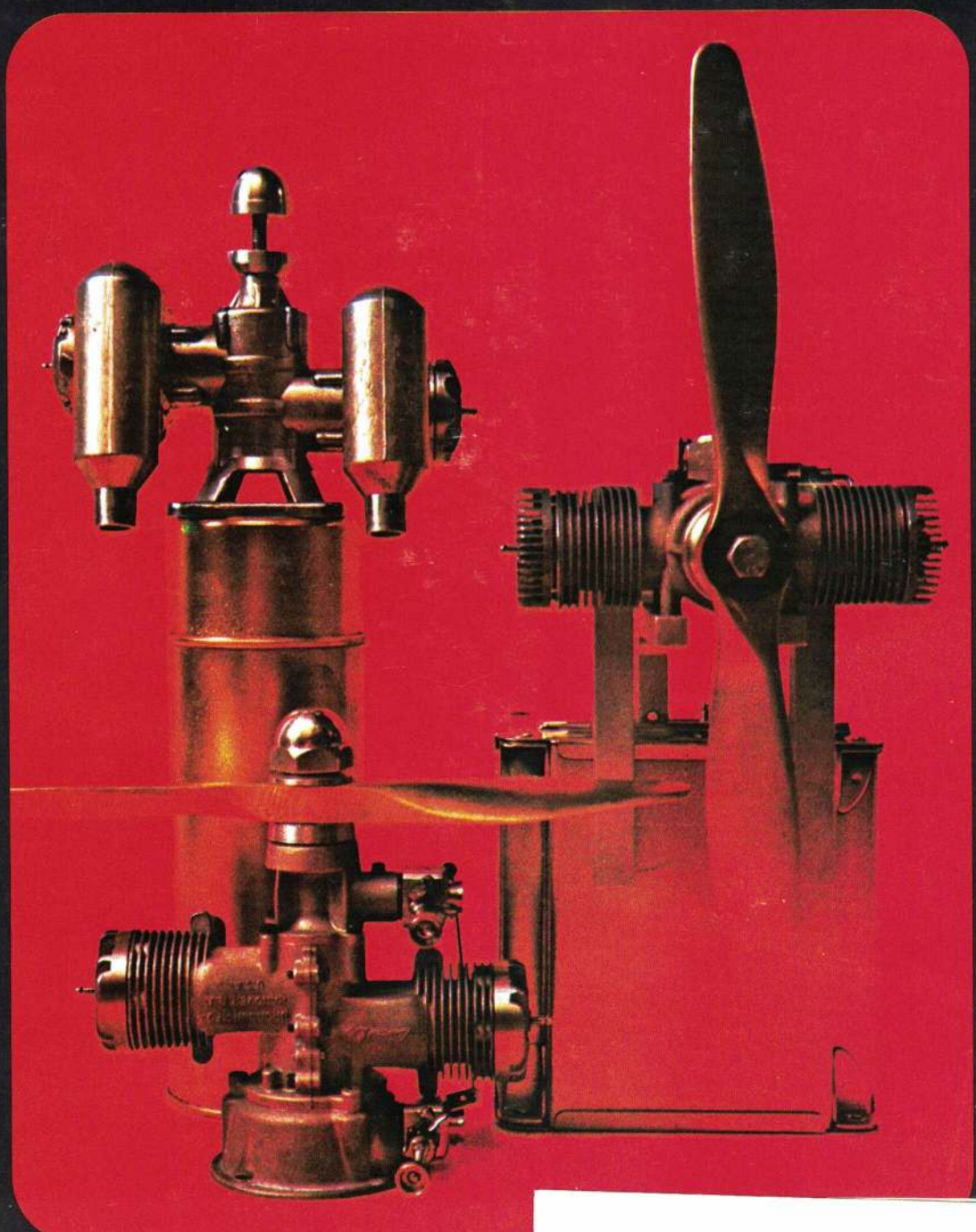
75c (41p)

JANUARY 1972
02303

AMERICAN aircraft modeler

Wheels Up

FAI Firecracker Racer,
The New Commercial Gears,
And Make Your Own Retracts

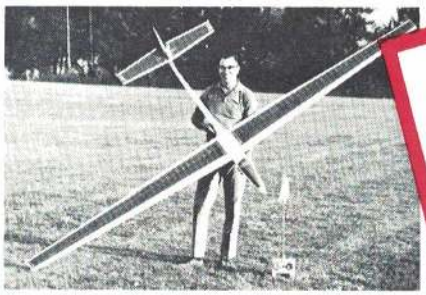


Penguin: Flyable model of n

MONOKOTE* GETS LETTERS... LOTS AND LOTS OF LETTERS!

"I've never taken the opportunity to thank a manufacturer before, but I do want to express my opinion on your Super Monokote. I've just covered five new wings and stabs with it, and it is great!

Chuck Broadhurst
Sacramento, Calif.



The ship came in 250 ft. straight down in a radio failure and there was only a small tear on the underside of one panel.

Harl
W

In these days of tising it's a real into a product everything claim

I have not "silked" a Monokote became availa Monokote job was regular silv on an Antic, since then have covered 14 models of my own. 3 Bikes, 1 Tripe & 4 Kwik Fli were included in this total.

Don Johnson
Denver, Colorado

I've been showing it to everyone I know demonstrating how hard it is to damage and the ease with which it can be repaired. Believe me it's all the ad says and more.

Winston Hockenberry
Waterbury Center, Vt.

I have found that Super Monokote works easier than any other covering that I have ever used. Super Monokote surprised me at how smoothly it covers curved areas like wing tips.

Brian McAvoy
Greenock, Pa.

MONOKOTE IS THE GREATEST!! I've experimented with most of "them" and always go back to Monokote.

Dan Rhoads
Newington, Conn.

Being a litt
mem

position
the most

ene Rubel
Torrance, Calif.

It's the prettiest finish I've ever had.

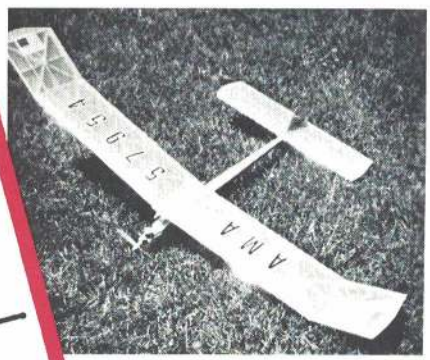
Dr. Walter Good
Bethesda, Md.

Even Naomi, my wife, loves Monokote because it is odorless, and also I have been able to stop getting paint all over my clothes. I am sold on this item and intend to trade in all of my paint brushes for a new "iron."

Donald Rothbaum
Silver Spring, Maryland

I'm a fairly new modeler and thought Monokote was too expensive until I saw your ads comparing Silk & Dope costs to Monokote. I tried Monokote . . . and you're right—Monokote's cheaper than Silk & Dope, and holds better too!

Marc Hoit
Michigan City, Ind.



ired the damage and recovith a fresh section of transSuper Monokote. Only a eye would ever spot the The good old days of and wait, then steam it again to make adjuste gone forever if Super is used.

Richard A. Lape
Dewitt, Mich.

THESE ARE JUST A FEW OF THE MANY, MANY LETTERS WE RECEIVE EACH MONTH ABOUT SUPER MONOKOTE. TAKE A TIP FROM OUR USERS — SUPER MONOKOTE WILL CUT YOUR COVERING TIME TO A FRACTION AND IT'S MORE ECONOMICAL THAN THE OLD SILK AND DOPE METHOD. IT'S BEEN PROVEN . . . MONOKOTING GETS YOU FLYING, FASTER!

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Oops!

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The RAF vs. the LUFTWAFFE!

The whole story blazes across the pages of DUEL OF EAGLES.

"...Stand by, stand by, stand by!...Hostile two now at 35 miles. Vector one eight zero. Bandit off Whitby, angels one!..." — The greatest fighter saga of them all was about to begin...

Peter Townsend: RAF pilot, ace, Squadron Commander. Shot down and wounded during the Battle of Britain, he went on to become one of England's most famous airmen — and aviation writers.

AUTHOR PETER TOWNSEND jammed the throttle to its stop, coaxing the last knot of speed out of his Hurricane fighter. Seconds before, Fighter Command Radar had picked up a hostile aircraft inbound and now Townsend was racing seaward for the intercept. Suddenly, a "tally-ho" — the hostile was sighted: a Heinkel. Townsend threw his fighter into a steep right bank and wrenched the stick back. The German plane blackened his sight. He fired. A hit. The Heinkel belched smoke, staggered under the relentless attack, and then crashed... The Battle of Britain had begun! 500 RAF single-seat aircraft against the onslaught of over 1,800 Luftwaffe fighting birds!

In what is probably the most realistic account of this famous air battle, author Peter Townsend not only gives us a no-holds-barred fighter pilot's view of the Battle of Britain, but masterfully captures all the human drama, the politics and eye popping mismanagement that led to the desperate clash between these two air forces.

Rich in detail, *Duel of Eagles* begins by tracing the almost catastrophic disintegration of both the German and British air forces after World War I... followed by the rise of Hitler's Luftwaffe out of the ashes of the Versailles Treaty.

Townsend's first-hand familiarity with the RAF and the Luftwaffe, and his years of painstaking research both in England and Germany have turned up some incredible ironies. During the build-up period in the 1930's, the Germans wanted complete targeting information on England: factory locations, industrial outputs, communications and transportation facilities, etc. To get this information, a committee was formed with Major Josef Schmid in charge. Schmid was not up to the job. He bungled things so badly, that after months of work his committee turned out a completely useless report. Utterly desperate, the Luftwaffe staff ordered a book on British industry that was available everywhere. It turned out to be so complete that it became the main source of targeting information for all the Luftwaffe raids on England!!

Townsend also reveals the pathetic, self-serving, warped personality of Hermann Goering, Commander-in-Chief of the Luftwaffe. He reveals the unbelievable oversights and blundering mistakes (wait until you read about the Luftwaffe's so-called "victory" at Dunkirk!) that "Der Dicke" (fatty) Goering made. His drug habit, his almost crippling fear of Hitler, his ridiculous preoccupation with his uniforms — are all here. Even the scandalous "Freiburg Incident," long shrouded in secrecy, is exposed, and you find out what *really* happened. You see the parts played by Ernst Udet (the famous World War I ace), Erhard Milch (it's a good thing for us this genius wasn't Commander-in-Chief!), and Willy Messerschmitt.

On the other side, you meet Britishers like Neville Chamberlain, Lord Beaverbrook, Douglas Bader (the legless ace), and Winston Churchill. There are the stories of not-so-famous men like "Wombat" Woods — who walked back to the airfield more times than he flew; Al Deere — who liked to ram his enemy in midair; and J. B. Nicolson — who in one searing moment of unmatchable bravery earned himself the Victoria Cross and a place in history.

You fly right along with Townsend as he is transformed from a fledgling student aviator into a fighter pilot, and finally a squadron commander. And you come to understand the fascinating story of how it was possible for 500 fighters to stave off "Der Dicke's" 1,800 Luftwaffe aircraft!

All the fury of air war comes vividly to life before you... and you're dead-center in the thick of it — German Me 109's coming at you from everywhere! You come to understand the exhilaration of victory (Townsend tells the step-by-step story of his kills), the terror of defeat, and the agony of cockpit fire that is an all-too-common enemy of fighter pilots. There are scenes in this book you'll never forget!

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AMERICAN aircraft modeler

Cover Photo: The three vibrationless twin opposed model engines. Upper left, Kronk twin imported from Germany. Lower left, the Shereshaw Bantam 60. Right, the Ross twin from Northfield Precision. Photo by Frank Pierce.

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VOLUME 74, NUMBER 1 **JANUARY 1972**

Articles:

Features:

Academy of Model Aeronautics:

Departments:

This magazine has 98 pages, including pages 66A and 66B

Published monthly by Potomac Aviation Publications, Inc., 733 Fifteenth Street, N. W., Washington, D. C. 20005. William J. Winter, Publisher; Edward C. Sweeney, Jr., President; American Aircraft Modeler Business Manager & Secretary, Harvey E. Cantrell.

ADVERTISING DEPARTMENT

733 15th St., N. W., Washington, D.C. 20005 (202) 737-4288

Western Advertising Representative: Aaron D. Viller & Associates, 5311 Venice Blvd., Los Angeles, California 90019. Tel: (213) 939-1161.

Eastern & Midwestern Advertising Representative: Boynton and Associates, P.O. Box 551, Barrington, Ill. 60010. Tel: (312) 381-7726; offices also at 438 E. Washington St., Chagrin Falls, Ohio. Tel: (216) 247-7094.

Subscription Rates: In U. S., Possessions and Canada, 1 Year, $7.50; 2 Years, $14.00; 3 Years, $20.00. Elsewhere, $9.50 for one year. Payable in advance. Single copies, 75 cents. Six weeks are required for change of address. In ordering a change, write to American Aircraft Modeler, 733 Fifteenth Street, N. W., Washington, D.C. 20005. Give both new and old address as printed on last label.

We cannot accept responsibility for unsolicited manuscripts or artwork. Any material submitted must include return postage. When writing the editors address letters: Editorial Office, American Aircraft Modeler, 733 Fifteenth Street, N.W., Washingon, D.C. 20005.

Second class postage paid at Washington, D.C. and at additional mailing offices.

Postmaster: Send Form 3579 to American Aircraft Modeler, 733 Fifteenth St., N. W., Washington, D.C. 20005.

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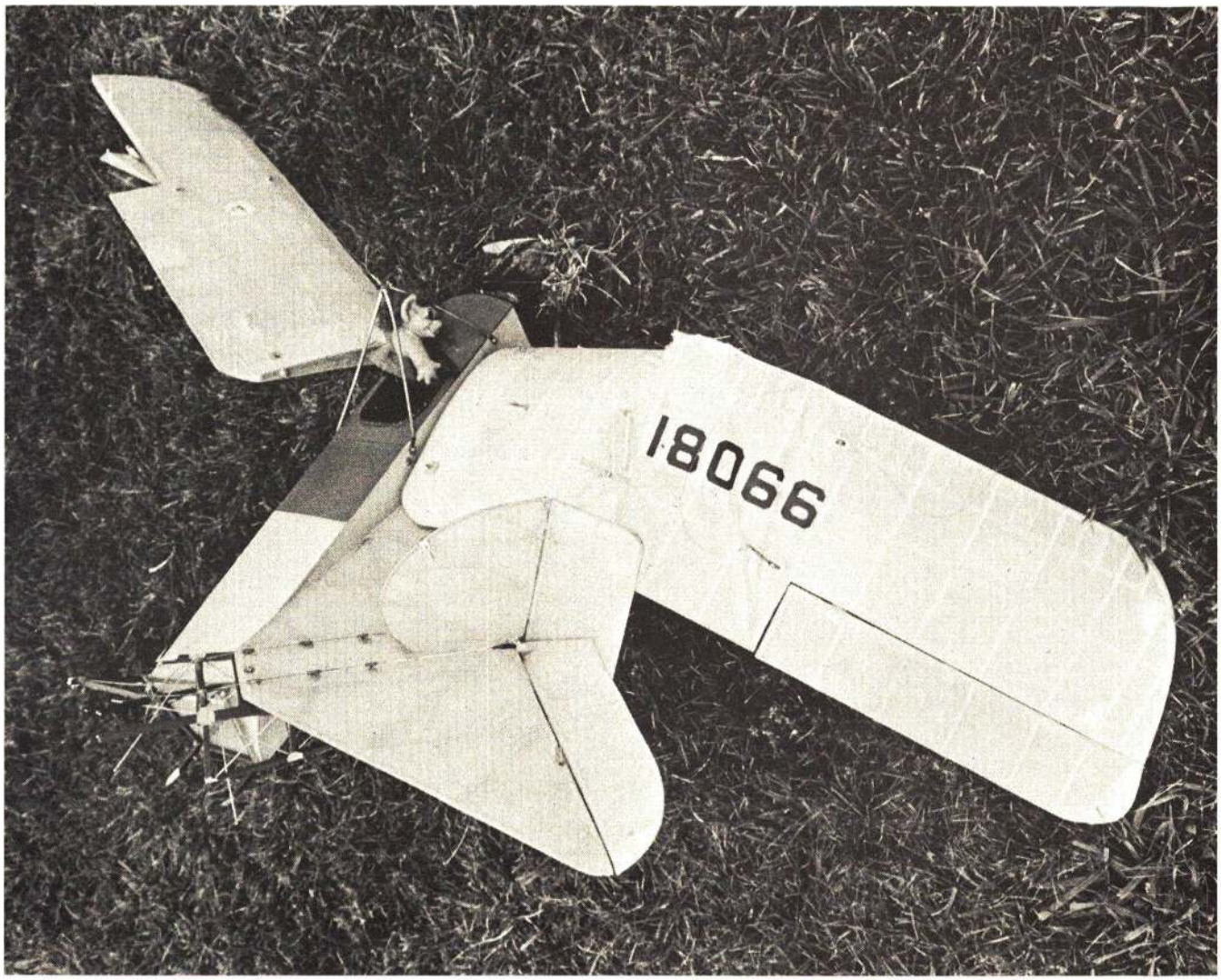

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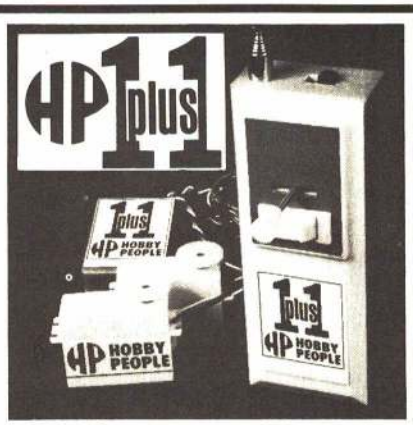

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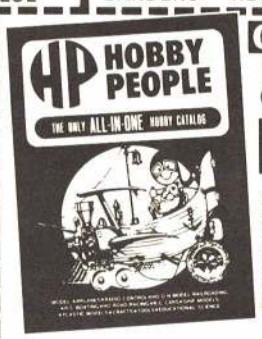

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straight and level

There was once a time when anyone who built a model plane necessarily was a beginner, but there was no beginner problem. Because the beginner was a pioneer he was also an expert. What he did, others copied. As with the guy who invented fire, or the wheel, explaining how he did it required instructions. Attaching nut A, to bolt B is twentieth-century Americana. Sis follows the recipe and her first cake looks like a bagel. Good display, demonstration and instructions are indispensable to the success of our activity and its supporting industry.

Millions of all ages are now exposed to model airplanes–from ten-cent store gliders and plastic ready-to-fly planes, to multi-control RC jobs–and there's an ever-present "beginner" problem. Which means that presentation and instructions can never be perfect. Pioneer modelers imitated with bamboo, spruce, bamboo paper and banana oil the glamorous machines flown by the Wright and Curtiss pilots at death-trap fairgrounds. For real plane or model the excitement was much the same, the death-defying adventure of getting off the ground in the big one, or the unforgettable thrill of first seeing the little one actually fly.

Promotion? That was the barker's spiel or the advance man's pasted posters to bring out the rubes to see the rare real aeroplanes. For the models it was a word of mouth thing–letters, a crude catalogue, the enchantment of the first sponsored contests. Good, bad and indifferent, promotion now is everywhere: in magazines, on radio and TV, in shopping center hobby shops. Model planes in all forms are everywhere you look. Yet it baffles us that many have never seen a model plane fly. Twenty-five years ago–and active modeling is about 70 years of age–there were those who felt every school kid in America should be force-fed model plane building, that they'd love it if puritantical educators would only see the light of day. One shudders to think what could have happened if formal goose-stepping modeling became homework every night of the week. Model planes certainly have gainful relationship to extra-curricular activity and perhaps in manual training, for example. But we seem to have a guilt complex that if we don't find answers soon, everything will slide downhill into oblivion. Surely, we don't believe that.

Consider the changing times. That modeling which we see all around us–entire aisles of plastic kits for instance, or racks of conveniently displayed gliders and balsa rubber-powered prop jobs–is a sign of the times. Independently of the serious, active leader, and of all our deep thinking, the normal marketing practice that brings together consumer and manufacturer is conditioned by environmental circumstances which we experts simply beef about. Flying fields are vanishing, or growing smaller; cornfields become parking lots. Newer modes of modeling have forever limited what we can squeeze out of the wild-blue-yonder types of models which go back to the Wrights.

Other activities vie for slices of the leisure-time pie–and leisure time is what it is all about. The four-day work week is on the horizon. Enjoyments which are too difficult to pursue surrender too many people to competing activities, including the boob-tube. Work benches do not vanish like flying sites. Models can give continued enjoyment to many people once we recognize that they really do like to make things. Just make things.

We suppose our bit should please others, because it pleases us. Some always will dig us. Many don't and won't. Relatively speaking, we are all experts and spend a great deal of money on remarkable engines–sometimes as much as we once spent on a used car–electronic equipment and accessories. We aren't actually against helping others but we are a bit self-conscious about it all.

Probably the greatest single-model promotion is the AMA Delta Dart or Racer. It was the brainchild of Frank Ehling, AMA's Technical Director. Virtually everybody laughed at the triangular wings with the pointed tips but it is almost impossible to make them warp. Warps come automatically to every kid–and many experts. It flies almost regardless of how poorly it is made, even by a kid who never saw a model before. Groups of kids build it on the spot within an hour and then fly it nearby. It can be flown indoors or in small outdoor areas. It *can* be built. It *can* and *will* fly. And there *is* a place to fly it. It virtually guarantees success, yet the builder has to work to get that success.

It is to be remembered that this design was the work of a concerned individual, and not a national promotion by a trade association and industry. However spectacular its success, it is only an indication of the untapped potential for a coordinated effort by press, associations, manufacturers and distributors, in the enlightened promotion of all forms of modeling. Although the Darts have been built by the many tens of thousands, the kits were provided free in most instances to kids in demonstration groups. The kits do little more, as presently visualized, than give an initial exposure to the temporarily interested kid. These groups require some instruction and guidance–which means dad or big brother or some other volunteer who then vanishes from the scene. For follow-up, what then?

What small percentage of these kids get to build other models? A progressive second-stage job refines the skill of a small part of the original demonstration groups which rarely come together again in just the same way. So here is a model, cheap, easy to build and fly but not found in flame-labeled boxes when the kid stumbles down the aisle filled with

(Continued on page 97)

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modeler mail

RC glider experiment

My thirteen-year-old son and I flew the Eldon Glider with the Ace Rudder Only radio unit you recommended in your article "How Cheap Can It Get" (December 1971 AAM). It really was fun.

This was our first experience with RC and we had our share of crashes–but everything managed to hold together. One of our early flights hit a stout tree trunk head-on, but we simply plugged the wings back in and continued flying. I was impressed by the ability of the radio gear to withstand the shocks.

The battery, receiver and actuator all fit into the nose section of the plane. I cut off the nose with our hot wire Marvel Maker and then sliced it down the middle, hollowing out spaces for the components. I secured all the pieces with glue from a hot melt glue gun.

We cut the last nine in. off each wing tip and glued them back at a 20 degree angle for greater stability. We also cut off about 1¾" from the top of the rudder after experiencing dives when we turned hard. The shorter rudder stopped these dives.

I think it would be a good idea for Ace to put out plans on exactly how to best put their gear in this glider. I had some difficulty deciding where to put the pieces and how to support the actuator rod. I finally got everything together and it flew well, but I am glad neatness doesn't count. Perhaps a kit with all of the hardward and detailed instructions would serve to get a lot of beginners started on RC Gliding.

Martin R. Carbone,
Carpinteria, Calif.

Beginners lost in shuffle

This is the letter I almost wrote many times. Your editorial page paid tribute to my dear friend Christy Magrath. This picture shows a magnificent stainless steel and wood (free-wheeling props) twin-pusher he made for me many years ago in St. Louis. I was one of the all-out addicts in Bob Sommer's Stix Baer and Fuller Model Club.

Contemporaries I knew well were Carl Goldberg, Wally Simmers, Casimir Leja, Bill Chaffee, Fay Stroud, Mike Roll, Ed Lidgard, Roy Marquardt, Louis Casale, Sid Axelrod, Joe Dallaire, Gordon Light, the entire St.

Louis gang, and endless others. Alphonse Penaud, Cecil Paoli and similar early birds were my heroes.

Enough reminiscing–it's just that I feel like a committee of one representing hundreds of others who appreciate the depth and breadth of your high-caliber coverage.

Your announcement of the **Junior Modeler** strikes me as being very timely. Model magazines have a "natural" tendency to grow away from fundamentals for a variety of reasons. Really good plans and manuscripts are usually contributed by advanced modelers who are interested in more advanced projects. Commercial interests rarely cater to beginners. Magazines are in business to make money and so they favor the market with the most money to spend. The coverage increases, the price per copy increases, and the beginner's needs are lost in the shuffle. In my opinion, the fact that kids, when properly helped, are tomorrow's best customers is also lost in the shuffle.

The progression away from fundamentals has created a vacuum, which **Junior Modeler** should fill. A parallel example is the light-plane industry that has horsepowered itself out of its category. Bellanca and Franklin have teamed up to fill that vacuum.

Teaching "raw" kids the fundamentals of free-flight model construction, adjustment and design is the most satisfying thing I've ever done. The perennial problem is how to satisfy this greatly needed and unusual ability without starving. Maybe you've found it–I truly hope so.

Edward W. Lockhart
Lakeside, Calif.

In the late 1920's, Ed Lockhart was a famous competition modeler. About that time Christy Magrath was the author of books on model airplanes. Christy sometimes made beautiful scale models of famous model planes. One, an exact scale, half-size Penaud–which had flown quite a distance around 1870, mounted on a polished pedestal with an engraved nameplate–was given to your publisher by Christy some twenty years ago. Magrath's scale models built for museums, etc., were so accurate that he duplicated the flesh tones of the face of the pilot stretched upon the wing of the Wright airplane which flew first at Kittyhawk.

–Publisher.

Indignant assistance

In the past I have sent information to six model builders who asked for it in this column. Not one ever sent a note of thanks, which is par for the course I suppose. So, instead of writing directly to the modeler, I am sending you information regarding the request for dirigible plans in the November issue.

Plans for Shenandoah, Graf Zeppelin and Hindenburg are 70 cents each from P. C. Coker III, 17 Atlantic St., Charleston, S. C. 29401.

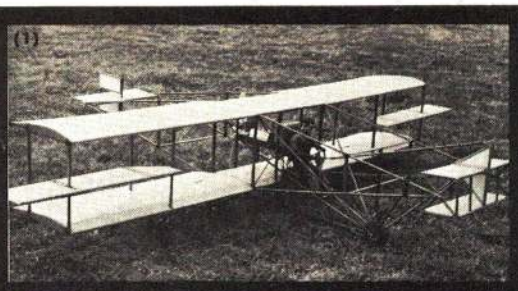
Tom Matterfis,
Staten Island, N.Y.

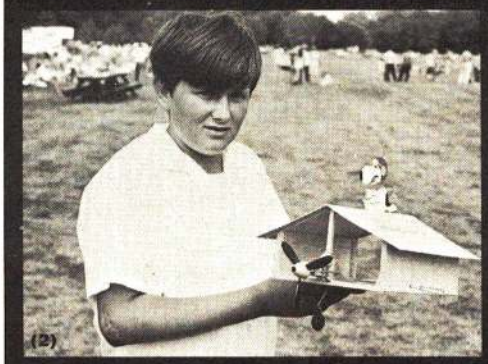
Young CL Enthusiast

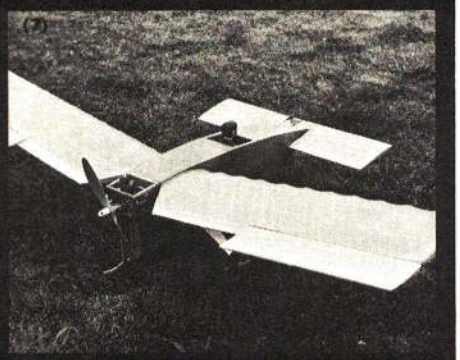
I am twelve years old and am interested in CL. I believe what you stated in the September, 1971 "Straight and Level" section of **AAM**, and I've got two such examples.

(Continued on page 97)

ON THE SCENE







(1) Zundel's Curtiss Pusher with Fox 40 hides servos in dummy engine and pilot's back.
(2) Control-Line Snoopy and doghouse with 049 power by Mitchell Blum, 1/16th balsa and sticks.
(3) Nordic A-2 Egglet built from A-1 plans by Lou Merlotti. Free flight also well-represented although site is small.
(4) Digitrio five-channel guides Larry Killian's Merco 49-powered Citabria. Weighs 8½ lbs.
(5) Nice Fox 35-powered Kingcobra by Tim Stanbaugh provided some of the control-line demonstration. Looks like new Midwest kit.
(6) RC sailplanes were represented by this well-made Cirrus by Bob Mattes.
(7) Unique semi-scale of 1911 Bleriot by Al Booseman needs only Enya 15 power; weighs just 3 lbs. and is flown RC. Slow flyer needs large ailerons.
(8) Fabulous ST 60-driven Stuka by Al Pickup weighs 10 lbs., yet flies realistically on Heathkit guidance.

ST. LOUIS AIR CIRCUS

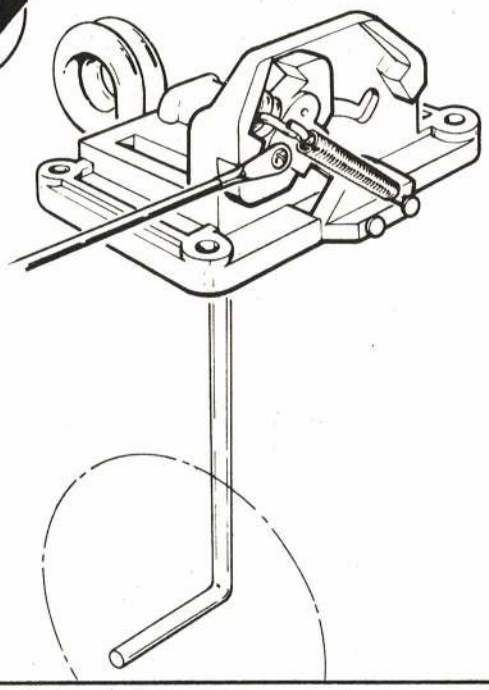
by JOHN BLUM

The Greater St. Louis Modeling Association again moved forward in the promotion of model aviation in the St. Louis area on July 11. The first of what is planned as an annual affair, an All-Model Air Show, drew over 800 spectators.

The idea developed from the suggestion to really show the public what air-modeling is, and was then modified from the usual contest format to one of programmed flights. Drawing on resources from the eleven member-clubs, announcements were printed and circulated; a multi-page printed program was prepared showing flight schedule, a brief description of RC, FF and UC, and information on the GSLMA and AMA. All area newspapers were alerted. Under the direction of CD Al Signorino and further coordination by Bob Underwood, Association Chairman, a full program was outlined. A tremendous boost in spectator attendance was realized through the television appearance of Vern Zundel and John Blum with models on the Corky the Clown Show (St. Louis Channel 5), which aired the morning of the Air Show.

Twenty-seven different flight demonstrations were presented from 1:00 to 4:00 p.m.–through the full range of RC, FF and UC. Larry Killian (Ferguson, Mo.) opened the program with an RC Banner Tow, pulling an Air Show announcement with his Merco 49-powered Citabria. At six to 12 minute intervals, the three-hour program progressed through RC Pylon Racing, FF and RC Glider, Stunt flying in UC & RC, Limbo, Goodyear Racing, Scale, Parachute Drop, etc. All activities were expertly covered over the PA system by Bob and Al. Accenting the show were: flights by Snoopy and the Red Baron; the 1910 RC Air Race; a class II Navy Carrier flight by Ray Willman; the RC Top Dawg race with eight planes in the air; a demonstration of Ed Henry's "fly-seat" for RC which had a great finale by Bob Underwood; a fast-combat match by Gary Frost and fellow member of the Hotheads MAC; power and glider flights by members of the Thermaleers; and an RC Jet. GSLMA displayed over 200 models.

CARL GOLDBERG



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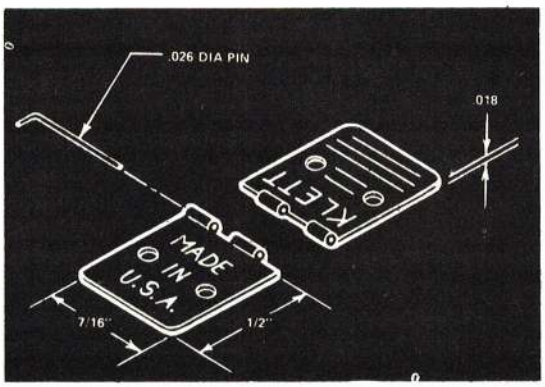

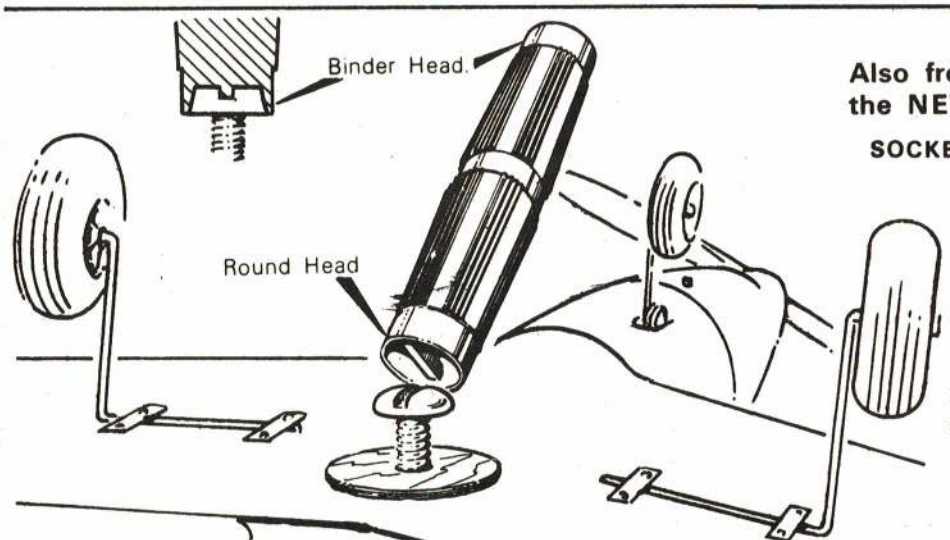

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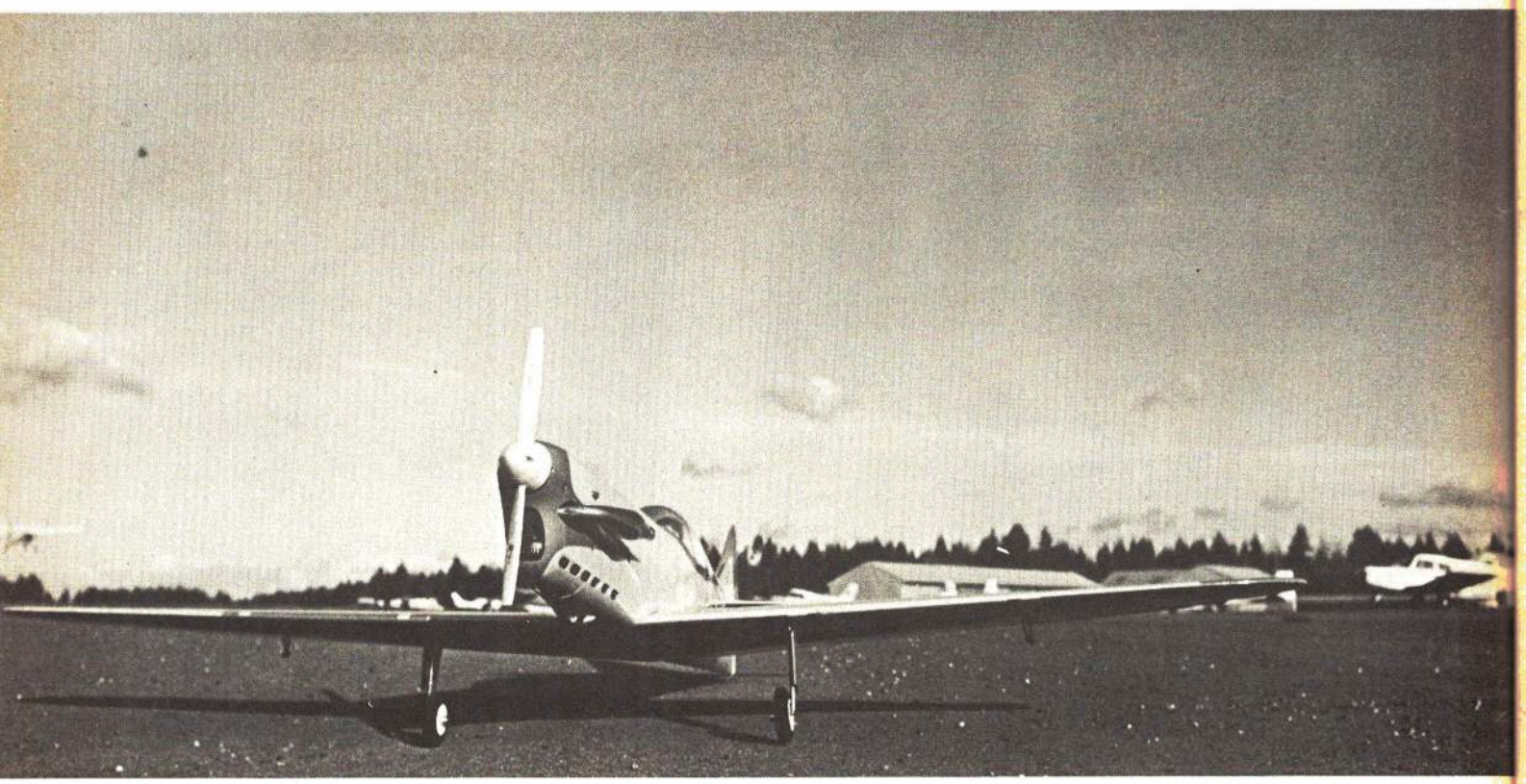


by BOB ROOT

Upon deciding to build a formula FAI class racer different from the enlarged Formula I configurations normally used, it seemed logical to investigate the era of the thirties, since some of the most interesting racing airplanes ever designed were produced at that time. After considering the good and bad features of various racing designs of this vintage, the Keith Rider R-4 design was my choice.

Popularly known as the Firecracker, this airplane was selected because of its low wing, short, wide-tread landing gear, large root chord, long fuselage and inverted inline engine. The low wing gives easy access to the radio gear. The low, wide-tread landing gear results in easy takeoff and landing. The large root chord allows a thin percentage wing for low drag, and the long fuselage results in a "groovy" airplane even though the tail surfaces are scale area. The inverted engine installation allows a clean, low drag front end.

The selection of this configuration turned out to be a good one as it placed in all the 1970 FAI races in our area including second at the Spokane Internats–in spite of its being the pilot's first year of racing. It handles and maneuvers so well that it has placed in several scale contests even though it is not, strictly speaking a scale model.

Construction

Light weight and straight, true flying surfaces are two important features to stress in the construction of this model. The original was very flyable even though it weighed six lbs. A five lb. version has just been completed and it is definitely faster. Extra weight will not cause any handling problems, but it will slow the plane down in the turns.

To insure good stall and handling characteristics with this type of wing, it is important to build it straight and true with tip wash-out as shown on the plans. When cutting the wing cores, use a foam block with at least one flat side. The core should be cut with the proper wash-out relative to the flat surfaces. The resulting block can then be used as a jig when sheeting the wing. In making the cutting templates, the tip should be made about 1/16" oversize to compensate for the foam melting that occurs with such a highly tapered wing.

The aileron linkage, tip ribs and landing gear blocks should be installed before sheeting the wing. The wing is covered with 1/16" balsa sheets which should be glued ahead of time. The wing can be sheeted in the foam jig as shown on the plans using a water-base contact cement such as Core Grip or Sig Core Bond. When finished, the sheeting at the tip can be pulled together and glued, and the leading and trailing edges added. Use straight pieces to prevent warps. Any gaps around the edge of the tips can be filled with Sig Epoxolite.

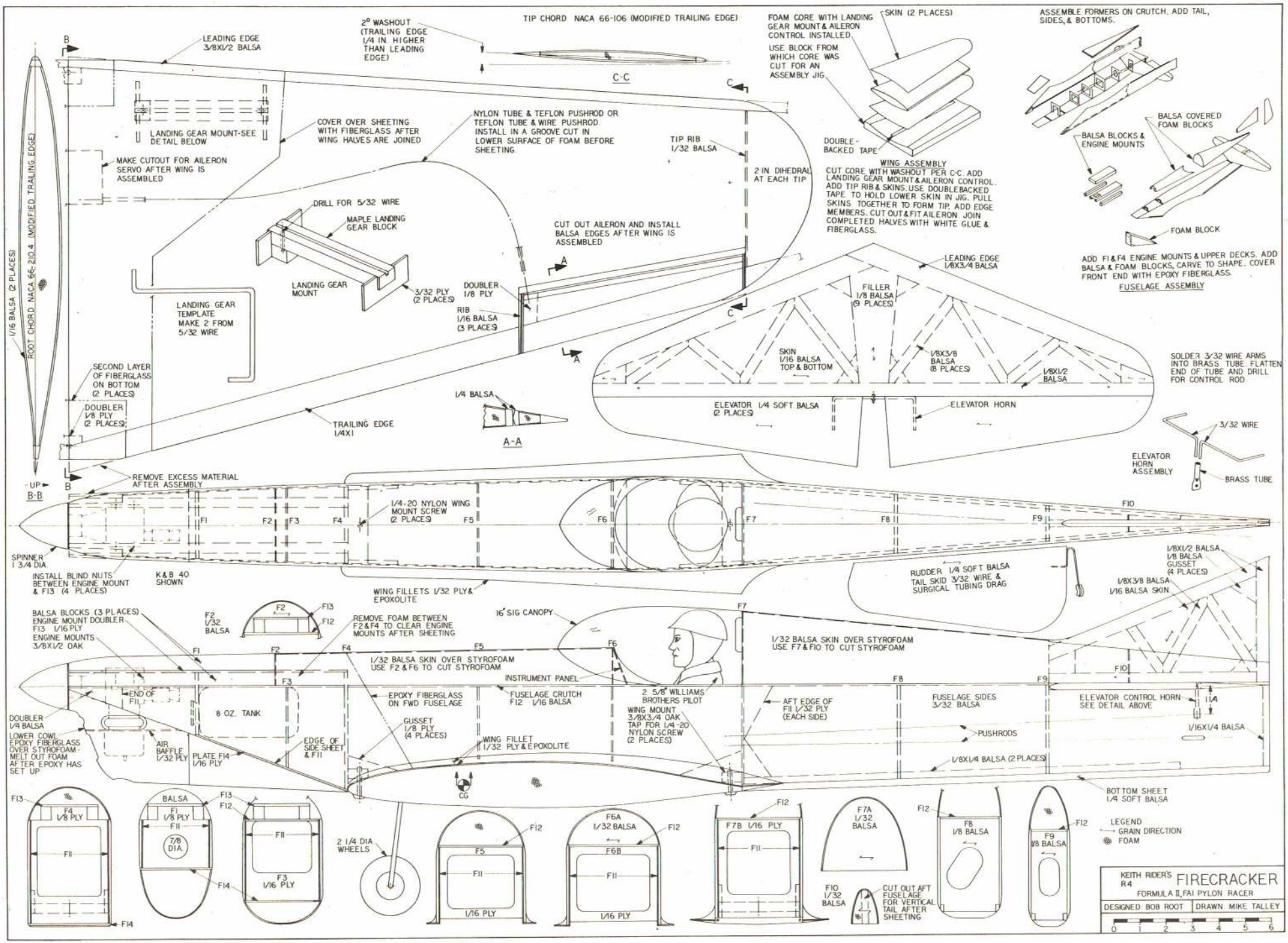
The ailerons should be cut out at this point and edged with balsa as shown on the plans, and the leading and trailing edges sanded to shape. Add the 1/8" plywood aileron doubler (shown on the plans) for the control arm. Blind nuts will later make the installation easier.

