RADIO CONTROL AIRCRAFT

GAS-TO-ELECTRIC CONVERSION, PART 2

JUNE 1993
DISPLAY UNTIL JUNE 1

MODEL BUILDER

WORLD'S MOST COMPLETE MODEL AIRCRAFT PUBLICATION

REVIEWS:

DESAFIO II FROM R/C CITY

DIETRICH CONVERTABLE FROM PECK-POLYMERS

MICROPEAKER FROM B.E.P.

RIDGEHAWK SLOPE GLIDER FROM COX

CONSTRUCTION PLANS:

PEANUT SCALE SE5 BIPLANE

PUSHCART 1/2A SPORT RC

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ALL SYSTEMS GO!

If you're looking for the hottest performing aircraft accessories around, Airtronics has you covered. With superior electronics and advanced design features, our full line of servos, receivers, gyro systems and speed controllers provide peak flight performance time and time again.

But performance isn't the whole story. Airtronics is committed to respond to your feedback, which has not only helped us design the finest aircraft accessories available — it's also allowed us to offer the best customer service in the industry today.

PRECISION SERVOS!

Talk about leading-edge technology!

Airtronics servos feature splined output shafts for easy-to-control surface adjustments. The injection-molded servo cases and molded vibration isolators provide the superior strength necessary to withstand the knocks endured during the most demanding flight. We build every one of our servos with rugged, heavy-duty gear trains and all are fully compatible with all Airtronics AM, FM and PCM R/C systems.

94581 Microlite Servo.
Weight: 0.57 oz. • Torque: 29 oz./in. Speed: 0.23 Seconds for 60° Rotation Dimensions: L: 1.07" x W: 0.50" x H: 1.07"

SUPER LIGHTWEIGHT!

Here's proof that good things come in small packages! The Microlite's outstanding performance belies its small size and super light weight. Its gutsy torque makes it ideal for a range of small aircraft applications, while its rugged coreless motor is fast and reliable. And twin mounting holes on an injected molded case give you terrific flexibility of installation.

Compare its performance and superior strength to servos weighing twice as much!

RUGGED AND COMPACT!

94407 Micro Ball Bearing Servo.
Weight: 0.96 oz. • Torque: 29 oz./in. • Speed: 0.25 Seconds for 60° Rotation • Dimensions: L: 1.23" x W: 0.60" x H: 1.23"

What do you get when you combine a lightweight and compact design with loads of punch? The ultimate in high-performance versatility! With small powered aircraft you can use the 94407 as an aileron servo, and with its small size and weight you can easily mount it inside the wing. It has terrific torque for a variety of applications, and its ball bearing shaft makes it incredibly durable. Ideal for electric helicopters!

94161 Pro Series Large Scale Ball Bearing Servo. *Weight: 2.5 oz. Torque: 135 oz./in. • Speed: 0.25 Seconds for 60° Rotation • Dimensions: L: 1.54" x W: 0.79" x H: 1.65"*

Got a giant scale aircraft? Here's the servo that's perfect for you. This Pro Series unit has a tough, metal gear train and metal output gear coupled with a double ball bearing output shaft. That combination helps it withstand heavy-duty use during competition and ensures longer life. Its hefty 135 oz./in. torque makes it more powerful than servos twice its size, yet its compact size lets you mount it in the same places as a standard size servo.

BUILT FOR GIANT SCALE!

92745 Micro Receiver, 72 MHz FM.
Weight: 1 oz. • Dimensions: L: 2.25" x W: 0.96" x H: 0.82"

SPACE SAVER!

If you want to get the best out of your small aircraft, electrics and gliders, you have to check out this micro receiver!

The new 4-channel Micro FM Dual Conversion Receiver has all the high-performance, super narrow-band features of its 8 channel big brother, the gold label 92785, but in a smaller, more compact package which still meets all AMA guidelines. What's more, its compact design features state of the art surface mounted electronics, thanks to the ingenuity of Airtronics' advanced engineering.

96332 MA-6 Speed Controller for Electric Aircraft.
Power Supply: 7.2 to 12 Volt NiCd Pack • Weight: 1.7 oz. Dimensions: L: 1.52" x W: 1.3" x H: 0.69"

ATTENTION ALL ELECTRIC AIRCRAFT FLYERS!

Electric aircraft flyers love the MA-6 speed controller. And for good reason. Just check out its range of high-performance features!

