2 x 36 65c
WING SKINS — 36" LENGTHS
1/16 x 12 x 36 1.75   3/32 x 12 x 36 1.95

SIG SPRUCE

36" LENGTHS		48" LENGTHS	
1/16 x 1/8	5c	3/32 x 3/32	7c
1/16 x 3/16	6c	3/32 x 1/8	8c
1/16 x 1/4	7c	3/32 x 1/16	9c
3/32 x 3/32	5c	3/32 x 1/4	10c
3/32 x 1/8	6c	1/8 x 1/8	8c
3/32 x 3/16	7c	1/8 x 3/16	9c
3/32 x 1/4	6c	1/8 x 1/4	11c
1/8 x 1/8	6c	1/8 x 3/8	14c
1/8 x 3/16	7c	1/8 x 1/2	17c
1/8 x 1/4	8c	1/8 x 3/4	22c
1/8 x 3/8	10c	3/16 x 3/16	12c
1/8 x 1/2	13c	3/16 x 1/4	12c
1/8 x 3/4	17c	3/16 x 3/8	15c
3/16 x 3/16	9c	3/16 x 1/2	19c
3/16 x 1/4	9c	1/4 x 1/4	20c
3/16 x 3/8	11c	1/4 x 3/8	24c
3/16 x 1/2	14c	1/4 x 1/2	30c
1/4 x 1/4	15c	3/8 x 3/8	32c
1/4 x 3/8	18c	24" LENGTH	
1/4 x 1/2	22c		
3/8 x 3/8	24c	3/16 x 3/4	15c

LARGE BUNDLE OF ASSORTED STRIPS — "SHORTS" AND "SECONDS". 89c

BIRCH PLYWOOD

FINEST GRADE — FLAT SHEETS

12" LENGTHS		24" LENGTHS	
1/32 x 6	30c	1/32 x 12	1.20
1/16 x 6	35c	1/16 x 12	1.40
3/32 x 6	35c	3/32 x 12	1.40
1/8 x 6	40c	1/8 x 12	1.60
3/16 x 6	40c	3/16 x 12	1.60
1/4 x 6	45c	1/4 x 12	1.80
		48" LENGTHS	
1/32 x 12	60c	1/32 x 12	2.40
1/16 x 12	70c	1/16 x 12	2.80
3/32 x 12	70c	3/32 x 12	2.80
1/8 x 12	80c	1/8 x 12	3.20
3/16 x 12	80c	3/16 x 12	3.20
1/4 x 12	90c	1/4 x 12	3.60

SIG BASS WOOD

18" LENGTH SHEETS

1/16 x 2-1/2	15c	3/16 x 2-1/2	23c
3/32 x 2-1/2	17c	1/4 x 2-1/2	28c
1/8 x 2-1/2	19c	3/8 x 2-1/2	35c

BLOCKS

1/2 x 3/4 x 6	6c	3/4 x 2 x 6	14c
1/2 x 3/4 x 12	11c	3/4 x 2 x 12	27c
1/2 x 3/4 x 18	16c	3/4 x 2 x 18	40c
3/4 x 3/4 x 6	7c	3/4 x 3 x 6	19c
3/4 x 3/4 x 12	14c	3/4 x 3 x 12	37c
3/4 x 3/4 x 18	20c	3/4 x 3 x 18	55c
3/4 x 1 x 6	9c	3/4 x 4 x 6	24c
3/4 x 1 x 12	17c	3/4 x 4 x 12	47c
3/4 x 1 x 18	26c	3/4 x 4 x 18	70c

SIG BIRCH DOWELS

12" LENGTHS		36" LENGTHS	
1/8 dia.	3c	1/8 dia.	6c
3/16 dia.	4c	3/16 dia.	9c
1/4 dia.	5c	1/4 dia.	10c
5/16 dia.	5c	5/16 dia.	12c
3/8 dia.	6c	3/8 dia.	15c
1/2 dia.	7c	1/2 dia.	20c

1/16 dia. available in 12" lengths 2c

SIG DECAL PROOFER

MAKES ALL DECALS FUEL-PROOF & DURABLE (ONLY ONE COAT REQ.) 4 Oz. Jar, 59c   3 Oz. Spray, 59c

SIG MODEL PINS

#8	1/2 Long	#20	1-1/4 Long
#14	7/8 Long	#24	1-3/8 Long
#16	1 Long	#28	1-5/8 Long
#17	1-1/8 Long	#32	2 Long

Pkt. 15c   1/4 lb. $1.15   1 lb. $3.95

MODEL MAKER'S "T" PINS
Pkt 15c   1 oz box 39c   4 oz box $1.95

SIG RUBBER BANDS

#8	1/16 x 7/8	#62	1/4 x 2-1/2
#10	1/16 x 1-1/4	#64	1/4 x 3-1/2
#14	1/16 x 2	#84	1/2 x 3-1/2
#16	1/16 x 2-1/2	#105	5/8 x 5
#30	1/8 x 2	#107	5/8 x 7
#32	1/8 x 3		PACKETS 15c

ALL SIZES AVAILABLE IN BULK AT: 1/4 lb. Pkg. $1.10   1 lb. Pkg. $3.95

SIG AIROLAC

OUR NEW HIGH-GLOSS CELLULOSE ACETATE BUTYRATE DOPE FEATURES TRIPLE-GROUND PIGMENTS FOR AN ULTRA-SMOOTH, GLASS-LIKE FINISH. IT'S FAST-FILLING & LEVELING — BLUSH-RESISTANT & FADE-PROOF. NOW AVAILABLE IN 15 COLORS: Lt. Red / Medium Red / Gloss White / Lemon Yellow / Cub Yellow / Gray / Med. Blue / Dark Green / Gloss Black / Sky Blue / Brite Green / Brite Orange / Dark Blue / Brite Silver / Brite Gold

COLOR: 4 oz. 69c   8 oz. $1.19   Pint $1.79   Qrt. $2.98   Gal. $8.95
CLEAR: 4 oz. 59c   8 oz. 98c   Pint $1.49   Qrt. $2.39   Gal. $7.19
THINNER: 4 oz. 39c   8 oz. 59c   Pint 98c   Qrt. $1.69   Gal. $4.39