The easiest way to join the wing halves is

(Continued on page 88)

Photos by Tom Sakata

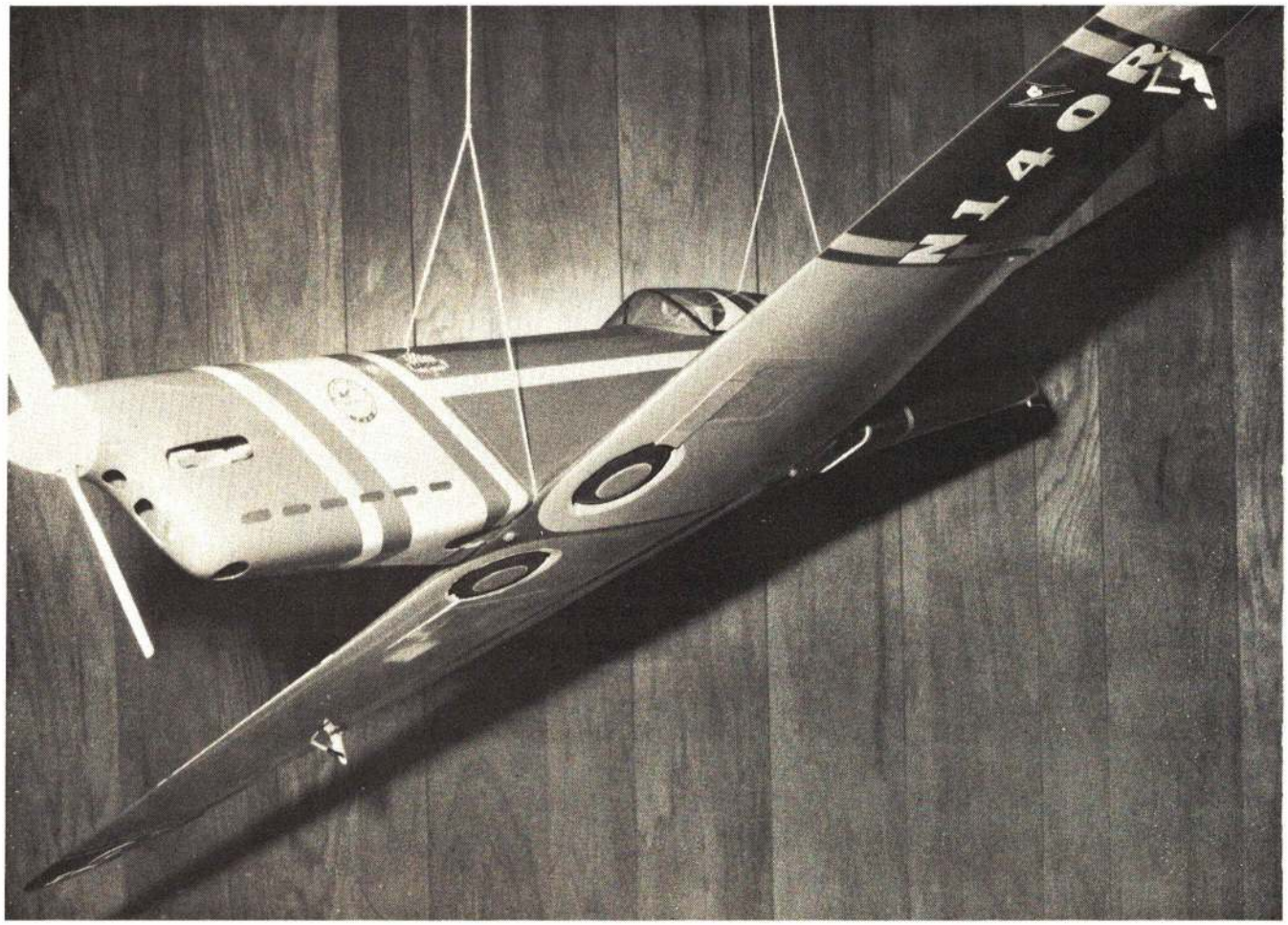
FULL SIZE PLANS AVAILABLE—SEE PAGE 70



PART 1

MAKE YOUR OWN RETRACTS

by BOB ROOT



Photos by Tom Sakata

After flying an FAI racer for one season with fixed landing gear, I decided to add retractable gear. I had observed while racing that those using commercial retract systems had not shown a speed advantage, and that they suffered from poor reliability. The lack of speed seemed to be caused by the thickened wing required to house the commercial units available at that time. I feel that reliability can be greatly improved with a good, simple design.

With this in mind, I set about to design a thin, reliable, strong retractable landing gear system suitable for my FAI pylon racer. Since I don't have access to a machine shop, any system I design must be built with regular hand tools. The landing gear system presented here is the result of this effort. Although the newer commercial units have greatly improved reliability, the gear described here have the advantage of low cost.

The racer design required a gear not more than 3/4" deep at the landing gear strut. A solid up and down lock is required to prevent servo damage. Since 3/4" was not enough room for a reliable lock, I designed the locking unit aft of the strut (forward on a tricycle gear setup) where more wing depth is available. From observations of some commercial units I feel that a 5/32 wire strut with adequate coils such as currently used on nose gear is also required. With an adequate coil there is less chance of the gear taking a permanent set (bend) during a hard landing.

The major materials required to build these gear are 3/8 to 1/2" thick Teflon, Nylon, or Delrin, .03 to .05" thick aluminum, and standard music wire, bolts, etc. I found 1/2" Teflon sheet at a surplus store. The thickness is not critical, it just needs to be thick enough to tap for a 6-32 bolt.

Main Gear

Start by cutting out all the Teflon and aluminum parts. Don't worry about the angled surface on the top of the main blocks. Just cut them square; they will be sanded to the proper angle later. Mark and drill all the holes in the aluminum plates using a 3/32 drill. The holes will be enlarged as required later. It is best to center-punch all holes before drilling.

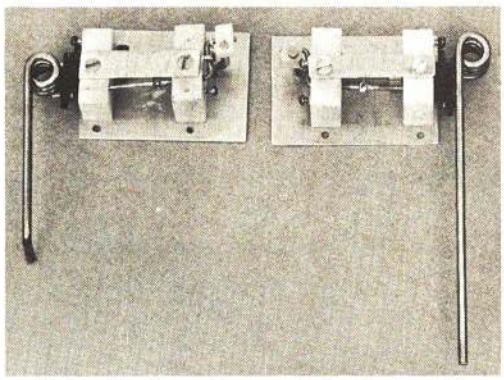
Now clamp the Teflon blocks to the aluminum plate in the correct location. Drill two 3/32 holes in each Teflon block using the aluminum plate as a guide. The blocks can then be removed and tapped for 6-32 bolts. Drill countersink holes in the aluminum plates and bolt the blocks in place with 6-32 flat head bolts.

The top of the Teflon blocks can now be sanded to the proper shape using a sanding block with coarse sandpaper. The top of the blocks should be drilled and tapped using the top aluminum plate for a guide as was done on the bottom. Bolt the top plate in place.

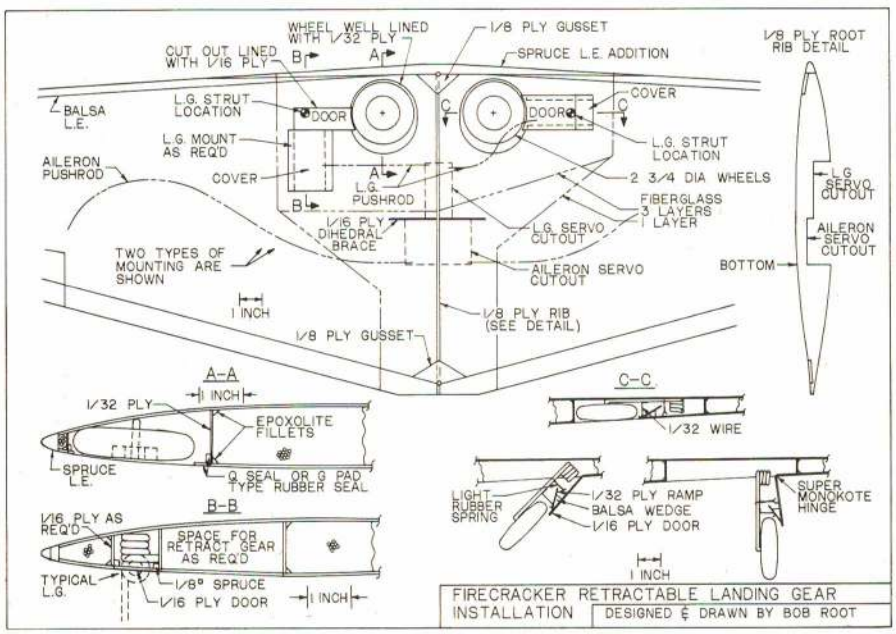
Next, carefully mark and center-punch the location of the holes for the strut and lock wires. As a start, use an undersize drill (1/16" for the lock and 1/8" for the strut) and after carefully aligning the drill, drill one block, turn over, then drill the other. Now drill through both blocks simultaneously to get the holes somewhat parallel.

Work the holes out to the correct size

DESIGNED FOR THIN-WINGED RACERS OR HEAVY STUNTERS, THESE SIMPLE RETRACTS CAN BE MADE WITH HAND TOOLS. NEXT MONTH—THE NOSE GEAR.



Note direction of gear leg's shock coil. Conventional-geared plane's retracts at left, nose-geared plane's main gear at right. Upper plastic block on left was thinned to fit well forward in wing.



using progressively larger drills. Try to get the original holes as parallel as possible to minimize the slop in the system when it is finished. The final drill size should be a No. 40 drill for the 3/32 wire, and a No. 20 for the 5/32 wire for proper clearance in the Teflon. These drills and the 6-32 tap aren't expensive and can be obtained at most hardware stores.

With the blocks now ready, decide which type of gear (tricycle or standard) you are going to make and bend up the 5/32 music wire struts accordingly. Bend the coil and the bend for the wheel axle, but not the aft bend which is required for the lock. There are several wire benders on the market which are capable of bending this size wire. Remember to make a right and left strut.

Before proceeding, the wire should be heat treated to relieve the internal stresses caused by bending the coil. Otherwise they will tend to unwind with time. Put the struts in a 325 degree oven for 30 minutes and then let cool at room temperature. The strut and lock wires should now rotate freely in the Teflon blocks. If they don't, work on the holes until they do. Mount the strut in the Teflon blocks remembering the nylon arm and the collar. The aft bend can now be made. If your wire bender is like mine, you will probably have to unbolt the aluminum plates and slide the blocks, etc. against the coil to have enough room for this. After the bend is made, reassemble the parts. If the units are to be used in a tricycle setup with the lock forward of the strut, a flat should be filed for the collar set screw. This collar will be subjected to large loads when the strut is mounted aft of the Teflon blocks.

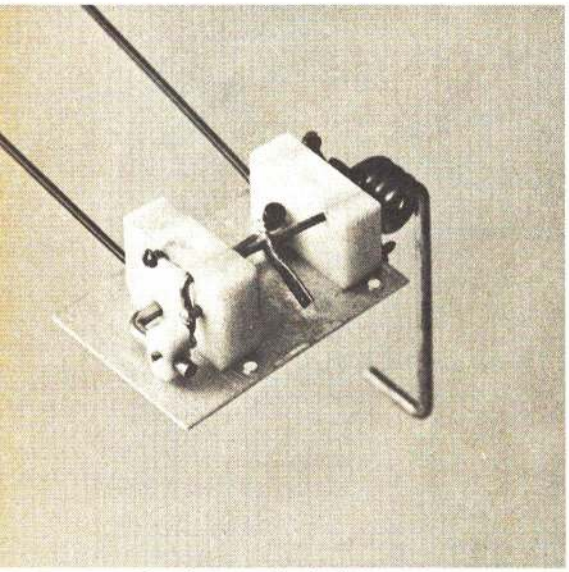
If the slider block hasn't been drilled yet, do so now using No. 40 and 20 drills. Drill the No. 20 hole and insert a piece of 5/32 wire when drilling the No. 40 hole. This will insure that the two holes are as close as possible.

The 3/32 locking wire can now be bent up. Install it with the slider block and see how things work. If it is the right length to give exactly 90 degrees throw, you are luckier than I. It always takes me several tries to get the right size, but the 3/32 wire is inexpensive. It will take some adjusting of the angles on the locking wire, but when bent properly there should be no binding anywhere in the system.

The only thing left is to make the pushrod arm and mount the various screws used to limit motion at the extremes. The amount of servo throw required to actuate the gear is a function of the length of the pushrod arm. However, the required actuation force increases as the arm length is decreased. After drilling the arm as required, solder it to the 3/32 wire between the Teflon blocks. Make sure you have a good solder joint. The heat won't hurt the Teflon. The gear should now lock with no force required on the output arm.

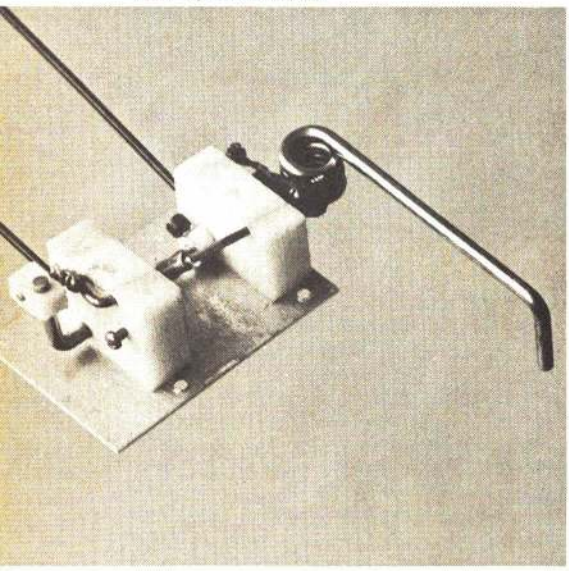
Mount the required screws using a 1/16" pilot hole to make it easier to screw them in. Experiment with rubber sizes to get one which just balances the strut and wheel you plan to use. I have found that indoor model rubber works well.

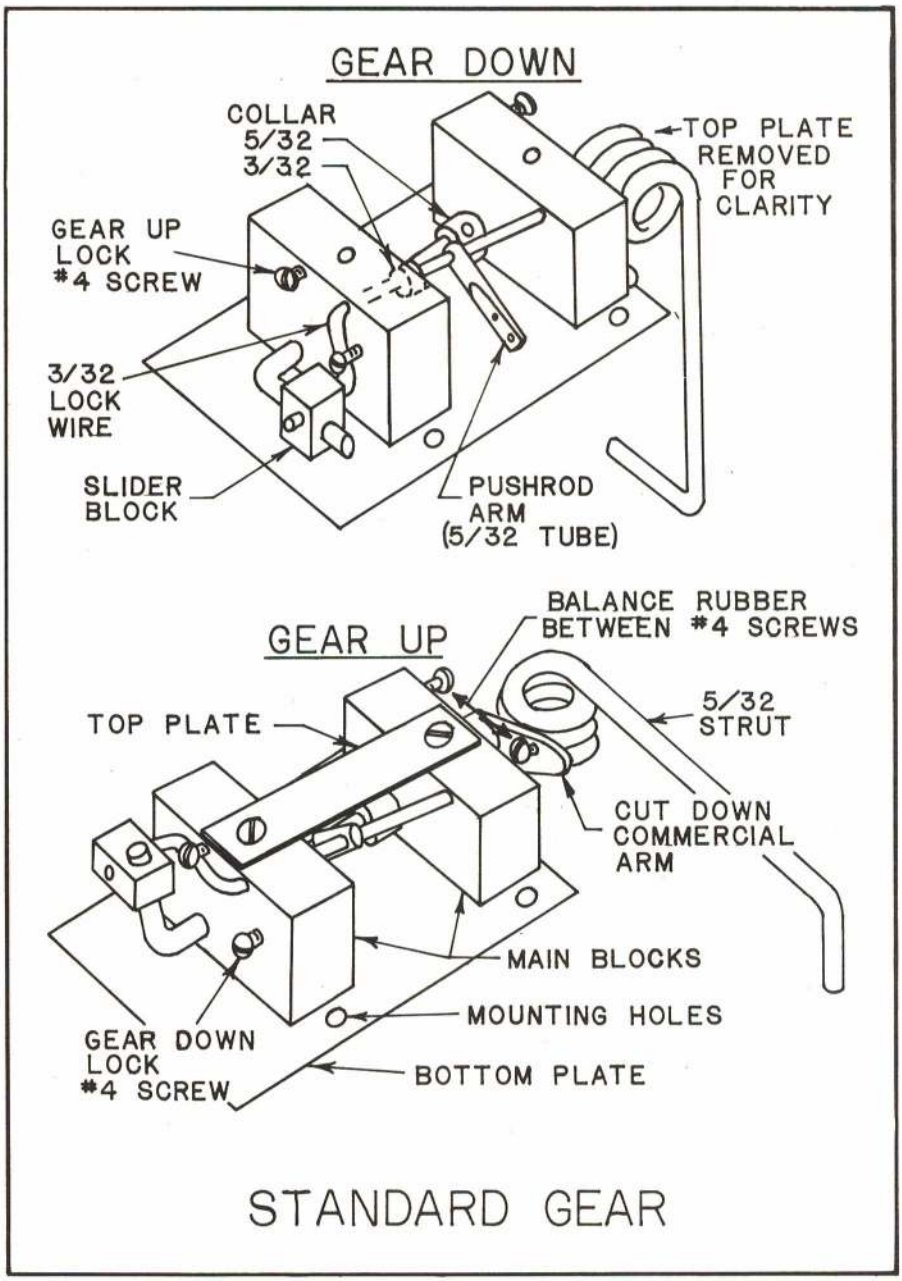
(Continued on page 82)

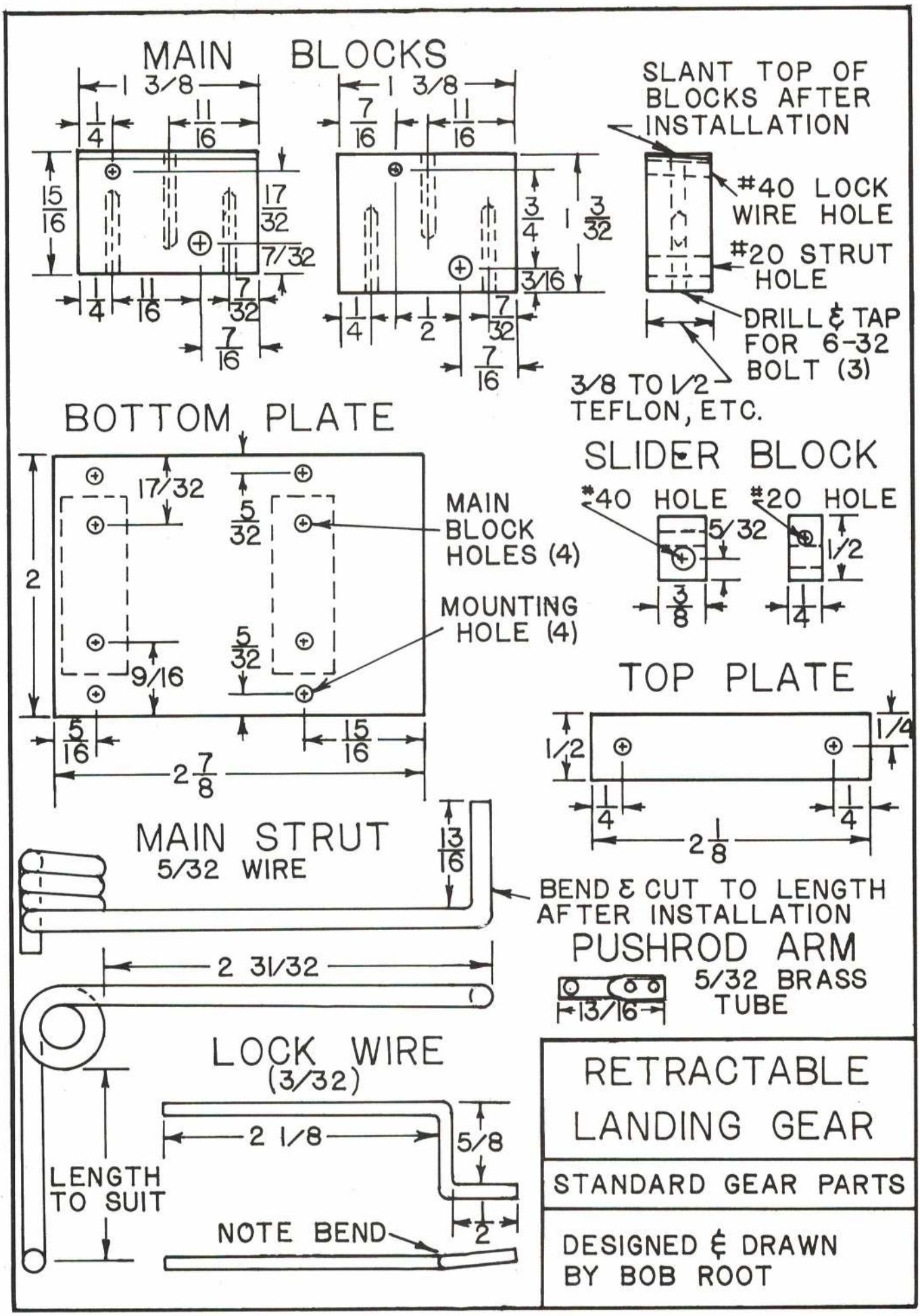


Gear down and locked.

Gear up and locked.





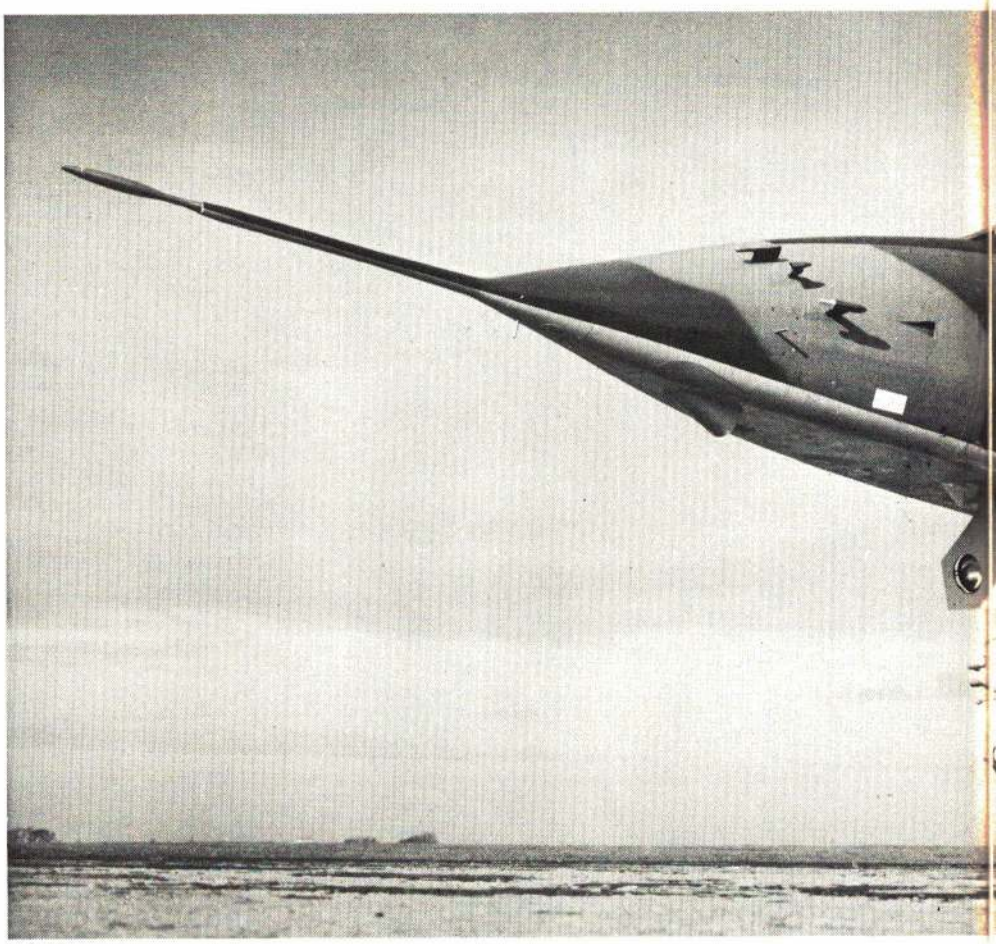

MAIN BLOCKS
1 3/8
1/4
11/16
15/16
17/32
7/32
7/16
1 3/8
7/16
11/16
3/4
1 3/32
3/16
1/2
SLANT TOP OF BLOCKS AFTER INSTALLATION
#40 LOCK WIRE HOLE
#20 STRUT HOLE
DRILL & TAP FOR 6-32 BOLT (3)
3/8 TO 1/2 TEFLON, ETC.
BOTTOM PLATE
17/32
5/32
MAIN BLOCK HOLES (4)
MOUNTING HOLE (4)
2
9/16
5/16
15/16
2 7/8
SLIDER BLOCK
#40 HOLE
#20 HOLE
5/32
1/2
3/8
1/4
TOP PLATE
1/2
1/4
2 1/8
MAIN STRUT
5/32 WIRE
13/16
BEND & CUT TO LENGTH AFTER INSTALLATION
2 31/32
PUSHROD ARM
5/32 BRASS TUBE
13/16
LOCK WIRE
(3/32)
2 1/8
5/8
2
LENGTH TO SUIT
NOTE BEND
RETRACTABLE LANDING GEAR
STANDARD GEAR PARTS
DESIGNED & DRAWN BY BOB ROOT

JAGUAR

Specifications: Jaguar

Dimensions:
Wing Span—27' 10-5/16"
Length—50' 10-15/16" (single-seat)
53' 10-7/16" (two-seat)
Height—15' 2-5/8"
Wing Area—262 sq. ft.
Normal Takeoff Weight—22,000 lbs.
Maximum Weight—30,000 lbs.

Performance
Maximum Speed—1115 mph (36,000')
840 mph (sea level)
Landing Speed—131 mph
Takeoff Run—1485'



by DON BERLINER

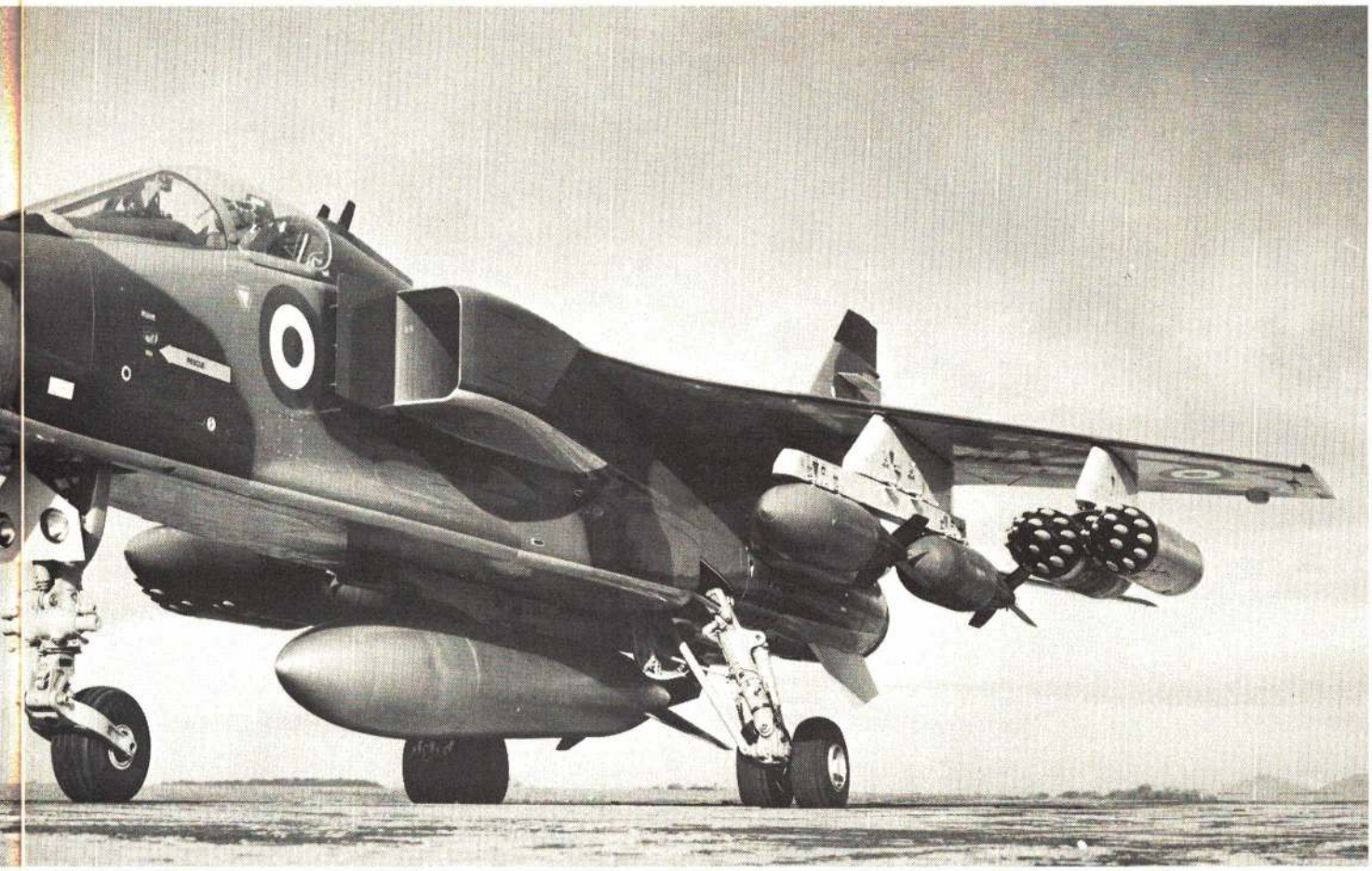
Things get more confusing all the time! It used to be that training planes were one thing and fighter planes another. And British planes were completely separate from French planes. But now the whole thing is mixed up and probably will get worse, mostly because developing modern, high-performance aircraft has become so ridiculously expensive.

A glowing example of this is the Jaguar—a fairly conventional Mach 1.6 (about 1100 mph) jet soon to be in production. It's British and it's French. It's land-based and carrier-based. It's a multi-purpose tactical fighter and it's a trainer. The Jaguar is actually built at the same time in both England and France—two countries that are only a few miles apart, but have had their disagreements over the years and still haven't built that proposed tunnel under the English Channel.

This confusion can be attributed to the high cost of fighting. Such ultra-expensive projects as the Concorde supersonic transport and space research are too much for most countries to afford, so two or more pool their resources and talents to build together. While the selling of airliners and space exploration have always been highly competitive, neither can compare with the building of combat airplanes. Not only are they major sources of national pride, but they could easily end up on opposite sides in a war.

The huge cost of modern combat planes has forced otherwise independent countries to get together. Despite the fact that the English and the French have quite different personalities, they haven't faced each other in a major war for more than 150 years. The possibility that the two countries might each be building half an airplane to be used against one another doesn't seem worth losing sleep over. In fact, the French didn't seem worried about an earlier joint program to build military

GREAT BRITAIN AND FRANCE JOINED HANDS TO PRODUCE 450 OF THIS VERSATILE LAND- OR CARRIER-BASED TACTICAL FIGHTER AND TRAINER.



transports with their traditional enemy, Germany.

From the British point of view, a major factor must have been the sensational post-war recovery of the French aircraft industry. After producing the few second-rate airplanes with which France entered World War II, and then being forced to build airplanes for its German conquerors, France came out of the war in pretty bad shape. In only a few years, however, her industry was rebuilt to the point where it could create one of the best of the early jetliners—the rear-engined Caravelle. Then came the sleek, delta-winged Mirage jet fighters, best known for their work in the Israeli Air Force, which has included the defeating of Russian-piloted MiG-21's. The French realized the British aircraft industry offered unparalleled experience in airframe and engine development.

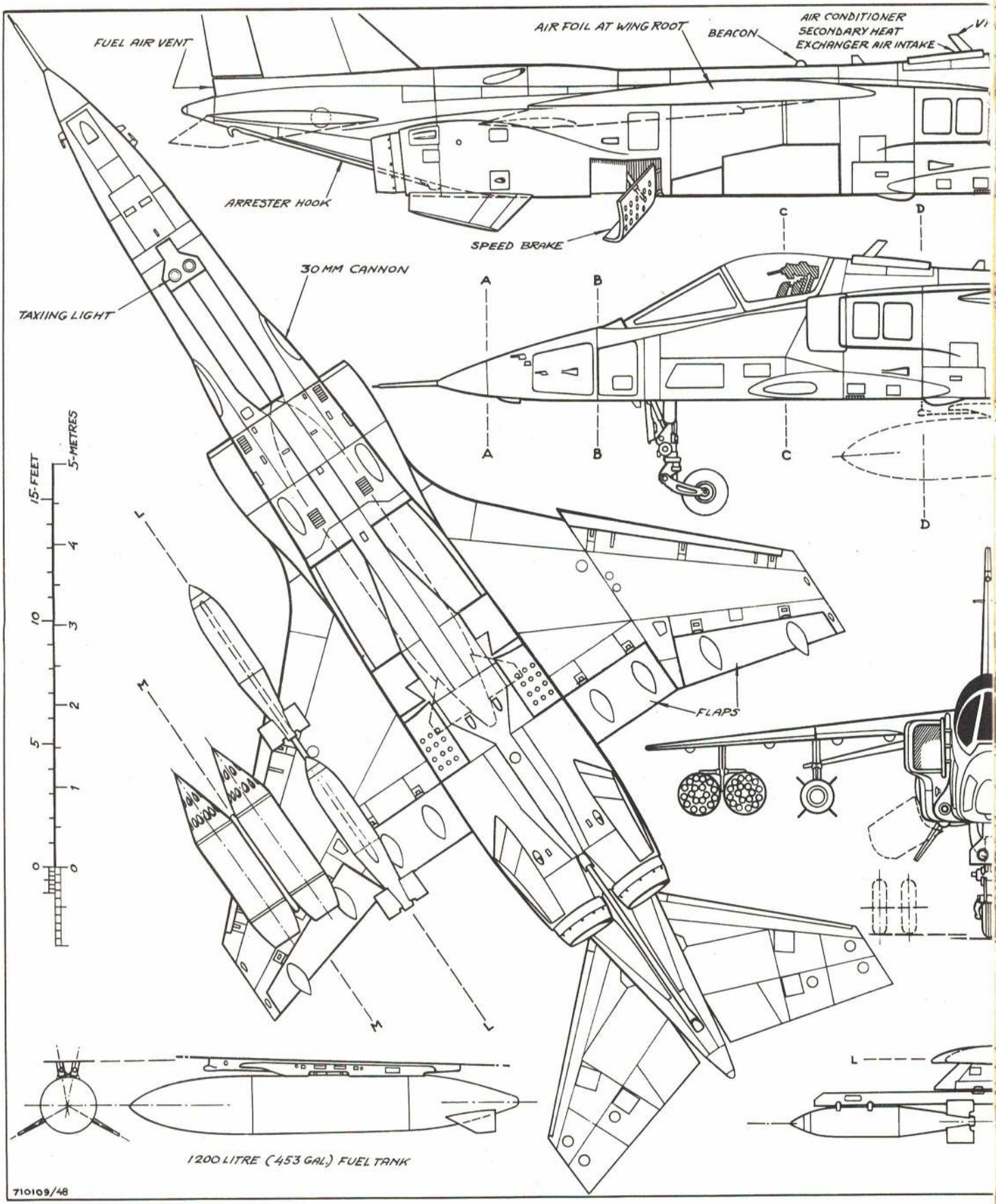
The story of the Jaguar began in 1964 when the French decided they needed something to replace their current Ourigan and Mystere fighters and Lockheed T-33 trainers. Winner of a competition was the Breguet Br.121, a multi-purpose, swept-wing design that looked like what eventually was to be the Jaguar. At about the same time, the British were looking for an airplane to do a variety of jobs; they, too, settled on a conventional lay-out, rather than the complicated and still unproven swing-wing idea.

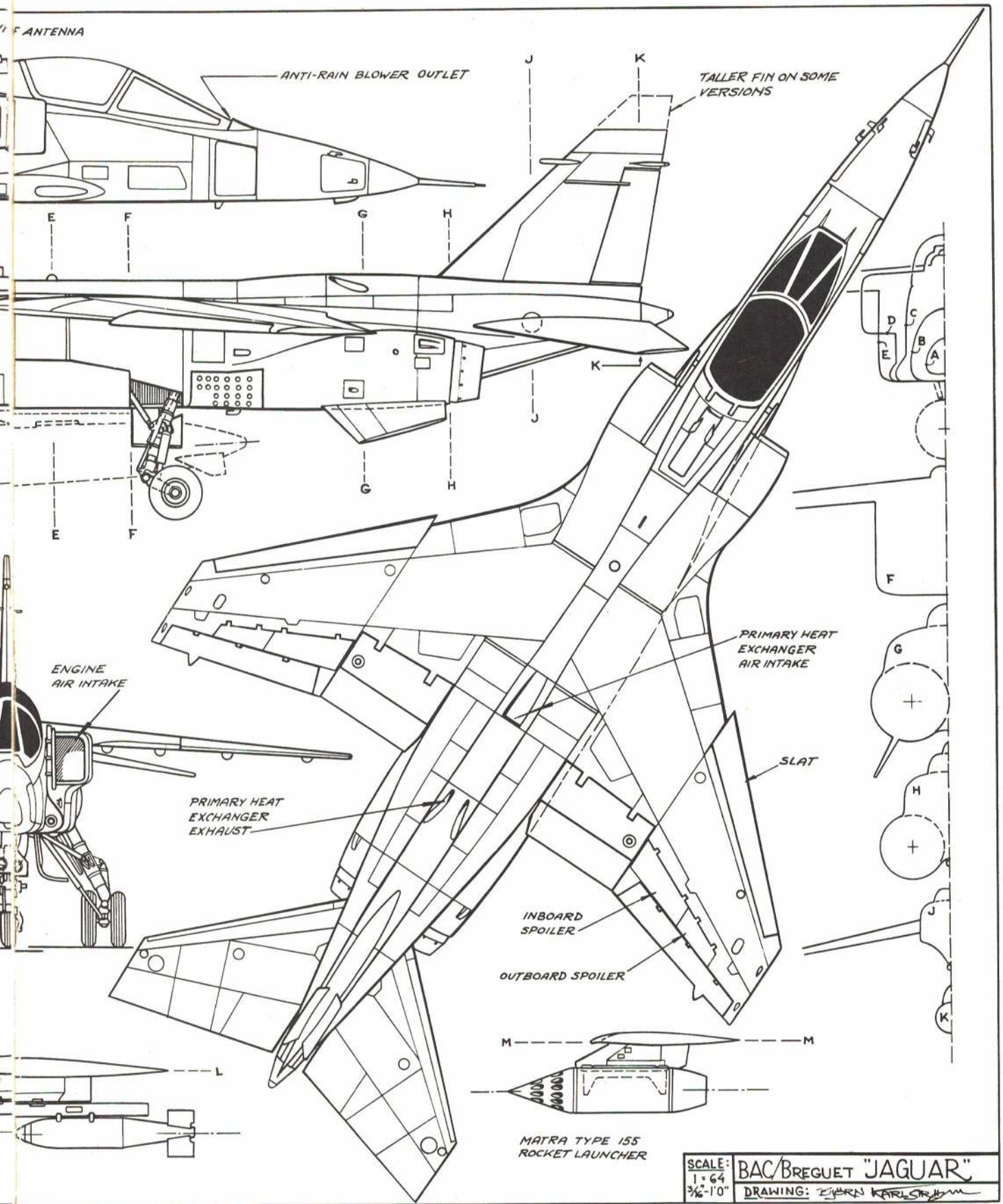
In 1965, the two countries agreed to work together, using the Br.121 as their starting point. In the amazingly short time of six months they had settled on the design of the new airplane. One hundred were to be built for each country—150 two-seat trainers for the RAF, 75 trainers and 75 single-seat strike fighters for the French Air Force. Later, each country agreed to buy an additional 50 airplanes, with the RAF order changed to 110 trainers and 90 strike fighters, and the French adding 40 single-seat trainers and 10 two-seaters.

At this time, plans were being made and cancelled for other projects. The British supersonic VTOL P.1154 "super Harrier" had been killed by the government a few months before the Jaguar project got under way. In 1967, the proposed AFVG (Anglo-French Variable-Geometry fighter) project collapsed when the French pulled out. But not even this could shake up the increasingly successful joint operation between four companies: British Aircraft Corp. and Breguet on the airframe, Rolls Royce and Turbomeca on the engine.

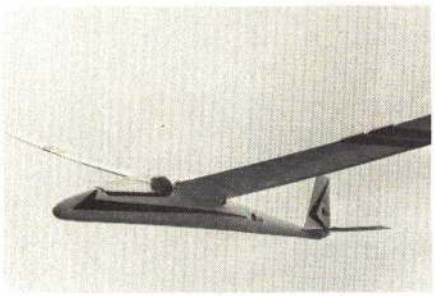
The first airplane was rolled out April 17, 1968 at Villacoublay, where it had been built as a French Air Force two-seat trainer version. On September 8 it made its first flight and

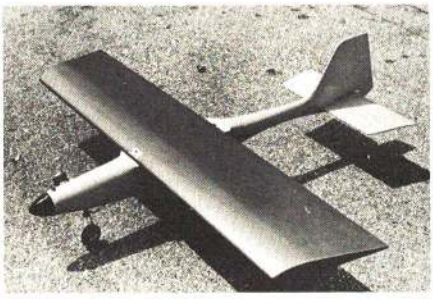
(Continued on page 92)

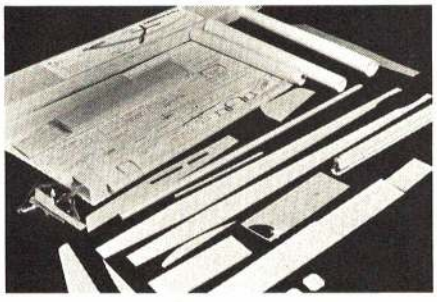

FUEL AIR VENT
AIR FOIL AT WING ROOT
BEACON
AIR CONDITIONER SECONDARY HEAT EXCHANGER AIR INTAKE
ARRESTER HOOK
SPEED BRAKE
30 MM CANNON
TAXIING LIGHT
A
B
C
D
FLAPS
15-FEET
5-METRES
1200 LITRE (453 GAL) FUEL TANK
710109/48

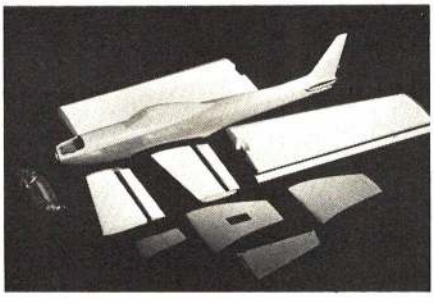

F ANTENNA
ANTI-RAIN BLOWER OUTLET
TALLER FIN ON SOME VERSIONS
ENGINE AIR INTAKE
PRIMARY HEAT EXCHANGER EXHAUST
PRIMARY HEAT EXCHANGER AIR INTAKE
SLAT
INBOARD SPOILER
OUTBOARD SPOILER
MATRA TYPE 155 ROCKET LAUNCHER
SCALE: 1:64 3/16"-1'0"
BAC/BREGUET "JAGUAR"
DRAWING: KARL STRUM

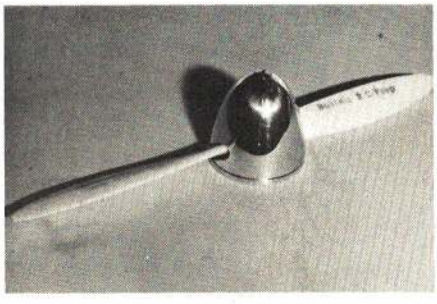
new products check list











JP Models/RC Glider. 100" span gives wing loading of less than 10 oz./sq. ft. Kit has completely finished fuselage with plywood skin and bulkheads with laminated fiberglass nose. Should be good for thermal or slope flying. Included in kit are all required rods, hinges—even painted sportsman pilot. $39.95. JP Models, 26557 Mazur Dr., Palos Verdes Peninsula, Calif. 90274

J & J Industries/American Eagle. 103" span sailplane uses Frank Zaic's thermic wing design, polyhedral for best soaring qualities. Built-up construction uses only top-quality balsa throughout. Wing panels plug in for clean design and ease of carrying. 790 sq. in. wing area, adaptable to power pod. $36.95. J & J Industries, Inc., Box 202, Oakhurst, N. J. 07755

Cox/P-51D Racer. Colorful conversion to unlimited-class air racer *Miss America* is a sure show-stopper even in U-control. Plane is ready-to-fly, including factory-installed Cox 049 engine. Pop-off wings protect plane from occasional hard landing, plastic finish wipes clean with soap and water. Detailed owner's manual. 16" span, beginner-oriented. $13. L. M. Cox Mfg. Co., 1505 E. Warner Ave., Santa Ana, Calif. 92705

W.A.V.E. High-performance trainer. One of a series of radically new RC aircraft developed to exploit the .amazing strength-to-weight ratio of nylon-honeycomb and epoxy-impregnated fiberglass, *Shadow* should give excellent performance but be easy and stable to fly. Complete kit with all necessary hardware should sell for under $100. For additional information, write W.A.V.E. Inc., 1237 S. Wells Rd., Saticoy, Calif. 93003

World Engines/Pilot-line Five Star. Beautiful ARF full-house 60-powered plane is scaled-up version of Sky Knight (December Check List), features integral bracing for motor mounts, steerable nose wheel, even pre-hinged rudder. 63.8" span with 650 sq. in. wing area. $69.95. World Engines Inc., 8960 Rossash Ave., Cincinnati, Ohio 45236

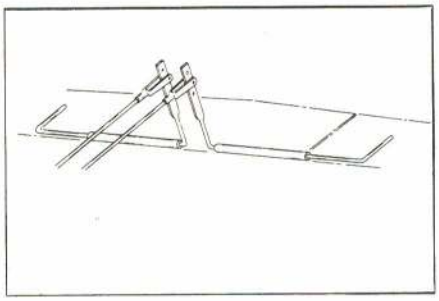
Royal Products/Pitts Special. Another addition to present line of scale kits, Pitts should be real attention-getter with 50¾" span and flying with 45 to 60 power. 856 sq. in. wing area; length, 43½". $59.95. Royal Products Corp., 6190 E. Evans Ave., Denver, Colo. 80222

Taran Products/Fuel pump. Rugged and reliable pump delivers one oz. of fuel per stroke. All-metal with flexible plastic tubing. $6.95. Taran Products, 466 Giannini Dr., Santa Clara, Calif. 95051

Fox/Spinner. Highly polished precision-made spinners use pop-fit attachment of base plate to spinner body for quick, sure installation. Contoured screw holds assembly together. 2¼" diameter. For additional information, write Fox Manufacturing Co., 5305 Towson, Fort Smith, Ark. 72901

Tatone/New mufflers. New line of double-expansion chamber mufflers for engines from 09 to 80 form Calumet line. (Calumet equals Peace Pipe in Indian and John Tatone parlance!) So keep peace in neighborhood and hold power loss at minimum. Five models including units adaptable for Testor McCoy 21 Series, $4.95 to $5.95. Tatone Products, 4719 Mission St., San Francisco, Calif. 94112

by FRANK PIERCE



World Engines/Gold Head rear-valve 60. One of the most powerful engines for its size, O.S. Max 60 RV GP R/C features twin ball bearings, ringed piston and ported piston skirt. Weight, 15.5 oz.; output, 1.05 hp; rpm range, 2000 to 13,000. $49.98. Also O.S. expansion-chamber muffler for O.S. 60 engines shown installed. $9.98. World Engines Inc., 8960 Rossash Ave., Cincinnati, Ohio 45236

Stanton Hobby Shop/MVVS 15 diesel engine. Czechoslovakian racing engine has displacement of 2.47 cc with bore of 15 mm and stroke of 14 mm. The bore stroke ratio is .93/1. Weight without muffler system, only 210 grams. Power output is .58 hp at 21,000 rpm. Muffling system includes a long rubber tube and lightweight aluminum expansion chamber. $29.95, complete with silencer and tube. Stanton Hobby Shop Inc., 4734 N. Milwaukee Ave. Chicago, Ill. 60630

Royal Products/Kavan Muffler. German-designed muffler can be fitted to many different engines through series of adapters. Two optional insert discs (shown) can be installed: Venturi disc eliminates some noise with no power loss; solid disc causes some loss of power but attenuates noise level further. For data on price and adaptability, write Royal Products Corp., 6190 E. Evans Ave., Denver, Colo. 80222

Sterling Models/Strip aileron link. Left- and right-hand links are made from zinc-plated carbon-steel rods, flattened on one end to accept pushrod adjustment holes and bent on other to provide mounting spur. Rod is mounted in virgin nylon tubing for low-friction bearing surface. Design characteristics are low drag, high strength, freedom from generated electronic noise. Sketch shows installation. No. 115, 59 cents per pair. Sterling Models, Sterling Bldg., Belfield Ave. & Wister St., Philadelphia, Pa. 19144

X-acto/Power tool set. Drills and grinds wood, plastic—even mild steel, 12V Mini-Drill operates at 9000 rpm's and comes with three chucks to accomodate drills and accessories from .0 to 3/32". Complete kit includes punch, transformer and 12V automobile cigar lighter plug for use in the field. Complete, $17.50. X-acto, Inc., 48-41 Van Dam St., Long Island City, N. Y. 11101

M & F Sales/Drill cleaning attachment. Removes rust, paint, scale, corrosion by means of 21 hardened steel whirling, cutting teeth mounted in head. Great for many home and hobby applications. For 3/8 and 1/2" drills or sanders. $16.95. M & F Sales, 1040 Biscayne Blvd., Miami, Fla. 33132

Pactra/High visibility paints. Fully compatible with all model materials, including Pactra's own Aero-Gloss dopes, special fluorescent paints, undercoat, and thinner are available in red, orange, yellow, and green. Sold as Aero-Glo, paints are available in 1-oz. jar for 39 cents, 4-oz. jar, $1. For plastic model aircraft and rockets, similar paint is available as Pactra Hi-Glo. Pactra Industries, Inc., 6725 Sunset Blvd., Los Angeles, Calif. 90028

Dumas Boats/The Hobie Cat. Cute catamaran, model of popular West Coast sailboat has nylon sails, built-up mahogany hulls. Fast, high-performance, no keel required. Kit RS-14, $5.95. Dumas, Box 6093, Tucson, Ariz. 85716

PENGUIN

by DAVE KINGMAN

CONTROL-LINE SCALE MODEL OF NON-FLYING TRAINER CAN ALSO FLY NICELY AS FF OR RC.