Its proportional throttle control lets you take smooth and efficient command of your aircraft. It uses the latest MOS-FET technology, with a high-performance regulator for longer run time. It has B.E.C., which uses voltage with maximum efficiency by allowing the receiver to run off the motor battery and consequently eliminating the need for a separate receiver battery. And it cancels the need for an additional servo, which saves weight and space. But that's not all! An automatic Temperature Cutoff switch prevents overheating, an Arming switch guards against accidental startups and a special Brake Circuit keeps folding propellers from freewheeling, allowing them to fold back in place properly.

The MA-6 handles up to 10 cells or 12 volts input. Get an MA-6 and you'll fly high and fly fast!

Model built by Colonel Robert Thacker

FREE CATALOG!

For more information about our quality line of R/C systems and accessories, contact your local hobby dealer or Airtronics for our free 1992 catalog.

AIRTRONICS INC

11 Autry, Irvine, CA 92718 (714)830-8769

New book "briefings" from H.A.

VULTEE AIRCRAFT 1932-1947, Thompson. From the V-1 airliner the early Thirties through the P-66 Vanguard, BT-13 Valiant and A31-35 Vengeance to the advanced prototypes of World War II. Design, production and service. 23 scale drawings, specifications and performance. 236 photos, 132 pgs., sfbd. 1183D **$29.95**

THE HORTEN FLYING WING IN WORLD WAR II, Dabrowski. Contemporary of the Northrop Flying Wings, the German aircraft was a little late for the war. History, development and construction details. Rare photo and line drawings. 130 photos, 52pgs., 8 1/4" x 11 3/4", sfbd. 3323C **$8.95**

BOOMED FROM THE START, Bartsch. American pursuit pilots in the Philippines, 1941-42. The ill-fated 24th Pursuit Group, fought the same battle as their more-colorful counterparts, the Flying Tigers, but with less publicity. Thier successes and failures documented. Illus., 503 pgs., 6" x 9", hdbd. 3999D **$24.50**

LOCKHEED CONSTELLATION, Stringfellow & Bowers. The story of the Connie from design through production. Ahead of its time, still nostalgic today. The finest piston-engined airliner ever? General Eisenhower and MacArthur both used them as personal transports, like as Air Force One. 70 b&w, 50 color illus., 144 pgs., 9" x 10 1/2", sfbd. 3566D **$24.95**

AIRACOBRA ARMANTAGE: THE FLYING CANNON, Mitchell. Should this often maligned fighter rank with contemporaries, the P-51, P-47 or P-38? This history of the P-39 offers background, testing, combat history, data on every variant, plus an inventory of all known surviving examples in the world. 130 photos, sfbd., 8 1/2" x 11". 4731B **$11.95**

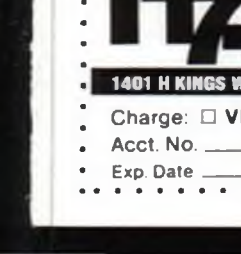
SLED DRIVER, Shul. An SR-71 pilot takes us into the cockpit and brings to life the unparalleled experience of flying the world's fastest, highest flying jet. The rigors of training, to the intensity of flight over hostile territory, feel the exhilaration of cruising over mach 3, outrunning Russian MIGS, and intelligence gathering missions. Compiled with a breathtaking collection of 105 rare color photos captured by him will take the reader where few have gone. 152 pgs., 10" x 12", hdbd. 1555C **$38.00**

NORTHROP P-61 BLACK WIDOW, Gary Pape with John and Donna Campbell. Chronicles the Black Widow through its development and career as a nightfighter. It was the first plane built specially for nightfighting. Included are cutaways and color plates of P-38s, P-70s, Mosquitos, and Beaufighters. Sfbd., 9" x 10 1/2", 144 pgs., 60 B&W, 60 color ill. 4662B **$24.95**

PAINTED LADIES, Walker. Modern military aircraft nose art and unusual markings. Tradition returns the cartoons and sexy ladies with names like "Memphis Belle" and "Maid in the USA" to the nost art on the B-52's, B-1B's, BF-111's, F-16's and many others. Full-color photos of some georgeous gals and far-out artwork. A good comparison reference for the buff of WWII nose art. Hundreds of photos, 130 pgs., 8 1/2" x 11", sfbd. 3342C **$24.95**

ALLIED AIRCRAFT ART, Campbell. A tour through modern aircraft paint schemes and markings, portrayed on the sides of allied aircraft of all types, from the F-4's of twenty years ago to the F-117's of today. 270 photos, 64 pgs., 8 1/2" x 11", sfbd. 3547C **$12.95**

SHARK'S TEETH NOSE ART, Elhell. A great collection of photos of sharks teeth nose art from WWII to the present. All manner of military aircraft, both allied and axis, plus the toothiest Tomcats of today. 120 photos, 212 pgs., 9" x 10 1/2", sfbd. 3556D **$19.95**