AIROLAC ALSO AVAILABLE IN PINT SPRAY CANS ($1.49) IN ALL COLORS

SIG CORE BOND

NEW CONTACT TYPE CEMENT FOR BONDING WOOD OR PLASTIC TO STYROFOAM. Pint $1.95 / Qt. $3.50

SIG DOPE BRUSHES

FINEST QUALITY CAMEL HAIR — IN TWO WIDTHS: 5/8" 25c   1" 29c

RAZOR PLANE

USES DOUBLE-EDGED BLADES $1.59

R/C FUEL TANKS

NEW SIG DESIGN HAS TWO-PIECE PLUG & LEAK-PROOF SCREW-CAP / PLASTIC CONTAINER AND FLEXIBLE PICK-UP / NON-CORROSIVE BRASS TUBING: 2 oz. 95c   4 oz. $1.05   6 oz. $1.15   8 oz. $1.25   12 oz. $1.40

PRESSURE FUEL PUMPS

FAST, EASY WAY TO FILL BIG FUEL TANKS. AVAILABLE IN: Quart $2.89 / Half Gallon $3.19 / Gallon $3.49 / Pump Only $2.39 / Primer Bottle 29c

COPPER WIRE

FOR BINDING C/LINES, L/GEAR 15c

SIG EPOXY

STRONGEST GLUE EVER DEVELOPED FOR THE MODELER / COMES IN 2 PARTS (A & B) — IN POLYETHELENE SQUEEZE BOTTLES, WITH SPECIAL NO-DRIP SPOUT: 1-1/2 oz. pack 89c   3 oz. pack $1.39   12 oz. pack $3.95

SIG EPOXOLITE

NEW 2-PART EPOXY PUTTY / LIGHT AS BALSA & STRONG AS EPOXY / QUICK SETTING / EASY TO WORK / LONG SHELF LIFE / EXCELLENT BUTYRATE DOPE ADHESION / CAN BE CARVED, SAWN AND SANDED. 4 oz. Set $1.69   8 oz. Set $2.95

SIG NYLON SHEET

.010 THICK NYLON, MAKES 16 R/C OR C/L HINGES (3 x 4 SHEET). 25c

SIG CONTEST RUBBER

NEW "HIGH POWER" RUBBER STRIP: 1 LB. of 1/8" $5   1 LB. of 1/4" $5

SIG CELLULOID

.008 x 8 x 10 12c   .015 x 8 x 10 30c

FLITE-FOAM

WHITE EXPANDED BEAD FOAM (1 lb PER CUBIC FOOT) 12" WIDE PLANKS

1x12	35c	1x36	90c	1x48	$1.20
2x12	69c	2x36	$1.80	2x48	$2.40
3x12	89c	3x36	$2.70	3x48	$3.60

NEW CELASTIC

FANTASTIC NEW PLASTIC MATERIAL BECOMES SOFT AND PLIABLE WHEN DIPPED IN THINNER. MOLDS TO ANY SHAPE — CAN BE SANDED & DOPED. PERFECT FOR COWLINGS, FILLETING & REINFORCING USES. 9 x 18 SHEETS: Light 85c / Heavy $1.00

WE HAVE NEARLY ALL MODEL AIRPLANE PRODUCTS ADVERTISED

SIG FOAM BOND

NEW CONTACT TYPE CEMENT FOR BONDING BALSA TO EXPANDED POLYSTYRENE / WILL NOT ATTACK FOAM / COLORLESS & STAINLESS PINT Can $1.25   QUART Can $1.95
THINNER: PINT Can 89c

SIG NYLON PUSHROD

COMPLETE WITH THREADED STUD & SERVO CONNECTOR, AVAIL. IN 2 SIZES: 30" Set, 79c / 48" Set, $1.25
BULK PUSHROD (10 Ft. Long): $1.49
PUSHROD STUDS (Set of Three): 10c
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PLUS 5 NEW SUPERCOAT COLORS — GOLD, COPPER, METALLIC GREEN, METALLIC BLUE, METALLIC MAROON

COLOR		CLEAR		THINNER	
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Pint	1.49	Pint	1.39	Pint	98c
Qrt.	2.79	Qrt.	2.19	Qrt.	1.69
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some weight, but they never can fill up like hollow floats.

The rear float struts are removable, leaving the fixed front gear struts for land use also. The wheel gear is rather conventional. With the steerable tail wheel, the model taxis beautifully. It has never ground-looped on me.

My ailerons are controlled with curved Nyrod, but use bellcranks and pushrods if you wish.

The wing mounting method I chose for the B&W is rarely used for models. It is customary to design model biplanes with full-span cantilever wings, and either leave out the rigging or put it in for looks only. This model has working rigging. Since the right and left wing panels separately attach to the fuselage and cabane assembly, the wings wouldn't support the plane at all without rigging. Rigging a typical biplane model on the field is a slow and sometimes critical process. These B&W wings are prerigged when the model is built, so that the wing assemblies can be transported to the field or water as short half-span units, and can be rapidly attached to the model internally with rubber bands to built-in hooks. The system has been proven satisfactory.

Use wire of at least 30-lb. test for the wing rigging and not nylon or other line or cord. The inherent stretchiness of non-metallic line won't support the B&W wings adequately. The Lou Proctor model turnbuckles would be an asset in the rigging operation. I rigged it without them. Get the wings well aligned and twist-free when you rig it, and occasionally check for alignment when you fly it — especially after any hard landings or crashes. Excessive twist or change in

incidence can make the ship unflyable. The cabane rigging is 1/32 diameter stainless steel cable. If you can't get stranded cable, use .020" diameter, or larger, music wire.

I have been using birch doweling for fuselage longerons and wing spars for many years with good results. Besides being a strong, straight-grained, inexpensive, readily available material, doweling offers advantages due to its round shape. For longerons, doweling provides ready-built round corners for a fuselage. With doweling wing spars, the making of the ribs is greatly simplified since the ribs can be stack-drilled for the round spars. No laborious whittling of square or rectangular rib notches, and the spars can readily be below the surface of the wing so the contour of the covering is not interrupted.

Silk or other fabric covering would give the B&W a realistic antique scale look, but white Super MonoKote is recommended instead. Fabric is subject to ripping on impact with the water, and it tends to go slack when wet. The Super MonoKote shows no sign of slacking from dunkings. Incidentally, don't use white glue or Titebond on seaplanes because they aren't waterproof. I used Ambroid and epoxy.