If you fancy yourself an airplane spotter, but couldn't identify this design from the past, don't feel bad. It's not an airplane! Turn to page 51 of the 1932 *Flying and Glider Manual* and learn about the Penguin practice plane, so named because it has wings but can't fly. Plans for the ship call for 15 ft. wing span and a motor of "at least 3 horsepower." They show an aircraft-type stick and rudder pedal control system operating oversize control surfaces. Skills required in balancing a Penguin on its main wheel as it bounced across a field could later help a fellow learn to fly. I bet it was fun! (Lost your 1932 *Manual*? The Experimental Aircraft Assn., Hales Corners, Wisconsin, has reprints for sale.)

The full-size design is so much like a huge model that it seemed natural to build a miniature of it. Model construction follows full-size construction with additional changes to simplify and strengthen the structure. Detachable wings are uncommon on control-line models. This feature was retained for the same reason the big Penguin had it—ease of construction, storage and transportation. The bicycle landing gear was a question mark. Would a model ROG as planned, or would it dip its left wing and come charging across the circle at me? No problem. Held with both wheels and the right wing skid touching the ground, the model is released heading downwind. An old O.S. 35 gets mine aloft in a quarter lap. Flight is very stable, with the offset ailerons and rudder providing a firm pull on the lines at all times—an essential factor when using throttle control on gusty days. The ailerons and wing weight are what keep the right wing low on takeoff, so retain them even if you don't use an RC-type engine and three-line control system.

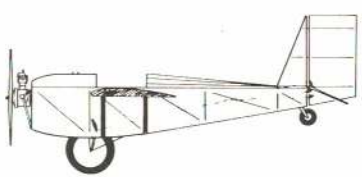
Information on the plans should be sufficient for modelers who are past the profile or foam construction stages. Covering an open framework model may seem old-fashioned these days, but this is a scale model of an old-fashioned machine.

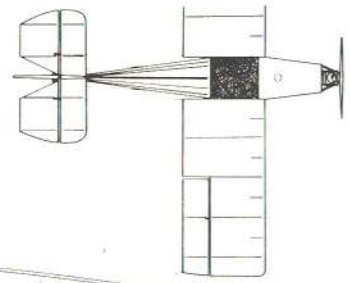
Construction

Build the sides of the fuselage first. The right side can be entirely made on a flat board. Cut the 1/16 plywood forward side piece and then assemble the 1/4 square strip balsa parts, gluing them to the plywood piece as indicated. The completed side should have its forward section permanently curved, plywood to the outside of the curve, before it is joined to other fuselage components. Build the left fuselage side. Bend both sides as follows. Side should be secured to a flat surface at station one. A block of wood clamped or nailed to a board with the side sandwiched between is suggested. Soak the side, from station one forward, with water. Carefully pry the front of the side high enough from the board to slide a ¼" shim under it. Keep the area wet, and later replace the ¼" shim with one ½" thick. Finally block the front a bit over ¾" high, so that when the side is removed from the board it will have a permanent ¾" inward curve from station one to the firewall. This procedure could take from a few hours to a couple of days. Don't be impatient and break wood by trying to bend it before it's ready!

The rest of the fuselage builds up like the "stick" models we all started to build when we were kids. (I was 27 before I finished one.) The sides should have wood removed at the rear where they join; trim the insides as shown on plans. Join the sides by inverting them in position on the plan top view, then cutting and gluing cross members in place. Use an artist's triangle to keep the assembly true during this important phase of construction. Note there are three crosspieces at station one. The firewall should be cut and drilled before installation. It's best to secure the radial motor mount on the firewall at this point. I built a radial mount, but suggest a short Tatone or Midwest metal one. Epoxy the firewall to the fuselage. Even though an extremely light front end is needed, don't save weight by scrimping on epoxy here!

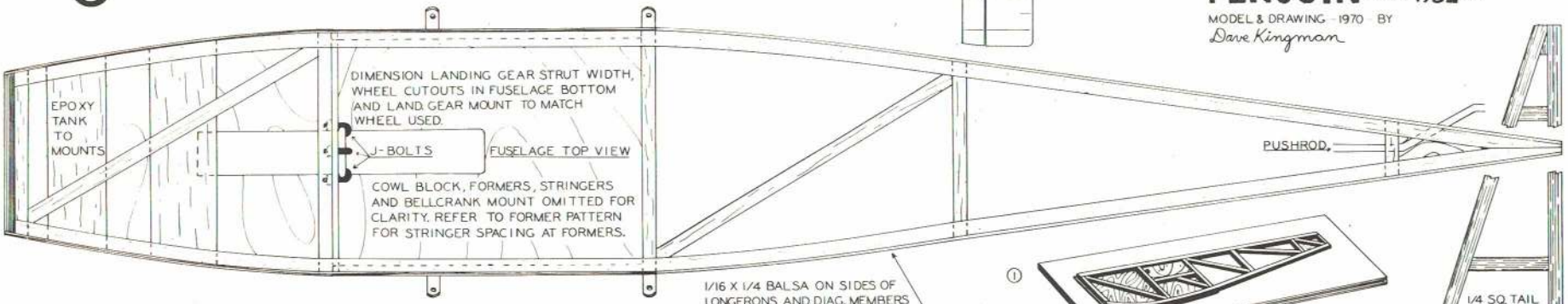
(Continued on page 64)





PENGUIN .....1932...

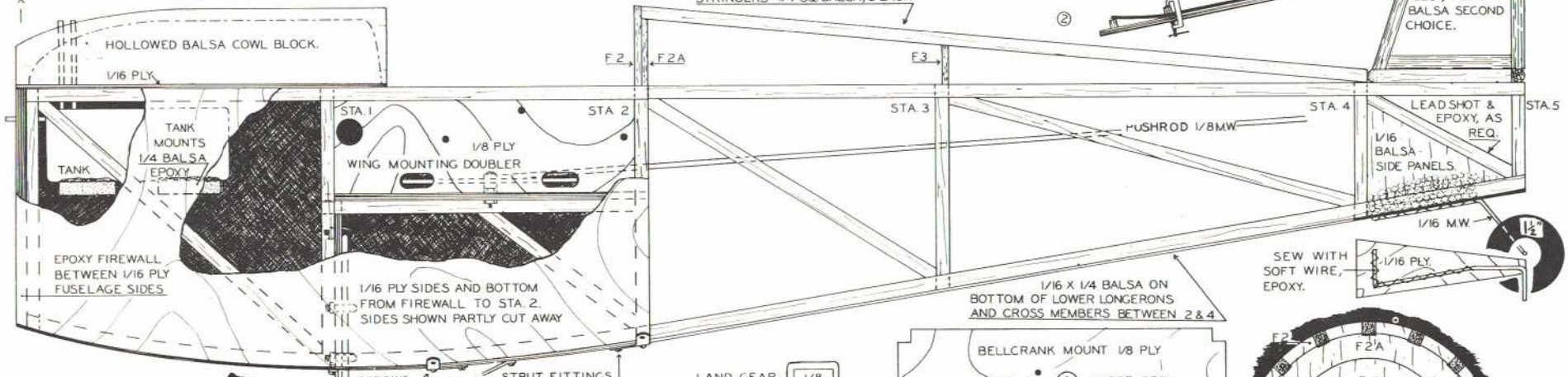
MODEL & DRAWING - 1970 - BY
Dave Kingman



1/16 X 1/4 BALSA ON SIDES OF LONGERONS AND DIAG. MEMBERS BETWEEN STA 2 AND TAIL STA.5

STRINGERS 1/4 SQ BALSA, 5 EACH

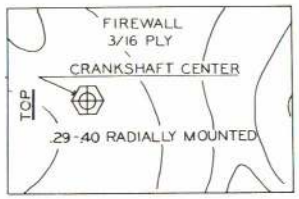
1/4 SQ TAIL SURFACES. SPRUCE IS BEST, HARD BALSA SECOND CHOICE.

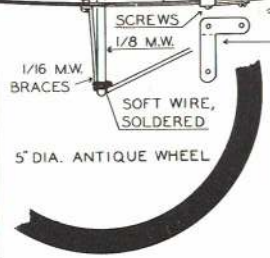


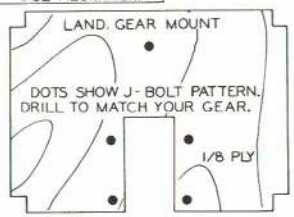
1/16 X 1/4 BALSA ON BOTTOM OF LOWER LONGERONS AND CROSS MEMBERS BETWEEN 2 & 4

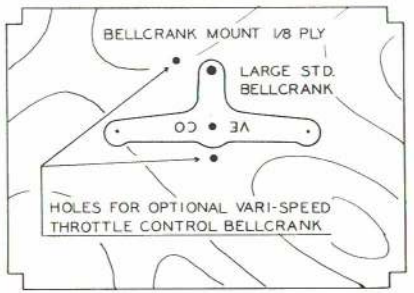
FORMERS ARE 1/8 BALSA

X-SECTION COWL BLOCK







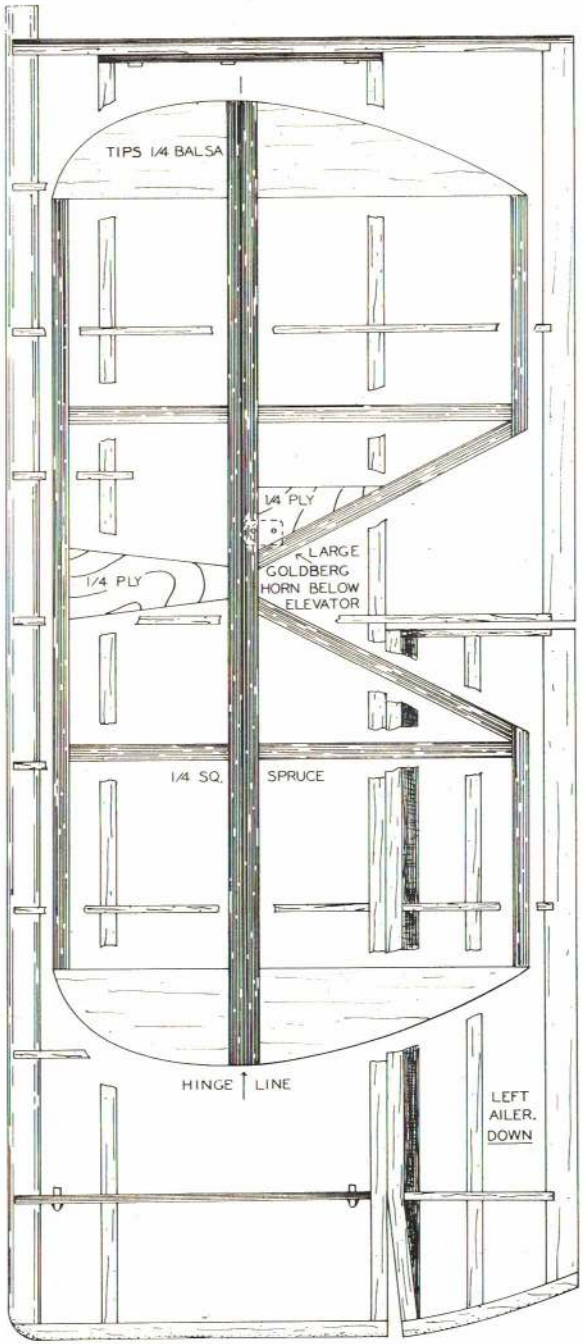


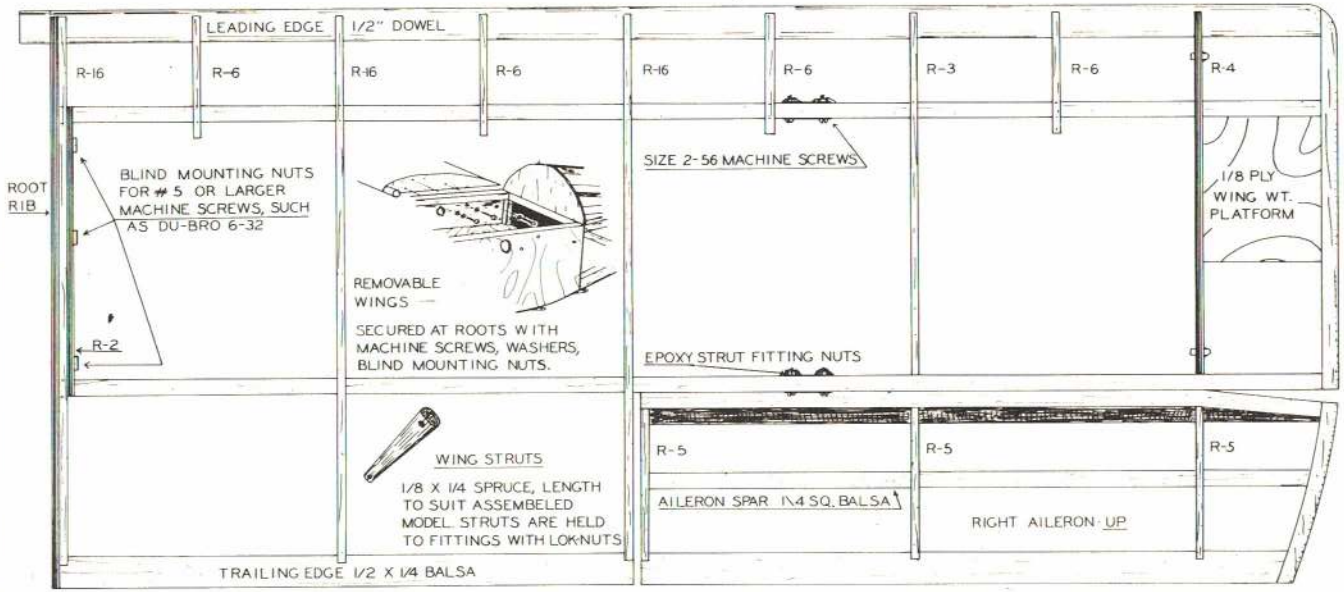
FORMING FUSELAGE SIDES - REFER ABOVE DRWG.

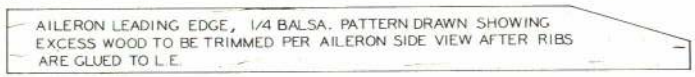
① BUILD SIDE ON FLAT SURFACE.

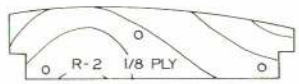
② WET PLYWOOD. CLAMP BLOCK ACROSS SIDE AT STA. 1. BLOCK FRONT OF FUSELAGE PROGRESSIVELY HIGHER UNTIL IT STAYS 3.4" HIGH UNBLOCKED.

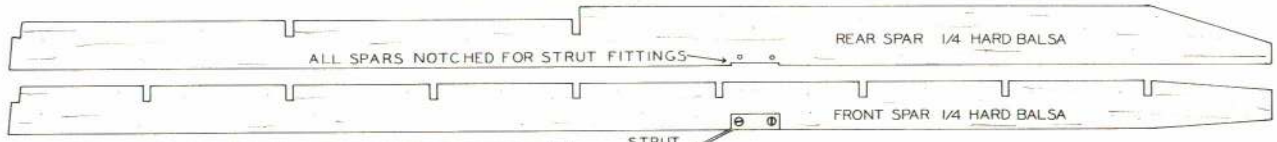
28 January 1972

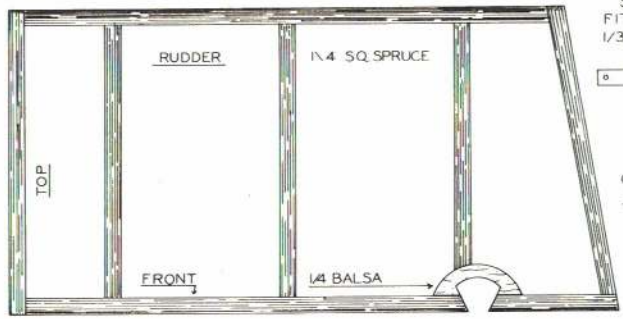


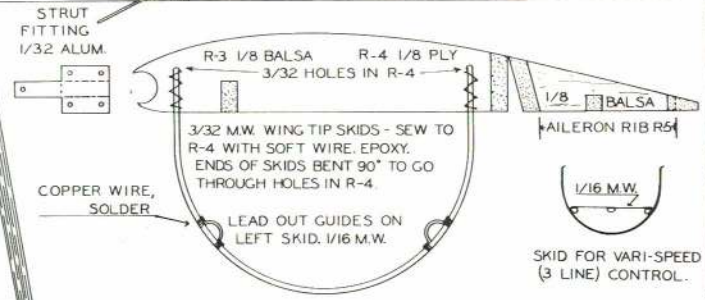












FULL SIZE PLANS AVAILABLE—SEE PAGE 70

Old-Timers Rise Again

by DICK STOUFFER


(1)


(3)


(4)


(7)


(2)


(5)


(6)

Photos by Dick Stouffer

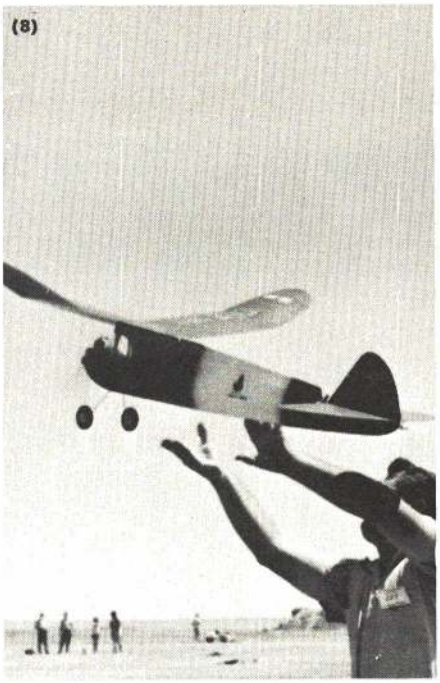
AT BONG, WISCONSIN

(1) No time for feet on the ground when launching the Goldberg "Valkyrie" with Anderson Spitfire for power. Dave Klapstein shows good form.
(2) Karl Schleicher with glow Enya 29-powered Megow "Soaring Eagle." A hard-to-trim design, known for spiral diving.
(3) The Lanzo "Record Breaker" gets weighed by Pete Sotich. Orwick 60-pulled model by Louis Levine.
(4) Body English prevalent at Old-Timers meets—here Chuck Zutell releases his "Playboy Jr." Cox 09 engine.
(5) A "Korda Wakefield" winds its way off the launching boards for Ron Martelet. Take-off is instant.
(6) A Vivell 35 ignition engine smoothly takes Chuck Zutell's Goldberg "Zipper" into the blue.
(7) Howie Heminger pushes out a Megow "Ranger" with O & R 19 for power. A relatively simple model.

Old-Timers are alive and breathing fire at Bong AFB in Wisconsin. There are two Old-Timers contests each year—one at the beginning and end of each flying season. Pete Sotich is the CD for events at Bong AFB and is supported by a number of Northern Illinois model clubs in his activities.

The contests at Bong draw enthusiasts from over four states. Michigan, Indiana, Illinois, and Wisconsin are all well represented. There are Juniors and Seniors participating in the thrill of watching models designed more than thirty years ago fly again. Many of the youngsters are finding that some of the old ignition engines were not weak sisters at all. Of course, there are many romantics in the Open category that are enjoying the models they flew as youngsters in the days prior to WW II. Some of the models are flown on glow ignition, but the larger models are nearly all spark ignition.

by GABRIEL BEDISH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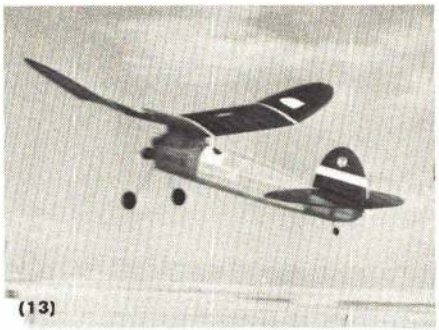
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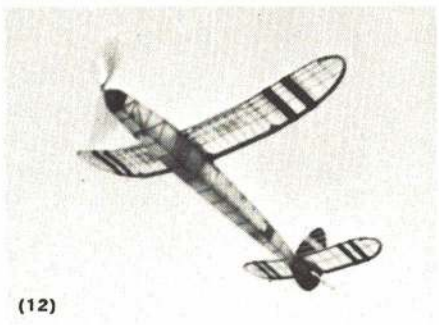
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Photos by Gabriel Bedish

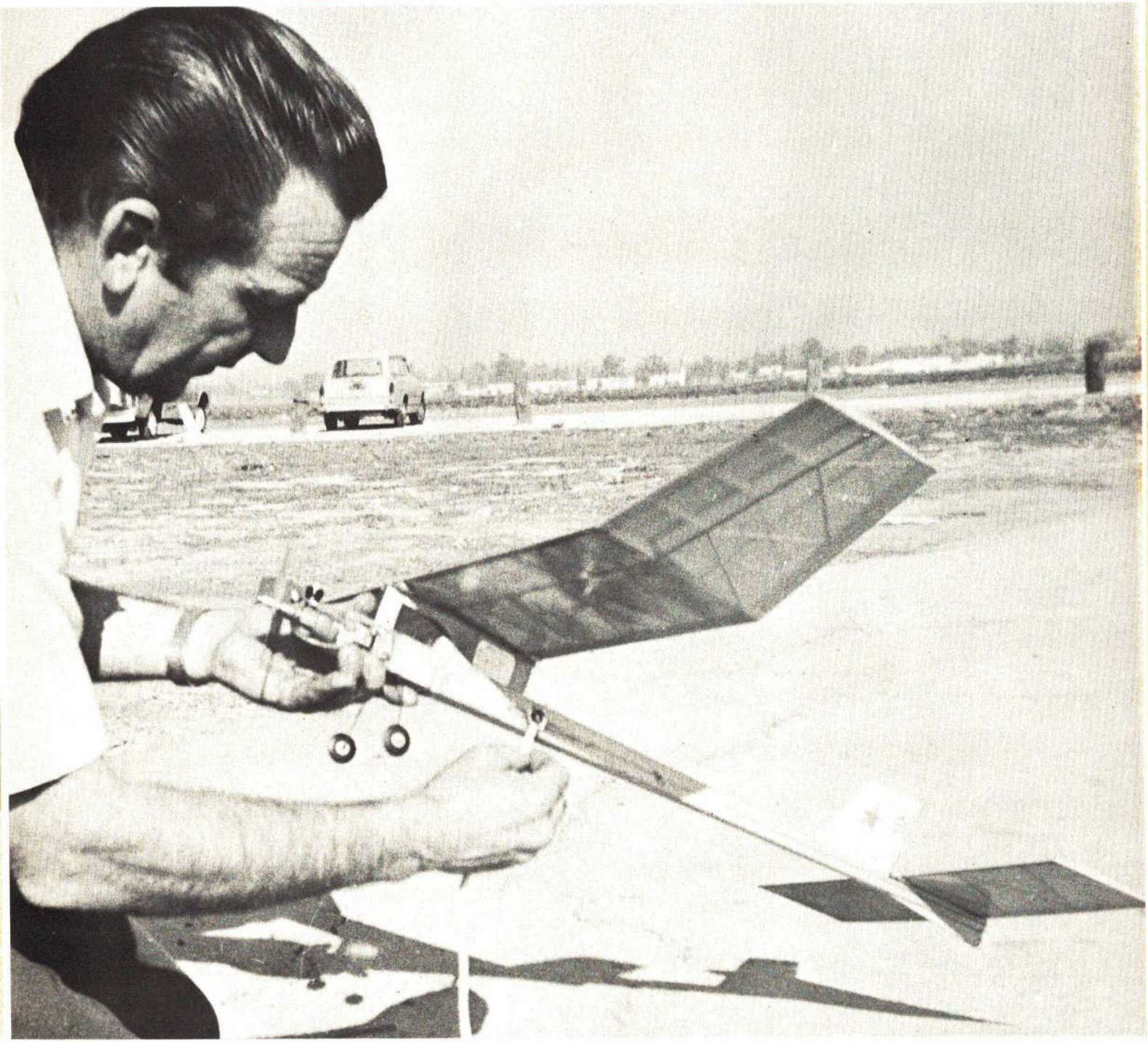
AT DENVER, COLORADO

Old-Timers from across the nation gathered east of Denver, Colorado last August 10-12 for the Fifth Annual Old-Timers Championships, sponsored by the Society of Antique Modelers. Mountain-size thermals abounded, so times were high.

Events were Scale, Towline, Rubber, Unlimited Antique, 30-Second-Engine-Run Antique, S.C.I.F. .020 Power–with divisions for Junior and Open Fliers. The evening of the 10th saw a Best Finish and Beauty Award, outstanding engine and product displays, and an MFCA National Collectors get-together at the United Air Lines training center at Denver's Stapleton Airport. Tours and a lavish smorgasbord on the 11th were hosted by Golden, Colorado. A victory banquet was held at Lowry Air Force Base near Denver, on Thursday–climaxed by trophies and other awards.

(8) Harry Murphy launching "Brooklyn Dodger" which uses an Ohlsson 23. Resurrected plans for this oldie were in last month's AAM.
(9) Murphy's other entry was Flying Aces "Scram" which landed with the Blue Angels (Navy Jet team) at nearby air base.
(10) Marge Bemhardt entered this Ohlsson 60-powered "Trenton Terror" seen here being launched by her husband.
(11) A "Buzzard Bombshell" with Gold Seal Ohlsson 60 by Art Hillis powers its way into the sky.
(12) Silently, Bill Hale's "Lamb Climber" heads upward.
(13) Henry Struck-designed "New Ruler," a popular 1941 Nats plane, climbs aloft. Note open cockpit.
(14) Super Cyclone-motivated "Turner Special" by John DeFond gets off the launching boards.

Pay-Up



ALWAYS AMONG THE TOP THREE WINNERS IN THE 020 PAYLOAD EVENT, THIS MODEL IS ALSO A DELIGHTFUL SMALL-FIELD SPORT FLYER.

by BILL TRACY

Simple to build and fly, Pay-Up makes it easy to win contests or to enjoy a good day of sport flying. The characteristics of this PAA Load Class model make it an excellent choice for use by the beginner for fun, or by the expert for contest work.

The 1/4-A engine is easy to start and operate. With its limited available amount of power, it is imperative to quickly clear the ground on ROG and gain altitude as fast as possible. After attaining good height, an excellent glide is required to be competitive. A side benefit is grooved, steady, smooth climb which lets Pay-Up get as high as most of the smaller PAA Load models.

This model borrows heavily from past successful designs. The wing planform and construction is recognizably Mathis. The stab construction is split rib type and fuselage construction is the old standard box type.

Moments and force arrangements were arrived at through the trial and error method—over a period of three years with four different models. The combinations appear to be right, for this model and its predecessors have never failed to place in the top three in any contest entered. Awards received include two won in small field "fly-for-fun" contests.

Any 1/4-A engine may be used, but fuel shut-off and a dethermalizer should be employed even if flying only sport. Too many sport models have been lost because of the lack of either one or both of these items.

Construction

Construction of Pay-Up is not at all difficult. Required tools are a sharp knife or a few razor blades, a good glue such as Ambroid or Sig, etc., and some straight pins. All balsa used is of light contest grade stock.

Starting on the fuselage first, since it is the most difficult component to build, cut out its sides. Next, cut out the formers including the firewall. With the aft of the fuselage pinned together, insert and glue formers 2-5 in place. Then glue the sides together at the rear, allowing to dry overnight.

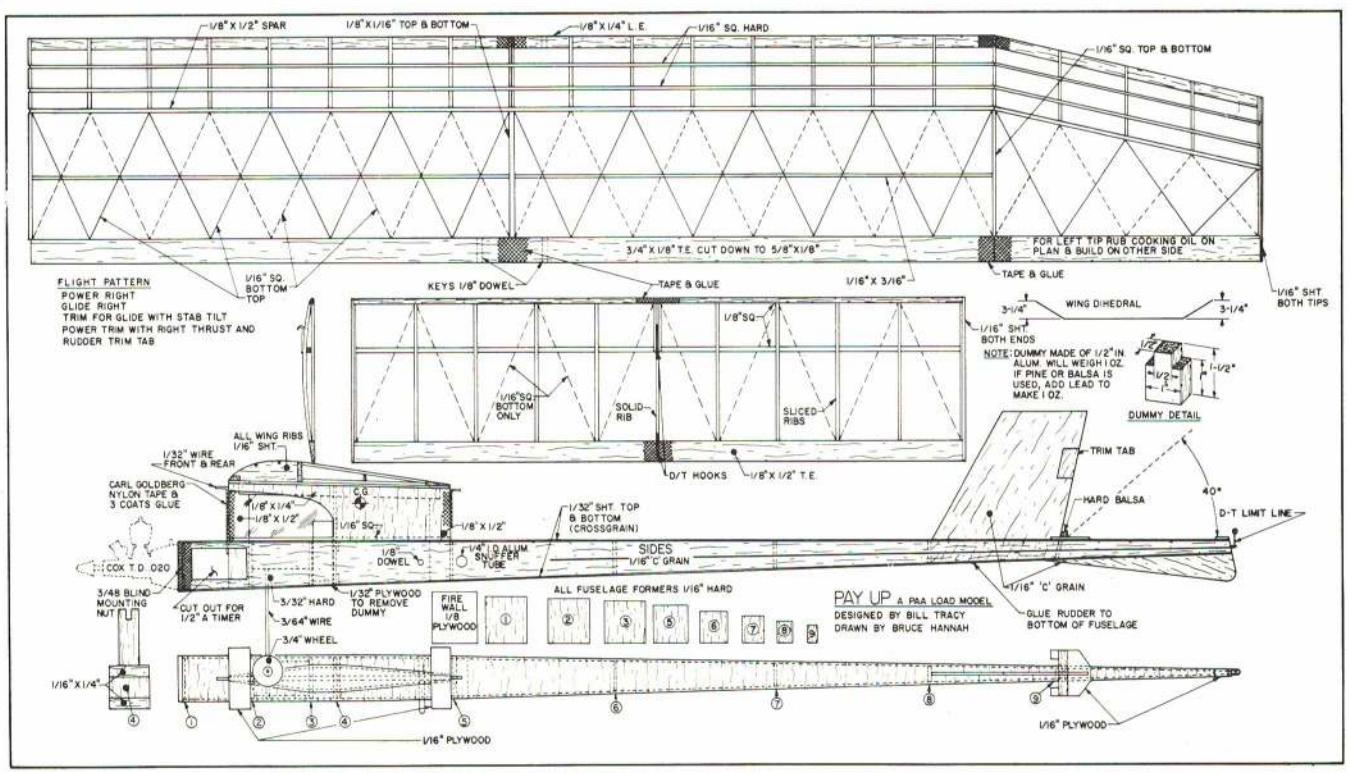
The firewall can now be drilled for engine mounts. We used blind mounting nuts epoxied to the back side of the firewall to anchor the engine. The landing gear should be bent at this time. In the "U" shaped top of the bent gear, install a piece of hard 1/16 balsa. This is glued in and bound to the landing gear before mounting it inside the fuselage.

Mount the firewall and former No. 1 making sure that there are no thrust offsets. Landing gear should then be well glued inside the fuselage. Complete with installation of the rest of the formers. Sheet top and bottom and the pylon sides with medium 1/32 balsa. The plexiglass windshield should be carefully fitted and then glued to the fuselage with epoxy.

The dummy is made out of hard balsa and must weigh one oz. and be removable from the fuselage. We weighted him down by cleaning out the center and filling with lead. The bottom hatch cover is of 1/16 balsa held closed with a rubber band from former 4 on one side of the fuselage to former 3 on the other side. Pins glued to these formers hold the rubber band.

The original fuselage was given three coats of one-half strength yellow-tinted clear dope

(Continued on page 86)



FULL SIZE PLANS AVAILABLE—SEE PAGE 70

WHERE THE ACTION IS

RADIO CONTROL

Dawg Racing? Yup, that's what the RC Spirits call their Top Dawg (from T.F. kit) races. Event recently had 20 entries. Nice permanent flying site there.

Publicity picture from Rocket City Radio Controllers meet with Bob Klineyoung adjusting Cutlass engine and Hulan Rogers with his big scale models. Prizes for meet awarded by Huntsville Mayor!

Navy photo of Don Coleman and Cutlass being interviewed by Petty Officer Mark Kell.

DON LOWE
SPORT AND PATTERN

Noise: Mufflers are a very common sight these days on pattern and sport ships. Info gleaned from newsletters indicates that many clubs enforce a muffler rule for club field operation. Of course, the FAI muffler requirement for international competition has had a strong by top-notch competition fliers in order to prepare for FAI competition has had a strong influence on modelers around the country. There is much misunderstanding regarding the merit and necessity for mufflers and unfortunately there has not been a great deal of scientific research on their application to RC aircraft. Sound measurements were made at the Nats this year on the FAI racers (with mufflers) to help yield a basis for future requirements for that event.

Some interesting comments and data were reported in the July Pioneer RC Club Newsletter "Modulator" which should be of value to clubs contemplating muffler action. L.E. Stephenson of the Pioneers reports: "Sound intensity is measured in terms of the acoustic energy passing through a unit area per second. When one sound has ten times the intensity of another they are said to differ by one bel, a hundredfold is two bels and so forth. In actual practice the smaller decibel (1/10th Bel) is utilized and measured with a Decibel (DB) meter. One decibel represents roughly the least intensity difference that can be distinguished by the human ear." Typical readings recorded by Stephenson are as follows: Average Whisper—30 DB; ordinary conversation—65 DB; level requiring ear protection for continual exposure—85 DB; sounds of auto horns, trucks on freeway—100 DB; quarter midget race car—135 DB; pylon racer at 6 ft.—no muffler—165 DB; ST. 60 at 6 ft.—no muffler—125 DB, with muffler—115 DB; ST. 60 at 100 ft.—no muffler—80 DB, with muffler—70 DB; pain threshold—130 DB; measurement from .8 mile early morning with 60-powered model in air—no muffler—24 DB—with muffler—15 DB.

Stephenson goes on to point out that people have differing tolerance to sound and what may be perfectly tolerable to one may be unacceptable to another. Just a suggestion to those clubs contemplating adoption of muffler rules: a survey of the surrounding residents might be worthwhile to determine the acceptability of your operation. It's wise to keep your neighbors happy!

Some further data on this subject was reported in the Twin City Radio Controllers newsletter "Flare-out." Wayne Jaax reports "the Federal Walsh-Healey Act lists the following permissible noise exposures." Eight hours per day at 90 DB, four hours. per day at 95 DB, two at 100 DB, one at 105 DB, one-half at 110 DB and one-quarter at 115 DB. Wayne continues, noting some typical measurements: Veco 45—no muffler—118 DB; Max Gold Head 60—no muffler—116 (max) DB, with muffler—108 DB; OS 30—no muffler—113 DB; St 60—no muffler—112 DB, with muffler—112 DB.

The mufflers used in the above samples were all of the Venturi flow-through type. This is the most widely-used design due to zero or very low power loss. Even though the DB reduction in using this type of muffler appears small, the sound is more pleasant since apparently they are attenuating the more irritating high frequencies. Of course, much quieter mufflers are available—but at increased power loss.

Jim Wilmot's pattern design with tandem retracts and flying tail. Unique and flies quite well. Claims bad landings are impossible.

Feedback: We recently reported RC flight restrictions at DaNang in South Vietnam. Maj. Wayne Christison reports that no such restrictions exist in Saigon/Long Binh. He informs that the Saigon area Sky Sailors Club at Tan Son Nhut has recently expanded to cover all forms of aircraft modeling. So, as we previously suggested, check the local area restrictions if you are headed for South Vietnam.

Old-Timers: For those nostalgic types who remember and yearn for RC models of yesteryear, Fran Ptaszkiewcz can make available plans for some of Pappy deBolt's early offerings, such as Cosmic Wind, Perigee, Viscount, Acrobat, Ercoupe, Sonic Cruiser, Yankee and Kitten. Contact him at 23 Marlee Dr., Tonawanda, N.Y. 14150.

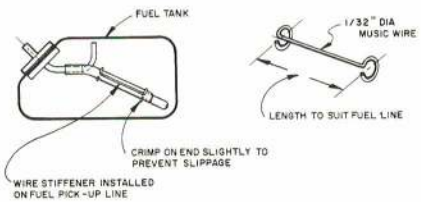
Tinting Tips: For those who aren't satisfied with ordinary standard colors and like to mix their own, Bud Caddell reports some tips on mixing in the Birmingham RC Assn. Newsletter. Primary colors are blue, yellow and red; white and black are used for toning only. The following are some suggested mixes (the ratios are parts of colors):

Avocado	Gold	Lt. Brown	Orange
5 yellow	19 yellow	15 yellow	3 red
1 white	6 white	10 white	8 yellow
¼ black	¼ black	5 red	2 white
¼ blue	1½ red	1 black	
½ red			

Purple	Turquoise	Burgundy	Gray
1 blue	5 white	9 red	1 black
7 red	1 blue	2 black	3 white
1 white	1 yellow		

Military colors are unique in that they are flat and require flattening agents. You mix all three basic colors to get brown. To make it greener add blue; if you want it sandier add yellow; for khaki add more red and yellow. Metallic colors are available by mixing into clear various powders. They must be stirred well and can only be sprayed properly.

Challenge: The Orange Coast Radio Control Club claims to be the largest radio control model airplane club and have the busiest model airport in the world. In June they reported 328 members. Can anyone challenge that?

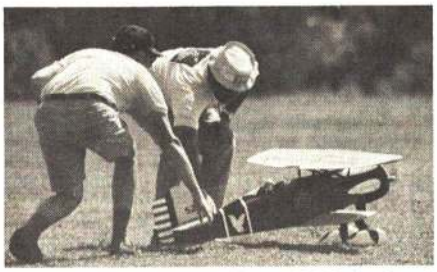


In-tank fuel line stiffner from Tri-Valley Club Newsletter. Idea by Gerald Mast.

Trouble With Decals? If you're having trouble making decals stick to MonoKote or plastic ARF surfaces try a suggestion of the Suffolk Wings RC Club. Clean the surface carefully then apply the decal in the usual manner and let dry. Cover with a piece of Curtiss Dyna-Products "Slic-Tac" or a similar clear covering material which is slightly larger than the decal. No heat is required and the result is long-lasting adhesion.

CLAUDE McCULLOUGH
SCALE

Standoff Stands Out: The Chicago Scalemasters held their annual Scale Rally August



Dick Larson launches Hawk P-6E in Sport Scale event by the Chicago Scalemasters.

29th at Miller's Meadow, site of the Nationals RC Glider contest. First competition test of the new AMA Sport Scale event went well, with SS contestants outnumbering those in regular RC Scale. The new class seems to draw fliers who would not be interested in the established event and promises to be popular upon appearance in the 1972 rulebook.

The regulations accepted by the Scale Contest Board at Glenview from a proposal by Nats Scale Director Clark Macomber call for static judging to be done ten ft. from the model. Details not visible in flight, such as cockpits and dummy engines hidden in

Junkers JU-52 flew demonstrations at Aero-Club des Cigones in France. Power is two O.S. Wankel's and one O.S. 60. Note flaps down for takeoff.

cowlings, are not scored. A novel feature is a ten point bonus for original designs. The flight pattern includes a requirement for a low, slow flypast and the way spectators craned necks and snapped camera shutters it seems a good maneuver to add to the standard Scale event also. An average of the two best flights is specified for flight scoring.

Veteran pattern flier Harold Parenti took first place in Sport Scale, flying a retract gear Wing Zero with smooth precision. Dick Graham, using his Liberty Sport bipe which missed the Nationals due to last minute crack-up damage, won AMA RC Scale.

Harold Parenti's Sport Scale entry is Wing Zero with retracts.

A Word To The Wise: From the Palm Beach Aeronauts News—"The real secret of successful scale modeling is the careful selection of a suitable aircraft, one that has sufficient wing area, relatively large tail surfaces and enough area forward of the wing to allow balancing with engine and radio rather than large deposits of lead."

Sand, Don't Shine: Common practice in preparing a wooden canopy mold for stretch or vacuum forming is to coat with fiberglass resin and buff to a highly-polished surface. Better results will be obtained by sanding smooth, without scratches, using 280 no-fill silicon paper, but not doing any further buffing. The matte finish produces clearer and more perfect canopies, evidently because the plastic lays against it better. When gluing blocks together before mold carving, avoid seams in places where a scale seam does not appear. Even if well covered with several coats of resin, the heat during forming causes the seam to leave a trace in the plastic.

No More: The engine-turned metal sheet used by Ed Ellis on the Spirit of St. Louis and reported here as being made by Croname, Inc. is no longer available. Ed has barely enough left to complete his new Ryan M-2.

Scale Data Sources: One of the best ways of compiling a good scale presentation is personally photographing the details on an example of the subject aircraft. No one else ever seems to take pictures of door handles, oil filler lids, wheel wells, etc. To locate rare types, go to the nearest FAA Flight Service Station and ask to use their Register. It lists the current owner's address for every licenced airplane in the U.S. by "N" number. Many airport businesses also have copies available. The FAA Aeronautical Center in Oklahoma City will provide registered owner information by telephone (405-686-2117) and their files are open to the public for research. If approached properly, most airplane owners are glad to allow photographing their pride and joy for modeling purposes.