NEW IN-ACTION

P-61 BLACK WIDOW In Action	4146A	**$7.95**	**T-34 MENTOR** In Action	4145A	**$7.95**
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MiG-21 In Action,	4179A	**$7.95**	**C-7 CARIBOU** In Action	4180A	**$7.95**
H-60 BLACKHAWK ,May Release	4181A	**$7.95**	**A-26 INVADER** June Release	4018A	**$7.95**

LOCKHEED SKUNK WORKS, Pace. Inside story of the brain trust that developed the P-38 fighter, the U-2, the SR-71 and F-117A stealth fighter. The planes, the people, engineering, and flight tests. A rare inside look. 200 photos, 192 pgs., 8 1/4" x 10 5/8", sfbd. 3555D **$24.95**

PIPER CUBS, Pete Bowers	4774C	**$18.95**
BOEING 247, First Modern Airliner, van der Linden	1200D	**$24.95**
AIM/FAR-1993	1130C	**$12.95**
AVIATION PHOTOGRAPHY MADE EASY, EAA	4773D	**$19.95**
BIRDS OF PREY, A/C Nose Art Operation Desert Shield	4182C	**$29.95**
BOOK OF AIR SHOWS, Hanndleman	4183C	**$49.95**
CONSOLIDATED B-24 LIBERATOR, Campbell	4184C	**$39.95**
WAR DIARY OF HELMUT LIPFERT	4185C	**$29.95**
AVIATION: A History Through Art, Handleman	4186C	**$45.00**
FLIGHT TO THE TOP, NW Airlines History to Cicchi	1249C	**$17.50**
PITTS SPECIALS, Davisson	4679B	**$19.95**
CESSNA WINGS FOR THE WORLD, Single Engine Cessnas	1520D	**$20.00**
CESSNA, A MASTER'S EXPRESSION, Phillips	2004AA	**$29.95**
WINGS OF CESSNA: MODEL 120 TO THE CITATION III	2011AA	**$13.95**
THE HISTORY OF AIRCRAFT NOSE ART	4676B	**$29.95**
VINTAGE AIRCRAFT NOSE ART, Valal	3059B	**$30.95**
YF-22 & YF-23 ADVANCED TACTICAL FIGHTER	2958B	**$8.95**

COMING IN 1993 FROM HISTORIC AVIATION!

OF MONOCUPES AND MEN, John Underwood
THE STINSONS, John Underwood
PIPER, A LEGACY OF FLIGHT, Ed Phillips

VIDEOS

THE AIR MAIL STORY, Chronicles the development of air mail service from balloons to jets. Astonishing early aviation footage, of aviation pioneers including The Wright brothers, Charles Lindbergh, Amelia Earhart, Earl Ovington, Max Miller and George Boyle. Traces the routes of early air service including the first regular flight from Washington to New York. 45 minutes. V8302B **$19.95**

HOOVER, You've seen his performances, fly with him as he preforms his unbelieveable routines in the Mustang, F-86, T-28, Shrike Commander and Sabreliner. A closeup look at the life of a man that all the aviation community admires. 98 minutes. V8304B **$29.95**

THOSE INCREDIBLE GEE BEES, The compelling story details the early Granville days, and the evolution and development of the remarkable Gee Bee raceplanes. Illuminates the successes of the National Air Races. The tragic loss of Lowell Bayles and the Gee Bee Model Z. Interviews with Bob and Ed Granville, Maude Tait and "Pete" Miller tell what it was like to build and fly those incredible Gee Bees. 57 minutes. V8020D **$29.95**

THE STORY OF CHARLES A. LINDBERGH, More than a documentary about a famous flight to Paris in 1927, this is a well-rounded biography of the man who, invited by Goering to inspect German aircraft production just before WWII, returned to the U.S. to urge rearming here, but remaining neutral. Lindbergh flew 50 combat missions in the Pacific, teaching Air Corps pilots how to fly the P-38. It's all here in this video! 55 min. V8718 **$29.95**

BASIC AEROBATICS. Discover the "building blocks" of aerobatics—spins, rolls, and loops. Aerobatic instructor Rich Stowell takes you through the basics of aerobatics, from Aresti symbols through actual manuvers. Experience the pilot's perspective during aerobatic flight through brand new video demonstrations. Color, 54 min. V8350D **$29.95**

NIGHTSTALKERS, Just declassified dramatic footage features the top secret, high-tech F-117A STEALTH Fighter and B-2 Bomber! Brand new 21st Century Advanced Tactical Fighter (ATF), classic SR-71 Blackbird, and nightfighting F-15E. Ghostly shadows flown only at night! Color, 60 min. V8702D **$19.95**