You can expect your model to pick up a pound or more of weight after flying from water, even though you think both the floats and the rest of the plane are well sealed. Some of this weight is water film and drops of water from spray on the outside, but much of it gets inside in spite of careful sealing. After a week of drying out, it will be partly back to its original weight. Give all your structure two coats of clear

dope or spray-can Krylon or equivalent before you cover it to help seal the water out of the wood. Balsa especially will take on its own weight, and more, of water in seconds, and inside a covered structure it stays damp for weeks.

I have had little trouble from wet radio gear, except when the equipment was actually submerged. Do take your hatches off so the dampness around the gear can dry out after a day's flying. If you dunk servos, receiver or battery, take the case completely off, shake and blow out all the water you can, then put it in front of a heater or close to a light bulb for a few hours to dry out thoroughly. Wet gear will malfunction, but when thoroughly dried will usually work normally. If after drying overnight it still won't work, moisture must have seeped into some electronic part and you are due for a repair job. I haven't succeeded in sealing a plane completely enough to keep the water out of it in a crash, and I don't consider it a reasonable goal. You can't always keep it out, but you can dry it out afterward. Salt water is a very much bigger problem; such a problem that I never intend to fly R/C from it.

With the engine completely enclosed as it is here, cooling provisions are a must. My model has a duct running from a hole in the firewall, over the fuel tank, to a grill on top of the fuselage ahead of the front cockpit. This looks good, but it slobbers oil back across the top into the cockpits. To eliminate this mess, the cooling grill is now shown on the exhaust side of the cowl and is larger than mine for better cooling. Without a muffler you would have to build an exhaust extension tube to get the exhaust outside of the cowl. So use a muffler; it is easier and also helps preserve flying sites.

The metal "radiator" grill is a joy to behold. It really "makes" the model as far as antique-scale looks go. I always fly with the grill on. It has proven completely practical.

This Boeing B&W model has turned out to be a rugged fun-to-fly ship. Mine is still going strong after about 50 flights (who counts?).

For beginners at R/C seaplane flying, I have this advice to offer: When you fly a seaplane from the shore, keep it over the water. From shore a seaplane field is essentially only half a field, because shorelines frequently have trees, steep banks, or houses on them, and emergency landings even on smooth ground with floats are "rough." For greatest safety in test-flying, one should go out from the shore and operate the model from a boat.

May your models not rest in pieces.

Orbit 6-12 IC

Continued from page 32

that is, 105 degrees F. on a 90-degree F. day, etc., so the 160 degrees F. top-end specification is excellent.

The resolution, speed, and torque of the servos were checked and found to be as specified. Transit time end-to-end; e.g., full right to full left, was approximately 0.9 seconds. In keeping with this transit time, damping is essentially dead-beat, i.e.; no measurable overshoot. Resolution was approximately 0.01", measured at the $\frac{5}{16}$" radius on the output wheel. The output thrust quoted by Orbit for the PS-4D servo is 3½ lbs. This was found to be the case at the $\frac{5}{16}$" radius output. The linear travel of a rotary output is the Cosine of the radius of the point at which the pushrod is connected. Thus, a total travel of ± 45 degrees rotation or $\frac{7}{16}$" linear is available with 3.5-lbs. of thrust. The output torque available, then, is about 1.1 inch-pounds.

Measured at a $\frac{3}{16}$" radius, the thrust was approximately 6 lbs., the travel about $\frac{5}{16}$". So you see, a rotary output can be used to apply a tremendous thrust at short radius. Further, the linear output is equal to the tangential thrust divided by the Cosine of the output angle. Thus, when the output angle is 45 degrees, the thrust available is 3.5 lbs. divided by 0.707, or about 5 lbs.

A rack output servo such as the PS-3D exhibits a constant thrust at all positions; in the case of the PS-3D, about 4 lbs. Experience indicates that the actual flight loads servos are required to handle are measured in ounces. One other feature found quite convenient was the relatively broad trim travel of about 15 degrees, nearly 20% of full travel. This was exceptionally useful for throttle control on an engine which does not have a stop at idle position. The weight of the total airborne unit is an honest 12 ozs. with four PS-4D servos and the 500-mah battery pack.

In order to take advantage of the lightweight and compactness of the MK II 6-12 IC, it was installed in a 0.10-powered model designed specifically for the new small systems. Flight-tests were performed in 40 degrees F. weather. Performance was as predicted. Everything worked just as it should. To push it to the limit, I collapsed the transmitter antenna with the model much further out than one would normally fly, and pointed the antenna directly at the model with absolutely no problem. This indicates a very

significant margin for normal operation.

I have only one minor criticism of the MK II 6-12 IC system tested; the power plug for the airborne unit is larger than necessary. This, of course, is only noticeable because of the tiny size of the remaining system components. Orbit states that a new, smaller plug would be introduced early in 1970. The reason for the larger plug was its compatibility with existing Orbit 4.8V packs.

In summary, the Orbit MK II 6-12 IC is an excellent system, manufactured by a well-known firm, offering continuing service. The system has some excellent features including availability on all 27, 50-54, and 72-76 mHz frequencies; the small, lightweight airborne package; highly professional design; a complete set of accessories with the system; and a most comprehensive set of instructions

You Said It

Continued from page 8

No. 1057 from Hobby Helpers. Recent correspondence with Hobby Helpers advises that the plan is now out of print.

My request is to ask the readers of AAM if perhaps a copy of the plan is in the possession of someone who would be willing to either loan or sell it to me.

Appreciate anything you may be able to do.

D. Sandulli, Old Town Farm Road, Woodbury, Conn. 06798

Also opened "box"

I am writing in reply to Mr. Charles Proffer, Gulfport, Miss. His letter appeared in "You Said It," Oct. '69.

Mr. Proffer. I agree with many of your

statements, but it gripes me to no end when you ask questions like: "How many paper-carriers do you see on bicycles?" Well, I deliver papers and I haven't seen any on expensive motor bikes, motorcycles, or cars.

Also, you say you see kids in pizza houses where they drop five bucks for a tear and a sip, also plugging music boxes and ball machines with no thought of the money dropped. Well, I have just one question to ask: How many of those kids are saving for R/C equipment?