HOWARD McENTEE
GLIDERS AND FAI

Bow Planes: Bo Thomas (Birmingham RC Assoc.) found that use of regular elevator on his Lil' T glider gave some reactions he didn't like, and he came up with pivoted control surfaces at the nose. The regular elevator is no longer used. The two nose surfaces are each 3 x 4", attached to a 1/16" music wire shaft that is held by bearings just ahead of the cockpit area. The surfaces are removeable for ease in handling. They do not have as much effect as the original elevators, apparently acting more as a "trim" device, but have enough effect to give definite climb or dive action. Certainly an unusual approach to glider pitch axis control.

Polish Glider: Not much is known of the glider seen in the photo sent to us by Peter Chinn of England. The craft is an original design by Wieslaw Schier and has several unusual features. Among them we see a tiny amount of tip dihedral, and an extremely drooping nose on the fuselage (a characteristic of many European designs). The aft portion of the fuselage appears to be very deep and very narrow; most glider designers try to get this fuselage area as small as possible—even going to rather small tubing to achieve this effect. Since no elevators can be seen, the high-mounted tail surface must be of the "flying" variety, assuming it is moveable. Note ground-based transmitter! Polish modelers have come up with some very advanced model glider designs, as have the full-sized glider makers in that country.

ECSS Going Strong: Turnouts at ECSS East Coast Soaring Society meets have been far higher this year than last, with several meets drawing around 60 contestants. This certainly points up the vast upsurge in glider interest and activity. At this writing four of the five official ECSS meets have been held, and the last will probably have been run off by the time you read this. We'll have some overall results when the series end. After four meets, Ray Smith DC/RC is in the enviable position of having won three. Ray certainly has licked the jinx that followed him all last season.

Huge Gliders: Some rather large RC gliders are known to be under construction, even flying by now. Wing spans have been reported from 16 to 20 ft.! The question has been raised whether or not these craft come under the coverage of the AMA liability insurance plan. Gliders that are within the Provisional

RC Glider flying in Poland. Wieslaw Schier's slope-soarer being launched by E. Osinski. Unique in many respects.

FAI rules are covered. These rules specify a maximum combined wing and stab area of 2325", max. weight of 11,023 lb. and load on the supporting surfaces must not exceed 24.51 oz. If a glider exceeds any of these figures, it is not insurable. Liability coverage may be lost if such violations occur—a point of special interest at AMA-sanctioned meets, to be considered by meet sponsors, and modelers flying in meets.

That Windspiel Again!: In the August, 1971 issue, we mentioned some difficulties we'd heard of regarding the Windspiel (German kit glider), relative the aileron linkage from fuselage to wings. Comments on the matter from the maker appeared in the December issue. Now comes a note from Capt. Kurt Kroeger (Lufthansa pilot who is often in the States), who says he has been flying the Windspiel with no problem from the aileron linkage; it has worked so well that Kroeger has utilized the same system on several other gliders, as well as for slope soaring, hand towing and high start. The point in question is a "break-away" connection in which a clevis engages a ball. The clevis must have good tension, and it's wise to put a fuel-tubing "keeper" over it for additional tension, and as a safety feature. We are assured that these precautions will result in satisfactory action of the aileron linkage.

BOB STOCKWELL
PYLON RACING

The Engine Rule: Last month we gave you some of the story behind the controversey concerning engine modification in Formula I. There are some further developments, the most important being that the proposal by Vern Smith, which was given a favorable straw vote at the meeting of the Contest Board during the Nationals, was an illegal proposal as it had not been submitted in accordance with established procedures. It therefore cannot possibly become the regular rule for pylon racing in 1972, no matter how favorably disposed the Contest Board members may be toward it. On the other hand, the proposal made officially by the NMPRA followed established procedures in all respects, and had the support of a very large proportion of the racing fraternity: 36-13 in the opinion poll, and the 100% endorsement of the F.A.S.T. Club (the very influential and knowledgeable fifty-member core of pylon racing in Southern California). It is hard to see how, under these circumstances, the Contest Board could even consider rejecting the NMPRA proposal in favor of the proposal of one member, no matter how highly respected, personable, and persuasive that member might be (and is).

NMPRA Championships: As you have no doubt heard, the NMPRA Grand National Championships for 1971 were canceled (though the District Championships were continued). The cancellation was due to the lack of interest east of the Rockies in participating in the proposed national fly-off of champions—a contest where the best from each of the five districts would meet to deter-

mine a grand champion. No one is quite sure just how much interest there would have been, since there were extremely few contest reports and point standings sent in to Gil Horstman outside of California. From the Southern California District alone, there were 84 fliers whose points were reported, and only 34 from all the rest of the country. The NMPRA Newsletter, which was supposed to be published regularly by *R/C News*, was written on a regular basis and copy sent to the publisher, but the last copy that the publisher actually distributed (and then to an incomplete mailing list), was sometime back in May. Thus, there was a more or less total breakdown in the communications network of the organization. Given this breakdown, it was impossible for the officers to publicize the intended National Championship Races and determine the level of interest.

Clearly, some reforms are needed. The first of these is that NMPRA will return, for 1972, to the Photo-offset Personal Newsletter format. The only issue of this new newsletter to appear in 1971 was in connection with the election of officers, and the money to pay for its production was put up by several individual members of the F.A.S.T. Club.

Lineup of FAI P-51 from the popular PB Products kit. Often pylon races are one-design events.

A second kind of reform that is obviously needed is in the Championship system itself. The reform for 1971, which set up District Championships along with the proposed Tournament of Champions that was canceled, was intended to equalize opportunity around the country. It was no accident that the NMPRA Champions in the first three years—Granger Williams in 1968, Jack Hertenstein, Formula I and Whit Stockwell, overall in 1969, Terry Prather, Formula I and Terry Prather and Larry Leonard, overall in 1970—were from Southern California, given a point accumulation system that is based entirely on the total number of competitors beaten. Southern Californians were bound to win, because they have much larger entry lists than the rest of the country. The 1971 reform tried to eliminate that edge by creating District Championships and a fly-off between the top competitors from each district. It didn't work. It is now up to the officers of NMPRA to come up with a new system for 1972 that will work, and that will still eliminate the inequities of the older system.

New Formula I Models: There have been three particularly successful new models around at many contests in 1971—the Shark, Miss DARA, and Miss Dallas. The Shark, one version of which is kitted by Francis Products, Cupertino, California, is an exceptionally pretty airplane with an elliptical wing and a turtledeck continuing the canopy line back to the fin. The true three-views of it show a Minnow-like front and (except for a long, thin Rivets-like airscoop on the bottom), though the Francis version of it has a front end more similar to that of the Shoshonik. The Miss DARA is being fiberglassed by P.B. Products (Bob Smith and Co.) of Panorama City, California. It is a shoulder-winged pot-bellied turtle-decked fuselage with a double-tapered wing that is especially fast in the straights, and the latest versions of it look solid in the turns, too. The Miss Dallas is a descendant of the DeKnight Special. John Garabidian, 909 N. 3rd St., Montebello, California, is putting out a beautiful kit for this one, all-balsa fuselage with extensive prefabrication. Like both the Shark and the Miss DARA, the canopy is faired clear back to the fin, and it is a slick, clean airplane. They took the first five places at the Pioneers Race in San Jose last summer, and several of them were near the top of the standings in Southern California throughout the season. They didn't manage to catch Terry Prather, but no one else beat them consistently.

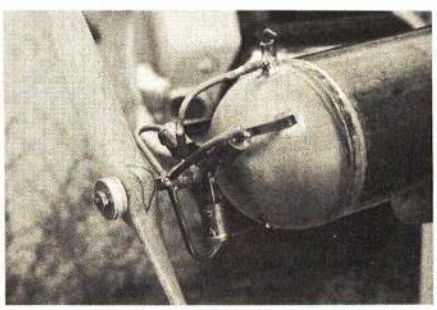
FREE FLIGHT

BOB MEUSER
FREE FLIGHT

Call for Papers: Bill Bogart, 1972 NFFS Symposium Editor, relates that the National Free-Flight Society has published four Symposium Proceedings which contain the experience of the contributors, new and original thoughts, and bring superior free-flight model designs to world acclaim. Now is the time to let the editor know of your intentions to contribute a paper. Bill's address is 469 Paulette Pl., La Canada, Calif. 91011.

Compressed-Air Lives!: In the early and mid-thirties, Compressed Air was an event found on many contest programs. Engines could be bought ready-made, in kit form, or they could be made from plans published in books and magazines of the period. Models had to be big and light, and getting them to fly at all was a challenge. But they did fly.

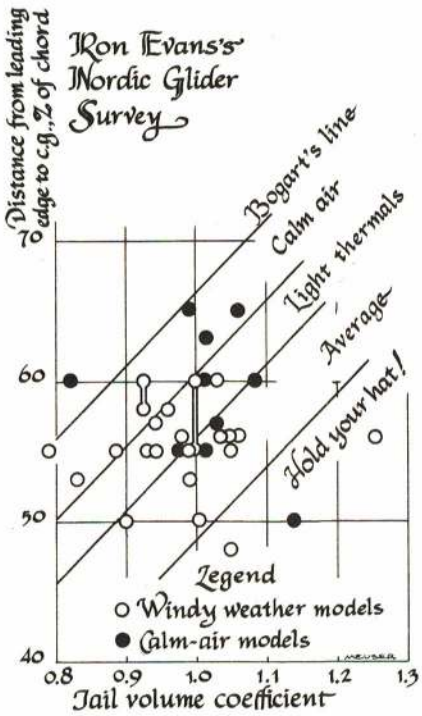
At the Old Timers' Banquet at the Nats, movies were shown of some hydroairplanes that actually took off. Now, Oldtimer Models is marketing the Hoosier Whirwind, a 3-cylinder radial of 3/8-in. bore and stroke, best of the old comp-airs, complete with thin-walled brass pressure tank. There is no reason why they would not work with steam, CO^2 or freon (cylinders available in hobby shops for paint spray outfits). There is no fussing with glow plugs, starter batteries, fuel, greasy kid stuff all over your hands and clothes—and no starting problems. All you need is a tire pump (and you probably need the exercise). Check with O.T.M., 7454 W. Thurston Circle, Milwaukee, Wisc. 53218.



Compressed air radial? Yes, and it may be back in production. This one might look crude, but it works. Forward fuselage part is the air tank too.

Drawing on Balsa: Try to draw a line on super-soft balsa with a pen or soft pencil and you practically cut the wood in two. Bill Bogart suggests you use a charcoal pencil, available at art supply shops. Buy the softest grade available and sharpen to a blunt cone or chisel edge. It makes a fine black line and positively will not indent the softest balsa.

Nordic Survey: We see successful Nordic gliders with long tailbooms and short ones,



large horizontal tail surfaces ("stabs") and small ones, CG's located at a position anywhere between 45% and 80% of the chord behind the leading edge, and wing aspect ratios from 12 to 20. All of these factors affect the aircraft's longitudinal stability—the pitching moment tending to restore the model to normal flight after it has been disturbed by a vertical gust. When it encounters an updraft, a stable model, one with a low moment-of-inertia (see this column, June 1970 AAM), will point its nose down slightly until it has achieved its new rate of climb, and then level out. A less stable model, rather than sticking its nose down into the updraft, will tend to plow through the wave instead of riding it, and may even stall.

Scientists earn their bread by finding relationships between seemingly unrelated facts. In the fifties, Bill Bogart and Bud Rhodes did just that with some of the data Bill had collected on 60 successful free-flight models of all types. They showed, in their January, 1959 *Model Airplane News* article, a plot of tail volume coefficient vs. CG position—a point for each model—and the points lined up in orderly fashion. A condensed version of the article appeared in Frank Zaic's *1959-61 Model Aeronautic Yearbook*. On the graph, a limit line was drawn which showed how close to instability one dared go. Tail volume coefficient (TVC) is simply the (area times the moment arm of the tail)/(area times chord of the wing). It expresses by one number the collective effect of four quantities which affect stability. The authors suggested that the graph could be used to predict the proper CG location for new designs.

In the July 1967 issue of *Free Flight*, Digest of the National Free Flight Society, the late Mike DesJardins presented tables of data on some 30 A/2 Nordic gliders of the period from 1958 to 1967, and he included the calculated TVC and the CG location for each. In the December/January 1968 issue of the Digest, Tom Hutchinson presented a Bogart-type plot of DesJardin's data. The graph showed that most Nordics are tuned considerably on the "stable" side of the Bogart line, and he suggested that the graph could be divided into a region for calm-air models, one for light-thermal models, etc., by drawing lines parallel to the Bogart line.

Recently, Ron Evans spent four months writing to 75 modelers collecting data on the

current crop of successful Nordics. He has made a table of the data and has generously offered to send copies to those who send a stamped, self-addressed envelope to him at 83 Blake St., New Haven, Conn. 06511. Ron calculated the TVC for each model and constructed a Hutchinson-type graph, which we have included here. The data was divided into two groups: one containing models considered by the designer to be suitable for calm air or light breeze, and the other including all-weather and windy-weather types. We have blackened the points for the calm-air models. Notice that the points for the calm-air models center around Hutchinson's "light thermals" zone in about the same way as the "all-weather" models do; there is no apparent distinction between the stability of the calm-air models and the still-air models. However, the calm-air types tend to have more forward CG positions and larger TVC's than the others. The larger TVC's result from the high aspect ratios, as the tail areas and moment arms are about the same as on the all-weather models. The fact that the calm-air models are about as far from the Bogart line as the all-weather types suggests that these models might be unnecessarily stable for their purpose. Perhaps still-air duration could be improved by using smaller stabs (hence larger wings), shorter tailbooms, or more rearward CG positions. Worth a try!

Sanding Blocks: Sandpapering is less of a chore if you use a proper block. Make up a set of four, each with a different grade of sandpaper, about 2 by 3 in., of balsa or pine. Sweep up the leading and trailing edges slightly so the sandpaper does not snag on the work. Wrap the sandpaper around the ends and secure it with thumbtacks, or better still, cement the paper to the block with rubber cement—the paper is easily torn off and replaced when it becomes worn out.

Personals: Dennis Denman, please contact Bob Meuser c/o **AAM.** I need your address so I can respond to your previous letter.

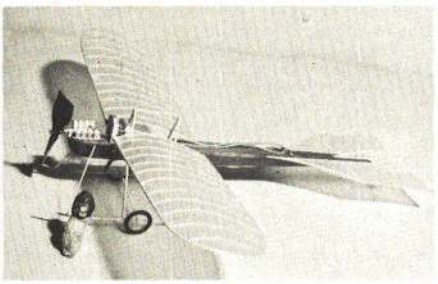
WALT MOONEY
SCALE

Wire Wheels For The Discriminating Scale Modeler: Bill Hannan showed me a couple of sizes of scale wire wheels as produced by F. Hungerford, 1770 Lilac Circle, Titusville, Fla. 32780. Bill waxes eloquently about these wheels and I have to agree. Each wheel will support three lb. of static load and weighs less than one gram. They are the best scale wire wheels I've seen and are available in several sizes for $3.75 a pair. This price won't discourage a discriminating scale modeler if he stops to consider how much time he would spend trying to make them himself.

Dennis Osborn's Stinson SM-1 on floats.

Seaplane Event: The Flightmaster's second Scale seaplane contest of the year went off without a hitch, except for the models that dunked themselves. Everyone had fun and the meet was followed by an outdoor picnic at Fernando Ramo's hacienda. The scale Loening I reported having crashed at the last contest was flying beautifully.

Not all the seaplane scale models are in Southern California. Dennis Osborne of Val d'Or, Canada has made a beautiful 48" span Stinson SM-1 rubber-powered seaplane, It looks great sitting on the water.



Peanut Handroit by Frank Scott. Popular FF scale design because of abundant areas.

Peanut Scale: Bernard Gale of Culver City has been making sub-peanut size flying scale WW I models for many years—most from sheet balsa, but some of them have hollowed out styrofoam blocks for fuselages. He has been obtaining flight times of ten to fifteen seconds duration.

Frank H. Scott of Dayton, Ohio has a peanut scale Hanriot complete with peanut pilot. The model looks like a real indoor scale winner.

Peanut Scale seems to be gathering steam all over the modeling world. The British magazine *Aero Modeller* recently had a very nice plan for a Gloster Gladiator by Doug McHard. This is a truly beautiful model and Doug is to be congratulated.

BOB STALICK
GLIDER AND RUBBER

Rules Moratorium: The recent AMA Executive Council decision to declare a freeze on all rules changes for one year gives all modelers a breather. This year's model should not be obsolete for at least another year. The moratorium also provides a more calmly approached look at unlimited rubber. as the spectre of another limited rubber event was very real. Now there can be some pertinent commentary on unlimited rubber at the 1971 Nationals.

Phil Hainer, Jr. and Unlimited job with Mono-Koted motor tube. Material survives lube and blown motors.

Winding Tubes And Torque Meters: A ready-made winding tube for rubber models exists at your local golfing shop—the plastic club separator functions well in this capacity, is long enough for all but the longest fuselage model, thin enough for all but the narrowest, is inexpensive, and can be modified to practically any propless winding system. Bob

Long winding stick serves as part of torque meter for winding and for removal of plastic explosion-protection tube.

Wilder's torque meter design was used by a number of modelers allowing winding to maximum torque regardless of the number of turns. Although relatively expensive ($12.50), its performance soon pays for itself in obtaining maximum output from that hank of Pirelli. Write to Bob Wilder, 2010 Boston, Irving, Texas 75060.

MonoKote, Once Again: Among the many uses for MonoKote comes still another—use it on the motor tube section of that built-up rubber model. It's puncture-proof and lube-proof. Phil Hainer, Jr. won second in the Boeing Scholarship Contest design competition with his unlimited so covered. If MonoKote strikes you as too heavy, you might investigate SolarFilm, which is lighter and less expensive—but harder to locate. One supplier is F and D Hobbies, 43 Gaybower Rd., Monroe, Conn. 06468, who also sells Pirelli and KeilKraft DT fuse, which has a narrow 3/16" diameter—making it more useful for small snuffer tubes such as those used on the typical hand-launch glider.

While on the subject of new or hard-to-find products, George Bahrman Studios is producing 1/32, 1/16, or 3/32" inside diameter teflon thrust washers, which should prove useful in smaller rubber-powered models such as Coupe.

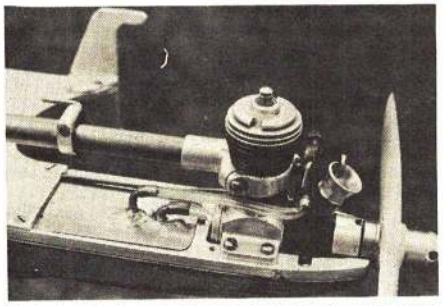
Unlimited Rubber At The Nats: While at the Nats, this writer was impressed by the multitude of approaches to Unlimited Rubber models. The standout feature on most was the ultra-lightweight structures used—striving for a total weight, sans motor, of 3½ to 4 oz. for a large 250 sq. in. plus model. This, coupled with a motor of similar weight, produced a zippy climb and long motor run, sometimes approaching two minutes. From the height obtained, no thermal was necessary to make an easy three minute max. What was needed at Glenview in '71, however, was an expert retrieval system—featuring cars, bicycles, fleet-of-foot runners and good old American luck. Because of certain field restrictions and a semi-hostile off-base environment, many models were not retrieved to complete the necessary three or more flights needed to win, despite the efforts of the Navy's retrieval crews. Even with these obstacles, five contestants exceeded three maxes, with Bob Sifleet topping them all by scoring 1365 seconds, only failing to max on his sixth attempt.

BOB HATSCHEK
POWER

½A Pipe Dream: Resonating exhaust systems, more commonly referred to as tuned pipes, constitute the biggest single technological leap forward in power models since the late Ray Arden introduced the glow plug more than 20 years ago. With everything else just right, a tuned pipe could boost an engine's horsepower as much as 40%. Then they were outlawed—first from AMA free-flight competition, later from FAI free-flight.

Several months ago, this column carried photos of a piped ½A free flight, and the volume of correspondence asking dimensions indicates that interest in tuned pipes is still

high—even though they're illegal for competition. The accompanying illustrations fill in details and the vital dimensions. This particular pipe features a "trombone slide" adjustment that allows tuning the system while the engine is running. At maximum extension, resonance begins at about 19,000 to 20,000 rpm, which was fine for the 6 x 3 and 5¼ x 4 props used in the original tests using a fuel containing about 30% nitromethane. Length adjustment is made simply by twisting the cam lock 90° and using it as a handle to slide the pipe back and forth. The 3/16-in. tailpipe simply slides back and forth in a wire loop standoff screwed to the side of the model.



Hatschek's tuned pipe Cox 049 adds 1500 to 2000 rpm with a potential of over 1000 more with fuel mixture and more internal mods.

A different arrangement was built on a pipe designed for a cowled engine. On this unit the cam lock was mounted on the section of tubing fixed to the engine and the front tube of the pipe slid inside this (tube ODs were reversed from those shown on the drawing). This particular pipe was neither round nor straight! Cross section of the diverging and reconverging lengths was a "D" having the same maximum cross-sectional area as the 5/8 in. circle on the earlier pipe. The flat side of the "D" snuggled up to the flat bottom of the fuselage in the inverted engine design, and, hence, this side was made straight—with all the taper on the other side.

While the rule change outlawing pipes ended all plans to build the model, two such pipes were actually made and tested. They were every bit as good as the more conventional layout shown, of which five were made.

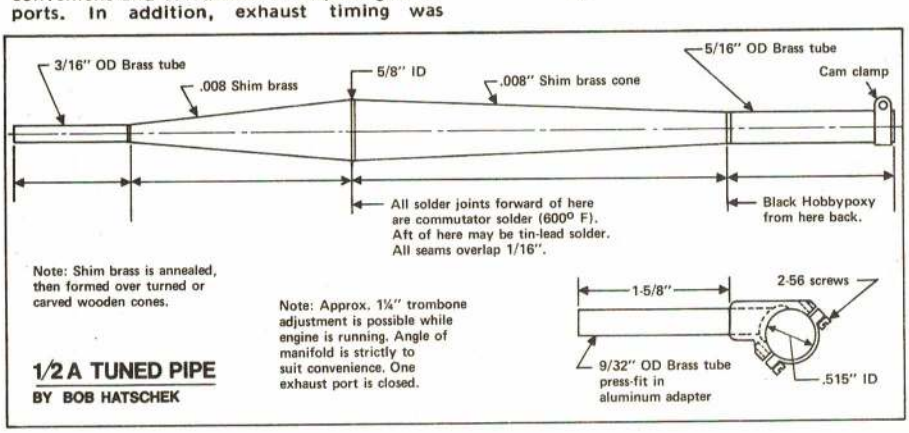
Engine Modifications: It was originally thought that a tuned pipe wouldn't work properly on an engine with sub-piston air induction, so a very light aluminum ring was pressed into the bottom of the Cox piston to close off the exhaust port at top-dead-center. This is apparently not necessary, but nevertheless all tests were run that way.

The cylinder was shimmed up about .005 in. to put the exhaust port where it was most convenient and to advance the opening of all ports. In addition, exhaust timing was advanced another .010 by opening up the top of the one exhaust port used.

These changes caused either no change at all or only a slight drop in rpm without the pipe, and either no change or only a slight increase in performance with the pipe. What made a much bigger gain, with the pipe and without it, was increasing the compression ratio by taking .010 to .015 in. off the bottom of the glow head.

Fuels used in the tests ranged from about 50% nitromethane down to straight 80-20 FAI fuel. The Cox engine didn't seem to like the latter mix, but the pipe improved performance on all brews.

Tests came to a screeching halt when FAI outlawed pipes for free flight, so the ultimate was never really reached. At the point of conclusion, however, the net gain over a stock engine was about 1500 to 2000 rpm—with probably another 500 to 1000 still achievable.

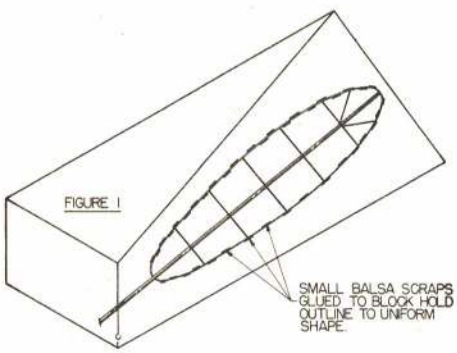


1/2A TUNED PIPE
BY BOB HATSCHEK

BUD TENNY
INDOOR

Prop Construction Summary: Previous columns have dealt with each part of the prop, with emphasis on methods for easier construction. Now it is time to consider the prop as a whole, from raw wood to finished structure.

Block Construction—Carve a prop block to the design pitch of the prop; if the block is longer than the minimum diameter prop needed, longer props can also be built on the same block. After finishing the block, mark a straight line, with ink or marker pen, for the position of the spar (see Fig. 1). It is convenient to draw the blade outline and rib locations on thin tissue. Dope this tissue in place on the block as a final building guide. Glue small scraps of balsa along the outlines, as shown in Fig. 1, to help hold the outlines in place during construction. Caution: the blocks inside the outlines must be very thin, 1/64" or less, for, when finished, covered prop will be put back on the block for "curing"—tall blocks will puncture the covering.



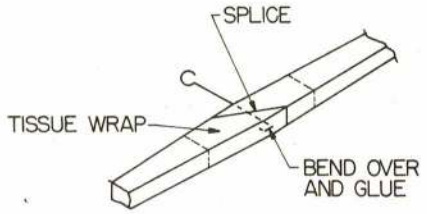


FIGURE 2

Prop Construction—Make prop spars and match them for deflection strength (October 1971 **AAM**), then splice the spar halves together. Reinforce the splice with tissue and mount the prop shaft (Fig. 2). Cut and form two blade outlines; while the outlines are drying, cut and match the ribs for size (December 1971 **AAM**). Use pins to hold one half of the finished spar in the proper place on the block. Never pin through indoor balsa pieces! Instead, bridge pins across the wood to hold it in place but not crushing the edges. Use caution in handling the block—it is easy to break off the projecting length of spar. Lay a finished outline on the block between the balsa scraps. Join the outline to the spar at the tip and near the center. Cut rib pairs to fit each location, storing the second rib of each pair for the second blade. Glue the ribs in place, first to the outline and then to the spar. If the ribs don't touch the spar, cut a tiny scrap of wood to fill the gap instead of using glue. Finally remove the finished blade from the block and turn the prop so the bare spar is in place on the block. Assemble the second blade in the same way as the first—and it is ready to cover.

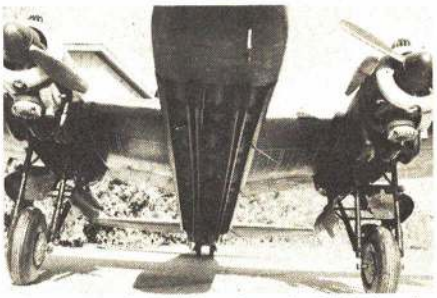
CONTROL LINE

BILL BOSS
SPORT AND SCALE

Tips For Successful Rat Racing: Howard Shahan, an experienced Rat Race flier of San Diego, Calif., has some advice for beginners in the event. While his remarks are aimed specifically at Rat Racing, they can also be applied to other types of CL flying.

A most important first step is to structure the plane and its control system so it is strong enough to withstand the rigors of the event and repeated pull-testing. Good flying wires and strong line connectors are a must. Howard makes up line connectors that will withstand 100-lb. pulls by taking the sliding lock from "Perfect" line connectors and replacing the connector with those formed of .045 music wire.

Super detail on Ed Dunstan's Short Sterling WW II bomber includes operating bomb bay doors, bomb release, revolving turrets, moveable guns and flight-operated flaps and throttle on the four growling 19's. Weighs only 13 lbs.



Balance of the plane is next. Add wing tip weight of 1/2 oz. on Scale racers (Goodyear) and a one-oz. weight on rats of average spans. Trim the plane for a slight nose-heavy condition without making the plane sluggish. The balance point should be in the area from the leading edge of the wing to about 3/8" back from the leading edge. A little experimentation will find the best point. Another item to be considered when balancing the plane is the placement of the landing gear on a single-wheel equipped plane. Be sure to mount the gear just inside the centerline on the inboard side of the ship. Putting the gear too far outboard can neutralize the effect of the wing tip weight.

Sensitivity of the control system should be kept to a minimum. With the high speeds of these planes large tail surfaces are not required. When installing the control system a 2" bellcrank should suffice. Install pushrod and leadouts in the holes closest to the bellcrank center pivot point. Pushrod should be entered in a hole of the elevator control horn about 3/8" to 1/2" from the surface of the elevator. Elevators of 10 to 20 sq. in. should be adequate.

The last item for consideration is the angle of attack for takeoff. Keep the angle at approximately 15 degress for straight smooth takeoffs. Add a tail skid if necessary to achieve the proper angle. Low, smooth takeoffs will keep you from making jack-rabbit starts that put you right in the path of planes already flying in the circle. Following these basic technical tips should get the beginner off to a good start. Even the more experienced fliers might find them helpful.

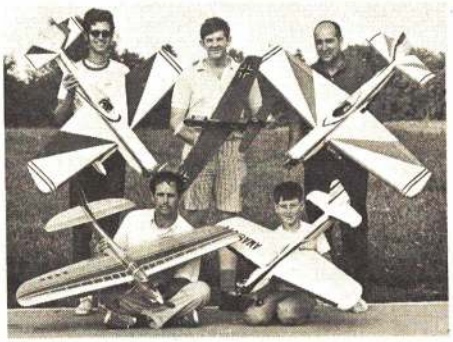
Scale Tech Tip: A quick and easy way for a beginning scale modeler to make turnbuckles for early aircraft is to use 1/16" OD brass tubing and soft florists wire. The procedure is simple. Cut brass tubing to desired length, make small loop on one end of a piece of the wire, insert wire through tubing, make small loop on other end and cut off excess wire, paint desired color and PRESTO—a simulated turnbuckle. Tom Fluker, originator of this item, also points out that elastic thread can be used for the wire rigging. The thread gives a taut-looking rigging and is easily made.

JOHN BLUM

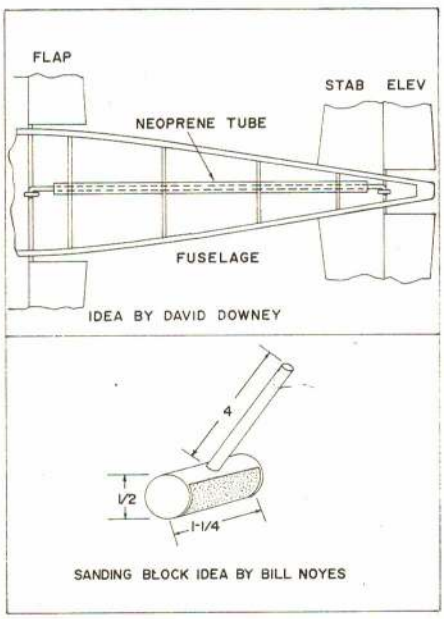
CARRIER AND STUNT

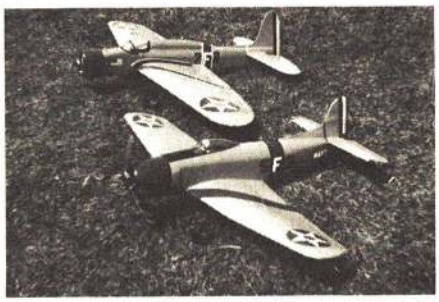
What's In A Handle: UC may or may not be demanding on the type of control handle used. Basically, it's whatever the pilot is comfortable with. In stunt, every shape and size known to man has been used. The same holds true in Sport flying. The serious stunt fliers usually prefer a smaller sized handle, such as the small E-Z-JUST, or one that permits adjustment between the line connectors at the handle. These features reduce the possibility of over-control of the aircraft. The larger control handles, such as the larger E-Z-JUST, induce an extreme amount of control with the lines far apart, which is not desirable for stunt.

Another factor is the novice that over-controls on "down" maneuvers, but not on "up." This situation may be induced by the setting of the control handle for neutral elevator position. If the handle position for neutral is perpendicular to the ground, the wrist movement will permit more "down" than "up." With the handle held vertically, adjust the lines to permit the top of the handle to tilt forward about five degrees for neutral elevator. When one's arm is fully extended, with hand firmly clasped about the control handle, the wrist should assume an in-line relationship with the arm. In this position, one will note that the center of the grip is not perpendicular to the ground and represents the proper position for neutral elevator. Aircraft control is more comfortable when this phenomena is realized and permits more equal "up" and "down" handle travel. For example, a pistol grip is tilted forward because that is the comfortable, proper way to hold and fire it. The control handle should assume this natural position.



Lexington, Ky. Nats entries are Kenny Stevens, age 11, Lew McFarland, Bill Richardson and Ralph Wenzel.





Mauler and Panther for Carrier and Stunt in Navy colors and K&B 35's, both throttled are by Joe Averitt.

Pushrod Stiffness: Sketch depicts a method used by David Downey (Manaus, Amazonas, Brazil). Neoprene tubing is placed over the pushrod. This pushrod is a size which permits it to move freely through the tubing. The tubing must be secured at every three in. of its length, with the secured ends within one in. of the horns. David relates that the system can be used with or without the wing flaps.

Sanding Fillets: Bill Noyes (Valinda, Calif.) presents the idea in the sketch of a fillet sanding block. Sizes can vary from that shown in the sketch, depending on the job to be done. Use different size dowels for different size fillets. Glue the desired grit sandpaper over two-thirds of the dowel and go to work.

JOHN SMITH

SPEED AND RACING

FAI Finals: Labor Day weekend found the top FAI fliers in Cleveland battling for a place on the U.S. FAI team. For Speed the top three are: Carl Dodge with a 15.43 average time (two best flights); Bob Spahr, 15.595; Chuck Schuette at 15.825. Carl used a Dodge-TWA engine while Bob and Chuck both ran Rossi power. In T.R. the top dogs are: Roger Theobald-John Barr, running a 4:34.7; Jim Dunkin-Bill Wright at 4:44.85 and J.E. Albritton-John Marvin with a 4:44.9. Competition was great and the teams picked, with a little bit of luck, should be able to take all the marbles next summer. We still have to get them over there so send your money for your AMA FAI shirt patch and decals. Specify which you want. They are representing you, so don't let them down.

Jerry Farr's nice ST pulled Swee Pea racer.

Almost A Nasty Accident: While trying for the C record the Frye-Roselle team, which came out of "retirement" for the Dayton, Ohio Buzzin' Buzzards Meet, Sept. 11-12, washed out their record-holding C model. As Jerry went for the pylon, he was pulled through it and while trying to get in again his trousers hooked on the pylon adjusting bolt. Meanwhile the model, turning at 200-plus mph, got ahead of him. When Jerry tried to catch up, he ended up flying almost in the all-together. His pants were completely ripped off but luckily he didn't get hurt. The model went in and was destroyed. The extent of engine damage is unknown and Jerry, due to the quick-thinking gang in the pits, can still face his friends. He sure looked cute in those blue denim "hot pants" someone brought him.

Paint Drying Tip: When you are ready to paint a model, park your car in the sun. Put the finished painted model in the trunk and lower the lid. In a couple of hours you'll have the nicest dust-free, baked-on finish you could ask for. Try it, it works.

HOWARD RUSH

COMBAT

FAI Combat: Combat may become an official event in the CL World Championships. The subject will be raised at the CIAM meeting in Europe this winter. Although FAI rules are frozen for five years, it may be possible to

add the Combat event, for which rules already exist. Laird Jackson, USA CL Program Administrator, reports that chances for Combat as an official event in the 1974 World Championships are doubtful, but he will investigate the possibility.

Copies of the FAI Combat rules can be found at AMA headquarters. Briefly, rules are as follows: Maximum engine displacement is 2.5 cc (.15 cu. in.); lines are .012" diameter, 52'3" long (monoline not permitted). Two planes and two sets of lines may be used per match. Streamers are 1.2" wide crepe paper ten ft. long with a 6'7" string leader.

Combat design has not changed too much in FAI meets since '63. They are not identical in features to our AMA 35-powered planes.

Prior to the match is a 30-sec. engine warming period, then 30 more seconds until the engine starting signal. The scoring period begins with the engine starting signal and lasts four minutes. During this period, each contestant gets one point for each second his plane is in the air and 100 points per cut. There are no kills as in AMA Combat and no points are given for cutting the string leader. Combat begins at a signal from the judge when both planes have completed two level laps and are separated by at least a quarter lap. A pilot can be disqualified for intentionally leaving the ten-foot radius center circle and is penalized 50 points when he accidentally steps outside the center circle. Although not clearly stated, it appears that a mid-air collision does not end the match. No fuel restrictions are mentioned.

Combat Abroad: 15-size Combat has been flown in England for several years and it is becoming increasingly popular in Europe. Down Under in Australia they fly both 15 and 35 classes, although the smaller class is becoming the standard contest event. Combat has been a side event at past FAI World Championships and the Russians have been winning. Keep us informed of FAI Combat activity by writing Howard Rush in care of **AAM**.

On Safety: AMA rules provide for circle markings and procedures to avoid planes hitting pit crews. Follow these rules in both Fast and Slow Combat. Slow Combat planes are generally heavy, so they can hit hard. Circles can be easily marked with hydrated lime available from garden shops.

special interest

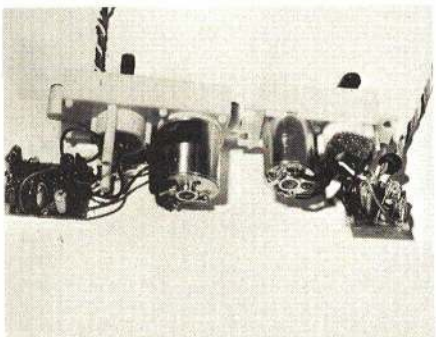
FRED MARKS
AERO/ELECTRONICS

A Look At Integrated Circuit (IC) Servos: Considerable effort has been expended in the development of a suitable servo amplifier for our upcoming two-channel digital system built around maximum use of IC's. Servo amplifiers now in use generally fall within one of three categories: those which make use of integrated circuit or hybrid integrated circuits plus discrete components; the bridge type amplifiers; the more standard discrete component amplifiers which use a center-tap battery pack. This last type of amplifier may be further divided into two levels: those which utilize the familiar error summing and pulse-stretcher preceding the output transistors, and those which add one more transistor per stage to form a Schmitt trigger preceding the output stage. Obviously, when designing an IC amplifier, one may put in pretty well what he wishes since space and complexity are of little consequence.

There have been four IC servo amplifiers designed and in production that we know of at this writing. The first was produced by Datatron and was given, along with the Micro-Avionics system, a Blue Ribbon Review in the March 1971 issue of **AAM**. This was a completely IC servo amp, i.e., it was all on the IC chip including the pulse stretching capacitors and output transistors.

The second IC amp was a modification of the Datatron unit to incorporate external trimming components such as capacitors and feedback damping resistors, presumably to reduce the IC rejection rate (a high percentage of all IC chips is rejected during manufacture, contributing to cost), and to ease manufacturing setup of systems.

More recently, Heathkit has introduced two IC servos. The amplifier boards are different to fit the KPS-11 and KPS-12 servomechanisms. These are both center-tap type amplifiers (as were the Datatron amplifiers).



The two new Heathkit servos using the IC chip amplifier design. Difference in amplifiers is the size of soldering iron tip needed!

We have not had access to the IC design circuit but the Heathkit amplifier is a hybrid design which incorporates the timing, error integration, and pulse stretching transistors on a chip designed by Motorola. There are 17 external components including two drive transistors, trimming resistors, and the timing and integrating capacitors.

World Engines also has an IC amplifier used in their S-5 and the LB-6 (Low-boy) servos. This particular chip is manufactured for World Engines by Signetics. It is a bridge circuit amplifier containing all the solid state components with a few external components for filtering, pulse stretching and timing.

Our primary goal in examining these was to determine suitability for use with our own design IC decoder. As a secondary thought, it seems that certain of these might serve as an excellent replacement amplifier approaching the category of the "throwaway" amplifier discussed last issue.

There has not yet been an opportunity to examine the applicability of the Datatron amplifier with other systems. John Maloney of World Engines indicated that they didn't feel their amplifier should be placed with just any system because it does place stringent requirements on decoder output in terms of a clean output pulse. A sample of the World Engines amplifier was found to work well with the Transistor-Transistor Logic (TTL) IC decoder incorporated in our two-channel decoder.

Samples of the Heathkit servos were built and were found to work quite well with every system available to us for examination. Performance is good, although not exactly equal to bridge amplifiers or those incorporating discrete component Schmitt triggers. When it is considered that one would probably spend ten dollars or more on most servo amp repairs, the possibility of using these as replacement amplifiers is attractive. This would be accomplished as follows: the servomechanism, complete with motor and feedback pot, wiring, and plug would be retained. The appropriate Heathkit IC amplifier would then replace the old amplifier.

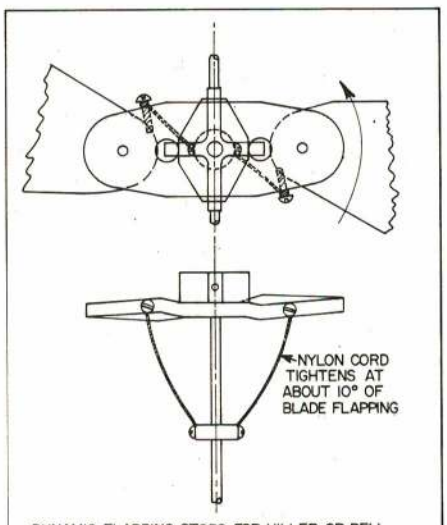
There is one hooker, however. The Heathkit amplifiers alone are not available as a kit—just the complete servo kits. Thus, one must order the amplifier as replacement-part components, i.e., by part number. There is then a total of 19 parts to be ordered including the IC and P.C. board. Total cost is approximately $13. This isn't as formidable as it sounds. Rather than use space to list the part numbers here, it is suggested that those interested in this approach either borrow the manual for the IC servos from a friend who has built one, or obtain it from Heathkit. The parts list is included therein.

The above was discussed very frankly with Bill Hannah of Heathkit. It is felt that Heathkit has been quite responsive to the RC hobbyist and that if enough people show interest, a complete replacement amplifier under one part number could be provided.

JOHN BURKAM
HELICOPTERS

World Record Set: Gene Rock flew his original design at Dahlgren, Virginia September 6 to 650 ft. altitude (verified by radar), setting a new world altitude record for RC helicopters. This will be a hard record to beat. Unfortunately his attempt to set a new endurance record on the same flight ended quite suddenly at 11 min. 11 sec.

My own attempt at endurance ended even sooner, but less disastrously. Once again technique lags technology. The new Hiller rotor handles well and is fairly stable. The following changes to the drawing in the November column are recommended:



DYNAMIC FLAPPING STOPS FOR HILLER OR BELL ROTOR, HELPS PREVENT BLADES FROM STRIKING BOOM

1. Increase servo paddle size to 2¼ x 5" and increase the radius to end of servo paddle to 13". Make servo paddles of ¼"

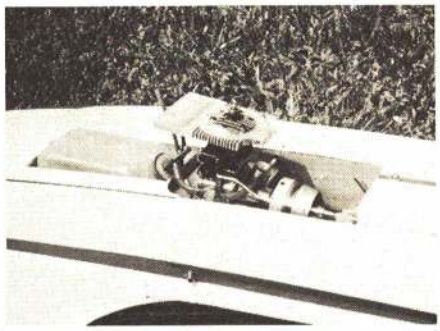
plywood, with outside grain running crosswise.
2. Use 3/16, rather than 5/32 tubing over the 1/8" music wire. Solder bushings of 5/32" tubing in the ends.
3. Use eight instead of four No. 4-40 screws to hold bottom plate to the diamond.
4. Make gimbal ring of steel, save buying bushings.
5. Use 3/4 oz. streamlined weights instead of setscrew collars on outer ends of 1/8" music wire arms. Fasten weights with setscrews and fasten 1/8" music wire to hub with setscrews instead of epoxy.
6. Use 1/32 birch plywood over blade root instead of 1/16.
7. Plus or minus 20° of cyclic pitch control on the paddles gives good control over the rotor.
8. Make the large center hole in the bottom plate round instead of oval. The diameter should be just large enough to stop teetering motion (one blade going down while other blade goes up) about an inch before the blade hits the tail boom.

Burkam's model with Hiller rotor system as flown at Dahlgren. While it carries 3 hrs. of fuel, pilot's skill and nerve gave out after only 7 min.

A better dynamic flapping or teetering stop can be made as follows: Drill and tap two No. 4-40 holes horizontally in the trailing edges of the ¼" thick bottomplate, about ½" inboard of the blade attach bolt hole. Put a setscrew collar on the rotor shaft about two in. below the rotor. There should be two screws 180° apart in this collar with heads that stick out about 1/8" from the collar when tightened. Position the screws parallel to the blade axes. Tie nylon or dacron cord from one collar setscrew to the screw in the tapped hole most nearly above it, using at least six strands. Do the same with the other setscrew. These 3 cords should be just long enough to tighten up when the opposite blade comes within two in. of the tail boom. As a blade comes up, the cord tightens and pulls down on the trailing edge of that blade. This puts a down force on the servo paddle following that blade. Ninety degrees later, by gyroscopic precession, that paddle flaps down, putting cyclic pitch into both main rotor blades at the proper point in time to decrease their flapping amplitude relative to the rotor shaft. The dynamic flapping stops are most useful when the helicopter comes in for a flared landing and strikes the tail skid on the ground. The tail boom comes up rapidly as the model settles, but the dynamic stops keep the blades from striking the tail boom. (This idea stolen from the Bell Model 47 rotor hub.)

CLIFF PETERS
RC BOATING

Eliminate That Heat Sink: When the last speck of speed is needed, eliminating the water pickup tube may be the turning point. Ernest Hull decided that a heat sink on his 19 would do the job of cooling as well in his hydro as in his model car. In fact, it could do even better because it could take advantage of that small amount of water spray occasionally hitting it to produce even more cooling effect.



Boats with sinks? Yes, an aluminum heat sink instead of water cooling. Works fine.

He found a 3/16" piece of aluminum sheet to be ideal. The hole can be made with a jigsaw or on a metal lathe using a boring bit. The "fingers" or slots should be thin, to give the greatest possible heat dissipation area. When selecting the aluminum, try to get as pure a piece as possible. The purer it is, the greater is its thermal conductivity—thus, a more efficient heat sink. Commercial aluminum's relative conductivity varies between 0.2 to 0.5 (the latter being that of pure aluminum).

If copper is available, it will work out better than aluminum, as its thermal conductivity is 0.92—almost as good, though much cheaper, as pure silver which has a thermal conductivity of 1.0.

"Jim Dandy" by 12-meter Class founder Buddy Black.

Brass, although easily attainable, will not work as well as aluminum, because its thermal conductivity varies between 0.2 and 0.26. When selecting metal from several kinds available, follow this simple rule: use one which is known to have good electrical conductivity. Generally speaking, pure metals are much better for either heat or electrical conductivity than are alloys.

In designing your own heat sink, select pure metal when possible, and also one that is known for its good electrical conductivity. The end result will be a good heat sink.

New Magnets Simplify Cowl Hold-Down: Holding a hydro cowl in place can be a nuisance and even a problem at times. Wallie

Ever noticed how RC sailing attracts pretty girls? Mona Harris pauses beside an East Coast 12-meter "Pontiac" skippered by Charlie Wormley.

Price solved this situation by using a series of small sectional plastic magnets recently developed and now available in hardware stores and some electronic and hobby shops. They do the job perfectly and permit the cowl to be removed or replaced easily and quickly. The magnets come in sections and the holding strength is determined by the number of sections used. They are made in various shapes—rectangular, square or cylindrical. Depending upon size, the price is between 25 and 75 cents. They can be anchored in place with either epoxy or bolts. They must be lined up correctly so that when the cowl is set in place the magnets face each other and their corresponding surfaces touch squarely. There can be no concession made to this rule. These new lightweight magnets do not add appreciably to the boat's over-all displacement.

Popularity Hurricane Strikes Sailboats: Model sailboats are showing increased popularity in all parts of the country where modelers are discovering how beautiful these vessels are to sail and watch and probably as exciting to race as any form of model boats. Sail really calls upon the skipper to show his (or her) ability.

With Class boats having duplicate hulls and equal sail area, sailing skill is the controlling factor. There is no working over that engine just a little longer or more knowledgeably to get those few extra rpm's.

The Santa Barbaras, designed by Tom Protheroe, are constantly gaining in popularity on the West Coast, with the assigned numbers becoming higher and higher. The East Coast 12-meter Class founded by Buddy Black is whipping up a typhoon on the Atlantic Coast.

The increasing membership in the American Model Yachting Association also is indicative of the growing interest in this phase of model boating. Producing no noise, odors or residues, look for these boats to be appearing more and more on lakes and reservoirs where power boats are prohibited.

A SPLENDID FAMILY PROJECT, THIS CL TRAINER USES 049 TO 15 ENGINES, DEPENDING ON LINE-LENGTH AND DESIRED PERFORMANCE.

NIFTY NOVICE

After the two dads had their fun, the kids got their chance to try out one- and two-wingers.

by DICK SARPOLUS and RAY BORDEN

In line with the series of "Tenderfoot" articles in **American Aircraft Modeler**, here is a project for an "advanced Tenderfoot." The design is patterned after many of the single-seat homebuilt airplanes seen today, and resembles many airplanes built in the 1930's. This model is a good basic and intermediate trainer, better-looking and bigger than the 049 types (for better performance), but still very easy to build—and you have your choice of a low wing monoplane or a biplane. If you build the low wing version it can later be easily converted to a biplane. An 09 is plenty of power; we used the Cox Medallion 09. A 15 can be used in the biplane for even greater performance.

The model was developed by the authors. Ray is an old-time modeler going back to ignition-engined free flights and early control-liners, and hadn't been involved in modeling since the glow plug came along. Dick started in control line, but for the past few years had been very active in radio-control competition flying. Ray was anxious to get back into modeling but wanted a project to "get his feet wet" without going too deep. A small control-liner seemed like the best approach and could be used to get the rest of the family involved with flying, too. Dick worked up a design featuring the single-wing, biplane conversion, and Ray built both versions and found that the basic modeling skills he had weren't lost, just rusty from lack of use. The project succeeded—the planes were easy to build and fly. The models proved to be good trainers during the first flight session, held to teach the whole family how to fly—the first nine attempts resulted in nine full-bore crashes, and the Nifty Novice was still in perfect shape.

Construction

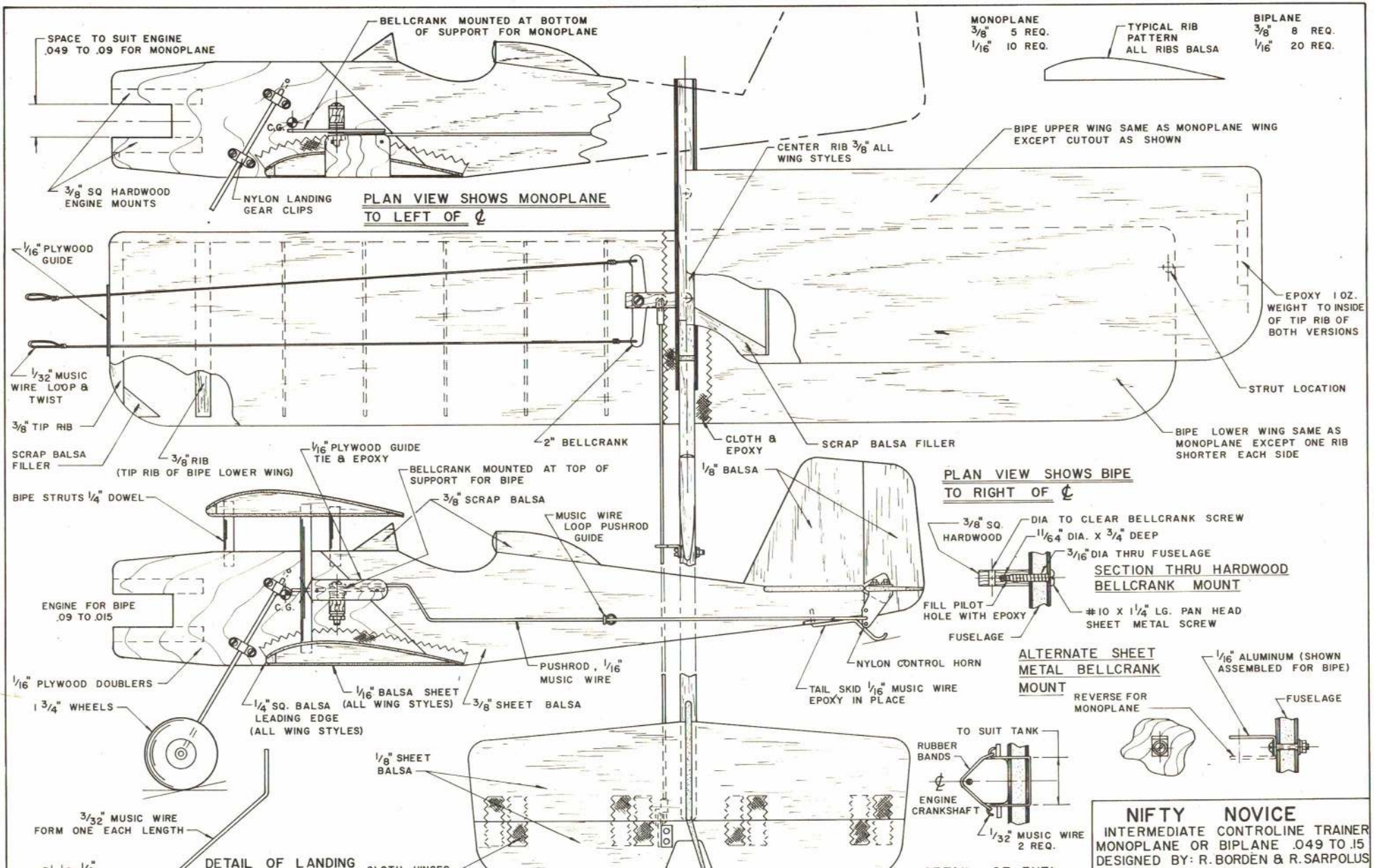
Let's start with the wing. Cut the required ribs from 1/16" and 3/8" balsa. Edge-glue two pieces of 1/16" balsa together for the bottom of the wing and lay on a flat surface. Use the plans as a guide and mark the rib positions on the 1/16" balsa; glue the ribs and the 1/4" square leading edge in place. Sand down the leading edge. Put plenty of glue on the leading edge, ribs, and along the trailing edge; add the top 1/16" balsa wing covering, holding it down with pins until dry. Sand well, finish shaping the leading edge and round off the wing tips.

The fuselage is cut from a piece of 3/8" balsa. Motor mounts are cut to length from a piece of 3/8 x 3/8" hardwood and glued in place. Be sure they are installed to suit your motor. The 1/16" plywood doublers are cut to shape and glued to the fuselage. Use clothespins around the edges to hold the doublers on while the glue dries, or put some heavy weights on the assembly and lay it on a flat surface to dry. The bellcrank mount is cut from a piece of 3/8 x 3/8" hardwood. Obtain a No. 10 x 1¼" sheet metal screw and drill a 11/64" hole in the end of the bellcrank mount. Put a hole through the fuselage and epoxy and screw the bellcrank mount on.

The tail surfaces are cut from 1/8" balsa; sand all the edges round. Glue on the cloth hinges, being careful not to get too much glue between the surfaces so the controls will work freely. Then glue the tail surfaces to the fuselage.

When attaching the wing to the fuselage, use a piece of fiberglass or thin cloth along

(Continued on page 91)

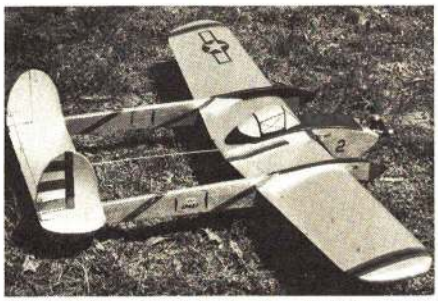


FULL SIZE PLANS AVAILABLE—SEE PAGE 70

WHO SAYS A LIGHTNING MUST HAVE TWO ENGINES? FOAM-WINGED 'FIGHTER' USES UNIQUE FUSELAGE AND CENTER WING ASSEMBLY.

P-38

FOR RUDDER ONLY



Foam wings, boxy fuse, and profile booms make it a snap. Note interesting linkage.

by JOHN CHAPIS

Like most fellows who have attended college, time for modeling was limited because of girls, student activities and homework, but not particularly in that order. The perfect excuse for working on a model was to use it to illustrate methods of fabrication for my Production Control class.

As I began to study the objectives my instructor had outlined, I found that research and paper preparations would limit the fabrication time needed to develop a display. Solution to the problem–good old foam. Why mess with cutting ribs? After looking at the situation more closely I decided to build a foam core instead.

I was all set to begin except for one thing–I didn't have any idea of what design to build. After going through a stack of old magazines, I came across an interesting scale P-38 RC bird. I figured I'd been different in my ideas this far, so why not go all the way? After studying this design I ruled out the twin-engine idea but not the P-38 design. I decided there wasn't any need in forming booms when using a single engine in the nose, consequently profile booms were selected.

I had an Adams actuator, an extra 049 and a few handy rules of thumb. I put them all on paper and formulated a 38" P-38-looking RO pulse bird. In one evening the parts were fabricated, and with another three evenings of spare time the structure was completed. However, it was not until a year later that the design was first flown. I felt that the simplicity of construction and ease of flying would make it an ideal model for a beginner. It also had a certain amount of appeal because of the scale-like appearance, not like the typical "box type" trainer.

After sending information about the design to the editor of this magazine, it was felt that the model would be of interest to RO fliers. At that time, Ed Sweeney suggested that possibly one of the new Ace mini-foam wings could be adapted to the design, making it easier for those not equipped or those not experienced in cutting foam wings. Thus the P-38 was modified for use with a straight set of Ace foam wings. The only two modifications were the addition of a trailing edge for increasing the wing area and the addition of wing tips.

Construction

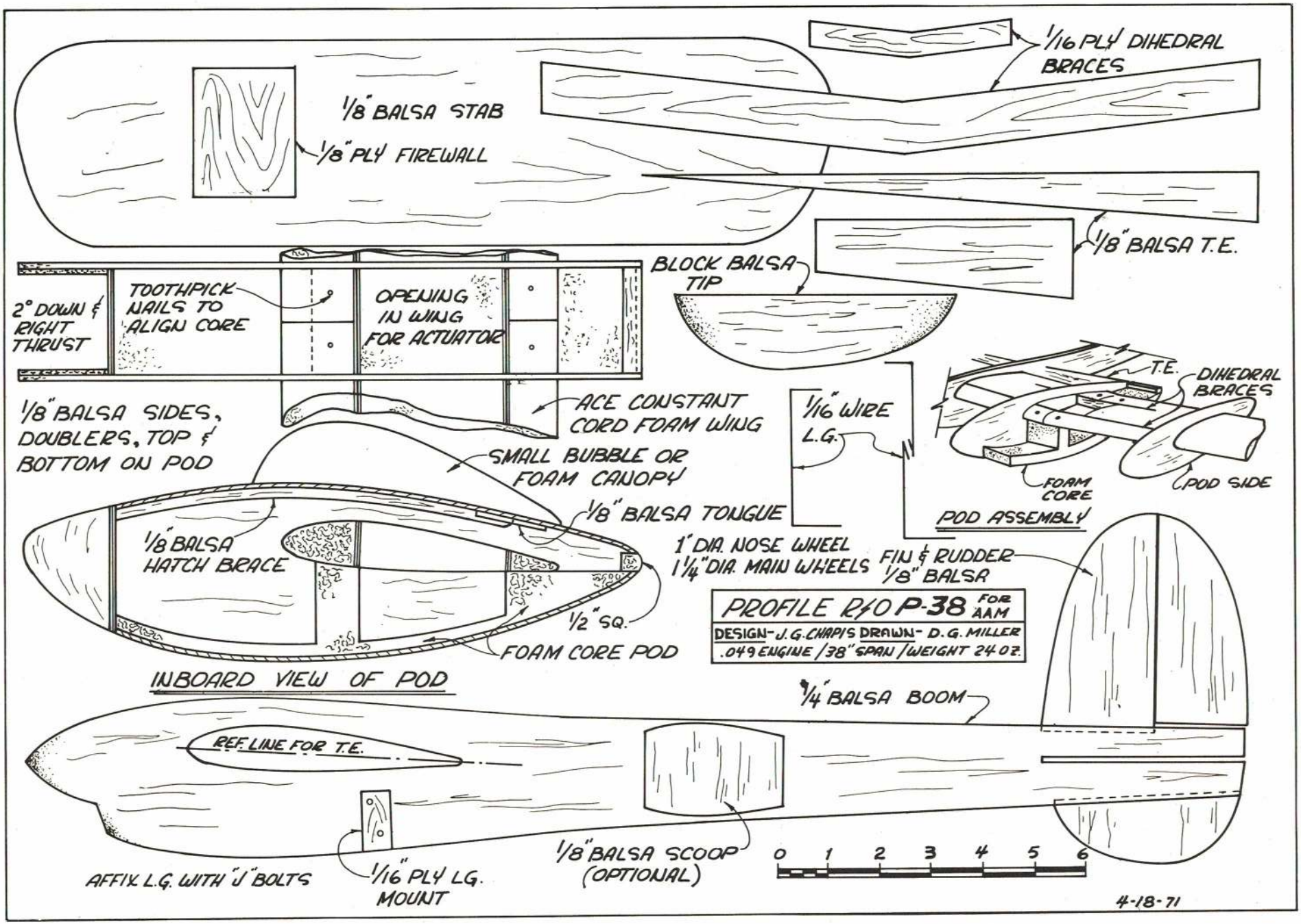
Before proceeding with the construction of this model it would be wise to cut out all parts. Assembly is much like that of a dime store glider. If five-minute epoxy is used, this model could be completed in one evening.

Prepare the wings, per instructions included in the Ace package, before joining them. After this is completed, join wing halves making sure that you cut out a 1 x 3" section on either side of center, between dihedral braces for the actuator. The foam core of the fuselage should now be epoxied in place, making sure to align it properly. After it has dried, install fuselage sides, firewall, and nose doublers. While all this is drying, set it aside and construct the hatch, install the styrofoam canopy and cut the bottom planking. Install ½" square tail block and bottom planking.

The booms can be added, but not glued to the stab until they are aligned. After this dries, glue booms to the wings with epoxy. Then epoxy the trailing edge and tips into place. The rudders and fins should be hinged in preparation for installation. After they have dried, add the rudders and sub-rudders. Then add the landing gear and the structure is complete.

Finish the wings as recommended by Ace. Dope the balsa portions as you would normally, being careful not to get dope on the styrofoam. The original was finished with olive drab upper section and gray underside. The second was finished like a Reno air racer.

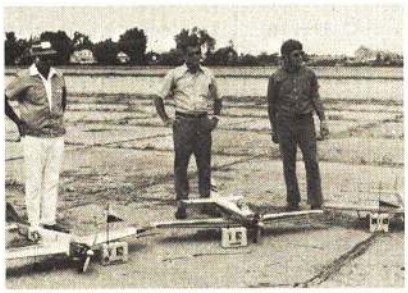
Flying is a breeze. Make sure to put in a 2-degree down and 2-degree side thrust–also radio equipment. Start the engine and up, up and away. Flying characteristics are much like that of the ½A Skylane by Carl Goldberg.


1/16 PLY DIHEDRAL BRACES
1/8" BALSA STAB
1/8" PLY FIREWALL
1/8" BALSA T.E.
BLOCK BALSA TIP
2° DOWN & RIGHT THRUST
TOOTHPICK NAILS TO ALIGN CORE
OPENING IN WING FOR ACTUATOR
1/8" BALSA SIDES, DOUBLERS, TOP & BOTTOM ON POD
ACE CONSTANT CORD FOAM WING
SMALL BUBBLE OR FOAM CANOPY
1/16" WIRE L.G.
T.E.
DIHEDRAL BRACES
FOAM CORE
POD SIDE
POD ASSEMBLY
1/8" BALSA TONGUE
1/8" BALSA HATCH BRACE
1" DIA. NOSE WHEEL
1 1/4" DIA. MAIN WHEELS
FIN & RUDDER 1/8" BALSA
1/2" SQ.
FOAM CORE POD
PROFILE R/O P-38 FOR AAM
DESIGN- J.G. CHAPIS DRAWN- D.G. MILLER
.049 ENGINE / 38" SPAN / WEIGHT 24 OZ.
INBOARD VIEW OF POD
1/4" BALSA BOOM
REF. LINE FOR T.E.
AFFIX L.G. WITH "J" BOLTS
1/16" PLY LG. MOUNT
1/8" BALSA SCOOP (OPTIONAL)
0 1 2 3 4 5 6
4-18-71

LANDING GEAR SYSTEMS DEVELOPED DURING THE LAST YEAR OFFER SIGNIFICANT IMPROVEMENT OVER THEIR PREDECESSORS. THESE ARE DEPENDABLE AND RUGGED.

Retracts Revisited

by DON LOWE



Retracts used to win at Nats. Don Coleman (left) and Ron Chidgey (center) used Pro-Line. Jim Martin used Rom-Air.

Tandem Wing retracts by Jim Wilmot.

Even "Rubber Ducks" retract their feet. Dean Koger of Air Force (right). "Cavalier" plastic flies much better with its gear up.

photos by Chuck Shade

In its November 1970 issue, **AAM** provided a comprehensive coverage of retracting landing gear systems–historical ones and those available at that time. In view of the rather wide acceptance of RLG's since then and the industry's feverish attempts to meet the demand, we offer a review of progress to date. RLG's certainly came of age this season when 18 of 20 finalists in Class C Expert Pattern at the Nats used them. The winning FAI racing team, Telford/Violett, achieved a speed advantage through RLG's to win at the Nats. The general contest scene around the country also shows wider usage of RLG's.

Much has been written regarding the pros and cons of RLG's, or "collapsing gears" as some affectionately refer to them. Most of those who have flown with them will extoll the increased A/C performance in speed, smoothness and grooviness (whatever that means). At the same time they will cite the beasts for weight, complexity, cost and unreliability. Granted, early versions of RLG's were deficient on a number of counts. However, progress has been made in what we might call the "second generation" of systems to cure some of these problems. Experience has taught that RLG's should possess the following attributes:

(1) Immunity to wear or failure from engine vibration. This is especially critical for the nose gear and is probably the most glaring weakness of RLG's. Main gears are much less affected due to substantially lower vibration levels.

(2) Structural strength to prevent damage from hard landings. (Most present designs are good in this respect.)

(3) Ease of installation with non-critical linkages and adjustments. Systems requiring separate servos are the most difficult in this respect and require careful installation to prevent binding and to assure positive locking, retracted and extended. The basic problem is the modest energy available from conventional proportional servos to perform this function. Special servos with increased power and rugged design help ease the problem considerably. Precise adjustment of servo travel limits is usually required to assure locking without jamming. RLG design should make this adjustment as non-critical as possible.

(4) Lack of failure due to exposure to oil and dirt. Systems which use electrical switching should provide shielding or some type of protection to prevent contamination and failure. A mixture of dirt and oil also hastens bearing failures under vibration conditions.

(5) Lightweight as possible commensurate with meeting the above criteria. This is a compromise that must be made to yield maximum performance with minimum installed weight penalty.

(6) Low cost. Obviously cost is relative. A system that does not fail, requires no replacement of parts during a season and prevents aircraft bashes due to various types of failures is a more cost effective system than a cheapie that is not reliable. This is not to infer that a cheap system with all the above virtues can't be built. On the contrary, such a system should be our goal. This is where ingenuity is required. In making the decision about which system to buy, however, be sure that you understand what extra equipment you must purchase to complete the installation such as 180-degree servos, switches, etc.

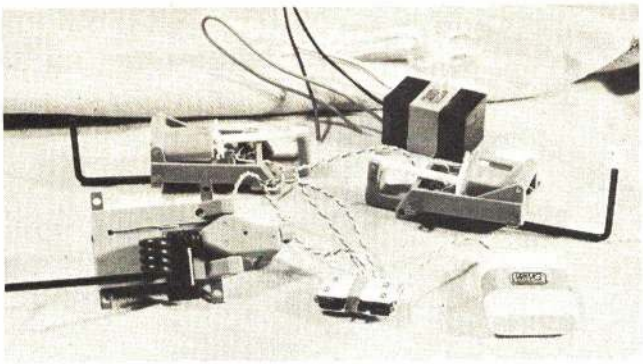
(7) Speed of operation. Most modelers usually want slow retracting and extension of gears for realistic appearance. This is alright–within limits. However, the competition flier, except for the scale flier, could care less about realistic operation. Fast operation can be a real asset in emergency conditions of engine failure near the ground. It also allows gear up flight immediately after takeoff and until just before touchdown to enhance A/C performance for pattern fliers; some even modulate A/C drag to adjust the approach by cycling the gear.

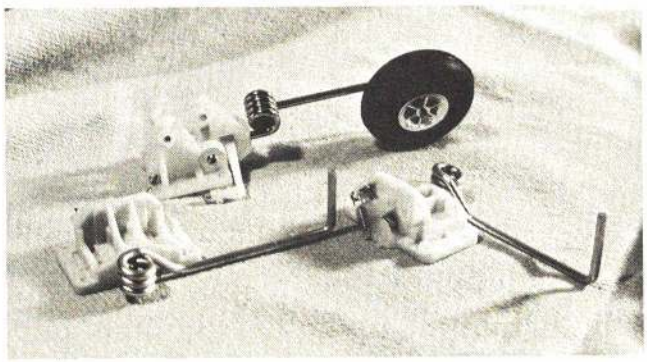
(8) Minimum operational limitations. Some of the RLG's can be operated only when in straight and level unaccelerated flight. In general, the spring-balanced systems which use conventional servos for operation have this limitation. The gear cannot be extended while inverted and has a difficult time retracting while pulling positive "G's". The difficulty here is the limited power available from conventional servos and a spring balancing system is used to ease the servo load. Optimum balancing occurs only when the A/C is upright, level and in unaccelerated flight (no "g's"). This operational limitation is satisfactory if you understand it and don't attempt operation outside the limits.

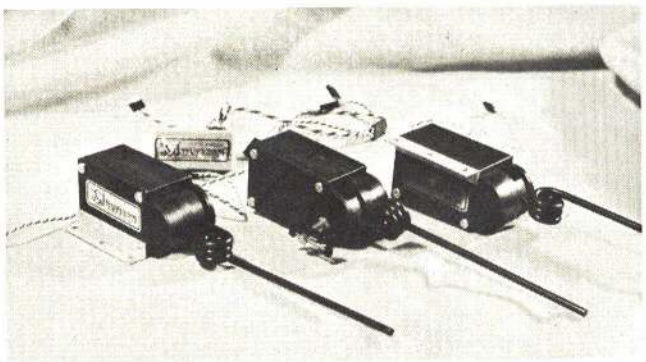
It is difficult to combine all of these capabilites in a single package and so the industry has taken a variety of approaches in design with each possessing its own set of features. Lets look at some of the current crop of RLG's.

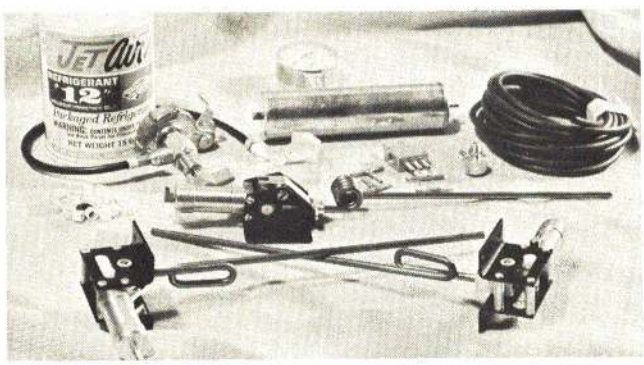
Pro-Line Electronics, Inc.–The Pro-Line retract system is a true second generation design–its design thesis is one of improvement on previously established design concepts by other manufacturers. Designer Ron Chidgey set out to remove weaknesses previously observed by competition fliers in other systems. The system is designed to operate with one or two 180-degree servos that must be purchased separately. The popular setup employs one servo for the nose gear and a separate servo mounted in the wing for main gear operation. Spring balancing is employed to reduce servo loads and actuation time is a function of the speed of the servos employed.

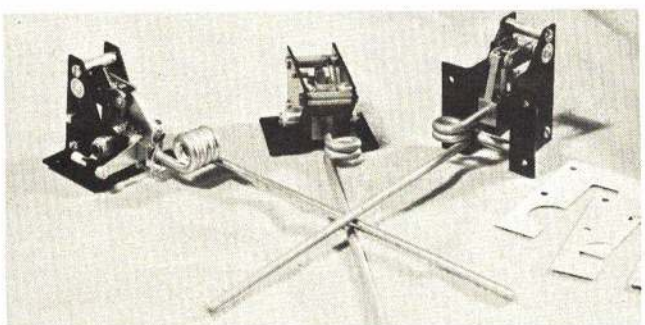
In practice, retract and extend times using 180-degree proportional servos is about one second. The actual servo load is a function of the length of the gear strut (which is shipped unbent) and the size of wheel used, but is only a few ounces and well within the capability of most proportional servos. Although it is possible to use a standard propo servo with actuator arm extension to operate this style of gear, it is far better to use a 180-degree servo. The reasons for this are threefold: (1) the servo travel required is achieved;











Wing Olympic gear—battery charger in rear.

Goldberg retracts have nose gear (rear) which mounts to firewall.

Multicon (Kraft) retracts. Nose gear center. Plug-in switcher in rear.

Rom-Air retract units shown in down position.

Pro-Line retractables—nose gear (left) mounts to firewall

(2) the servo mechanical advantage improves as it approaches 180-degree travel to assist locking up and down and (3) torsional loads are removed from the servo in up or down position in the event locking does not occur.

The Pro-Line gear is basically of aluminum construction with oversize nylon bearings at the pivot points to reduce wear. 5/32" struts with shock coils are provided on all gears. The axles are unbent to allow customer choice in regard to length. The nose gear is spring-loaded to center for proper alignment during retraction. The design provides a 90-degree travel retraction mechanism which positively locks the gear in the retracted and extended positions. Recent improvements include steel main bearing housings, a glass-filled nylon actuation arm and tightening up of bearing tolerances. This gear has been in use by many of the top fliers for a season's activity.

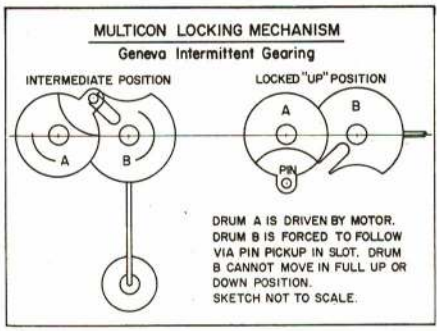
Carl Goldberg Models, Inc.–Carl Goldberg has introduced an RLG system to his ever-widening line of products. Carl has chosen a little different approach in construction by employing nylon or glass-filled nylon for all major parts, except for struts which are 5/32" wire. This approach should permit low cost production using injection molding techniques. Also, nylon has excellent shock absorbing and wear qualities, and a light-weight product is possible. The nose gear operating principle is a variation of that previously used by KDH, CAS, RMK and others, and provides positive lock retracted and extended. The main gears use the "sliding block" principle previously used by BK and first introduced by Bill Bertrand. The gears are spring-loaded and require separate 180-degree actuation servos. Carl provides large bearings on the critical nose gear at all wear points to reduce wear. The uniqueness of this system is the all-nylon construction, light weight and low cost. These features, coupled with the sound design principles employed, should make this a popular RLG system.

Wing Olympics– The Wing retract system was previously reviewed in the November 1970 issue of **AAM**, but is included here to cover design improvements since that time. This system has been in use for several years with continuous improvements being made in the areas of strength, limit switching and actuation speed. The set has integral motors in each main and nose gear unit. The motor drives through a gear train and Jack screw to operate the wheel strut. Locking is provided in any position by the Jack screw drive mechanism. Electrical limit switching controls the limits of travel.

The complete system includes the nose and main units, 3.6V NiCad battery, control micro switch unit and battery charger. It may be controlled through either a throttle over travel hookup, or by a separate servo operating the control switches. System improvements include a strengthened Jack screw and a faster motor for decreased actuation time (from about 10 sec. to 6 sec.). The attractiveness of this style of gear is the ease

of installation, since no extra servos or linkages are required.

Multicon—An affiliate of Kraft Systems, Inc., Multicon is now producing an RLG system of self-contained design with a unique actuation mechanization. The gear features an integral drive motor gearing and locking mechanism in a closed assembly. Construction is primarily of high-strength glass-filled nylon. A standard servo type motor is used for motivation through spur gearing into an extremely unique locking mechanism—in the fully retracted or extended position, it is impossible to unlock or collapse the gear due to external loads. The system may be actuated



through switching attached to the throttle servo linkage, via a separate auxiliary channel servo switching system or by a separate plug-in auxiliary channel amplifier available from Multicon. The amplifier provides an extremely convenient installation; all units simply plug in and no wiring is necessary. Multicon provides rather complete instructions and recommends vibration isolation mounting for the nose gear to reduce possibility of failure. This is a good suggestion for any nose gear unit if it can be practically done, since vibration failure is the greatest single problem with retractable nose gear units. As with all integral drive RC designs the Multicon system is very simple to install and requires no separate drive servos or actuation linkages. Electrical power is obtained either from the regular flight pack or from a separate battery. Either four- or two-cell separate packs may be used and instructions are provided.

Rom-Air—The Rom-Air RLG system is probably the most unique design covered in this report, primarily because of the energy source employed, Dichlorodifluoromethane (CCL2F2), or more commonly known as Freon 12. Freon is used to charge a small (1¼ x 4¾"), light cylindrical tank. This tank, through a selector valve and appropriate rubber tubing, pressurizes actuation cylinders which are a part of each LG assembly. The complete set consists of a nose gear, main gears, storage tank, selector valve, charge fitting, plenty of tubing and a Freon supply and charging assembly. A gauge is also available for checking system pressure. The LG assembly mechanism provides positive mechanical locking with the gear in the down position. In the up position, system pressure holds the gear in place. The gear will not sag however, even under severe maneuver conditions due to the fairly high system pressure. Jim Martin tells me that he purposely allowed system pressure to decay to about 25 PSI and found no sagging through hard maneuvering with his Banshee. An additional feature of the system is its exceedingly fast operation; in fact, the gear cycles so fast that it's difficult to see it in motion. The high energy available from the pressure source allows gear retraction or extension in any attitude or maneuver condition. This "energy margin" should also prevent sticking or failure due to dragging in the wheel walls. An additional benefit could be nesting the gear against foam in the retracted position to help absorb vibration and reduce wear. A combination of metal and nylon parts, the lightweight gear mechanism is compact in size. It comes with extra long struts so that axles may be bent to the length required per installation requirements. The nose gear is designed for firewall mounting and cable steering and is spring-loaded to center for retraction.

Operational tests with the Rom-Air gear showed a system pressure of about 80 PSI when fully charged. When charged with gas, about 10 cycles of operation were possible before pressure dropped below 10 PSI and operation was no longer possible. When charged with liquid and gas, about 40 cycles were available (a cycle being one retraction or extension).

Nose gear steering for all sets reviewed is the same functionally except for the Rom-Air system which uses a two-cable mechanism that loosens upon retraction and permits uninhibited rudder action. All other gears use a single pushrod. A mechanism mounted to the nose gear steering arm allows full movement of the nose gear pushrod with the gear in the "up" position. Either system should work satisfactorily and it's a matter of personal choice. Nose gears of all sets are of the firewall mounting variety, except the Wing Olympics which requires horizontal mounting beams. The other sets bolt to the back of the firewall. Main gears for all systems mount flat to hardwood bearers in the wing.

System weights are noted in the chart. One should not simply add the weight to the projected airplane weight, since several ounces must be subtracted for the weight of a fixed-gear system which would be on the order of six oz., depending on the nose gear and mounting system projected. In addition, of course, wheel weights must be added. The weights shown on the chart are "as received" and include in some instances extra-long struts which will be trimmed off. In all cases, weight will be added to the ship, but performance improvement will more than compensate for this.

Those of you who haven't yet tried retracts are missing something, even if you don't fly competition. They add a lot to appearance and add just a bit more "moxey" to your craft. The competition flier will testify to the added benefit in performance. Don't expect trouble-free operation, however, because all gadgets have their weaknesses and require some tinkering. But, believe me, the first time you take off and "suck them up", you'll feel the investment in time and money was well worth it!

SPECIFICATIONS TABLE

MAKE	NOSE GEAR WEIGHT (AS RECVD.)	MAIN GEAR WEIGHT EACH	APPROX. TRIKE SYSTEM WT. WITH SERVOS IF REQD.	OPERATING PRINCIPAL	REMARKS
PRO-LINE	3.4 oz.	3.1 oz.	14.5 oz.	Spring-loaded with separate servos. Approx. 1 sec. operation with propo servos.	Weight includes two 2.5-oz. servos.
GOLDBERG	2.26 oz.	1.87 oz.	11 oz.	Same	Weight includes two 2.5-oz. servos.
WING	3.82 oz.	3.42 oz.	15.5 oz.	Self-contained electrical motors. Jack screw drive. 6 sec. operation	Battery weight: 2.33 oz. System weight includes one 2.5-oz. actuation servo and battery.
KRAFT	4.1 oz.	3.91 oz.	12.8 oz.	Self-contained motors. "Geneva mechanism" locking. 6 sec. operation.	Amplifier weight: .9 oz. System weight computed with amplifier switcher and common battery pack.
ROM-AIR	2.86 oz.	2.5 oz.	12 oz.	Freon Pressure-operated. Almost instantaneous operation.	Tank Weight: 1 oz. Valves Weight: .7 oz. System weight includes one 2.5-oz. actuation servo.

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3/32" x 3" x 36"	.44	.50
1/4" x 3" x 36"	.79	.90
1/16" x 4" x 36"	.50	.60
1/8" x 4" x 36"	.70	.80
3/8" x 4" x 36"	1.18	1.35
1/16" x 6" x 36"	1.08	1.20
1/8" x 6" x 36"	1.29	1.45
1/4" x 6" x 36"	1.54	1.75

MODEL AIRPLANE DOPE	SIG PRICE	BRAND X PRICE
4 OZ.	$ .59	$ .79
8 OZ. CLEAR	.89	1.39
PINT CLEAR	1.39	2.29
QUART CLEAR	2.19	3.69
16-OZ. SPRAY CAN	1.39	1.98

EPOXY GLUE	SIG PRICE	BRAND X PRICE
CONTAINER	3-OZ. $1.39	4-OZ. 2.25

MODEL AIRPLANE CEMENT	SIG PRICE	BRAND X PRICE
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TUBE	4-OZ. .55	4-OZ. - .69

RESIN GLUE	SIG PRICE	BRAND X PRICE
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BOTTLE	4½-OZ. .79	4-OZ. - .89
BOTTLE	9-OZ. - 1.19	8-OZ. - 1.40
BOTTLE	PINT - 1.95	PINT - 2.40

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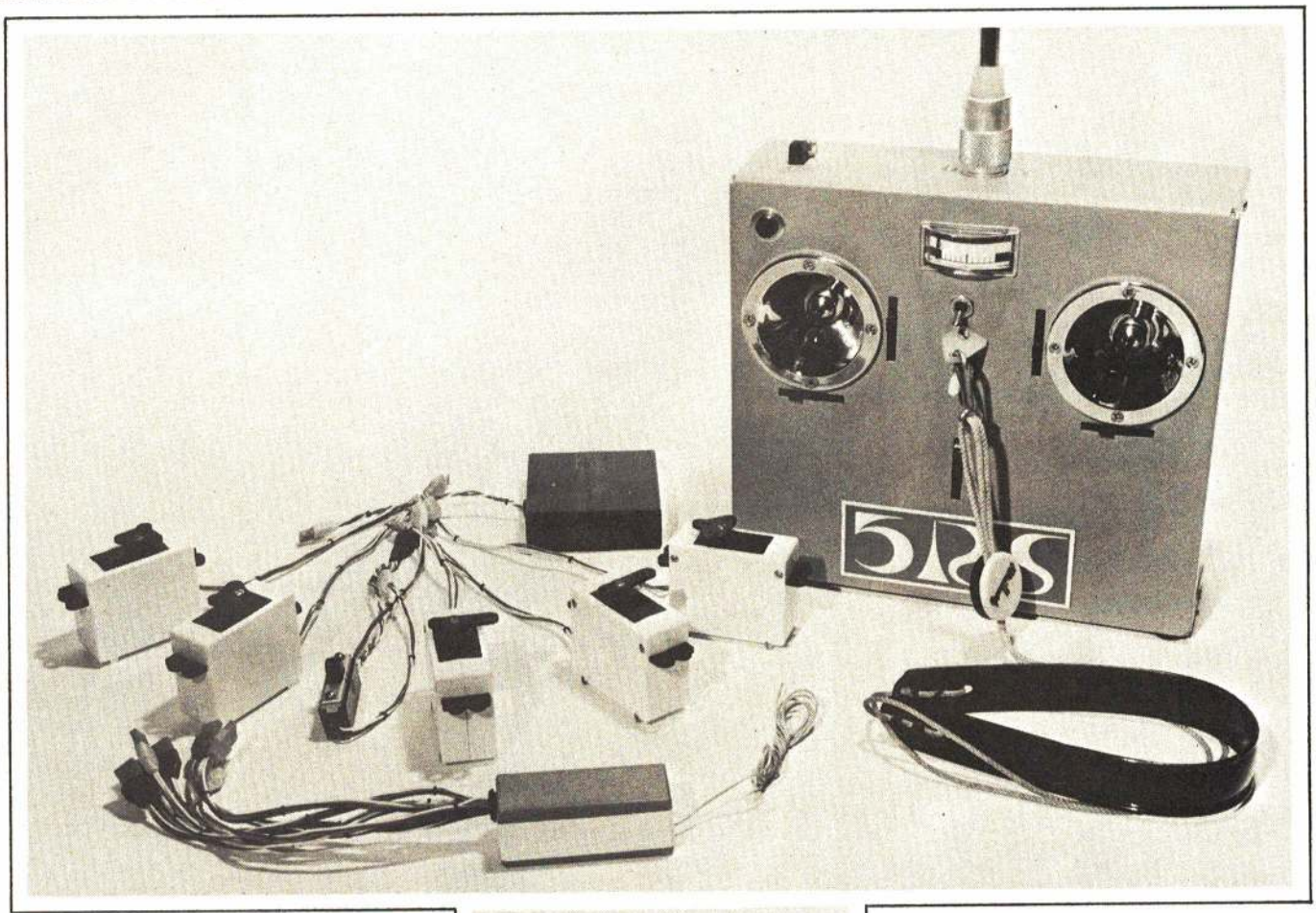
Blue Ribbon Review

LARSON 5-RS SYSTEM IN FULLY-EQUIPPED ARF DRAGON FLI



by FRED MARKS

The Larson 5-RS system has a rather long history for an RC system. Its ancestry can be traced to the original 4-RS manufactured by Bonner. The preceding model of the 5-RS received a Blue Ribbon Review last year and the new set has changed significantly. While the "RS" title remains, this is a completely different system by a third generation manufacturer. When Howard Bonner retired, he sold the rights to the system design, repair, and manufacture to Gordon Larson and Frank Koegel, who held regular jobs in addition to operating the business. However, their positions required relocation to other countries and the business changed hands again to Bob Novak, a graduate of Iowa State University with a B.S.E.E. The RS systems reflect the expertise in RC system design and manufacture of all these men.

The unit tested was the optional 6-channel 5-RS system. It has a new transmitter design, a modified decoder design and a brand-new and outstanding servo design. The system is available on the 27, 50, and 72 MHz bands. The usual bench tests were performed after the system was installed, flown extensively in a Dragon-Fli manufactured by Reddi-Flite Products, and fitted with a Kraft retract landing gear system, Webra 61 motor, and Northfield Precision muffler. This combination, assembled by Ed Sweeney, competed in the 1971 Nationals in the Pattern event.