What I am doing with my money is buying R/C equipment which is almost paid for. This is not cheap single-channel, but full-house proportional. I am also buying an engine and plane, not mentioning clothes, Christmas gifts, etc.

Forgive my onslaught toward you personally, but you also opened the "box."

In closing, I think AAM is the best magazine selling. Also, thank you for helping me get this off my chest.

Steve Gibson, Lebanon, Ind.

On The Scene

Continued from page 12

selves, ended up just flying for fun. At any rate, today was the final test, that of flying ability, for the planes in competition. Most of the ships proved that their good looks were something more than skin deep. Dick Adams nailed down first place R/C with a good flight by his finely detailed Nieuport 17. As always, however, with so much flying going on, there is bound to be a mishap or two. We saw two R/C planes demolished, apparently due to control malfunctions. At least one of these crashes was caused by interference. Transmitter discipline apparently continues to be a problem.

Free-flight had the most entries, and as mentioned earlier, the greatest variety of configurations, sizes and power. After we had observed several successful flights, we noticed a wing, all by itself, fluttering slowly and silently to earth, revolving about its long axis. The wing was in great shape, but we assume it went up attached to a fuselage, which probably did not fare as well.

We moved over to the control-line area just in time to see Allen Hess picking up the pieces of his ME-110. Fortunately, Allen had completed his qualifying laps for a second-place trophy before the solder joint failure at the control horn brought him down. This plane had been given the best finish award of all planes at the contest. It had twin Torp 45's, and working flaps, throttles, and landing gear. The only reason we didn't cry is that we are grown men, and people were watching.

Noel Hess had a little better luck than

Allen, taking first place control-line, and qualifying without a mishap. He flew a Vought SBU-1 bi-plane, powered by a Torp 45 R/C, and having working flaps and tail-hook.

Lots of interest was generated by the ducted-fan F-100 brought over from Nellis AFB at Las Vegas, by Air Force Major W. A. Kulczyk. This plane was powered by a conventional O.S. 29 driving a built-up six-bladed fan. The Major also had a nearly completed Mirage III ducted-fan job powered by a K&B 40 R/C. The fan is not quite as efficient as a conventional prop and the 29 left the F-100 a bit underpowered, which the Major hopes to cure with the 40 on the newer ship. A lot of detailed workmanship has gone into these two models.

The wind stayed down all day, but at one time a sizeable whirlwind or dust-devil, possibly 500 ft. in diameter, passed through the area. Everyone stopped to watch this "happening." We were glad that it stayed at least 200 ft. away from the planes, where it might have raised havoc.

After all the contestants had qualified, we flew Terry Aldrich's Boeing 40 mail-plane, and the three-engined profile BV-170 just for fun. The mailplane is large, light, and powered by a throttled Fox 59 which gives it very realistic, bipe-like flying characteristics.

The awards were presented, after which there was more practice and fun flying. The new pre-fabbed R/C Learjet was flown in demonstration. The flying day does not end abruptly at Sepulveda, but tapers off gradually after close of the contest. We arrived home at 10:00 p.m., quite tired, but we did "have a nice day."

Bearcat

Continued from page 27

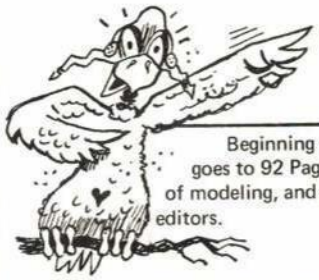
lages should be avoided because at high angles of attack the rectangular fuselage will have several times greater profile drag than a circular fuselage. The optimum low-speed fuselage shape is much like a jet fighter tip tank and should have a length to width ratio of 6 to 1. While not optimum in shape, the Bearcat's fuselage is rounded and does have a fineness ratio of 6 to 1. In a corner, this improved shape should compensate for the increased induced drag due to the Bearcat's extra weight, enabling it to match the performance of its slimmer, lighter competition.

In summary, first, remembering that parasitic drag is only approximately half the total drag and, taking no credit for any reduction in profile drag from a possibly better shape, the Bearcat should have only about 5% more total drag in level flight than a comparable size stunt ship. Second, the Bearcat should be no worse in drag than a

comparable size stunt ship at high angles of attack. Third, drag, in any form, only retards the speed of the aircraft. Drag has practically no effect on line tension or maneuverability and can always be compensated for by an increase in power. At the flying circle, the only noticeable characteristic of the Bearcat's particular combination of frontal area and low-pitch prop is the tendency of the Bearcat to resist speed build-up in consecutive down-wind maneuvers.

The cowling size of 5 x 6" dictates the use of a large diameter propeller to achieve efficiency. To turn this large prop and overcome drag, I need a large engine. The Bearcat uses an Aldrich customized Supertigre 46 and a Rev-Up 12-5 prop. I like big engines anyway and have yet to overpower a stunt ship. It seems that large quantities of torque improve line tension. Therefore, I select a big engine noted for power and steady four-cycle operation, run it slow, control aircraft speed with prop pitch, and cram on all of the prop diameter the engine will stand. This method of improving line tension really hangs them up there on the reverse wingover but will cause problems with prop precession if you fail to use an operating rudder. The increased weight of the propeller and its larger diameter both increase the yaw from gyroscopic precession of the propeller, causing the airplane to fishtail excessively in corners and lose line tension on outside maneuvers. (For a more complete explanation of gyroscopic precession see American Modeler June, 1969, Mustang.)

When I designed the Bearcat, I was fairly certain the short nose wouldn't affect longitudinal stability (groove), but I was curious about its effect on handling qualities. I discovered, after building and flying the Bearcat, there is a considerable difference be-



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"WHERE THE ACTION IS"

An exciting new six-page feature to be written by fifteen well-known experts in each major field of modeling. They will present the latest information, readers' ideas, rules commentary, and activities in each category or competition event. If you have something to offer, send it in and it will be forwarded to the appropriate expert for possible quick use.

THE TEAMS OF EXPERTS

FREE-FLIGHT

BOB MEUSER is "General Correspondent for F/F." In addition, each month we will have one or two of the following "Specialist Correspondents": CHUCK BROADHURST on Power; BOB STALICK on Rubber and Glider; BUD TENNY on Indoor; and WALT MOONEY on Scale.

The General Correspondent covers the overall field of Free-Flight and Sport Flying. The specialists assist with ideas and developments in their particular categories.

CONTROL-LINE

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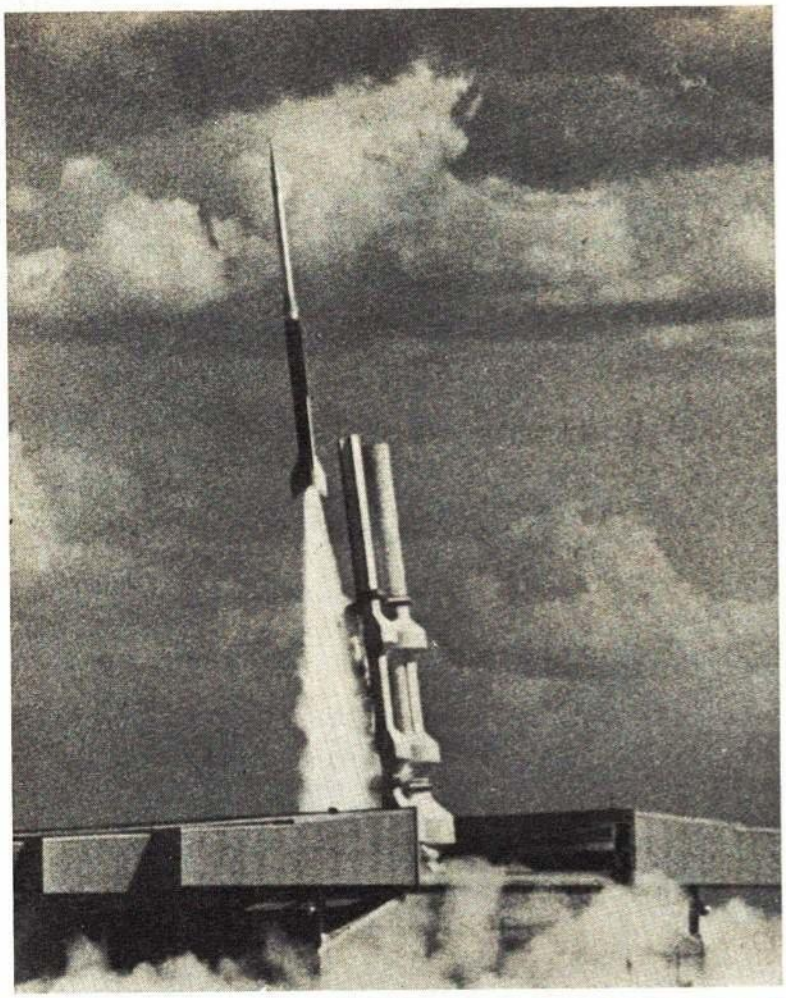
tween "grooving" and having a "groovy" feel. The first, grooving, is simply longitudinal stability, easily obtained by a large tail-volume coefficient. This means a large stabilizer and elevator on a long moment arm. The Bearcat has a large tail-volume coefficient and therefore grooves fine. The groovy feel, however, is something else again, involving the psychology of the flyer and handling characteristics. Groovy feel is usually obtained by using a long nose to somewhat deaden the turn by placing the mass and inertia of the engine farther from the CG. In this case though, the turn is also harder to stop. The Bearcat, with its short nose, doesn't feel particularly groovy but it does lay in there, turns easily, and will stop turning quickly without overshoot or bobble. I'm not implying the Bearcat's handling qualities are unpleasant or inferior. After I became used to the Bearcat's feel, the square maneuvers seemed easier and more precise than with other airplanes I've flown.

Like my Mustang, I've also used dihedral on the Bearcat, partly to improve its scale appearance, but more important, to compensate for its low-wing configuration. Due to "dihedral effect," some effective dihedral is lost because of the deep nose. This, in effect, removes the slight (¾" per panel) dihedral used so that the airplane is, aerodynamically speaking, equivalent to a straight mid-wing. Dihedral also gets the leadouts up nearer the vertical location of the CG. Without dihedral the wing tip will line up with the CG, causing the airplane to fly banked out when upright and banked in while inverted. The sorriest flying stunt ship that I ever built was a semi-scale Spitfire with a low flat wing. I fought that airplane for almost a year but no amount of trimming would make it fly or turn the same upright and inverted.

The landing gear on a full size Bearcat is extremely long and located fairly close to the fuselage. The length was necessary for the Bearcat swings a prop which has a diameter equal to 1/3 of the wing span. The narrow tread (width) was for structural considerations and necessitates folding each gear leg double as it retracts to prevent the wheels from overlapping. This narrow, stilty appearance has been duplicated on my stunter without degrading the takeoff or landing performance. The explanation is mostly for all of those kind folks who have pointed out that my gear struts are too close together.

The Bearcat has the unusual characteristic of flying equally well from grass or hard surface. This is achieved through proper gear location with respect to the CG and the use of 3"-diameter wheels. The large nose-high sitting attitude caused some takeoff problems at first. The airplane would lurch up on the gear with a bit of nose-swing first



out of the circle, then inward. This was trimmed out by realigning both main gear axles so that both wheels now point slightly inboard. This allows the Bearcat to roll smoothly around the circle with the nose pointed slightly outward. Now she sets up slow and smooth all by herself with neutral elevator and tight lines. Once up, you have 3" of prop clearance on a 12" prop, so roll as long as you like. I usually use a quarter to a half lap to get airborne.

Landing characteristics are best described as "fun." With this gear location the airplane behaves much like a real one. With some skill and practice the landings can be breathtakingly smooth. If you goof it will really bounce. As an average, I'd say that you can grease on about eight out of ten landings. Landing consistency has been good enough that I feel the airplane has a competitive landing; that is, the extra points for those beauties will about balance the points lost for bounces over a season. The big bonus is that grin which is so difficult to suppress when the bystanders burst into spontaneous applause for the beautiful realistic landing that the Bearcat does best.

I've also found the uncertainty of a challenging landing helps to maintain interest throughout the hundreds of practice flights required to develop a competition pattern.