An orange vinyl-covered case (7 x 6-5/8 x 2") houses the transmitter's encoder, RF section, and charger. Kraft dual sticks were used and provide precise feel, centering, and lack of slop. In a distinct departure from the older system, the RC section and encoder are built on the same board and the RF section requires no shielding. However, the RF

(Continued on page 68)

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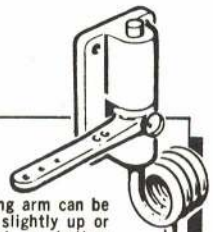

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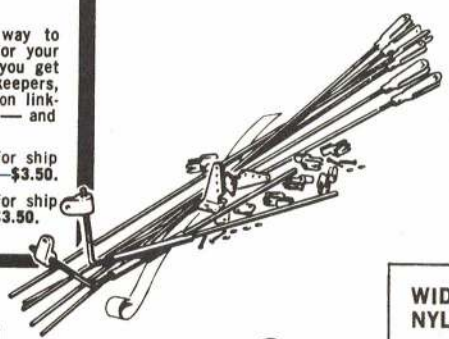

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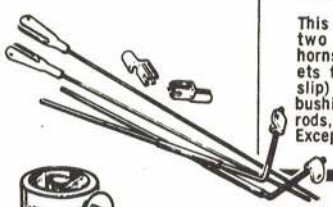

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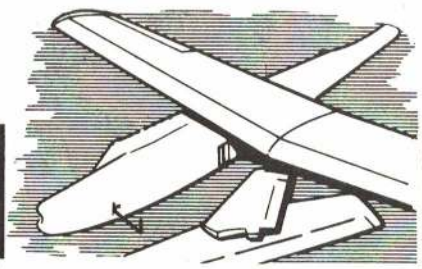

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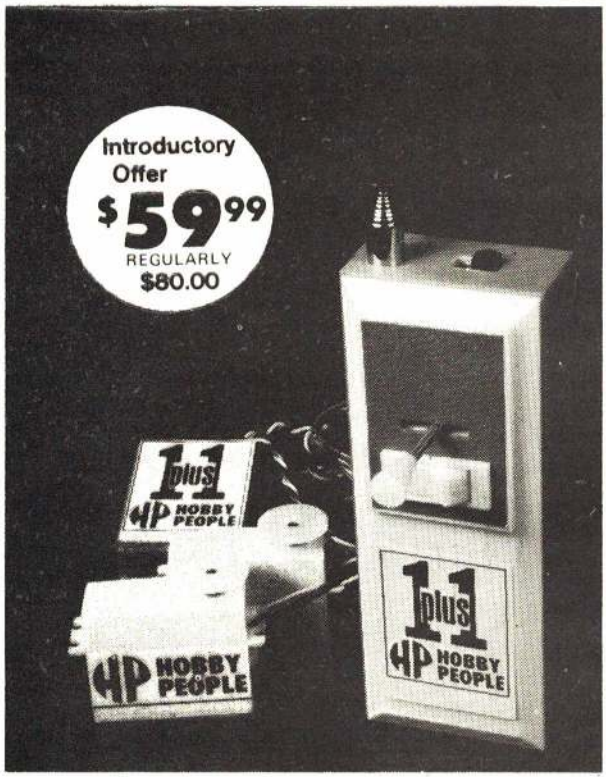

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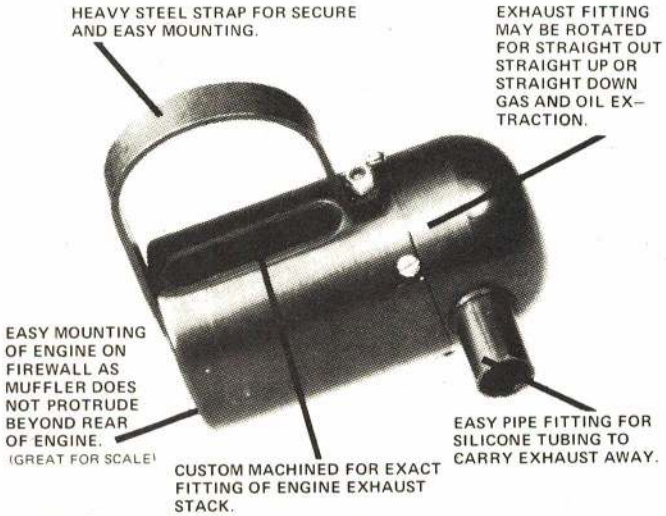

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JANUARY 1972

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AMA's Spectacular World Championships

Photos by Phil Edwards and AMA HQ staff.

The verdict is in from all over the world: The 1971 RC World Championships was not only a success—it was one of the greatest ever. To some who have been to many World Championships the U. S. hosted event was the best yet.

Yet it was somewhat of a miracle that the event happened at all—there were times when it seemed like a disaster was more likely. The story of this World Championships is, therefore, one of triumph over adversity and how people and a spirit, with a bit of luck and help from above, prevailed against a series of critical situations. It is also a story of financial success, despite considerable expense—the most expensive single event operation ever undertaken primarily by the Academy of Model Aeronautics.

Weather many times threatened to wipe out the event. For four days before flying was scheduled to begin the skies poured out a steady drenching rain. Practically all of the ground area for parking at the World Championships airport was grass-covered and it became completely soaked. With income from parking fees considered vital to financial success of the event, the outlook was for a muddy swampland and a major loss in revenue.

It got so bad that some main roads and bridges within the immediate vicinity were

Flags of the twenty-two competing nations, plus those for FAI and Pennsylvania, were all hoisted simultaneously during opening ceremonies for the 7th RC World Championships.

FCC Adds Frequencies for Model Use

The Federal Communication Commission has made a final ruling on a proposal first introduced in 1969 to provide 72 MHz frequencies for modeling activities other than aircraft. The result is that of the five 72-76 MHz frequencies previously reserved exclusively for model aircraft use, one has been opened to sharing with model car and boat use, and two more frequencies have been made available for shared use by model aircraft, boats and cars.

The FCC's ruling was effective November 15, 1971. It provides for the following frequencies to be reserved for model aircraft only: 72.08, 72.24, 72.40 and 75.64 MHz. To be shared by all types of models are the frequencies 72.16, 72.32 and 72.96 MHz. The latter frequency (72.96) was previously for aircraft only. (This FCC action does not affect 27 or 50-54 MHz bands. All frequencies previously available in these bands for model use continue as before.)

The FCC ruling is the end product of a proposal the FCC made in November of 1969 for the mutual sharing of the five 72-76 MHz frequencies for all types of models. The proposal encounted so many objections, primarily from model aircraft users, that the FCC issued a modified proposal in June of 1970. The modified proposal provided for reserving three of the frequencies exclusively for model aircraft, plus two for non-aircraft, and two more to be shared by all types of models. The modified proposal also was considered unacceptable by model aircraft users, and a second round of controversy resulted in a further modification of the FCC proposal. It was this second modification, detailed above, which was made a new rule by the FCC with the effective date of November 15.

Once again the Academy of Model Aeronautics has been instrumental in producing a reversal of governmental direction concerning RC model activities. The FCC in its report No. 7222 (Sept. 30, 1971) specifically refers to the arguments of the AMA pertaining to interference and safety problems which could have resulted from the previous proposals.

Although the latest FCC action takes one of the existing model aircraft-only frequencies and opens it to sharing with model cars and boats, it adds two new frequencies for shared use which previously had not been legally available. The net effect is an increase in the total frequencies available for model aircraft use. It should be noted that in many areas of the country where interference from car and boat operation is no problem, the effect will be to provide for expanded activity.

Above: Receiving their permanent awards of Sterling Revere bowls provided by AMA are (L-R) RC Aerobatic World Champion Bruno Giezendanner, Wolfgang Matt, 2nd, and Phil Kraft, 3rd. Presenting the awards are Gen. Brooke Allen (USAF Ret.), NAA president (L), and John Clemens, AMA president. Giezendanner also received the FAI King of the Belgians Trophy. Below: Holding aloft the FAI Team World Championship award (Model Aeronautical Press Trophy) is Phil Kraft, joined by U.S. team members Jim Whitley, Ron Chidgey and Team Manager Jim Edwards. K. Leroy Irvis, left, Pa. House Majority Leader, made the presentation.

Above: Henry Nicholls of the United Kingdom presented the new FAI Sir Thomas Sopwith Pylon Race Trophy to the victorious U.S. Telford-Violett Team. Pictured L-R are Nicholls, Bob Violett, Cliff Telford, Alan Mann, 2nd, and Tony Dowdeswell, 3rd. Below: John Patton, left, presents the first place International Soaring Contest award to Sandy Pimenoff. Adjacent are David Dyer, 2nd, and Otto Heithecker, 3rd.

closed. There were also numerous drownings within a few miles of the site due to flash flooding. Predictions for continued rain throughout the week of the meet made it difficult for much enthusiasm to be generated. But planning and preparations went on anyway—the event was committed come rain or shine.

Crowd control fencing was put up even though the ground was too soft for good support. Twenty-four flag poles were installed even though they wouldn't stay up straight in their muddy holes. Acres of grass were mowed for parking despite the fact that the ground might not be able to hold any cars. Direction signs were put up even though the wind and rain threatened to destroy them before they could help anybody.

Meanwhile AMA's chartered jet, which was to bring 250 passengers from Europe, ran into scheduling problems and would arrive about eighteen hours late. This caused practice and competition flying schedules to be rearranged and threatened to eliminate several supplementary actitivities such as Pylon Racing, Gliding, and an air show finale. Then several more hours were also added to the flight delay due to a blown tire upon landing in London.

On Tuesday evening, Sept. 14, the problems were considerable. The briefing which had been scheduled for officials and competitors that evening was scratched. Motel rooms which had been reserved for over two hundred people had to be paid for even though they were not used. Tents and other field facilities were not yet ready since the rain had prevented installation.

But other preparations continued anyway. A welcoming committee headed for JFK Airport in New York even though rain and fog made it uncertain whether there would be a plane to meet anytime soon. The group also faced the possibility that customs officials currently engaged in a crackdown on narcotics smuggling would further delay the passengers, especially since there were forty-five model boxes (each almost the size of a coffin!) to be inspected.

Such additional delay would really complicate matters as everyone could eventually arrive in Doylestown completely exhausted and perhaps too late to participate in the test and practice flying period scheduled for Wednesday. The original day of rest which had been planned for was already eliminated by the flight delay, and it looked like even the practice day might be missed—not a very good way to start a World Championships, since the outcome could be blamed on insufficient time for team preparation.

The plane was expected in about 1 a.m. but didn't arrive until 2 a.m. Meanwhile six buses were waiting and the prospect was for considerable overtime to be paid the drivers. Here again a potential financial problem caused worry, especially since it was usual to take several hours for so many people to clear customs after the plane finally did arrive.

But some advance work saved the situation. AMA officials had previously contacted the U.S. Customs Bureau in Washington and asked for help and relief from normal procedures. Nothing was promised by the bureau personnel but they seemed sympathetic. As added insurance, however, it was arranged for Ina Lopshire, the wife of AMA's PR director, to personally lead the planeload of people through the customs operation. As a former KLM airline stewardess she knew all the details of customs procedure and this could save much time. She was also multi-lingual and could explain to the passengers how to proceed more quickly.

The advance work paid off. Two hundred and fifty people cleared through customs in about an hour—a spectacularly short time for so many. Meanwhile the model box inspection was also shortcut, and the boxes were loaded into a huge trailer truck and on the way to Doylestown by the time the passengers were getting on board the buses. The truck, provided by Matty Sullivan (Sullivan Products, Willow Grove, Pa.), proceeded directly to the contest site, so that the boxes could be unloaded and be ready in the model processing area when the contestants would arrive at the field.

AMA President John Clemens and AMA PR Director Bob Lopshire got the passengers aboard the buses in record time despite the complication of making sure that groups got on the right buses—there were two motels involved, and destination foulups at this point could result in more delay. Other AMA'ers helped too. Bob Caplan from N.Y. and Jerry Kleinburg from Texas were on hand, as were Harold Brinkman of N.Y. and Hank DeKat of Toledo. Everybody helped and the caravan got rolling by 4 a.m.

By 7 a.m. all passengers were at their motels. But hardly anybody wanted to rest even though many had been traveling for thirty or more hours! As soon as motel check-in was completed most flyers headed for the contest site. AMA provided a continuous shuttle bus run between motels and the field. Helping the situation was a break in the weather. For the first time in four days the dawn came with bright sunshine. This en-

TO RENEW AMA MEMBERSHIP WITHOUT LOSING SERVICE, MAGAZINES

December 10 is the critical deadline. Owing to the publication lead time, the very least to be expected for members whose renewal applications are received by AMA HQ after this time is that their March American Modeler will reach them late. This is because the March issue is mailed in January, and the address tapes of AMA members are prepared for the publisher during December.

Those who wait until after the critical deadline will have 1972 subscriptions initiated from scratch—just like new members, with a six week lag in magazine renewal service.

The February AAM, which is printed and mailed in December, is the last magazine to be mailed to 1971 AMA members—all 1971 memberships expire December 31, 1971.

Renewal notices were mailed to 1971 members in early October. Any AMA member who has not received his 1972 bill for dues by the time this issue reaches newsstands should notify AMA HQ immediately.

Thinking of joining AMA for the first time? Right now (by December 10) is the best time to do so because, by joining early you will receive maximum value—12 issues of American Aircraft Modeler plus all AMA benefits during each month of 1972. Use the handy form on page 61.

PRESIDENT'S MEMO

September 19, 1971, was perhaps the proudest and most thankful day of my life. That day I stood proudly at the foot of a circle of flagpoles from which flew the national banners of competing aeromodeling teams from all over the world. The flags had been arranged in a never-ending circle to symbolize the spirit of friendship established by bringing together the peoples of the world in friendly and dignified competition.

The occasion for this gathering was the award ceremonies climaxing the 7th Radio Control Aerobatic World Championships at Doylestown, Pa. In the gathering, beside the competing teams, their supporters and team followers, were diplomatic representatives from many of the countries represented in the competition. The State of Pennsylvania was represented by Governor Milton J. Shapp, who intended to be present but couldn't be, and House Majority Leader K. Leroy Irvis. The Academy of Model Aeronautics was represented as host, sponsor and organizer by some 100 of its most dedicated officials and my position as president. The Federation Aeronautique Internationale, the governing body for worldwide sporting aviation, both man-carrying and model, was represented by the president of the Committee for International Aero Modeling, Sandy Pimenoff of Finland. Enthusiastic spectators made up the remainder of the crowd, braving threatening weather to salute the new champions of the world.

AMA President John Clemens addressing the crowd assembled for award presentations at the Radio Control World Championships.

As I made the opening address of the ceremonies before this impressive assemblage I was keenly aware that I was speaking for each of the 40,000 members of the Academy of Model Aeronautics, and I was so proud! I was proud that we had been good hosts to good people in a good cause. There can be no better cause than worldwide friendship and understanding!

I was proud, but at the same time thankful. Thankful that there are still peaceful corners of the world where peaceful people can gather to offer the hand of friendship in a soft glove of friendly sporting competition. With aeromodeling as our weapon we were waging a successful battle of peaceful understanding and respect for our fellowman.

I want to offer my deepest thanks to the competing teams from other countries, and their supporters, for being our guests. I also offer thanks to the members of our own organization, the Academy of Model Aeronautics, who directed and organized this historic event. I thank the governor and people of the State of Pennsylvania for having shared their lands and hearts in supporting this inspiring event of international honor.

I salute the new champions for their superb flying accomplishments and their humble pride in winning. And I congratulate all of the other competitors because they proved that there are no losers in an activity this fine. I especially salute the team which represented the United States for having carried our country's banner so proudly and well.

And a bow of my head to Our Creator for the Blessing of life and intelligence that allowed us to all meet there in that great expression of World Friendship.

John E. Clemens
AMA President

couraged everyone to head for the field rather than catch up on much-needed sleep.

Despite the problems of the preceding 24 hours the championships finally got going on the revised schedule. While test flights were being made, the field facilities were rushed to completion: the public address system got hooked up, special phone lines were put into operation, the flagpoles were straightened, the fencing was finished, the concession stands were put into operation.

By the end of the first day—Wednesday—the field was ready and everyone was briefed. Team Managers and Judges had met and contest officials had been checked out. The only thing really wrong was that hardly anybody had slept for days. This condition would not improve much all week long as everybody was too keyed up with the excitement of the event to spend much time asleep.

To help the situation there was actually bright sunshine during the opening flag raising ceremony at 2 p.m. on Thursday, and this made for a memorable occasion.

Twenty-two Team Managers or other national representatives raised their flags simultaneously in a stirring event capped with appropriate speeches. Then, having been kind to photographers as the World Championships officially got underway, the weather turned overcast and stayed that way through most of the meet. This made it much easier on pilots, judges, and spectators who could watch the flying without the usual blinding problems from looking at the sun. Rain threatened constantly but never quite materialized until after the closing ceremonies on Sunday.

Yet it rained all around the airport many times between Thursday and Sunday. People

Landing by World Champion Bruno Giezendanner, Switzerland—in the spot! His Marabu design had a lighter wing loading than most other entries; Webra engine, Digi-Fly radio, KDH retracts, Top Flite 11-7¾ prop. Inset: Phil Kraft with his Fire-Fli design won 3rd place individually and led the way handsomely for a U.S.A. team victory. Webra engine, Silence Aire muffler, Kraft radio and retracts, Top Flite 11-8 prop. Approximately 40% used Webras.

Above: U.S. team meber Jim Whitley is just finishing the assembly of his Daddy Rabbit 7, readying for an official. Model uses Webra 61 power, Silence Aire muffler, Top Flite 11-7¾ prop, Pro-Line radio and retracts. Whitley always seems completely calm and collected, even in the heat of competition. Below: Josef Wester, Germany, placed fifth with his original design AW-40. Uses Rossi 60, Mini-Vox muffler, KDH retracts, Graupner 11-8 prop, Varioprop radio. Was 3rd in 1969.

Above: At age 20, Austria's Hanno Prettner was the youngest entrant—beginning takeoff run. At right, Hans Prettner signals to the judges. Model is an original design powered by a Rossi 60, home-made muffler, Dirigent radio, KDH retracts, Graupner 11-7 prop. Note use of transmitter harness. Below: Top U.S. Soaring placer Otto Heithecker helped by Dave Burt. It's an original design named Snoopy and controlled by Heathkit radio.

constantly reported getting caught in heavy showers going to and from the field. Somehow the rain avoided the airport and it soon became a commonly expressed thought that somebody upstairs was helping. The same thing had happened in 1969 during the Nationals at Willow Grove Naval Air Station—just a few miles down the road—so it seemed that we were still in good graces with the Big Boss above.

The weather remained favorable for several days, and an amazing hour-after-hour performance resulted which caused much favorable comment. Four full rounds of flying were completed in two and a half days. Actually, because the first round on Thursday morning was only for practice purposes, five rounds were completed in three days—including an opening ceremony and an exciting break for a short air show of demonstration flights on Saturday.

The tight flying schedule also was able to overcome a hold of almost three hours on Friday when low morning clouds prevented scoring of maneuvers. Test flights had models disappearing into the clouds at the tops of loops. There was no choice but to simply wait during otherwise fine flying conditions. Official flying eventually resumed just before eleven in the morning, then went on without further interruption until seven that night.

It took well organized and efficient crews to work so well despite the time and weather problems that prevailed. This, however, was where the capability of AMA officials became appreciated. What had originally appeared to be an impossible contest schedule soon became accepted as reasonable. Although most of the contestants were not used to this fast pace of U.S.-style competition they soon adapted and were comfortable with it. Obviously, too, the pace was a tribute to the reliability of equipment and the competence of the flyers.

Meanwhile there were other crises behind the scenes. Parking was a major headache. The soft ground prevented use of all available parking space so some very tight situations resulted. At one point—on Saturday about noon—all spaces were filled, including a field adjacent to the airport. While the use of another nearby field was arranged for, some cars had to be parked on the airport runway. This relieved the pressure somewhat while incoming traffic was backed up for many blocks away from the airport entrance.

Persistent efforts saved the day. Civil Air Patrol Cadets kept traffic moving. Officials pushed or towed cars that got stuck in soft spots or otherwise blocked critical traffic points. In one case officials actually picked up a car and moved it several feet sideways to let other cars through! It was a great example of coping with a continuing series of problems, and somehow the total effort kept up until all the bottlenecks were licked.

Electrical power problems also plagued the operation. Fuses blew, circuit breakers

RC PYLON INTERNATIONAL CONTEST

Pl./Competitor/Nation	Pts.	Best Time
1. Telford-Violett, U.S.A.	16	1:57.5
2. A. Mann, England	16	2:05.2
3. A. Dowdeswell, England	13	2:28.2
4. T. Prather, U.S.A.	12	1:53.6
5. B. Smith, U.S.A.	10	1:56.8
6. G. Shaw, Canada	10	2:17.7
7. B. Castaneda, Mexico	9	2:48.9
8. R. Svenningsson, Sweden	7	2:05.0
9. J. Sederholm, Finland	7	2:58.2
10. Y. Murakami, Japan	4	2:28.8
11. P. Pilsworth, England	4	2:37.5
12. B. Ball, Canada	3	2:26.5
13. H. Bando, Japan	2	2:25.7
M. Sierra, Mexico	0	
L. Castaneda, Mexico	0	
T. Isobe, Japan	0	

RC SOARING INTERNATIONAL CONTEST

Pl./Competitor/Nation	1st Flt.	2nd Flt.	Total
1. S. Pimenoff, Finland	597	485	1082
2. D. Dyer, England	640	430	1070
3. O. Heithecker, U.S.A.	405	515	920
4. J. Nielsen, U.S.A.	580	330	910
5. C. Carlsen, U.S.A.	576	269	845
6. G. Dallimer, England	341	415	756
7. I. Matsui, Japan	454	162	616
8. G. Hortzitz, Germany	260	312	572
9. D. O'Hara, Ireland	306	234	540
10. Y. Oki, Japan	220	233	453
11. I. Hirasawa, Japan	337	25	362
12. L. Blair, Ireland	200	159	359

tripped, and all kinds of power failures were experienced. Extra power lines were installed to at least a dozen places which had problems. Thousands of feet of cable were laid in the midst of other operations, the public address system was rearranged, and a complete lighting system was installed in the exposition area where none existed before. Practically all of the effort was made by AMA people who solved one power crisis after another.

In the midst of all this a dramatic innovation was introduced to the World Championships scene. TV monitors were installed at key points on the airfield: at each of the two flying sites, near the exposition area, and near the headquarters area. On the monitors were displayed the latest scores and other interesting information about the progress of the meet. This information supplemented that which was provided via the public address system.

This public display arrangement was installed and operated by AMA people. Connecting cable and power lines were installed all over the field and a TV studio-like operation was maintained throughout the contest. The equipment was provided by Pierce-Phelps of Philadelphia and was a unique contribution to the public information system, equivalent to electronic scoreboards at the Olympics and at major league ball games. At one point when the system broke down and company technicians were unable to restore operation, the AMA crew pitched in and got it going again—their RC know-how solved the problem.

With the completion of the Aerobatic competition on Saturday evening, the nature of the event underwent a subtle change. Whatever followed was a bonus—the basic obligation to fulfill the World Championships requirements had been met. The need, however, was still great to get in another day of action. There was much flying still scheduled and a good spectator crowd was needed for revenue—a good "gate" could make the difference between financial success or loss.

There was lots of flying on Sunday, and there was a big crowd to watch. Again the ever-threatened showers held off so that the International Class contests for Pylon Racing and Thermal Soaring were held as scheduled. The only problems involved were due to a late start and a slow pace for the Glider flying. The Soaring event had to be ended with only two of three scheduled rounds completed for there was too much else still scheduled.

An awards ceremony had been promised at 1:30 p.m., and there was still a two-hour air show to be held, including a much ballyhooed battle between Snoopy and the Red

OFFICIAL RESULTS
1971 RC AEROBATICS WORLD CHAMPIONSHIPS

Pl./Competitor/Nationality	Round One	Round Two	Round Three	Round Four	Best Three
1. Bruno Giezendanner, Switzerland	7075	5295	6455	6785	20315
2. Wolfgang Matt, Liechtenstein	5745	6925	6310	7040	20275
3. Philip Kraft, U.S.A.	6845	5580	6230	6380	19455
4. Hanno Prettner, Austria	6355	5735	6515	6225	19095
5. Josef Wester, Germany	6595	4990	6255	6240	19090
6. James Whitley, U.S.A.	5930	6405	5805	6415	18750
7. Ron Chidgey, U.S.A.	5585	6400	5695	6400	18495
8. Ferdinand Schaden, Austria	4825	6150	6065	6010	18225
9. Yasufumi Sugawara, Japan	6085	5110	6215	5860	18160
10. David M. Hardaker, England	4960	6640	5655	5695	17990
11. Kazuo Shimo, Japan	5285	5975	5500	6340	17815
12. Benito Bertolani, Italy	5730	5385	5750	6180	17660
13. Michael Birch, England	5055	6065	5745	5595	17405
14. Pierre Marrot, France	4610	5875	5805	5640	17320
15. Emil Giezendanner, Switzerland	5530	5110	5560	5995	17085
16. Graziano Pagni, Italy	6410	4780	4860	5800	17070
17. Gustaaf Cappuyns, Belgium	1100	5940	5190	5875	17005
18. Warren G. Hitchcox, Canada	6000	4455	5250	5540	16790
19. Gunter Hoppe, Germany	4515	5545	5380	5760	16685
20. Terence F. Cooper, England	5710	150	4990	5710	16415
21. Poju Stephansen, Norway	4955	5635	5215	5560	16410
22. Goran Ridderstrom, Sweden	4645	5470	5180	5605	16255
23. Wolfgang Kosche, Germany	310	5870	4685	5645	16200
24. Richard Brand, South Africa	4860	5775	4765	5220	15855
25. Guy Hardy, France	3365	5680	4850	5210	15740
26. Knut Aker, Norway	4475	5465	4655	5240	15360
27. Gerard Werion, Belgium	5595	4545	4825	4935	15355
28. Jan J.B. van Vliet, Netherlands	5090	4470	4890	5365	15345
29. Charles Marincowitz, South Africa	5635	3695	4705	4795	15135
30. Masahiro Kato, Japan	4625	4265	5365	5110	15100
31. Ronald E. Chapman, Canada	4725	4370	4695	5455	14875
32. Giovanni Bettini, Italy	5090	2940	4435	5260	14785
33. Renato Ragoni, Switzerland	4410	5240	4950	4550	14740
34. Denis Chabert, France	4075	5060	4050	5400	14535
35. Konrad Weixelbaumer, Austria	4300	4780	4600	5010	14390
36. Ivan Kristensen, Canada	4555	3835	4875	4955	14385
37. Bert-Erik Stovling, Sweden	3985	5525	4685	3755	14195
38. Salo Feiner, Mexico	5130	3410	4170	4820	14120
39. Feliciano Prat, Mexico	4970	3765	4410	4740	14120
40. Chris Sweatman, South Africa	4355	4185	4990	4560	13905
41. Christer Gillgren, Sweden	4545	3825	4065	5280	13890
42. Koos H.L. Tromp, Netherlands	4825	3295	4300	4485	13610
43. Brian Green, Australia	4045	3790	5145	4185	13375
44. Edward Vandermeulen, Belgium	3785	3580	4455	4425	12665
45. Hannu Riihela, Finland	3165	4280	3855	3965	12100
46. Erik Toft, Denmark	3925	2545	3620	4105	11650
47. Krijn H. Sliedrecht, Netherlands	3590	3785	3930	3710	11425
48. Carl Mollerup, Denmark	3480	3615	3140	3605	10700
49. Luis Castaneda, Mexico	3640	3415	3595	780	10650
50. Pierre Hoffmann, Luxembourg	4155	2315	1865	3365	9835
51. John Dible, Ireland	3580	2730	2990	2790	9360
52. Robert A. Young, Australia	620	3250	2680	2690	8620
53. Kari Lautala, Finland	1335	2000	3035	3120	8155
54. Howard Menary, Ireland	2470	370	2605	3010	8085
55. Paul Behm, Luxembourg	0	990	3300	3160	7450
56. Jens Jorgensen, Denmark	2210	2260	2215	2380	6855
57. Fred Buick, Ireland	0	890	2855	2910	6655
58. Tore S. Paulsen, Norway	1590	190	580	3825	5995
59. Norbert Bertemes, Luxembourg	0	0	505	4195	4700
60. Tae Sik Kim, Korea (South)	2465	250	0	0	2715

TEAM RESULTS

Pl./Nation	Points
1. U.S.A.	56700
2. Switzerland	52140
3. Germany	51975
4. England	51810
5. Austria	51710
6. Japan	51075
7. Italy	49515
8. France	47595
9. Canada	46050
10. Belgium	45025
11. South Africa	44895
12. Sweden	44340
13. Netherlands	40380
14. Mexico	38890
15. Norway	37765
16. Denmark	29205
17. Ireland	24100
18. Australia	21995
19. Luxembourg	21985
20. Liechtenstein	20275
21. Finland	20255
22. South Korea	2715

"Pretty nice" is the obvious feeling of Frank Ehling, left, about the RC Glider entry by Yuji Oki, Japan. Also shown, at right, is Isao Matsui. All of the Japanese entries showed marvelous workmanship.

Dan Pruss launches Graupner Cumulus 2800, finished while in America, for Soaring Contest winner Sandy Pimenoff. Contest was held to two rounds due to other activities. Jay Stargel photo.

First time U.S. team member, but certainly not new to RC competition, was Ron Chidgey who placed 7th with his Tiger Tail design. It has Webra engine, Pro-Line radio and retracts.

Thirteen, Bruno Giezendanner's contestant number, didn't prove to be unlucky for the World Champion, here in the ready box having his plane fueled by brother Emil and Albert Frei, mechanic and radio designer.

Left: Big line of cars waiting entry. Parking fees and admissions, plus other income sources, made the contest a financial success. Below: one of the stars of the noontime air shows was Maxey Hester (L), accompanied to the flight line by Mrs. Glen Sigafoose and Walt Moucha. Big crowd.

Bob Violett, L, who teamed with Cliff Telford, flew a consistently fast course for the team to become International Pylon Race Champions. Model won AMA Nats earlier.

Flight line discussion between (L-R) Bob Scott, Site Director, Maynard Hill, Contest Manager, and Tom Rankin, Contest Administrator, during low-cloud hold. Hill used bike for field transportation.

Baron. To the paying public the latter event often seems more important than anything else. The decision to cut the Gliding event short was painful but the least harmful to the overall program—of the three basic competition events (Aerobatics, Pylon Racing, and Soaring) the gliding event had not yet reached official status and was being run more as a test of the international rules than as a full-fledged championships type event.

The awards ceremony went off late but moved quickly. Photographers had a field day as team members from many countries shared the honors. It was a dramatic scene with flags fluttering in the background and the winners accepting trophies and medals on a raised olympic-type platform. The cheers and applause with each announcement provided a true championships atmosphere and it was a most happy occasion.

The tension was off and spirits were high as the model air show started immediately after the awards ceremony. Several unusual flying exhibitions got the show off to a good start. Snoopy and the Red Baron had their big duel in the skies and the crowd loved it. With the competition pressure gone, everyone was having fun. Then suddenly, as if someone had decided that the weather luck had lasted long enough, the rains came. It poured for a couple of hours, too long and hard to expect any resumption of flying. So the crowds headed home. All at once the World Championships was over. Most people were soaked but smiling. It had been a most amazing week with good fortune prevailing over the constant weather threat.

Additional reporting and photos of RC World Championships: see Dec. AAM p. 46 for Don Lowe article and p. 63 for AMA News Extra.

Tallying up the financial picture, officials were relieved to find that despite a fantastic cost of about $94,000 the World Championships came out in the black by about $2,000. Most of this, about two-thirds, was involved in the transportation, feeding and housing of the approximately 300 visitors from other countries.

The chartered jet, which had brought 250 people from Europe via Operation Friendlift, cost about $34,000. Bus transportation before, during, and after the event, cost about $4,000. Lodging and meals accounted for about $21,000 more. The visitors themselves paid for about $48,000 of this $58,000 cost, and the $10,000 difference was more than made up by contributions from AMA members (about $7,000) and sponsor fees (about $10,000). Advertising and exhibitor fees, gate receipts and souvenir sales provided further income which offset additional costs for equipment rental, supplies, printing and various special services.

Originally the AMA Executive Council had approved the committment of up to $20,000

(Continued on page 62)

OVER 39,000 JOINED IN 1971
7,000 more than the year before!

YOU CAN TOO!

AMA* MEMBERSHIP OFFERS:

liability insurance • special discounts • official rules manual • competition privileges

magazine subscription • exclusive decals • aid to air youth • national recognition

Subscription to American Aircraft Modeler is included with AMA adult membership—includes AMA news. Members under 19 can purchase the magazine at a special, low, AMA rate.

Discounts on special items stocked by AMA Supply & Service Section—books, magazines, pins, decals, etc.

Official Rule Book included with all AMA memberships. This manual details the specifications by which different types of models are built and flown and clarifies most of the specialized model aviation terms—a real aid to understanding model magazine reporting.

Super Decal Sheet—three different 4" x 9" sets. AMA wings, FAI emblems.

***The Academy of Model Aeronautics**—a non-profit organization, organized in 1936; guided by regional officers elected from among the membership. National headquarters is in Washington, D.C. AMA members have privileges in other organizations: National Miniature Pylon Racing Association (NMPRA) open only to AMA members. Membership in the Nat'l. Free Flight Society (NFFS) is $1.00 less to AMA members. All AMA members are automatically part of the National Aeronautic Association (NAA) and the Federation Aeronautique Internationale (FAI); may become voting members of NAA—with other special benefits—for half price, and may obtain an FAI sporting license for international competition.

Liability Insurance is included with all AMA memberships. Bought separately, this insurance would cost more than the adult AMA membership fee. Coverage is for $300,000!

Competition Privileges: All AMA members are licensed to enter the National Model Airplane Championships and all other non-restricted meets (over 500 each year—fun-flys, local, state and regional meets, and record trials); to establish national and international records; to compete on U.S. teams in World Championships (two held per year).

Special Help for Youth Members: Membership fee, with full competition privileges, eligibility for AMA scholarships, only $2.00 for either Juniors (up to 15) or Seniors (15 thru 18). (Does not include magazine subscription—cost with magazine subscription only $5.00.)

TO JOIN AMA USE THE FORM BELOW: AMA membership ends each year on December 31, regardless of the date a membership application is received. Late-year membership policy is as follows: those who apply between August 1 and September 30 pay full one year rate, but will receive half-year credit toward the next year's membership—they must, however, use this credit by July 1 of the next year; those who apply between October 1 and December 31 pay full one year rate and receive full membership for the following year, plus whatever days of membership remain in year of application.

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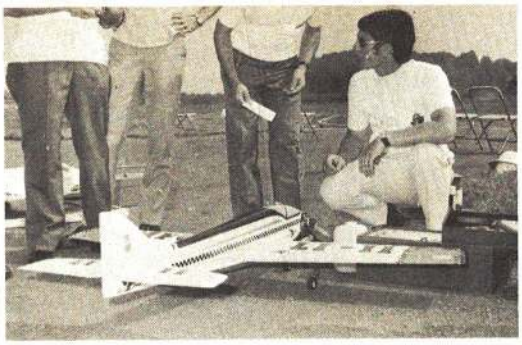
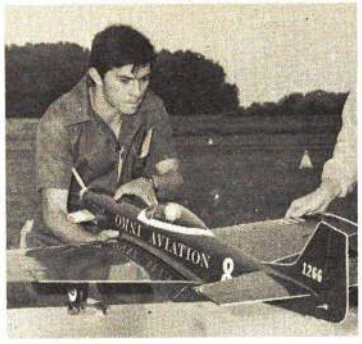




Left: Liechtenstein's Wolfgang Matt is a young man to watch closely in the future. He was 6th in 1967 and 1969, and this year he was 2nd, remarkably close to the leader. Model—original Super Star II powered by HP 61 and controlled by Simprop radio. Right: Pylon Race entrant Luis Castenada, Mexico. P-51 configuration for FAI Pylon is most popular.

Above L: A flight-by-flight log of radio transmissions was kept, including any which might cause interference. Vince Bonnema is shown as he monitors the Hewlett-Packard Spectrum Analysers. Above R: two rows of T-hangers, plus tents between, housed the International RC Exposition—manufacturer displays and exhibition models. Below: Flight judges establish flight path reference. Shown (L-R) are David Henshaw, Canada; Ritsuri Honda, Japan; Guy Revel-Mouroz, France; Bill Northrop, U.S.A.; and Tony Aarts, Netherlands.

for the World Championships project. The AMA obligation never got higher than this figure at any time—advance income always kept committments within the budget. In the end the project paid its own way so that, other than the use of AMA HQ staff time, AMA general treasury funds were not actually required.

Aside from the monetary profit, the value of the 1971 RC World Championships is beyond measure. In terms of international prestige there is no doubt that the U.S.A. has won hundreds of friends and a respect for our way of doing things.

We have also proved our ability to stage a major public event within our own resources of personnel and financing—this could be of tremendous significance for the future if we do not have the benefit of support by military or government sponsors. The experience has proved AMA capability to manage a complex and long range project. This means that we can expect bigger and better events of this type—there's a new dimension to aero-modeling now that we can bring people and events together from all over the world.

1971 RC World Championships Financial Summary, Sept. 30, '71

INCOME	
Entry Fees	$ 3,700.00
Charter Fares	29,600.00
Motel/Meal Fees	15,235.00
Contributions	6,351.37
Sponsorships	11,000.00
Exhibitor Fees	700.00
Advertising	4,271.00
Souvenir/Booster Sales	8,455.00
Admissions/Parking	12,436.76
Other	1,962.92
Total Income	**$93,712.05**
EXPENSES	
Charter Flight	$33.768.00
Motel Fees	20,819.47
Ground Transport	4,803.86
Souvenir Purchases	6,084.47
Trophies	646.80
Equipment Rental	4,686.61
Supplies	3,844.74
Officials Travel & Fees	1,914.27
Program Printing/Adv.	5,860.40
Postmeet Hosting	2,388.97
Film Project	6,400.00
General	238.15
Total Expenses	**$91,405.74**
Excess Income Over Expenses	**$ 2,306.31**

CONTROL LINE AND INDOOR TEAMS FOR 1972 WORLD CHAMPIONSHIPS

September was a busy month for AMA in FAI related competitions. There was the Radio Control Aerobatic World Championships from the 15th to 19th. Earlier there was the Control Line Team Finals, at which U.S. teams for Speed, Stunt and Team Racing were selected at Cleveland, Ohio, during Labor Day Weekend. Then on the 25th and 26th there there were the Indoor Team Finals. The teams selected to represent the U.S. in 1972:

Speed
Carl Dodge, Richmond Hts., Ohio
Robert Spahr, Thousand Oaks, Calif.
Charles Schuette, Santa Monica, Calif.

Stunt
Bill Werwage, Berea, Ohio
Jerry Phelps, Woodhaven, Mich.
Bob Gieske, Irving, Tex.

Team Race
Theobald/Barr, Downey, Calif.
Dunkin/Wright, Kansas City, Mo.
Albritton/Marvin, Arlington, Va.

Indoor
Joe Bilgri, Santa Clara, Calif.
Bud Romak, Moraga, Calif.
Pete Andrews, Bogota, N.J.

The Control Line Stunt and Team Race teams are exact repeats from 1970, but none of the Speed team are carry-overs. Pete Andrews is the only carry-over Indoor team member, but Joe Bilgri was the previous team manager.

Joe Bilgri and Pete Andrews each had high times among the Indoor finalists at Santa Ana, Calif., and Lakehurst, N.J., the two Team Finals sites. Bud Romak's 2nd place flight total was 99.63% of the Santa Ana winning time, just slightly better than the 99.56% achieved at Lakehurst—but enough for Romak to be named to the U.S. team.

CONTEST CALENDAR

Official Sanctioned Contests of the Academy of Model Aeronautics

DEC. 26—NEAR KERMAN, CALIF (A) Fresno Monthly FF Gas Meet (Cat. I). Site: Near Kerman. F. Gallo CD, 1725 Kenmore Dr., W., Fresno, Calif. 93703. Sponsor: Fresno Gas Model Club.

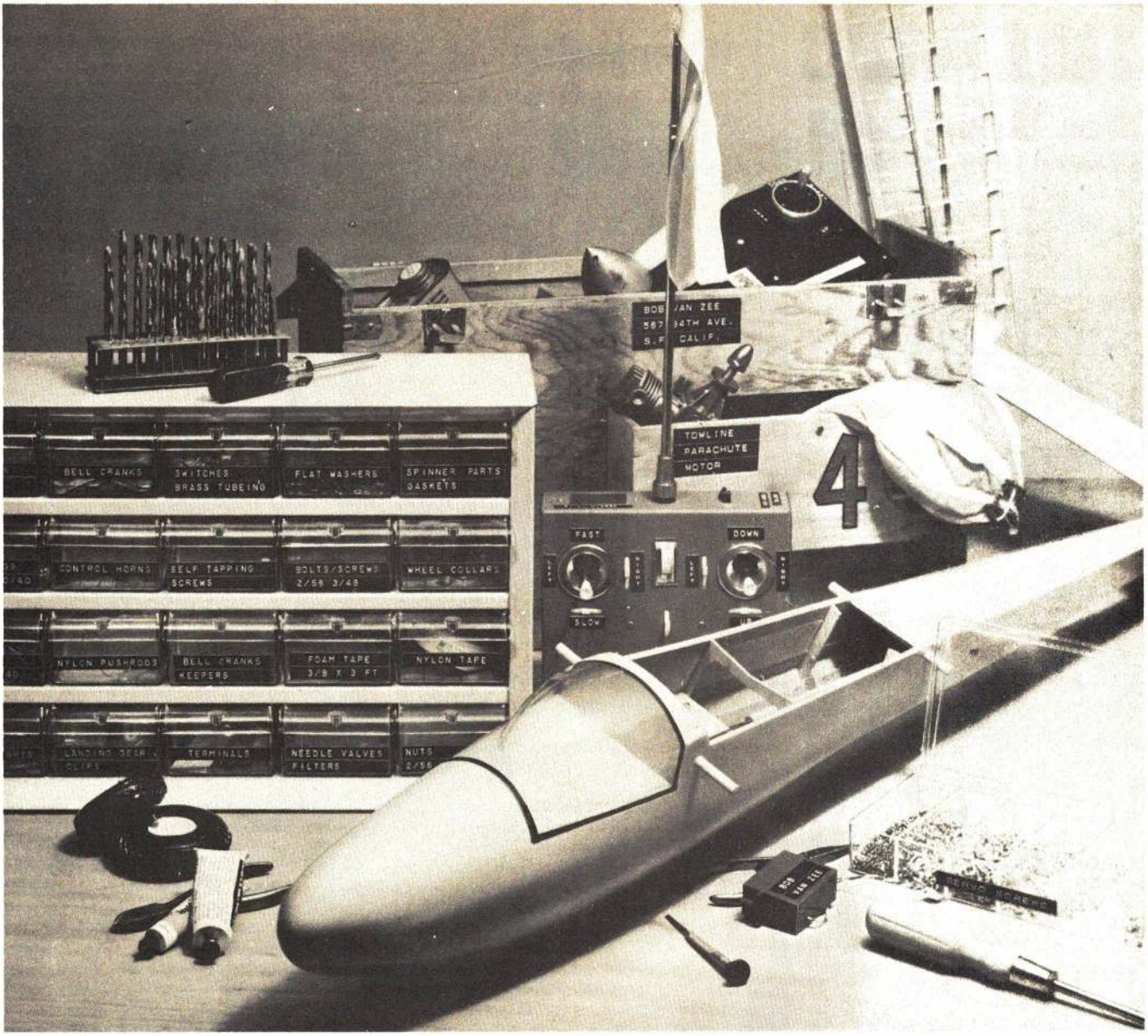
DEC. 31-JAN. 1-2-3—WINTER PARK, FLA. (AA) Tangerine International RC Championships. Site: R.C.A.C.F. Field. W. Schoonard CD, 2080 Sharon Drive, Winter Park, Fla. 32789.

JAN. 29-30—PHOENIX, ARIZ. (AA) Southwestern RC Championships. Site: Auxilliary II. G. Sing CD, 5603 W. Morten, Glendale, Ariz. 85301

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

AMA OFFICER DIRECTORY

The most recent complete directory was published in the October AAM, page 64.



The modeler's guide to keeping control of absolutely everything.

Keeping track of things is bad enough at home. It's even harder when you're in the field.

But Dymo labels can help you keep things under control no matter where you happen to be. Use them to identify your flight equipment, so it doesn't get mixed up with someone else's. And they're great for organizing your flight box, so everything's right where it belongs.

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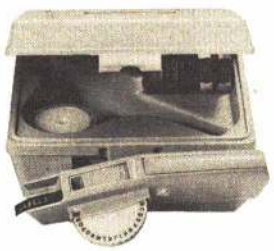

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DYMO®

Penguin

(Continued from page 27)

The bellcrank mount is glued in place with the bellcrank and leadout wires mounted. The wing mounting doubler is fitted between the bellcrank mount and top longeron, one doubler on each fuselage side. Choose a wheel to resemble that of a bike or motorcycle (specified for big Penguin builders). A 5" Williams Brothers Antique type is probably best. I used one from a doll coaster wagon. Main landing gear is bent from one piece of 1/8" music wire. The axle is 1/8" ID brass tubing, soldered to the gear struts. Distance between vertical struts is determined by the width of the wheel used. Make the landing gear mount with its cutout section just wide and high enough to clear the wheel, allowing for deflection loads bending the gear. Part of the lower cross member at station one will have to be cut away before the gear mount is epoxied in place. Make and mount tail gear, using a 1½" wheel.

The fuel tank should go in now. Tank mounts are ¼" balsa, epoxied to fuselage sides, with the tank epoxied to them. Make it sturdy. With the tank in, top and bottom forward plywood sections can be attached. Have the wheel cutout in the bottom piece just large enough to pass over the wheel. The fuselage will be putting on a lot of weight in front, so make the cowl block from light balsa and hollow it well. In case tail weight is needed, sheet balsa side panels form a ballast box between stations 4 and 5. Drawings show a 1/8" music wire pushrod. Another type has a 1/16 ID tubing center section, with pieces of 1/16" music wire extending from each end of the 12" brass tubing. The thin wire is easier to bend, and may be positioned for exact neutral elevator with neutral bellcrank before it is soldered to the tubing.

Formers, the five stringers, and the 1/16 x 1/4" balsa strips complete the fuselage framework. The strips fair in the plywood sides with the ¼" square longerons and side upright and diagonal members. Strips on the bottom of the lower longeron and other bottom members fair the bottom plywood covering to the tail landing gear mount. Detail work on the fuselage bottom consists of wing strut fittings and landing gear braces. Braces are mostly for looks, but the fittings help hold the wings on. They secure to fuselage with tiny wood screws like those used by model train builders. The hardwood wing struts attach to the fittings with Perfect brand 2-56 machine screws and lock nuts to fit them.

Each wing and aileron is assembled and covered separately. Wings are built by pinning the spars in place on plans, then gluing on ribs and other pieces. Note that the root rib assembly (root rib, R-16 and R-2) for each wing is glued to the spars at the angle at which the end of the spar is cut. This provides dihedral. Leading edges are of ½" dowel. They extend past the root and into the fuselage when the wings are mounted. Du-Bro markets 6-32 machine screws and nuts that are fine for bolting the wings to the fuselage. Each wing is held on with three root machine screws extending from the cockpit into blind mounting nuts secured in the root rib assembly, and by two struts held by four smaller machine screws. I glued my ailerons in place, but wish I had devised some sort of

If you haven't yet made a scale model, there's no excuse—Now!