Just as the Mustang was published as an improved Mk II version which did, in fact, fly better than the original, these plans show the Bearcat in a Mk II version incorporating improvements indicated by recent experience. The changes to the original Bearcat should erase any competitive advantage the Mustang II might presently have. Except for wing sweep, landing gear and flap, the Bearcat's wing is now the same as the highly satisfactory Mustang II wing and employs the same progressive airfoil and construction alignment procedures. This change is the result of the demonstrated

ability of the wing of the Mustang II to fly 56 oz. through a competition pattern better than the Bearcat's modified Nobler wing of the same area carrying 5 ozs. less weight.

The adjustable leadouts satisfy a need for a simpler and lighter mechanism which can be quickly adjusted in the field. This adjustment was tacked on to my last airplane almost as an afterthought but proved so valuable in trimming the airplane that I'll not be caught without a similar device again. Working both with leadouts and adjustable rudder offset you should be able to obtain better line tension than you have ever experienced before.

While the adjustable leadout is self-explanatory, the bellcrank orientation is not. It is not upside down. I put it in the Mustang II that way to make the front leadout the up line. As the airplane turns it is supported largely by one leadout or the other which tends to yaw the airplane slightly as the loaded leadout lines up with the CG. A conventional rear up line tends to aggravate gyroscopic yaw and the forward up line dampens it. This noticeably reduces or eliminates wobble from a hard corner. Don't worry about the strength of the backward bellcrank. I've pulled 50 lbs. with this arrangement.

Now for the discouraging word. The Bearcat takes approximately twice as long to build as a scratch Nobler. It is not difficult to build but it is time consuming and requires a fairly high level of craftsmanship and skill. Part of the fun of this game for me is my appreciation of the sight of a realistic Bearcat or Mustang hanging out there on the end of the lines, regardless of the effort required to achieve it. If you feel as I do, I doubt that the Bearcat would disappoint you. If you should build a Bearcat, send along a photo of the model in advanced construction, say on its gear. I will help the first 20 of these modelers by giving them a custom-molded Bearcat canopy.

Construction: The biggest problem in building the Bearcat is finding sufficiently light blocks. I wouldn't have attempted to build a contest stunter this big without a source of light wood. This is such a massive airplane even using all contest balsa and 36 oz. Nobler techniques that it came out at 50.3 ozs. Without contest blocks you have only two choices. You can plank it or you can mold the top and bottom from contest 1/8" sheet as described in the June '69 issue of American Aircraft Modeler. Personally, I would lean toward the molding method. Although molding shells would be more work, they also would be lighter and, in a project like this, simplicity of construction must always be forfeit to weight considerations. For the same reason you should use a fiberglass arrow shaft pushrod and build up the tail surfaces instead of using 3/8" sheet. You can save 3/4 oz. here and you must. If you cut corners in construction, the weight will soar above 55 ozs. and you will have a great Sunday afternoon sport flyer instead of a competition winner.

Fuselage: To build the fuselage, first cut the 1/8" contest balsa sides and the 1/4" balsa external doublers and laminate them with aliphatic resin glue. While this is drying, build the engine-tank assembly consisting of a 1/8" ply firewall, 1/8" ply rear tank bulkhead, 1/2"- sq. motor mounts and a modified T-21E tank. Modify the Veco tank by removing the end and splicing on 1 1/4" section of another T-21 tank to increase the tank capacity to 5.25 oz. Replace the tank brass vents with annealed copper and bind the tank to the engine bearers with strips of fiberglass cloth and epoxy glue. This step is necessary as the Bearcat's tank isn't wedged in like most stunt ships and needs this support to dampen vibration and prevent fuel foaming.

The extra tank volume is required if you

plan two level laps per maneuver with a 45 or 46. Epoxy the fuselage sides to the engine-tank assembly and add the ply nose ring. Add bulkhead "D" and the cross fuselage spacers of ⅛ x ¼" balsa. Tack glue the top and bottom blocks in place. Permanently glue the ½" balsa nose ring in place and shape the entire fuselage. After shaping the blocks, remove them and hollow. Keep hollowing until as much light shines through your blocks as through a piece on ⅛" contest sheet when held up to a light. Lace the 1/16" wire tailwheel strut to the 3/32" ply mount with soft wire and glue it in the bottom block.

Wing: Cut the root- and tip-rib templates from .032 aluminum. Sandwich 13 pieces of 1/16" contest quarter-grain balsa between the templates, and carve and sand one set of ribs to shape. Now duplicate this process to obtain another set of ribs for the other wing. Don't sand the bevel off the edges of the ribs as it will ruin their shape.

Make a jig alignment template from .020 celluloid by tracing from the plans with a sharp instrument to scratch the plastic. Punch the ⅜" holes with a sharpened piece of ⅜" tubing and a hammer.

To use the jig alignment template, align rib No. 1 on the bottom horizontal line of the template, with the horizontal line running through the center of the leading-edge cutout and the center of the trailing edge. The trailing edge should be aligned with the diagonal line on the right end of line No. 1. Now use that sharpened ⅜" brass tube to twist through the holes of the plastic template to cut holes in the balsa rib.

Rib No. 2 uses the second horizontal line from the bottom and the same diagonal line at the end of line No. 2, etc. When these ribs are spaced on the 6' x ⅜" jig tubes you will

find the ribs solidly held in excellent alignment and properly positioned to give both dihedral and trailing edge sweep. Now add the spar doublers, spars, leading and trailing edges.

The 1/8" landing gear wire struts should be bent to shape and J-bolted to the 1/8" ply mounts. These gear assemblies are glued to the bottom of the leading edge 1/4" sq. and to the top of the bottom 1/8 x 1/4" spar doubler between ribs No. 3 and 4. A 1/16" ply spar web is used in this bay only. Install the double bellcrank mount, bellcrank, lead-outs, flap pushrods and flaps, and operate the controls while still in the jig to insure complete freedom of movement and adequate travel. Now reinforce the top and bottom of the double bellcrank mount at the front with short pieces of 1/4" sq. inserted between outboard rib No. 1 and inboard rib No. 2. This addition will better distribute the bellcrank stresses to the top and bottom wing skins. Sheet the wing leading edge using plenty of pins and aliphatic resin glue. Now finish sheeting the rest of the wing using 1/16" sheet. When you remove the center jig supports to sheet the bottom of the wing, support the wing at the leading and trailing edges and insure jig tube alignment by bore sighting them.

Tail assembly: The vertical and horizontal stabilizers are both built utilizing a main spar, several ribs and contest A-grain 1/16" sheet balsa folded double to form the leading edges and top and bottom skins. Dampen the wood on the outside only. If you still have trouble folding it without splitting at the tip, sand a small spanwise groove on the inside of the sheet to reduce the thickness where you are going to fold it. The rudder and elevator skins are simply glued to the top and bottom of the spars. Building the stabilizer and elevator assembly this way will save about 1/4 oz. compared to using contest 3/8" sheet.

Assembly: Fit the basic fuselage to the wing and epoxy in place using strips of fiberglass cloth and epoxy. This should be done with the wing in the jig because the jigged wing will be exactly level. You will be able then to use the jig base and the building board to precisely align the fuselage and tail surfaces. Make the elevator pushrod from two short lengths of 3/32" wire and a 13" length of arrowshaft. The assembled pushrod will weigh less than a 3/32" pushrod and will be much stiffer in compression, requiring no fairlead support.

Install the pushrod and glue the stab-elevator assembly to the fuselage. Now, add the vertical fin-rudder assembly and hook up the rudder pushrod. At this point all of the controls should be operating smoothly. If the complete control system is satisfactory, close the fuselage by adding the top and bottom blocks. The assembled airplane can now be removed from the jig. Build and install the dorsal fin, fiberglass the nose

and add a double layer of fiberglass and epoxy to the area around the trailing edge of the wing and the leading edge of the stab. Carve and epoxy the cowling and attach the canopy with strips of Celastic.

Finishing: Give the entire airplane two coats of clear nitrate (commercial) dope, sand lightly and cover with Jap tissue. Add two more coats of clear, two coats of nitrate-talc sanding sealer and sand with 320 wet paper. Now give it one more coat of nitrate-talc and sand with dry 320. Now apply the finish of your choice. I used Hobbypoxy and did not rub it out. The nitrate is cheap, has low shrinkage, is high in solids and both Hobbypoxy and butyrate dope stick to it well.

Good luck with your Bearcat.

Mistral

Continued from page 35

glued inside the fuselage at the wing saddle at the nylon screw location. A hole is drilled in F2 to receive the dowel hold-down peg. Place wing on fuselage and mark nylon screw holes on the maple block. Remove wing, drill and tap maple with ¼ x 20 N.S.C. thread.

Wrap center section of wing with Saranwrap. Cut and glue the 1/32" ply fillet planforms to the wing saddle and fasten wing in position before glue dries. Cut two pieces of Celastic to approximate fillet shape. Activate adhesive with thinner. Place at wing root and mold to shape before drying. From L.E. of wing to front end of fillet a small bead of epoxolite is blended in to complete fillet. Allow to dry, then remove wing and sand fillet.

Canopy: I made a vacuum forming (.030" thick) from butyrate plastic sheet. My method was to carve a block of white cedar to shape and size. This gives a good finish that does not need primer. The mold is supported on something solid that will allow the edges to overhang (I used an Aerosol can with the cap on). Any good support that will allow you to work near a source of heat (the stove).

Cut a piece of butyrate approximately 15 x 12". Most of this will be waste, but it gives a good grip. Hold butyrate over the hot ring and move in a circular motion to spread the heat. The butyrate will sag and smoke (don't overheat). As quick as you can, drape over mold and pull down around the wood shape. You may have to reheat the plastic until you hit it right. Hold about a minute until it cools off, then trim off excess around mold with a scissors. The finished canopy is ready to be epoxied in place. Put a floor in the cabin before locating canopy.

Determine how much padding will be needed around battery and receiver, then glue in the two formers that will support the padding. These formers are simple rectangles of ply trimmed to fit snug in the

fuselage. The servo rails are glued in to suit your equipment.

Finish is up to the builder. I used Super MonoKote.

The control surfaces are hinged and epoxied, horns and tail-wheel bracket fastened on. I used Du-Bro hinges and clevises, Midwest horns and bellcranks.

The landing gear is bent for two degrees toe-in. Fasten undercarriage blocks in wing. Install motor, make and fit pushrods. Check to see if everything works before going to the field.

Start up the motor and taxi out. If flying off grass, hold full-up elevator as you give power. When the model gets up speed, ease off the elevator; the tail will come up and the ship will roll straight ahead. Give full power, let her roll, ease in a little up elevator, and it will become airborne. Trim the ship out and get the flying feel.

When it's time to land, go far out, giving yourself lots of room to lose airspeed; otherwise when you flare out, you'll think you've taken off again. Once you've mastered the approach, you will enjoy doing real three-point landings. Don't worry about dropping a wing — the plane is docile at low speeds.

That's all there is to it. As you get used to the flying, you can move in the clevises for more action, but I don't think you'll need to.

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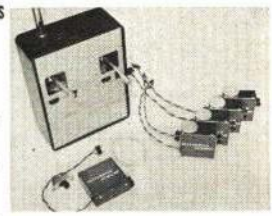