Our new Radio Controlled P-51 Mustang is a *Standoff Scale* model. You can build it in about the same time a Kwik-Fli takes, but when you're through, you've got a model that only a ruler can tell from a true scale plane.

This means that in the same building time of your next sport or pattern R'C, you could have instead *this Mustang* . . . an authentic looking plane that flies like a sport model — no tricky handling.

Designed by Scale Champ Dave Platt, wing span is 60″ for .40 to .60 engines and full house R'C. The flaps can be stationary or operable. And like all Top Flite kits, it has exciting new features and time saving ideas.

Take a step UP—to a real-looking airplane!

MUSTANG P-51

SOME SPECIAL KIT FEATURES:—

Wings fully sheeted for strength and scale appearance.
Ready made ailerons and flaps.
Inverted or upright engine—parts for both versions supplied.
Full-size detailed plans with information for modification to various Mustangs—A thru D.
Machine shaped one-piece fuselage sides.
Nylon fittings—formed LG—canopy, etc.

Kit RC-16 $39.95

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adjustable hinge mount. It would be interesting to experiment with various aileron settings. Be sure the outer wing skid (the right one, for flying counterclockwise) is well-secured to R-4, and that R-4 won't come loose from the rest of the wing. The inner skid should never touch the ground, but the outer one should be functional. Use ample wing weight—1½ to 1 oz.

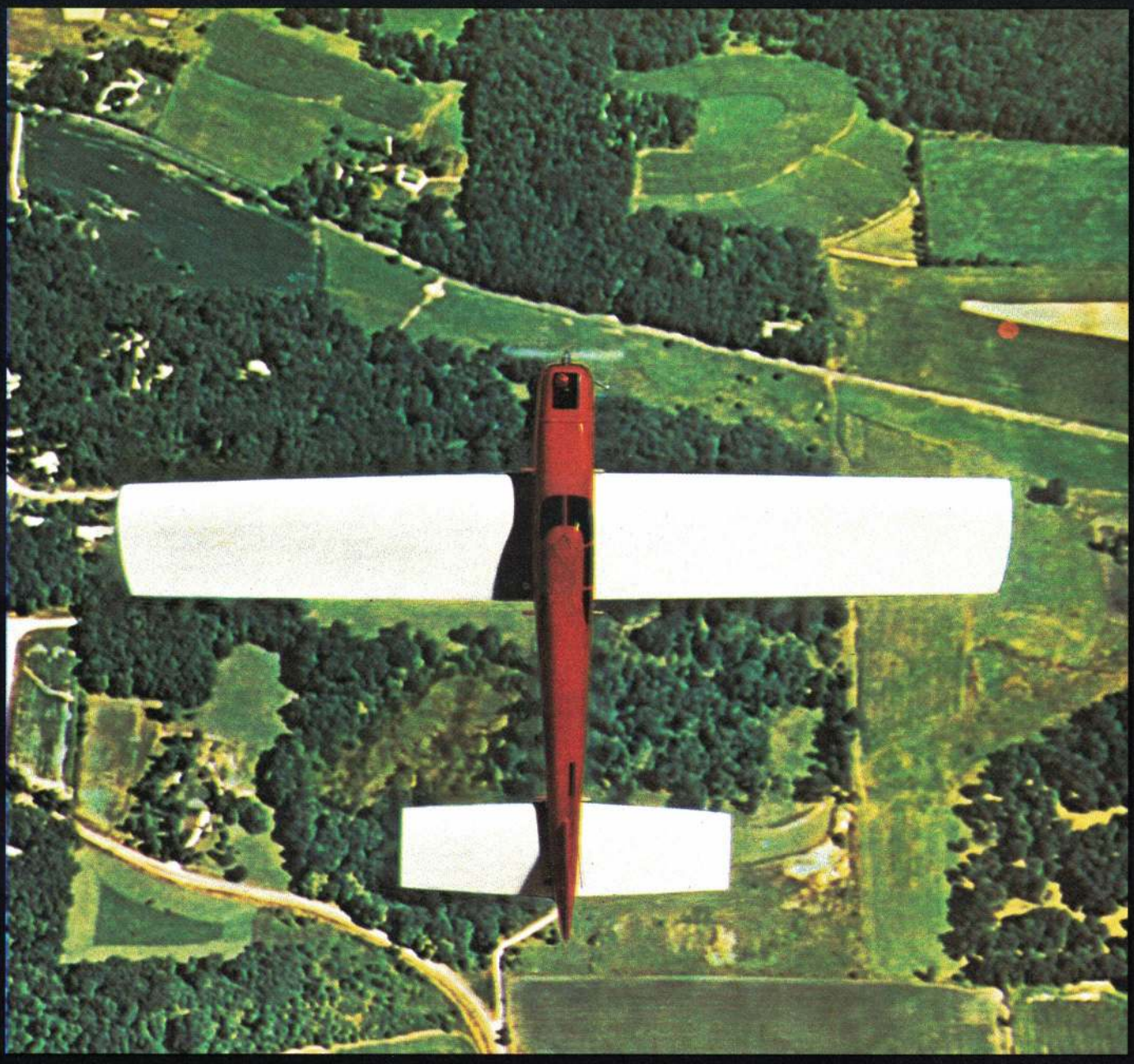
For ease of construction, storage and transportation, model has detachable wing panels—for the same reasons as did the real craft.

Holding boxy Penguin inverted in his lap, Dave attaches wing struts before flying. Ailerons, wing weight, keep it level on takeoff.

Suggested stock for the basic framework of the tail section is ¼" square spruce. Hard balsa may be substituted, but we can expect to need weight toward the fuselage rear, so why not gain it in stronger structural materials? If you do use balsa, please retain the specified harder wood parts to which the elevator horn is attached. Horns have been known to separate from balsa—in flight. Rudder offset probably isn't needed, due to the ailerons, but habit directs that it point slightly to the outside of the circle to be flown. Du-Bro makes some dandy nylon elevator hinges and Carl Goldberg manufactures a large elevator horn that work well on this model. I covered and doped my Penguin's tail surfaces before gluing them to the fuselage.

Due to the long nose moment arm and the light fuselage aft section, we can expect a nose-heavy model. To limit this, use heavy materials toward the rear. Attach the wings to the fuselage before covering the fuselage. Have the engine, prop, tail section and pushrod at least temporarily in place so the ship can be balanced. Add ballast if required to balance it at the front leadout position. The wing struts are individually fit to their fittings with wings bolted on the fuselage.

TESTORS R/C SKYHAWK WOULD RATHER FLY THAN WATCH YOU FIDDLE



If you'd rather spend the day flying instead of fiddling with field adjustments on your R/C plane, slip over to your nearest hobby/model dealer and trade your cash (incredibly little) for a Testors Ready-to-Fly Skyhawk and completely installed and tuned R/C system.

With the dependable 250 milliwatt, single channel solid state transmitter/receiver and powered by the reliable Testors/McCoy .049 engine, the 44" wingspan Skyhawk will keep you up in the air all day. See your hobby/model dealer for details.

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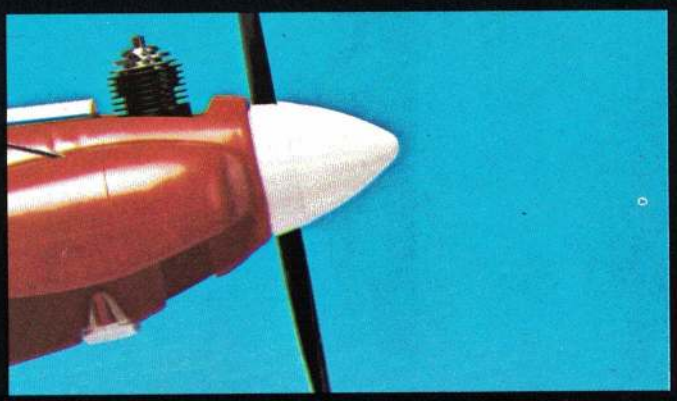
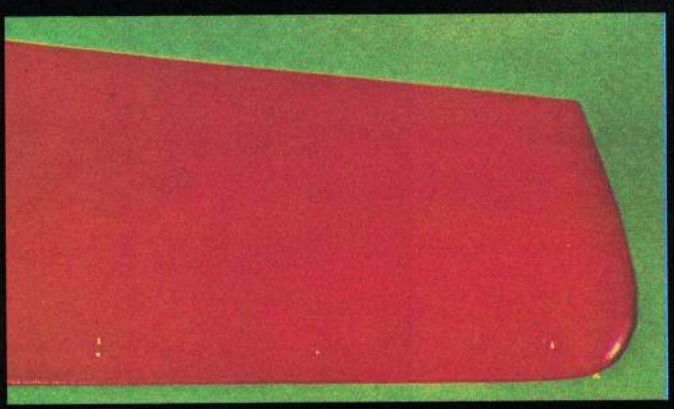
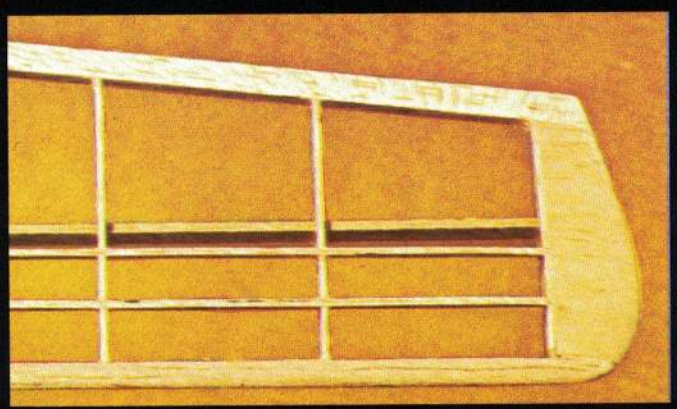
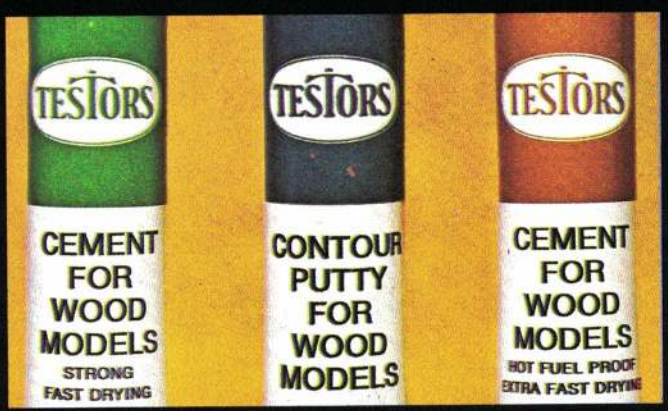
FROM START... TO FINISH... AND EVERYWHERE IN BETWEEN









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MICROMECCANICA
SATURNO

SUPERTIGRE G.40
CLEANS UP IN PYLON

The writer of this advertisement is John Maloney. I have always considered it a privilege to write these Supertigre advertisements and I have tried to tell my readers a little more about the engine than the fact that it is a 2 cycle, loop scavenged, machine. Recently we published an advertisement which stated "Supertigre is the competition". In this advertisement we acknowledged that there were some other good model airplane engines around and, as a case in point, we mentioned Johnny Brodbeck's K & B 40. We also stated in the ad that we were working on the Supertigre 40 and hoped to have some competition for Johnny. How is this for our report card? Around the 1st of June there was a large R/C pylon contest in Bakersfield, California. There were 60 to 70 entrants and among those there were four men running Supertigre 40s. Supertigre placed one, two, three with Terry Prather and his buddy placing first and second and Jack Hertenstein placing third. On the east coast, Pete Reed and Vern Smith have been taking their share of pylon race honors with Supertigre 40s and down in the Washington area at the DCRC contest, Mike Helsel running Supertigre 40s took first in both Formula I and II.

Now a little bit about the girl and the airplane in the ad. The airplane is my own design and I think I will call it "Long Moment". The girl is Jean McMahan who is in charge of electronic assembly work here at World Engines. Jean is just a little taller than the model.

This "Long Moment" was designed as an engine test bed. This is the reason that there is no cowling. Model ingredients include Bev Smith's Hobbypoxy glue and Big Frank's balsa wood.

WORLD ENGINES
INCORPORATED
8960 ROSSASH AVE. CINCINNATI, OHIO 45236

NEW
WORLD ENGINES
4 COLOR—64 PAGE
CATALOG
$1.00

BLUE RIBBON

(continued from page 52)

section is unchanged–the same input to the final of one watt is available.

The unique encoder utilizes a series of half shot multivibrators connected as a ring counter. The synchronization pause is achieved by setting the time base for one of these half shots to approximately six milliseconds versus a nominal 1.5 milliseconds for each half shot used for control. The encoder is designed for buddy box operation with any matching 5-RS transmitter with connection via the charging receptacle. The "enable" button for training is located at the top left of the transmitter where it is unlikely to be actuated inadvertently.

The familiar voltage-dropping resistor and diode rectifier is provided for series charging the transmitter and airborne pack. The transmitter utilizes a 9.6 volt nickel cadmium pack housed in the molded case (seen at the bottom of the transmitter). The airborne pack uses four 500 mah cylindrical nickel cadmium cells. Charging is indicated via the RF indication meter. The transmitter still retains the outstanding coaxial connector for antenna mounting.

The set tested had the sixth channel set up for toggle switch control of landing gear, i.e., a flip of the switch gives either extreme of control pulse width. This is offered as an option. The test airplane had a retract gear amplifier installed which operated the Kraft retract landing gear.

The only receiver design change is the injection of the local oscillator signal which is at the emitter of the mixer transistor instead of the base, to eliminate a problem in transistor selection occasionally encountered in older sets. The normal 455 kHz intermediate frequency strip is followed by a detector and the detected voltage is fed back to the first two IF stages for automatic gain control (AGC).

The decoder is a second-generation IC circuit incorporating low drain dual in-line IC's from National Semiconductor. A hex inverter (i.e., six separate transistors and their associated loading and bias resistors in a 14 pin dual in-line pack) is used to square and

ENGINEERED AND DEVELOPED UNDER THE PERSONAL DIRECTION OF DAVID D. GRAY, WELL-KNOWN U.S. RADIO CONTROLLED MODEL HELICOPTER BUILDER AND FLYER.

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No. 0191, Curtiss-Wright Jr. — Robert Hawkins transformed open-cockpit pusher of thirties for single channel. First step into RC scale. Span 44", Use .049. **$2.50**

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No. 0193, Cutie Coupe — Coupe d' Hiver F/F by Dave Linstrum. Quick to build with all-sheet surfaces. Your first rubber contest model. **$1.75**

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No. 0691, Jr. Sky Squire — R/C sport-trainer by Jess Krieser, .09 to .19. From Galloping Ghost to multi-digital proportional. Span 48" (416 sq. in.), 3 lbs. **$2.50**

No. 0692, ½A Sky Squire — Small version famous Sky Squire. 1 ch. rudder-only, or rudder, elevator and motor on Galloping Ghost. Only 22-28 oz. **$2**

No. 0693, Mustang — Rabe's great near-scale C/L stunt. Flies pattern with ease. ST 40. Over 57". **$2**

No. 0792, Rivets — Speedy, responsive R/C. Owen Kampen design for .020. Adams Baby Actuator, rudder-only. **$1.75**

No. 1183, Corrigan — James Wilson's unique ½A C/L stunt model. Flies tail first! Stable like big stunt ships. Easy to build, 23". **$1.75**

No. A693, Sweeper — Windy Urtnowsky's giant, C/L stunter, 78" span. .60 up front. Many trim adjustment features. **$2.75**

No. A695, Lady Maxley — Brian Donn's A/2 Nordic towline. Davis 3 foil. Ritz construction. **$1.50**

No. A697, Dwarf Dip III — Easy to fly, rubber Coupe de Hiver by Charles Sotich, a winner! For small fields. Warp-resistant. **$1.50**

No. A691, E A A Biplane — Nick Ziroli's scale R/C uses .40 engine, full house gear. 38" wings, semi-symmetrical foil, box-and-stringer fuselage. Two sheets. **$2.50**

No. A692, Miracle Worker — John Blum's C/L trainer. Combat, carrier, stunt. Easy-to-build profile. .35 engine. **$1.50**

No. 1291, Demon Delta — Fast, mild-stunting C/L for 35-45. Looks like modern fighter. Attract attention for demonstrations. By Jerry Farr. **$2.50**

No. 1292, Dolphin II — Czechoslovakian R/C for pusher, 09-15 mounted at rear under T-tail. Rudder/motor, good slope soarer. **$1.75**

No. 1293, A/Wonder — Simple all-balsa A-1 towliner by Bob Stalick. Ideal for beginners at towline events. **$1.50**

No. 0201, Cardboard Cutie — Inexpensive all cardboard C/L for Tenderfoot. 049. Two sheets. **$1.25**

No. 0202, Push-Air — For Brown's tiny CO2 engine. Simple F/F by Ehling, like Curtiss-Wright Jr. **$.75**

No. 0203, Ole Tiger — Bob Morse's swift Formula I R/C of Bob Downey's famous racer. K&B 40. **$3.50**

No. 0204, Classical Gas — Haught's C/L stunt for 35, for flyers graduating from profiles. **$2**

No. 0205, Kestrel — Dave Boddington's delightful R/C rudder-only soarer with 02. **$1.50**

No. 0302, Bearcat — Al Rabe's stunt C/L was talk of the 1966 Nats. Aldrich customized ST 46. **$2.00**

No. 0301, 1916 B&W — Biplane on floats was Boeing's first airplane. Beautiful R/C job by Francis Reynolds, uses a 60. Two sheets. **$4.50**

No. 0304, M. K. Sportster — Ho Fang-Chiun's cute cabin free-flight takes 049 power. **$1.25**

No. 0401, D-H 88 Comet — Scale twin by Skip Williams from Jan. '69 centerspread for .20's. Fast, stable, can fly pylon rules. **$3.75**

No. 0402, Lively Lady — World Championships winning Nordic by Elton Drew. Well detailed plan. All weather flyer. **$3.75**

No. 0404, Sweapea — C/L Goodyear by Williamson for club project also is tough trainer. For 35 engine. Balsa cutting guide incl. **$2.50**

No. 0502, Mod Pod — All-purpose model, F/F, R/C, or tether — glider or power. Fiberglass pod, arrow-shaft boom. **$1.75**

No. 0503, Royal Marine — By Yuji Oki of Japan, magnificent seaplane with 6' wing. Two 40's or one 60. Graceful lines, smooth flyer, handles easily on water. Two huge plan sheets, every part shown in detail. **$8.00**

No. 0601, Flower Power — Sport/stunt full-house RC with a 40 engine. All-balsa, simplified structure. Plugs generation gap. **$2.50**

No. 0602, Skyraider — Profile or built-up fuselage shape Navy Carrier job for 35-60 engine. A winner or a trainer all-in-one. **$2.00**

No. 0603, Waco — Delightful bi-plane, stick and tissue, rudder-only RC on 09 to 020 for FF. Very well detailed plan. **$2.50**

No. 0701, Suds — Nimble RC for sport or competition. One-piece construction, 40 to 60 engines. Build fast from standard balsa sizes. By Joe Dolan. **$4.25**

No. 0702, Contender — Military-like RC, also Sport/Stunt type for 35-60. Tri-gear, removable no-dihedral wing. Fast building. By Dave Platt. **$4.25**
Special Offer: Get both Suds and Contender plans for only $7.00

No. 0703, Ironsides — Record-holding CL jet speed model. Metal or wood model shown. Uses Dyna-Jet. By Jerry Thomas. Two plan sheets. **$1.25**

No. 0704, Cessna AW — Delightful stick and tissue FF of great private plane of years ago. Indoor or outdoor version possible. Peanut Scale too. **$1.50**

No. 0801, Winnie Mae — Spectacular RC Vega for strong 60 engine in 2"-1' scale, foam and balsa, lots of details. By Monty Groves. Two big sheets. **$4.50**
Also, special 1½"-1' version for FAI scale, 40 thru 60's. Two sheets. Order as No. 0802. **$4.25**

No. 0803, Thermal Dart — Enlarged and improved rubber-powered beginner's delight by Frank Ehling. **$1.00**

No. 0804, BV-141 B — Asymmetrical WW II fighter bomber in profile for 049 engine by Terry Aldrich. Easy to make, good flyer. **$2.00**

No. 0901, Sorcerer — Pee Wee 02-powered, free-flight flying saucer uses sheet wing, easy to make by Tenderfoot builder. **$1.00**

No. 0902, Cloud 9 — Intricate contest winning Wakefield by Roger Gregory. Plan shows streamlined prop/hub design. **$3.50**

No. 0904, Antoinette — Signorino/Zundel RC. 98" wing, nearly scale, flies well on .36, like powered glider. Plans 3 huge detailed sheets. **$9.00**

No. 0905, Mini Cat — Bud Atkinson scaled down the Cat series, for pulse or light digital and up to 19 engines. Easy to make RC sport flyer. **$2.75**

No. 1001, Phantom — Well-engineered RC Dyna-Jet-powered scale fighter by Ralph Saldivar is practical but noisy model. Highly detailed plane. Jet installation shown. **$4.00**

No. 1002, Hobbit — Simplified Nordic A1 by Bob Stalick is steady on tow, all-weather flyer. **$1.50**

No. 1003, Charger — ½A powered sweptwing stunter does full pattern on long lines safely. **$2.00**

No. 1101, Autogiro—Simple 049-powered model builds fast and gives unique performance. Pusher prop or motor. **$1.25**

No. 1102, Aerobile—Large scale CL or RC of a famous Waterman roadable plane. Uses 45-60 motor. Wing detachable, car drivable! Large single-sheet plans. **$4.00**

No. 1103, Akromaster—RC scale/stunt model or real aerobatic plane for 45-60 engine. Fast and responsive, easy to make, simple shapes. **$2.75**

No. 1104, Tardon—Formula II semi-scale pylon racer or stunt plane for 40 engines. Won event at 1969 NATS. Groovy flier. **$3.00**

No. 1201, Stiletto—Unique ½A proto model uses much-extended motor shaft for clean prop thrust and speed. **$1.00**

No. 1202, King Kong—Huge flat-land soarer for competition use has 12' wing of glass, foam, and balsa. By Sarpolus. **$3.25.**

No. 1203, 10-HI—Six-foot span, 049-powered flying wing is high-performance model with sporting flair. Huge plan. **$3.50.**

No. 0111, Dragonfli — Fast graceful competition stunter by Phil Kraft. Uses big 60's and retracts. **$4.00**

No. 0112, Toothpick — Long thin winged combat CL ship is both fast and quick turning. For hot 35's. **$2.25**

No. 0113, Luton Minor — Delightful 10-powered semi-scale RC for three light servos is high-winged parasol monoplane. **$2.25**

No. 0211, Cobra—Steve Wooley's great, smooth-flying CL stunt ship for 35's. Light model, ideal for both FAI and AMA patterns. **$3.50**

No. 0212, Voodoo—Converted Goldberg kit for streamer-towing RC combat, by Ed Sweeney. Two servos with 19 engine. For new event. **$2.75**

No. 0213, Guillotine—Modified from CL for RC combat. Maneuverable, fast, responsive, and fun. Glides well. For two servos and 19 engine. For new event. **$2.75.**

No. 0312, EKKO—A compact FAI pattern and sport model for 35 engines. All wood low-winger. **$3**

No. 0311, Skydancer — Two-channel-equipped RC boost glider using aileron and elevator control. Lofted by new, powerful rocket motor. **$2**

No. 0411, P-51 Mustang—Semi-scale 60-powered with ARF Lanier or Dee Bee wing on balsa fuselage. Realistic and quick construction. **$3.25**

No. 0412, Grouper—Unique in appearance, oval balsa fuselage hides a big 60 engine. Easy-to-make stunter for commercial ARF wings. **$3.25**

No. 0413, Dauntless—Low-wing scale profile FF model for sport flying on inexpensive 020 engine. **$1.50**

No. 0414, Nesmith Cougar—Accurate scale CL model of boxy homebuilt. Fine beginner's scale model using 19. A winner with detail. **$3.50**

No. 0511, Fire Wagon—Contest free flight model for ½A, by James Clem. Diagonal-ribbed wing resists warps. **$1.75**

No. 0512, Platypus—Unusual-looking RC aerobatic seaplane, made with balsa-covered foam blocks. Uses a 60. **$3.00**

No. 0513, Troop Glider and Tug—Two models, one a twin-engine, 19-powered C-46 Profile, the other a scale CG-15 troop-carrying WW II glider. Both on one large plan. **$2.75**

No. 0611, Phantom Stunter—Very realistic jet-like model of Blue Angels plane with typical stunt moments and airfoil. For 35-45 engines. **$2.75**

No. 0612, Crusader Stunter—Anhedral wing, ventral fins and full array of missiles and drop tanks. It is a unique but truly competitive flyer on a 35 or 40 engine. **$3.00**

No. 0613, Simple-Fly—Semi-symmetrical CG airfoil low-wing on box fuse. Performance for beginner on 29 or novice contest ship with a 50. **$2.50**

No. 0614, Sopwith Pup—Single or multi-channel, nearly-scale model for 10 to 19 power. Highly detailed plans. Stable flyer. **$3.50**

No. 0615, Santana—Jon Davis' contest-winning towliner A/1. Uses fiberglass boom, stiff warp-resistant wing. **$2.00**

No. 0711, Phoenix 5—Don Lowe's latest in a series of swept-wing competition stunters for 60 and retracts. **$3.00**

No. 0712, Bonanza/Debonair—Build either V-tail or conventional version of this popular fast light plane for full-

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Please send the following plans by First Class mail, at no extra charge. I enclose $_____ for payment.

Name _____

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PLAN NO.	COST
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# _____	$ _____
# _____	$ _____
# _____	$ _____
# _____	$ _____
# _____	$ _____

Total: $

house radio and a strong 60. Fine-flying ships, foam wing construction. $5.00

No. 0713, I.F.O.—Would you believe a FF 020-powered flying saucer which really flies? Built-up construction looks real. $1.00

No. 0714, Helldiver—Semi-scale CL model of WW II torpedo bomber builds fast and is rugged. $1.50

No. 0811, Douglas Mailplane—Large FF scale of Western Air Lines M-2 bipe. For 09 power. Could fly with light radio. $3.00

No. 0812, Hot Canary—Unique Formula II/FAI racing biplane by Bob Sigelkoff. Although unusual-looking, it is fast and quickly built. $3.25

No. 0813, Pogo Model of Owl Racer for Formula I features midwing, low stab, non-cheeked cowl. Very stable and plenty fast. By Bob Morse. $3.50.

No. 0814, Flying Fortress—Not a scale plane, but a novelty CL flying medieval castle for a 19. $2.75

No. 0911, Fletcher—McCullough's magnificent tri-geared, low-wing crop duster scale job for 60's. Generous area and moments. All balsa. Highly-detailed plans on 2 sheets. $7.50

No. 0912, Killer—Fast, responsive combat plane. All-balsa for 35's has many wins. $3.00

No. 0913, ACE High—Featherweight 049-powered RO glider uses a set of ACE R/C foam taper and constant chord wing sets. $2.25

No. 0914, Sakitumi—Highly-developed 40-gram Wakefield plane by Brian Donn features latest trends in gadgets and design. Well-detailed plan. $3.00

No. 1011, FAIMan—Competition FAI free flight job for screaming 15's. Simplified construction with warp-preventing wing. Build a winner. $2.75

No. 1012, Peregrine—All-out RC slope soaring racer for ailerons and elevator. V-tail, laminar wing; aerobatic, too. Balsa fuselage with foam wing. $3.50

No. 1013, Hi-Pro—Highly proficient slope/thermal soarer. Build several versions from these plans. Balsa wing and glass fuselage. $3.50

No. 1015, Marut—Named for the Wind Spirit. Designed for windy weather CL contests. Large-size jet appearance uses 45 engine. Two sheets. $4.50

No. 1111, Longster—Large-size free flight scale ship for 09 power, also ideal as small RC. Construction similar to real plane. $2.75

No. 1112, Buster—Built-up profile Goodyear racer well-streamlined and a winner. For hot 15's. $1.75

No. 1113, Bippi-Bipe—Delightful scale-like rudder-only or GG model for single channel and 09 engine. A fun plane. $2.75

No. 1211, Fireball—Jim Walker's great design presented as it was by Bruce Lund. For ignition 23's or smaller on glow. $2.00

No. 1212, Brooklyn Dodger—Sal Taibi's great old-timer FF job presented as it was by Bob Harrah. For ignition 23-35 or smaller glow engine. $1.75.

No. 1213, Canus—Sixty-powered and large-size FAI aerobatic RC plane. Very quick building. $4.00

THIS MONTH'S PLANS

No. 0125, Firecracker—FAI scale RC pylon racer with special fast airfoil and homemade retracts (in text), a winner by Bob Root. $3.50

No. 0121, Penguin—Unusual scale CL flying model of post-WWI pre-flight trainer. Simple and RC-able. Uses 19 to 35 engine. 3-views on plan. $2.50

No. 0122, Pay-Up—TeeDee 020-powered AMA Pay Load event winner also nice for sport FF. Simple and sturdy. $1.50

No. 0123, Nifty Novice—049 thru 15 power for monoplane or biplane Tenderfoot CL trainer. With power, bipe is stuntable. SPECIAL PRICE $1.00, decal included.

No. 0124, P-38—Semi-scale WWII fighter with single 049 flies rudder-only pulse RC with ACE mini-foam wings, others useable. $1.25

amplify the received pulses to form clock pulses; this uses two of the inverters. The remaining four inverters are used to integrate the received pulses and provide serial input and clear pulses.

The actual decoding function is performed by an eight bit serial-in, parallel-out shift register—the DM 8570. This arrangement can accept from one to eight channels without modification of the circuit. It is a Mil spec IC used, coincidentally, in a decoder by the writer a year or so ago. This arrangement, in block diagram fashion, is not significantly different than most decoders—it is simply a series of 8 J-K flip-flops contained in a single dual in-line, 14 pin IC. The reliability of this decoder, in which several modes of circuit control are available to the designer, should be outstanding.

The decoder board also serves as a wiring terminal board for the power and servo wiring—a departure from the older set which had a terminal board mounted to the back of the power switch. We had felt the latter to be an ideal arrangement and questioned Novak about the change. It was made because of high production costs for the previous arrangement and because of several complaints about that method. Gold-plated, four pin crimped connectors are used throughout. Charging, as usual, is via the switch harness.

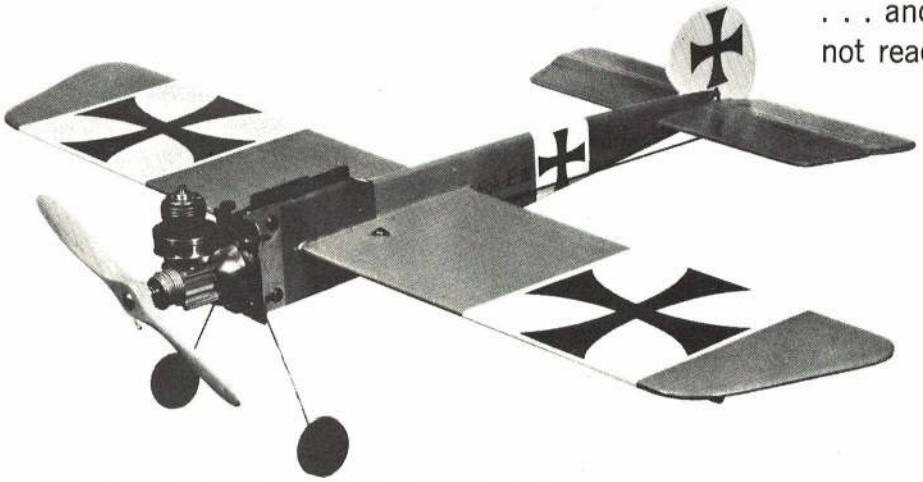
The servo design is completely new. The D-R servomechanism designed and produced by Dick Rehling, formerly of Orbit, is used. It features a rotary output and a split case which permits the entire "innards" of the servo including motor, gear train and supporting plates, and the amplifier to be removed from

if you want some fun

. . . then go out and get yourself one or more of these nifty little Control Line models. And are they simple! Kits contain from 6 to 9 die-cut Balsa parts as well as the metal engine mounts, complete Control System (less lines and handle), Landing Gear, Wheels, authentic Decals, etc., all ready to use, which makes assembly a cinch IN ONLY MINUTES!

KIT S-35 BEGINNERS THUNDERJET 2.95

Almost any .049 Engine can be used and the flight performance is just great. . . . and if you bash the ground "when you're not ready to land," they're so light and strong that they're practically damage-free. By the way, Engines from most ready-to-fly plastic models can be used, so if you have one, don't waste it. It might require a little modification to install, tho.

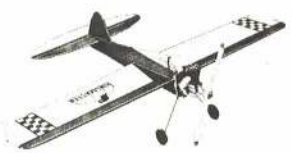


KIT S-37 BEGINNERS EINDECKER 2.95

Plans are easy to read and complete. They even have a run-down on beginners' first time flights. There are six models at $2.95 and one Bipe (double winger) at $3.50, all about 21" wing span; and all the tools you need are generally found around the house.

. . . so get over to your dealer's and take a look . . . at $2.95, you'll find they're the MOST . . . for your fun . . . for your money.

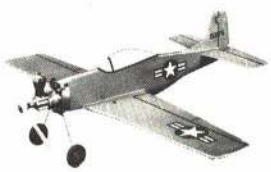
KIT S-36 BEGINNERS SUPER CUB 2.95



S-30 BEG. RINGMASTER 2.95

S-32 BEG. RING. BIPE. 3.50

S-34 BEG. SPITFIRE 2.95



S-31 BEG. MUSTANG 2.95

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PHILA., PA. 19144, USA

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If no dealer available, direct orders accepted—with 10% additional charge for handling and shipping. (60c minimum in U.S., $1.25 minimum outside U.S.)

- ☐ Catalog of entire line of airplane control line model kits, R/C scale and Trainer kits, boat model kits, accessories; etc. 25c enclosed.
- ☐ "Secrets of Model Airplane Building." Including design, construction, covering, finishing, flying, adjusting, control systems, etc. 25c enclosed.
- ☐ "Secrets of Control Line and Carrier Flying." Including preflight, soloing, stunting, Carrier rules and regulations, Carrier flying hints and control line installation instructions. 25c enclosed.

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ACE R/C INC.

HIGGINSVILLE, MO. 64037

GLIDER SUPER SKID

Make Your Glider Safer With A "Super Skid"

We've packaged up 4 ft. of 1/8 x 1/2 double sided vinyl tape (3M) and .020 x 1/2 polypropylene which when applied to the nose of your glider makes an attractive, quick, and indestructible skid that absorbs shock and protects the plane's belly from hard surfaces. There's enough for two or more gliders.

No. 25L14—Glider Super Skid $1.50

ONE INCH REINFORCING TAPE

The one-half inch brand of 3M Reinforcing Glass Tape is available at almost any corner drug store or hardware store. The one inch variety, which is finding increasing usage in strapping, dihedral bracing, and other applications in R/C, is virtually nonexistent on the consumer market.

Ace R/C is doing something about it, and has it available in 10 yd. rolls 1" wide.

This will allow you to buy only what you need instead of having to buy a case!

This is 3M Scotch brand Glass Reinforcing Tape--the highest quality available.

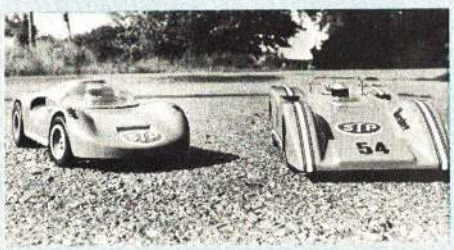
No. 35L10—1" Reinforcing Tape, 10 yds. $1.89

D & R BANTAM SERVO MECHANICS

Here is the DS3P Bantam Servo, which is the smallest commercially produced servo, and which allows conversion of your existing KPS12 or Orbit PS4 to this small configuration quite easily. See November 1971 R/C Modeler for details.

The mechanics come complete with all gears and hardware, but less motor and pot and wiper, so that it can be used for your conversion or your own servo design.

No. 14L30—D & R DS3P Servo Kit $5.99



JEROBEE CARS LESS RADIO

JEROBEE offers their famous chassis, with choice of either of two bodies, for the thrill of 1/12 scale racing. This scale does not require so much room; yet is large enough to allow you to use almost any two channel brick, or two servos of almost any digital system for control.

Don't let the low price fool you--this is quality all the way through: High-impact strength injection-molded frame...Independent front suspension...Ackerman steering...Heavy duty rear axle...Centrifugal clutch...Realistic MAG type wheels...Cycloac high-strength body.

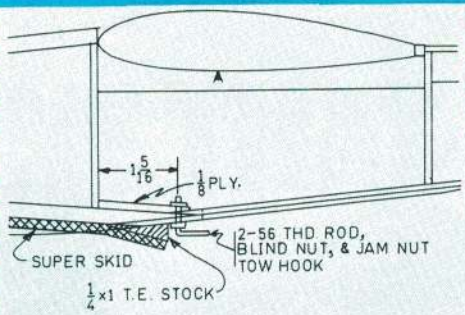
COMPLETE WITH COX .049 engine with recoil starter, installed and ready to run--except for radio and finish decals.

Two models--the Comando and Bandero. Completely assembled--these represent a real break through in scale autos.

No. 39L4—Jerobee Comando, less radio $34.95
No. 39L5—Jerobee Bandero, less radio $34.95

Canadian Commander Manufacturer

All Canadian customers for the Commander R/O Pak should contact H & W Enterprises at Box 972, Regina, Sask., Canada.



Dear Customer:

When a designer and a manufacturer sweat together on a project to come up with an acceptable model airplane kit, you can bet on one thing--they've made the design as near to being able to fly right out of the box as possible.

When instructions are followed, the builder is generally assured of success. At least this has been the case with kits Ace has marketed.

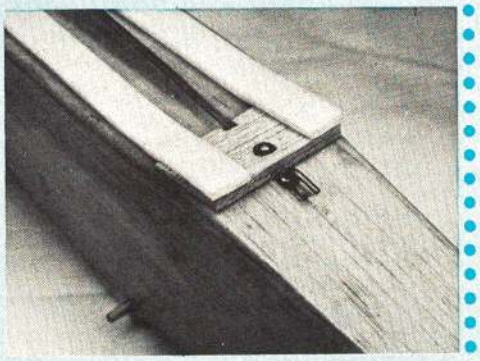
However, this doesn't mean the designer or the manufacturer want to discourage genuine true experimentation. However, this is the case only if the builder KNOWS what he is doing--and why!

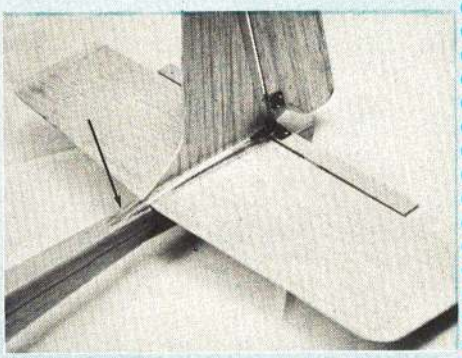
One such mod was worked out by Dick Jansson of Wellesley Hills, Massachusetts, 02181. The Ace High is not designed for powerful high start or winch launch, but Dick changed it.

Let's let Dick tell it: "I've gone big on soaring gliders WITHOUT POWER PODS. With this in mind, I made some modifications on the Ace High for use with my two channel digital--and it has performed exceptionally well.

"Four full span runs of one inch Scotch reinforcing glass tape were used on the bottom of the wing to help the stress situation.

"The hook is mounted 1 5/16" back of the leading edge of wing. CG should be at 2" or slightly back. I used the Glider Super Skid which is not only a great tow hook saver, but also helps take up other shocks of landing.





"The Nyrod exit use (arrow) is important, it does not weaken fuselage by open slots.

"Glider goes up like a shot on winch for excellent altitudes of 600 to 800 feet with a 300 meter line. Pilot has to be on the ball to correct any yaw, although it is not vicious.

"The Ace High is very docile and will do well on rudder only. (I plan to build my next one with a Commander R/O) With elevator shown, I hope to shoot for LSF level II landings."

A reprint of photos and complete writeup by Dick are yours by sending a large No. 10 envelope with 8 cent stamp. Ask for R/C Data Sheet on "Jansson Ace High" Mods.

Yours sincerely,
Paul F. Runge

ACE HIGH SAILPLANE KIT

Kampen Designed--
For Rudder Only Pulse

The Ace High kit features a matched set of foam wings. The constant chord section forms the center, and the taper section forms the outer panels for a graceful, easy to build, strong but flexible, high aspect ratio, wing. This method of construction overcomes the biggest single stumbling block for the beginner to the fine art of soaring. The polyhedral span is 70".

Fuselage and tail assembly is straight forward construction. Balsa and plywood is precision band sawed, and dimension sanded of the highest quality wood available.

Parts for power pod are included (Cox Babe Bee .049 recommended). Those living in the soaring areas of the country can leave off the power pod and locate hooks for high start or tow line launch.

The kit also contains step by step assembly details, matched foam wing sections, hinge material, torque rod and link parts, nylon tubing, and installation hardware for Rudder-Only Pulse Commander. (Standard Commander 10G16 recommended).

Extensively test flown for well over two years.

No. 13L104—Ace High Sailplane Kit $14.75

DICK'S DREAM PLANE KIT

For the Beginner or Expert!

(Designed especially for pulse)

This kit of the Dick's Dream, designed by Owen Kampen, has been extensively test flown in various parts of the country. It has several innovations which are for the small breed of airplane specifically, and with the foam wing the beginner is assured of overcoming a big drawback to success. Features crutch type fuselage construction to assure line-up and accuracy.

Full step by step instructions to assist in building this gem of a kit. AND ultra simple installation shown for the Commander R/O Baby or Baby Twin!

Span is 34" (cut from the Ace taper wing foam sections), 5½" chord, length is 25 inches. Weight with R/C gear is 12 to 14 ounces.

With a Pee Wee .020 and a Commander R/O Baby you have a docile performer and excellent trainer. If you want something hot, Tee Dee .020 with the Commander R/O Baby Twin will do the job--it'll do everything in the Rudder Only book!

No. 13L100—Dick's Dream Foam Wing Airplane Kit $5.95

ACE MINI FOAM WINGS

Ideal For New 1/2A Racers!

Special 17% semi-symmetrical airfoil expanded foam developed by Owen Kampen for the small planes.

The constant chord measures 35" span, width is 5½". Area is 192.5. Weight about 3 oz.

The taper section is 35" span, center is 5½" which tapers to 4". Area is 166.24. Weight is just over 2 oz. Come in two 17½" pieces which may be easily epoxied for desired dihedral.

No. 13L166—Ace Foam TAPER Wing $2.95
No. 13L192—Ace Foam CONSTANT Wing 2.95

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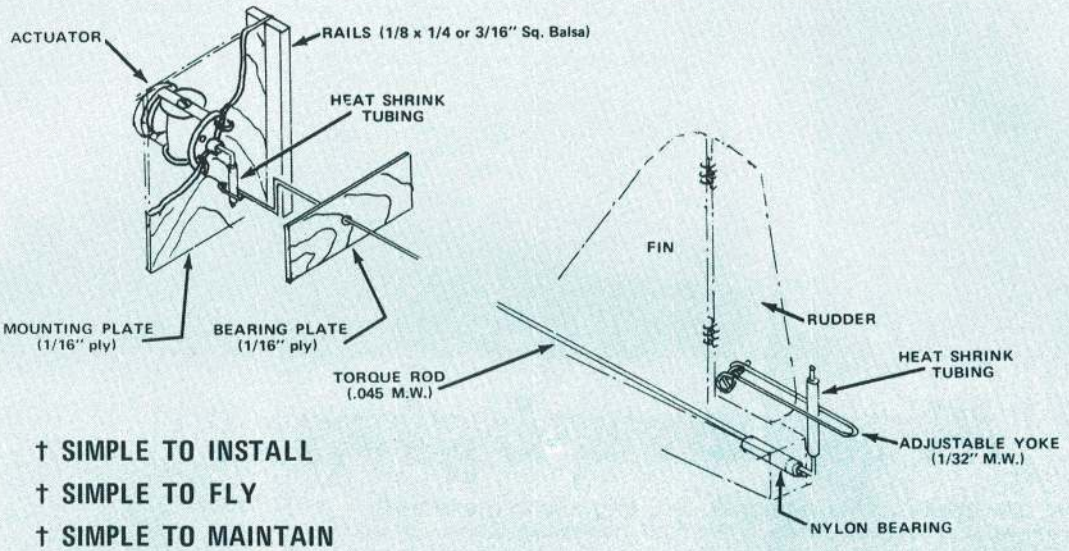

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the case halves and operated on the bench. It is compact—about equal in size to the Orbit PS-4, Kraft KPS-10 or EK MM-3 servo-mechanisms. The servo measures 1-5/8 in. high, including the rotary output, by 2-3/16 in. long, including mounting lugs, by 3/4 in. wide.