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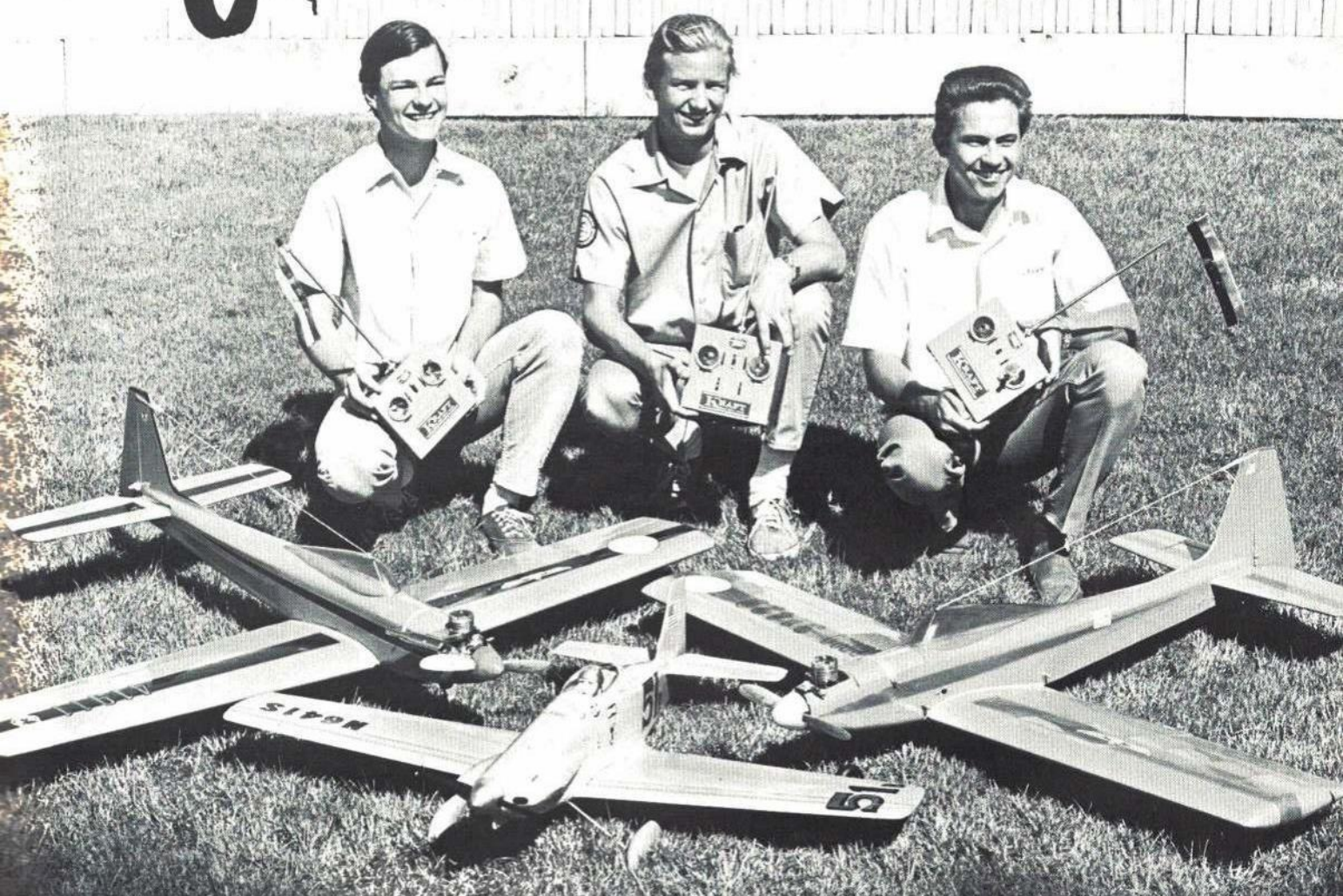

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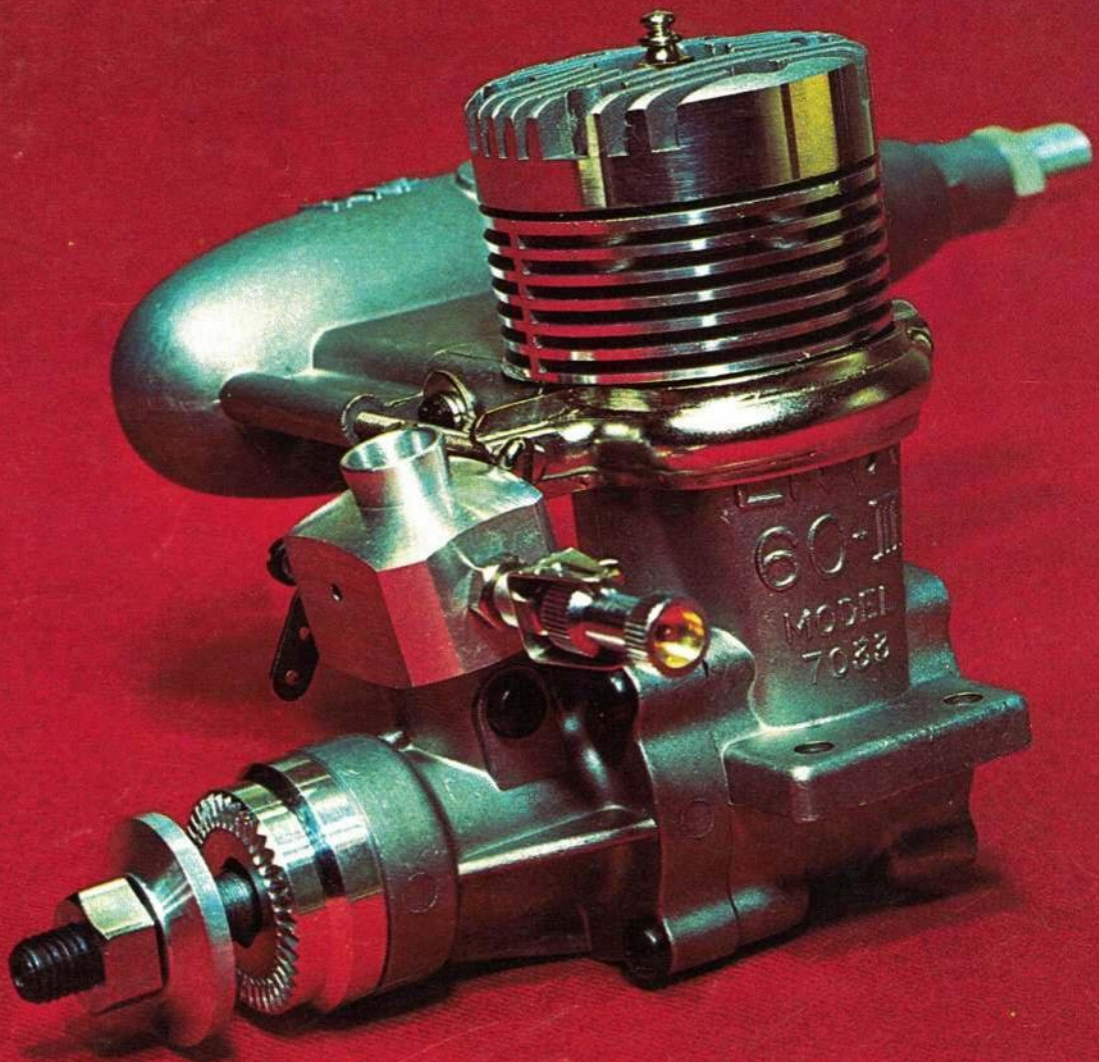

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