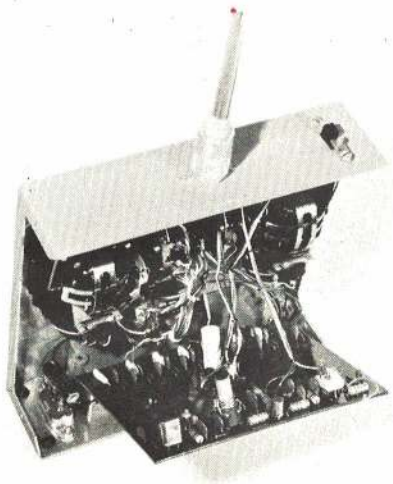
The amplifier is a discrete-component design using center-tapped battery power. Its primary feature is the use of a Schmitt trigger following error pulse integration. This requires two more transistors than for the normal design. However, it overcomes one problem facing every servo designer. Silicon transistors don't like to operate as desired below three volts, which means that they are used in a non-optimum fashion in the half of the servo amplifiers driven by 2.4 volts. This results in slight "stepping" of most servos in one direction when the stick is moved slowly and steadily, whereas operation is silky smooth the other way. Since the Schmitt trigger has high gain and can be set to trigger at nearly any desired level, operation of 5-RS servos is equally smooth and precise in either direction. The only equal to it is to use a bridge amplifier which always operates at 4.8 volts.

The system was cold-soaked for an extended period at 0 degrees F and was found to operate with no degradation. The test was repeated at 150 degrees F, with equally good results. The five test servos were checked for thrust in both directions and found to produce an average 2½ lb. at .38" radius for .85 in.-lb. torque. Servo damping is approximately 0.6 critical, i.e., there is one cycle of overshoot with absolutely no tendency to oscillate or jitter.

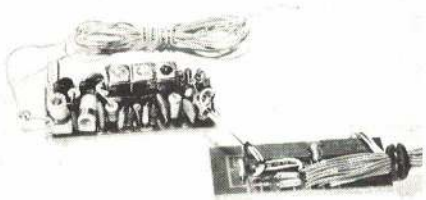
The test set operated quite satisfactorily throughout the test flights. Except for the use of a voltage dropping charger circuit, a criticism of all but a very few manufacturers, there seem to be no other criticisms of this system.

The Reddi-Flite Dragon-Fli was built from the kit with the addition of the Kraft retract landing gear system and the coupled flaps system. Because the final weight came up to over 10 lbs., the wing was reinforced and a potent Webra 61 engine used for power.

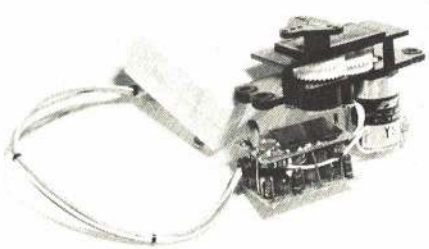
Construction of the kit, similar to most ARF kits, involves joining the wing and stab halves, doubling the center sections, installing wing mounting system, gluing in the stabilizer assembly, engine and landing gear, as well as control surface hinging and covering. The fuselage is probably the smoothest, most gracefully contoured fiberglass body available.



The popular Kraft-Hayes stick assemblies are used in the transmitter. Wiring is neat and short. RF meter also indicates charging operation.

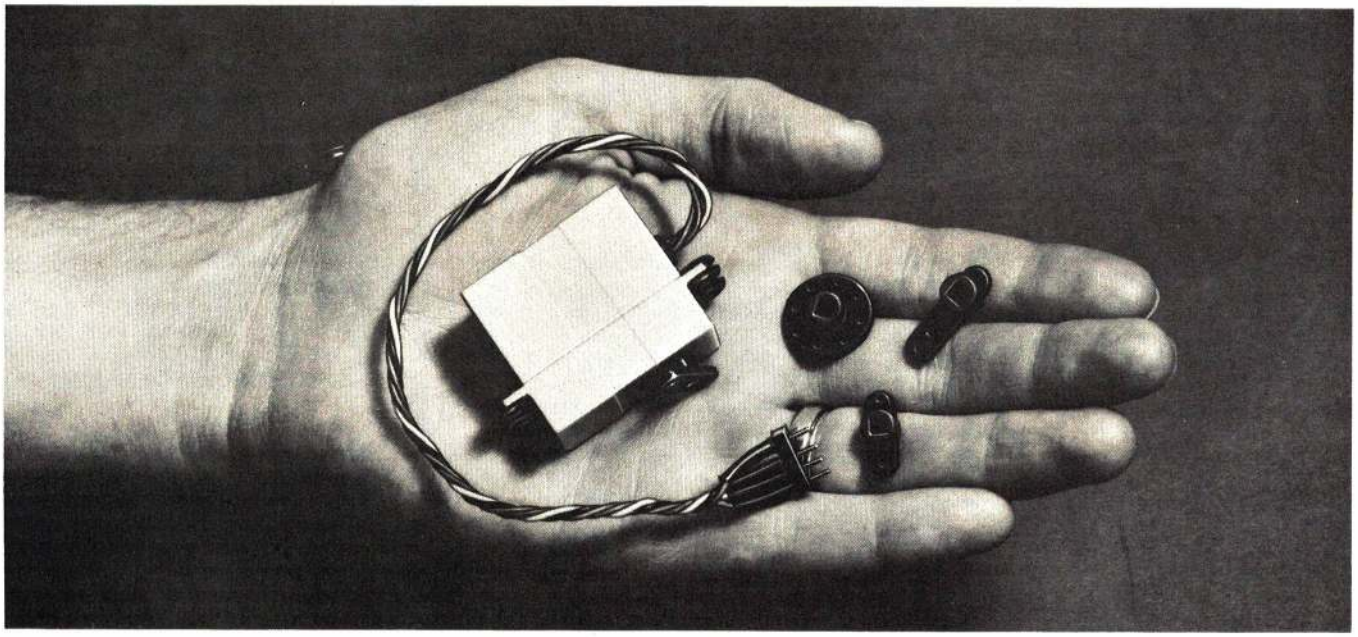


Very low receiver component parts count permit it to be so small. Note decoder IC bricks.



Accuracy of servo comes from excellent mechanics and discrete component Schmitt-triggered amplifier.

(Continued on page 78)



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New Heathkit Sub-Miniature Digital Proportional Servo utilizes an integrated circuit to trim off excess bulk. The Sub-Mini weighs-in at 1.25 oz., measures 1⅞" from mounting ear to mounting ear, yet provides the same 3-lb. thrust of much larger servos. Features include 90° rotation in 0.5 seconds; 1% position accuracy; ceramic variable control feedback element; nylon gears and molded nylon case. Just 18 components install quickly on printed circuit board. Includes 4 rotary outputs, is compatible with all Heath R/C Systems and most others. Measures 1 17/32" H x 23/32" W x 1⅞" L.
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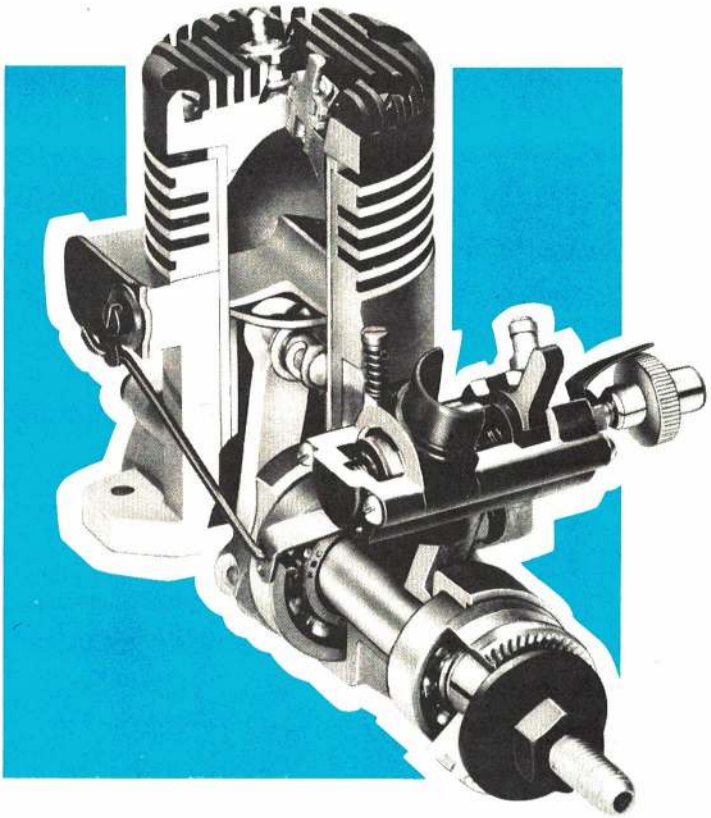
Nose gear installation was different than the recommended procedure in the instructions provided. (Incidentally, these instructions for the Kraft gear are thorough and well illustrated.) Four soft, large grommets were used to mount the gear to the back of the Dragon-Fli's firewall. The nose gear is slightly loose in the grommets to isolate the gear from the adjacent engine vibration. This looseness does not cause any steering or retracting problem. The nose gear must not be rigidly mounted or engine vibration will damage the electric motor in the gear.

A coupled flaps systems, preferred by Ed Sweeney, was also applied to the Dragon-Fli. Considering the final weight of this plane, it was a definite asset. The system also permitted having sharp flap deflection for landing, again a real asset because of weight. However, we have flown a lighter Reddi Flite Dragon-Fli without flaps and can report that they are not essential with a 7½ lb. model.

The extra tiny toggle switch on the Larson transmitter operates the coupling/uncoupling flap system which we added to this transmitter. It is not a Larson-supplied option. For information on a system for coupling elevator and flaps with a switch in the transmitter see August 1971 AAM. Above the neck strap mount on the transmitter, an excellent and logical location, is another tiny toggle switch. This is the Larson system's sixth channel for retract landing gear operation.

The distinctive and attractive Dragon-Fli is an excellent contest pattern plane, but different than most less-sophisticated designs. It takes some learning and trimming. It is big, fast, stable, smooth, and very precise and does not react suddenly. Landings without a flap

IT TAKES A LOT OF GUTS...



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Our model was an early kit and needed a 1/16" shim above the wing's trailing edge to give the plane zero wing/stab incidence.

One criticism of the wing's construction is that the landing gear mount is treated as a short rigid spar; when joining the wing halves, a dihedral brace is epoxied to the mount. This then becomes a rigid member in an otherwise flexible wing. Having a rigid centerpiece in a flexible wing causes a high-stress area just outboard of the gear mount. If the wing is fitted with retracts which would naturally weaken the wing somewhat, we wondered if the high-stress area might fail in a sudden flying maneuver. So, a doubler of vinyl plastic sheet was contact-cemented around the leading edge and extending aft 6" on the top and bottom. This additional material eliminated the danger of wing failure, but is not necessary with a fixed-gear plane.

The new Kraft retract landing gear system was fitted to the Dragon-Fli. The three gear units each contain an electric motor for operation. These Kraft units are tough, reliable, and easily mounted. Kraft also offers an amplifier to drive the gears from the regular on-board battery supply. The gears move slowly into position, but they are most positive in operation and in locking.

Main gears were mounted immediately ahead of the dihedral/fixed-gear mount so that the wheels retracted outward into the wing. The gear legs were bent aft to position the wheels behind the model's CG. Appropriate cutouts in the wing covering and foam core were made to accomodate the units and a plywood plate was fitted for attachment. The wells thus created were then coated with Hobbypoxy glue to seal the foam.

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system are rather fast. Shimming the wing to add incidence will considerably slow the landings and is recommended for Sunday stunt flyers or grass fields.

The Webra 61 certainly provided all the power necessary for pattern flying. It was also fitted with the new Northfield Precision muffler which draws the castor oil out of the exhaust gases to help keep the model clean. We can report that this works quite well. The Larson 5-RS, Dragon-Fli, Webra 61, Kraft gear system and Northfield Precision muffler were a well-tested and well-liked combination. All are excellent products. The Dragon Fli, originally a Reddi-Flite product, is now being manufactured by W. E. Tyson, 2068 Bunnell Rd., Warrington Industrial Park, Warrington, Pennsylvania 18976.

MAKE YOUR OWN RETRACTS

(continued from page 17)

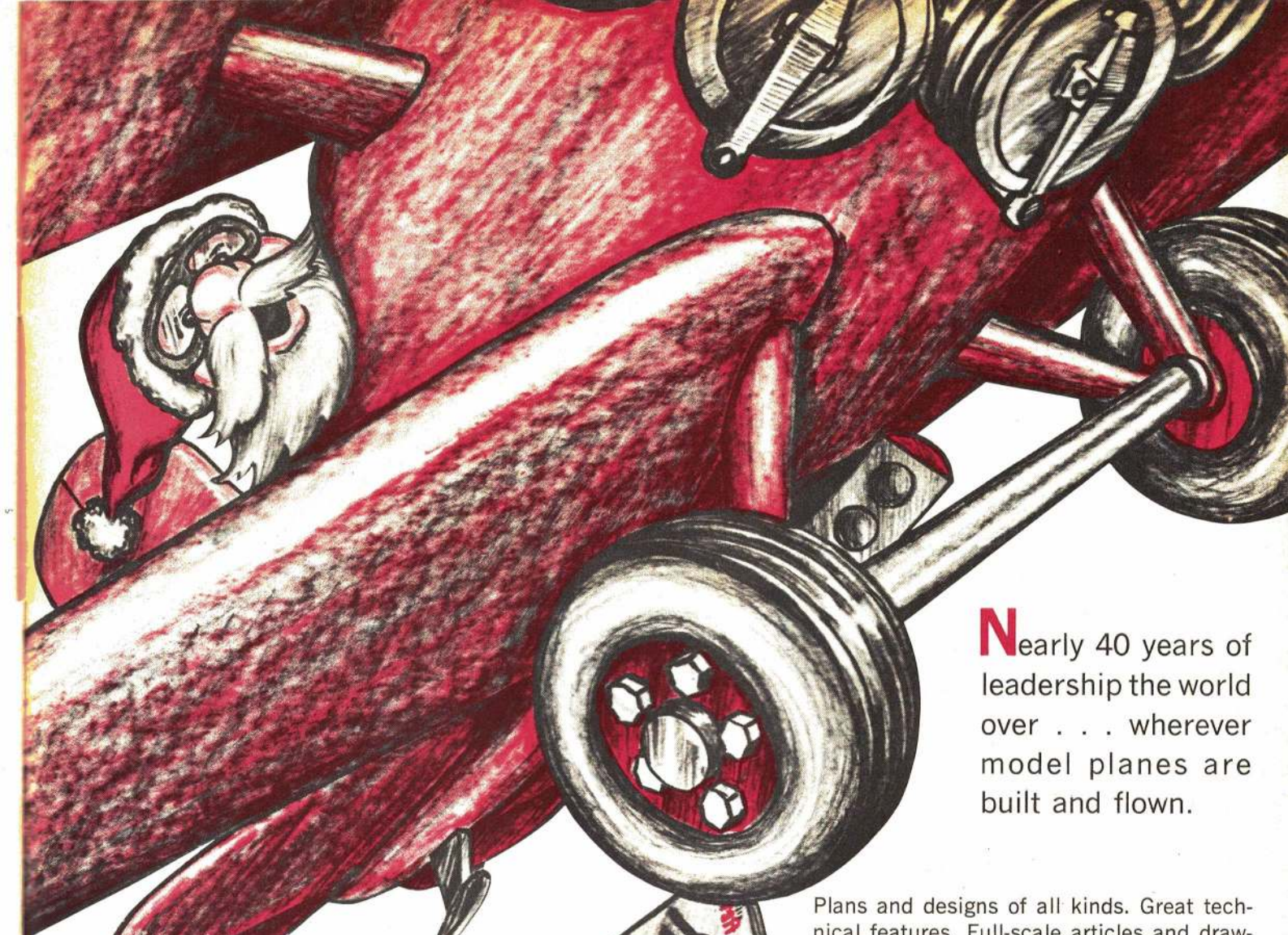
Firecracker RLG Installation

The following are the methods used by the author to fit a retractable landing gear system into the thin Firecracker wing. They are applicable to any retractable landing gear which will fit in a 3/4" thick wing at the landing gear strut.

When the basic foam cores are ready, the holes for the landing gear should be cut out. Their size and location depend on the type of gear used. (I used 2 3/4" diameter Williams Bros. smooth contour wheels.) There are two general LG types—one type has the mechanism behind the strut, and the other has the mechanism in line with the strut.

The landing gear pushrod and aileron pushrod holes should be cut out and the nylon tube added. The wing cutouts should then be lined with plywood; 1/32" ply around the wheel and 1/16" ply in the other areas. Plywood or hardwood LG mounting blocks should also be added as required. Remember blind mounting nuts if needed. The parts should be glued with white glue or epoxy and taped in place while drying. In designing the gear mount, it is important to realize that the foam is strong in shear but weak in compression. Be sure the mounts are solidly attached to full depth plywood shear plates.

Once the plywood glue joint is dry, an epoxolite fillet should be added around the plywood edges, top and bottom, as shown in



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the sketch. A small amount of foam must be removed for the epoxolite. The fillets result in a larger surface area for the wing skin to bond to.

The wing can now be sheeted with 1/16" balsa using contact cement. Epoxy should be used, however, in the area of the plywood and epoxolite to insure that the skin is well bonded to the plywood. It is important to get a good bond as the holes required for the landing gear greatly weaken the wing.

When dry, add the leading and trailing edges. The bottom sheeting can be cut away as required and the landing gear mounted to make sure everything fits and that the push-rods work. Sand the wing to shape and make a 1/8" plywood root rib as shown. Cut out the wing foam and rib as required for the aileron and landing gear servos.

The wing halves should be joined with the root rib between them and a 1/16" ply dihedral brace added for strength. When dry, use a saw to cut off part of the wing center leading edge as shown in the drawing. A spruce LE can then be glued on in this area.

After all has been sanded, the wing center section can be fiberglassed with one 8 oz. layer and a couple additional layers in the area of the cutouts and around the hold-down bolt holes. Use epoxy as described in the fuselage building instructions. Polyester will not harden over the epoxy that was used in assembling the wing. When this has cured, cut out the holes and mount the gear. The wing is now ready to finish.

After finishing, a rubber circle can be glued in the hole flush with the surface. One sixteenth inch "Rubatex," "Q-Seal," or "G-Pad" type material works well. A hole can

11

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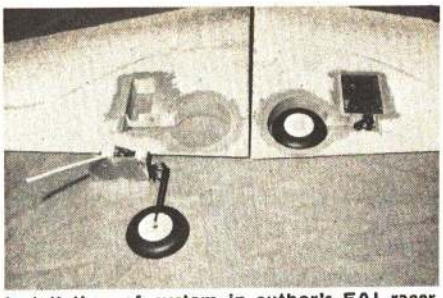


Installation of system in author's FAI racer shows liberal use of epoxy for strengthening foam wing core.

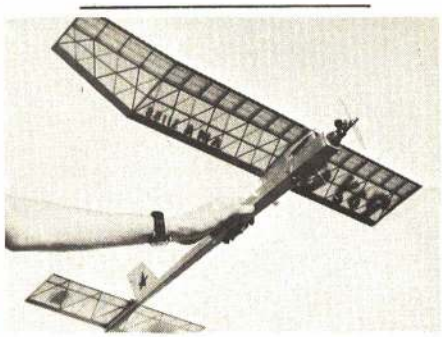
Make Your Own Retracts

(Continued from page 84)

then be cut out for the wheel. This produces a good seal with the wheel, but if the strut bends slightly, the gear can still retract without binding.

The doors can be made from 1/16" plywood and hinged with Super MonoKote. One eighth inch square spruce can be used for the doors to rest on when retracted as shown in the drawing.

The doors are actuated by a wire pushing on a ramp. A light rubber band is used to hold the door to the strut. This allows some wheel movement when retracted without the door moving. The door is not connected directly to the strut so it won't tend to cut the wing in a hard landing. In addition, the MonoKote hinge is easily replaced if broken. MonoKote can also be put over the complete LG installation to cover up all the bolts, gaps and holes.



Pay-Up

(Continued from page 33)

and then finished with one coat of Hobbypoxy.

One final note on the fuselage: be sure that your alignment is correct as to incidence and particularly be true when joining the rudder to the fuselage.

Carefully select the wood to be used in the wing and stab. It must be light yet strong. Particular attention should be paid to the leading and trailing edges. Make a template out of 1/16 plywood for both the stab cut ribs and the wing fore-ribs. Use the template—it's more accurate and quicker than any other way.

Build both wing tips first and let them dry at least overnight. Leave the turbulator spars out at this stage of construction. Build the center section while the tips are drying. When the tips are fully cured, join them to the center section. Now add the top turbulator spars to the tips and let everything dry for 24 hours. Finish by sanding in the leading edge airfoil section, etc.

The stab building procedure is almost self-explanatory. Be sure to use the template for

cutting the top split ribs. This type stab is strong, light, and warp-free. Cover stab and wing with lightweight Jap tissue. Water shrink and then put on about five coats of one-third strength clear dope. Finish is with one coat of Hobbypoxy.

Flying

Balance as shown. Take the warps out of any twisted surfaces. The model should climb to the right in a fast wide circle. Use the aluminum trim tab on the rudder to produce a fast shallow climb. The glide should also be to the right. Do not let the model stall. Use stab tilt to regulate the glide circle.

No model is finished until it has your name, address, and phone number on it, so don't forget them. And be sure to use the dethermalizer—it is a shame to lose the model after all your work.

Firecracker

(Continued from page 14)

cutting the dihedral angle carefully on a power saw and gluing the two halves together with Titebond or white glue. Remember to pre-glue the balsa edges. Masking tape stretched under tension can be used to hold the halves together until dry.

Before covering the center section with fiberglass, plywood plates should be countersunk in the area where the hold-down bolts will be located. Don't drill these holes until the fuselage is finished. One layer of 8 oz. fiberglass cloth in the center section and a second layer in the area of the bolt holes is sufficient.

The tail surfaces can be built up as shown or shaped from light 1/4" sheet balsa. It is important to keep them light. The stabilizer and elevator should be finished, except for the color, and hinged together before the fuselage is started. I have had good luck with the nylon hinges which use wire pins. A strong connection is attained by drilling holes in the hinges and gluing with epoxy. The wire areas of the hinges should be liberally coated with petroleum jelly before gluing to insure their being free when finished.

After cutting out and assembling the required parts of the fuselage, mark the locations of the formers on crutch F12 (3 parts). Check carefully that the crutch and former widths match correctly, sanding to size where necessary. The crutch is 1/16" wider than formers F1 through F7 because of the 1/32" plywood doublers. Formers F8 and F9 should be the same width as the crutch. Former F11 should be cut out to accept the fuel tank to be used.

The fuselage is started by pinning the completed horizontal tail and the 1/16" fuselage crutch parts to a flat surface. The elevator pushrod should now be connected. The wing hold-down blocks should be glued and fastened to their respective formers with wood screws for added strength. All of the flat-topped formers can then be glued to the crutch, and the fuselage sides (with doublers) and bottom pieces added, as shown in the exploded view on the plans.

When dry, the fuselage can be lifted from the work bench and the remaining parts added, including the vertical tail. Make sure the tail surfaces are at right angles to each other. Formers F1 and F4 and the engine mount doublers F13 should be adjusted to fit the engine used before mounting in the fuselage. The foam fuselage top blocks should be formed and sheeted before being contact-cemented to the main fuselage. Former F2 and the foam block shouldn't be cut out for the motor mounts until after the foam is sheeted.

The next step is to glue enough foam blocks to the front end to finish filling it out. Mark the location of the spinner using the engine mounts as a reference, and you are ready for the fun part. Get some No. 60 grit sandpaper and rough shape the entire airplane, being careful not to overdo the foam front end. When you are satisfied with the shape, sand the wood portions with finer sandpaper (about 180). The foam shouldn't need much additional fine sanding. If you get a dent or hole in the foam, just glue in a foam patch and resand. Low spots in the foam can be filled with vinyl spackling compound since it sands easily.

When you are satisfied with the shape, mix up some Hobbypoxy or Sig Epoxy and cover the front end with fiberglass over the wood, foam, etc. The best method is to spread on a thin coat of glue, lay on the cloth, and then rub down to force the glue into the weave. Fingers can be cleaned with acetone to keep them from sticking to the cloth. Try not to add too much additional glue on top of the cloth as it will make the cloth float and fill up unevenly.

Try to achieve a cloth texture all over and avoid shiny areas, since these are hard to sand and unnecessarily heavy. Work a small area at a time until you get a feel for the working time of the epoxy. Let the first layer set a little, and then add additional layers over the foam parts, overlapping the balsa slightly. One layer of 8 oz. cloth on the balsa and three layers on the foam should be sufficient. When hard, the cowl can be cut out and the foam removed. The foam is easily melted out using lacquer thinner or acetone. The fiberglass

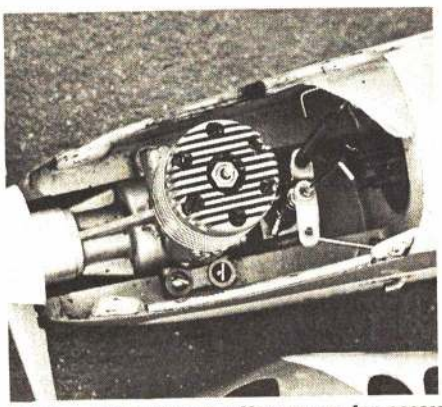
A carefully bored-out and polished Tatone Peace Pipe is an effective, non-restrictive muffler.

cloth edges can be faired to the fuselage using Epoxolite.

The wing should be carefully positioned on the fuselage with holes drilled through the wing and hold-down blocks. The blocks can then be tapped for the hold-down bolts. Having completed this, the 1/32" plywood wing fillets can be glued, bolting the wing in place to hold them. A 1/32" balsa spacer should be used between the wing and the plywood fillet on the inside, and the plywood taped to the wing on the outside. This will leave space for a wing seal inside the fuselage, while still achieving a thin fillet at the wing surface. Before dry, make sure the wing is parallel to the tail.

Epoxolite can be added to finish the fillets when dry. An Epoxolite fillet should also be added around the tail surfaces. If care is used when forming the Epoxolite with a wet finger, little sanding will be required.

MonoKote is by far the easiest method of finishing, but I prefer a paint finish on racers because of the durability and beauty.



Engine compartment offers room for access and cooling. Note use of adjustable needle valve in addition to throttle/cut-off.

Flying

Mount the RC gear where required to balance within the range shown on the plans (tank empty). It is important to use long control arms on the aileron-at least one in.

When everything is working properly, go fly it. Just hold lots of right rudder and up elevator and it should take off with no sweat. With the short landing gear it won't lift off until it's ready. Oh yes, get off the elevator when it gets in the air.

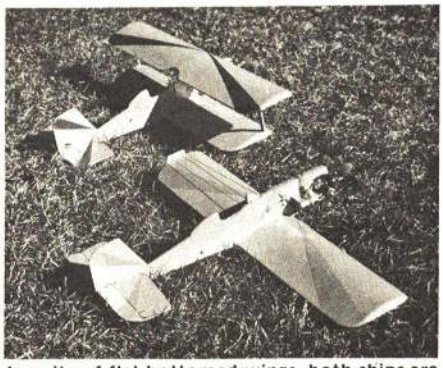
NOTE: For those who are interested in high quality three views of this racer and many others, contact R.S. Hirsch at 8439 Dale St., Buena Park, Calif. 90620. Also, if you can't find anyone in your area to cut the wing cores, the author will supply a set for $15. Write Bob Root, 1318 144th S.E., Bellevue, Washington 98007.

Nifty Novice

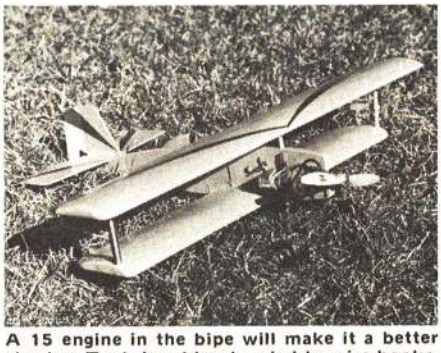
(Continued from page 42)

the fuselage-wing joint well-saturated with epoxy for strength. Use epoxy in the motor mount area and glue the tail surfaces to the fuselage.

The landing gear is bent from 3/32" wire to the pattern on the plans and held in place with small nylon brackets or metal straps. Bolt on the bellcrank, make up leadouts as shown, bolt a control horn to the elevator and bend the pushrod to shape. The gas tank is held in place with rubber bands attached to two hooks made from light wire, as shown on the plans. Mount the engine with one washer under the front mounting lug hole for the necessary offset. Add weight to the outboard wing tip.



In spite of flat-bottomed wings, both ships are capable of figure eights and inverted flight.



A 15 engine in the bipe will make it a better stunter. Tank is rubber-banded to wire hooks.

If you are building the biplane, you have put the short wing on the fuselage. If you are converting the monoplane to the bipe, cut down the wing and round off the tip. Drill a hole in each wing tip and two in the fuselage top for 1/4" dowels; drill holes in the top wing to match, and epoxy the top wing on with the dowels. Be sure to keep the top wing level–parallel to the bottom wing. A new leadout guide must be made and the bellcrank is put on the top of its support for the biplane version.

To finish the model, final sand it and put on several coats of clear dope or balsa filler-

coat, sanding between each coat. Then use several coats of color dope and finish off with a coat of clear dope. The more time you spend here, the better-looking your model will be.

Flying

Pick a calm day for the first flights and, if possible, have an experienced flier along as an instructor. We used 35-ft. .010 stranded lines. Start off with the pushrod in the outer hole of the control horn to reduce the available movement. For more stunting performance you can move the pushrod to the inner holes. Both models are capable of inside loops, wing-overs, etc.—that is, when the flier is ready to try them. In spite of the flat bottom wing, we have found that these models will even do figure eights and fly inverted. The biplane could use a 15 for better stunting performance.

Good luck and enjoy yourself flying!

Jaguar

(Continued from page 21)

was followed early in 1969 by a similar trainer and the first tactical strike fighter. The first British-assembled airplane, with many items of equipment especially for the RAF, was a strike version; it did not fly until late 1969, when four French prototypes were already in the air.

The public got its first look at this rare example of international cooperation during the 1967 Paris Air Show where a mock-up was displayed. The first showing of a real, live Jaguar came at the 1969 Paris Air Show, with the ground and flying displays of the first four test models.

Of the first eight airplanes built (the No. 1 prototype crashed in 1970), two are two-seat trainers, two are French-equipped single-seat strike fighters, one is a single-seat French naval strike fighter, two are single-seat British strike fighters, and one is a two-seat British strike-trainer. Clearly, the Jaguar is intended to perform a wide variety of roles. Unlike such versatile craft as the F-111, however, there will be many different Jaguars, in hopes that it will not experience the frightful problems which come with airplanes that try to do everything.

The needs of the two air forces are quite different—the RAF wanted a high-altitude supersonic trainer with performance like the French strike fighter; the French, in turn, wanted a low-altitude ground-support trainer, much like the RAF idea of its combat version. In addition, however, the RAF needed an air-

Statement Required by the Act of October 23, 1962; Section 4369, Title 39, United States Code showing the Ownership, Management and Circulation.

1. Date of Filing: September 30, 1971.
2. Title of Publication: American Aircraft Modeler
3. Frequency of Issue: Monthly
4. Location of Known Office of Publication: 733 Fifteenth Street, N. W., Washington, D. C. 20005.
5. Location of the Headquarters or General Business Offices of the Publishers: 733 Fifteenth Street, N. W., Washington, D. C. 20005.
6. Names and Addresses of the Publisher, Editor and Managing Editor: Publisher, William J. Winter, 733 Fifteenth Street, N. W., Washington, D. C. 2000; Editor, Edward C. Sweeney, Jr., 733 Fifteenth Street, N. W., Washington, D. C. 20005.
7. Owner: Potomac Aviation Publications, Inc., 733 Fifteenth Street, N. W., Washington, D. C. 20005. Stockholders: Catherine Hauberg Sweeney, 4013 Douglas Road, Coconut Grove, Miami, Florida; Edward C. Sweeney, 5026 Eskridge Terrace Washington, D.C. 20016
8. Known Bondholders, Mortgagees, and other Security Holders, Owning or Holding 1 Percent or more of Total Amount of Bonds, Mortgages, and Other Securities: None.
10. Extent and Nature of Circulation:

	Average No. copies each issue during preceding 12 months	Actual number of copies of single issue published nearest to filing date
A. Total No. Copies printed	118,803	121,671
B. Paid Circulation		
1. Sales through dealers and carriers, street vendors and counter	33,288	32,000
2. Mail subscriptions	39,992	45,834
C. Total paid Circulation	73,280	77,834
D. Free Distribution By Mail, Carrier or Other Means		
1. Samples, Complimentary, and Other Free Copies	350	350
2. Copies Distributed to News Agents, But Not Sold	41,673	39,987
E. Total Distribution	115,303	118,171
F. Office Use, Left-Over, Unaccounted, Spoiled After Printing	3,500	3,500
G. Total	118,803	121,671

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

(Signed) Harvey E. Cantrell, Business Manager

The two-place trainer. By building different versions the problems and high costs of more complex multi-mission craft were reduced.

plane which could be ferried long distances, as it plans to use the Jaguar in the Far East. With a gross weight only half that of the F-111 and three-quarters that of the Phantom II, the Jaguar has to rely on efficient engines to get its range, and the two Rolls-Turbomeca Adour engines put a total of almost 14,000 lbs. of thrust for a weight of just over 2600 lbs. With large external fuel tanks, the Jaguar's range can be stretched to 2400 mi.

Standard armament in the single-seater is a pair of 30 mm. cannons, while the right-hand gun of the pair is left out of the two-seater due to lack of space. Up to 10,000 lbs. of bombs and rockets can be carried on two weapons stations under either wing and one under the fuselage.

Unusual design features include different landing gears for the land-based Jaguar (dual main wheels and single nose wheel) and the shipboard version (single main wheels and dual nose wheel). Since flaps take up the full wing span, there is no room for ailerons; rolling is done with spoilers on the top of the wings and differential movement of the horizontal tail, like the elevons of a tail-less airplane.

With the Jaguar about to go into production, it obviously has no record of performance. Perhaps it will just be an ordinary airplane, perhaps a very good one, or even an historic one—all this remains to be seen. What is already clear is that the Jaguar marks a milestone in the story of international cooperation, and that alone may be enough to rate it a spot in the history books.

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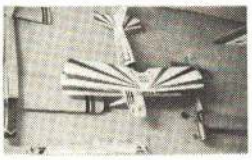

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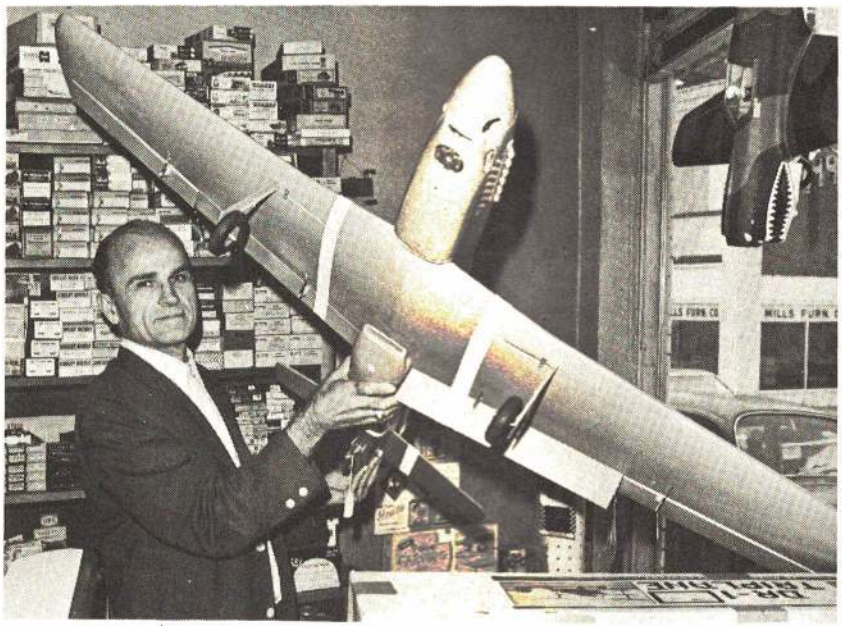

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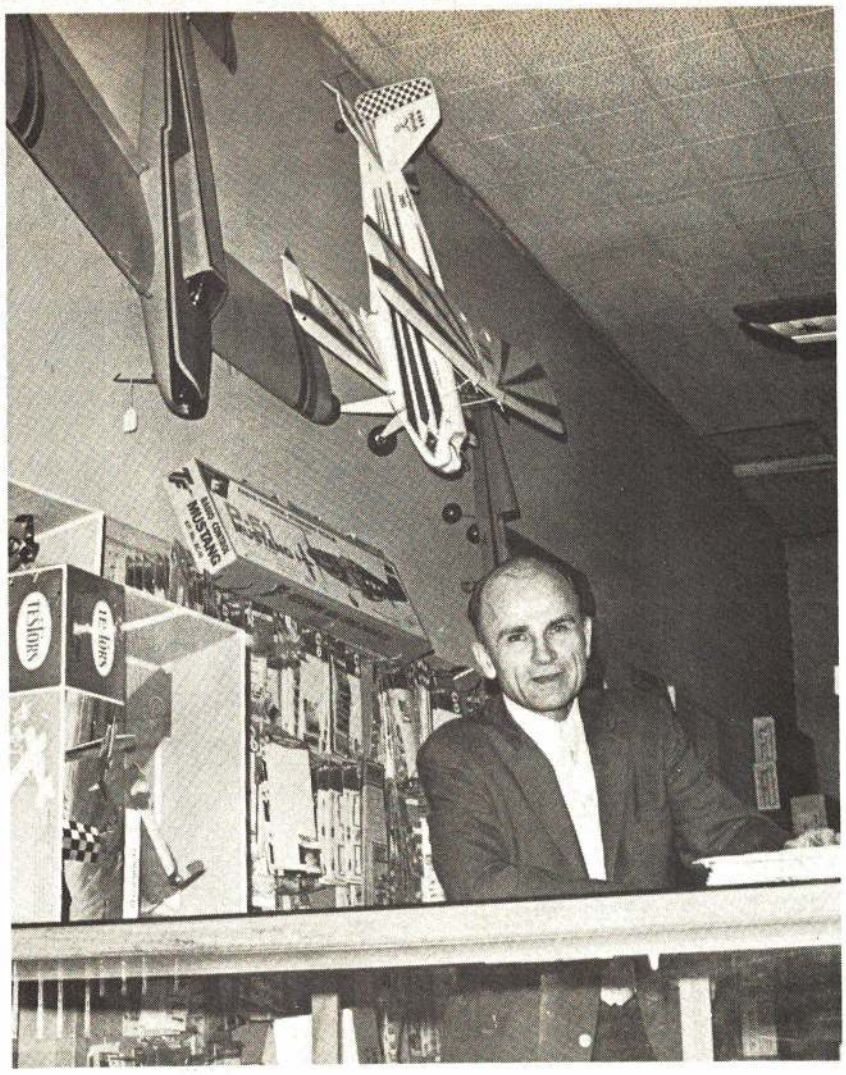
206—Ace Dual Charger. Sale. $7.00



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226—Midwest Super Snifer FF, $8.95 kit. Sale. $6.50
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EST. 1951

Straight and Level

(Continued from page 8)

little balsa things and plastics (and they too are essential) in tens of thousands of retail outlets. What indoctrination can go with kits which would give the purchaser a birdseye view of the model airplane activity? Does industry provide a brochure which would be a total picture briefing. Or pool effort for big-time institutional promotion? Don't think that magazines alone can do it. They are too specialized, largely for the older more advanced modeler. One stick-and-paper manufacturer of intermediate and advanced kits produces 350,000 yearly, or 1500 a working day. That alone is more than the combined circulations of all the model plane magazines.

Designs, and kits, must be integrated with conditions that maximize success and enjoyment for the individual, and with a minimum, if any, of outside help. Every design, every kit, is a public-relations representative for us all, and should be given a "voice." It must favorably influence, and be a connecting link to other things which make the lasting hobbyist. Chancy crashes and lost models, or models with no place to be flown, need not be a way of life. We carelessly consider plastics as toys. For many kids they may be a novelty, but sir, is there really a difference in that relationship compared to the one between you and your model? In between the five-hundred dollar model which requires a weekend trek to a distant field, and the plastic *scale* model which requires only a trip to the work bench, there surely must be many variations of types and designs which could be tailored to any environment and interest. Nothing could be perfect. Many things can be a heck of a lot better.

Bill Winter

Modeler Mail

(continued from page 11)

In September my friend Dennie Greenwell flew his 049-powered Lil Satin, and I was in the center circle with him. That bird sure has a mind of its own! It flew two rounds with the pilot having no control at all. it then spiraled to the ground, breaking the booms.

An hour later it was ready to fly again and so we did. It flew around with slack lines and then dived right at us. We never figured out exactly what happened, but we have this theory. A week before, while it was flying, the prop came off and the engine was still running. That engine sounded just like it was crying. When it crashed, it was still running!

I think your magazine is great except that it concentrates too much on FF and RC.

Jim Brooks, Bardstown, Ky.

For other young fliers with similar problems, the name of the game is to keep the lines taut. If they go slack step back—you may have to scamper! Keep the model low on the upwind side of the circle, and let it climb, as for loops on the downwind side, where the force of the wind helps keep the lines tight. Offset the engine to pull toward the outside of the circle, and bend the rudder in the same direction. Put a weight on the wing tip which travels the outside of the circle; on a small plane, as with an 049 engine, use a fairly heavy washer, well attached to prevent loss.

—Publisher.

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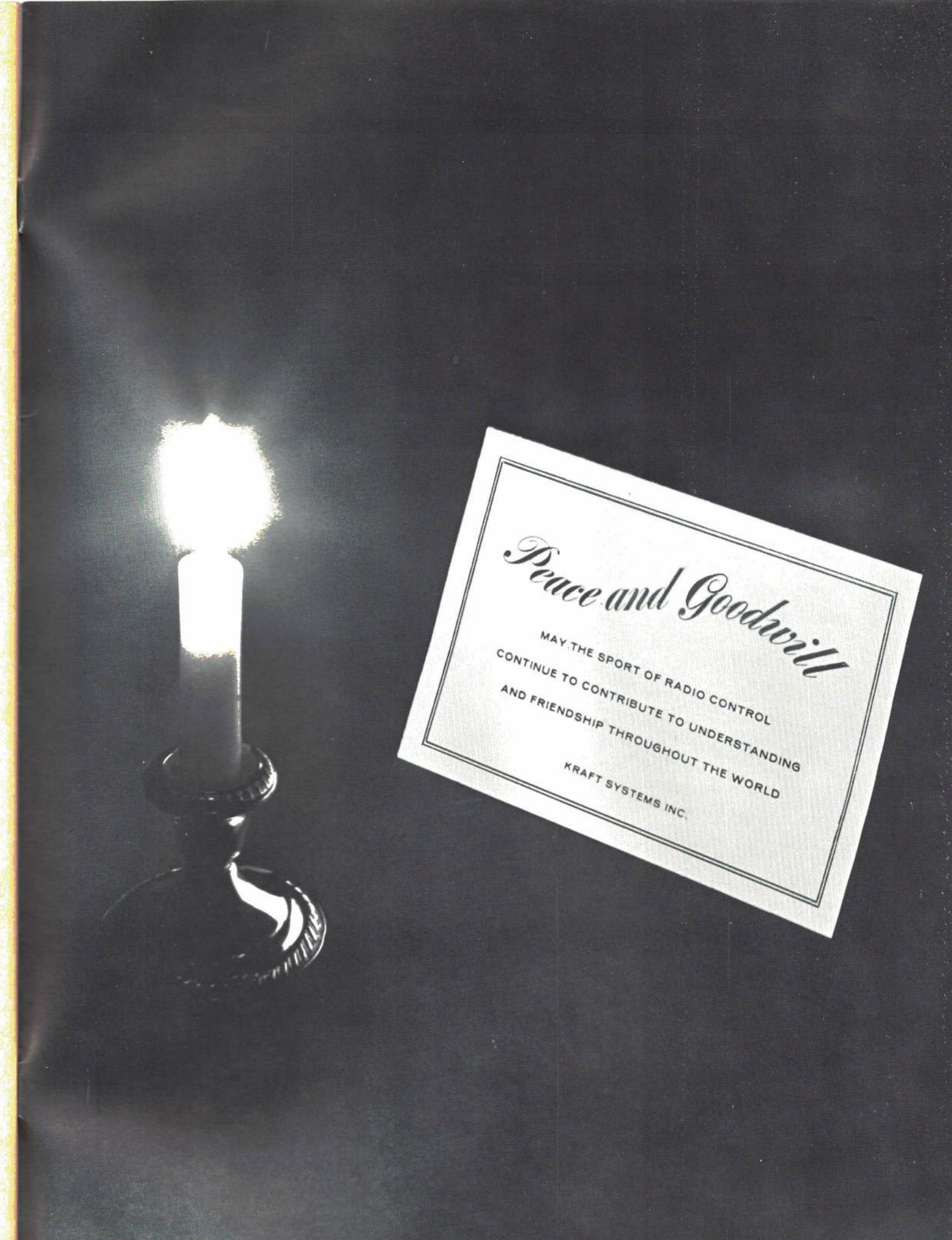
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