JIMMY DOOLITTLE: AN AMERICAN HERO. He started as an airshow performer and pilot, tamed the Gee Bee racer in 1932, was first to fly "blind" and led the daring Tokyo raid that won him the Congressional Medal of Honor. Black and white and color. 60 minutes V8749 **$24.95**

THE GREAT AIR SHOWS, AIR RACES & THEIR STARS. Highlights of 1929, 31, 35 and 38 Cleveland National Air Races, present-day Reno Air Races and performances by Art Scholl, Frank Tallman, BobHerendeen and Bob Hoover. The great Paris Air Show. Color and B&W. **Appros. 50 minutes, VHS.** V8770C **$39.95**

1993 CALENDARS !

GHOSTS : A TIME REMEMBERED	9301A	**$13.95**
EAA WORLD OF FLIGHT	9304D	**$8.95**

PILOT MANUALS

Reprints of offical USAF training manuals.

P-38	14018	$8.95	B-25	1410B	$12.95
P-38	14028	$8.95	B-26	1411B	$14.95
P-40	14038	$8.95	B-29	1412A	$12.95
P-47	14048	$8.95	F-6F	1413B	$8.95
P-51B	2006AA	$14.95	FM-2	1414B	$12.95
P-51	14058	$8.95	AT-6	1415B	$8.95
P-63	14068	$8.95	SPITFIRE	1416B	$4.95
F-80	14208	$8.95	HURRICANE	1417B	$4.95
P-82	14078	$8.95	MOSQUITO	1418B	$4.95
B-17	14088	$10.95	Me262	1419B	$8.95
B-24	14098	$12.95	SR-71	3575D	$98.95

BEECHCRAFT: PURSUIT OF PERFECTION, Phillips. Authorized and update, detailed history of every aircraft produced to the present. Covers all military and civilian models with tech specs, production listings. Most complete reference source avaliable. 245 photos, 92 pgs., 8 1/2" x 11", hdbd. 2014AA **$24.95**

THE TAYLORCRAFT STORY, Peek. History of the design and production of the 13,000 T-craft, civilian and military, plus British Auster. 3-views plus a wealth of technical, financial, and colorful anecdotes, from day one to the rebirth with the F-22 model. 300 plus photos, 236 pgs., 8 1/2" x 11", sfbd. 4979C **$24.95**

VISIONS OF LUSCOMBE, Zazas. Biography of Don Luscombe, and his relations to tow very popular aircraft, the Monocoupe and the Luscombe. Details the origins of the designs, and the colorful events that surrounded the man and his planes. 300 photos, 275 pgs., 8 1/2" x 11", sfbd. 4980C **$26.95**

THE BEECH 17, Berry. For the Staggerwing buff. Precise data on every Model 17 from 1932 through 1949. Constructor number, date built, disposition, and current status. Includes a background on Beechcraft history. 154 photos, 13 in color, 3-views, 8 1/2" x 11", sfbd. 1893D **$29.95**

FLEET, THE FLYING YEARS, Page and Cumming. History of Fleet, Canada. From the beginnings as Consolidated Aircraft, Major Rueben Fleet demans high quality. Covers all models, 2,7,10, 16 and Pt-19. 112 photos, 152 pgs., 8 1/2" x 11", hdbd. 2013A **$24.95**

THE LOCKHEED P-38 LIGHTNING: The definitive Story of Lockheed's P-38 Fighter, Brodie. After 25 years of intensive investigation and research, the first accurate, inside story of the conception, design, development and wartime operation is here! Authored by the most respected P-38 investigative historian—this is the only P-38 book ever endorsed by Kelly Johnson and Brig. Gen. Ben Kelsey, the designer and test pilot respectively. More than 325 photos, 16 pgs. in color. Hdbd. 2305 **$34.95**

MUSTANG, THE RACING THROUGHBRED, Carter and Matthews. Great photography portrays all the great racing P-51's. Documents the design from a fighter to a superb pylon racer, and profiles the greats: Dago Red, Beguine, Cloud Dancer, Red Baron, Miss Bardahl and Tsunami too. A must for the racing or Mustang buff. 230 photos, 240 pgs., hdbd., 8 1/2" x 11". 3341C **$39.95**

CHANCE VOUGHT F7F3 AND XF5U-1 FLYING PANCAKES, Ginter. Some of the most fascinating aircraft ever prcduced. History, structural analysis, landing gear, and cockpit detail, test flights and wind tunnel tests. Scale drawings, cutaways, and details for th modeler. 58 photos, 34 pgs., 8 1/2" x 11", sfbd. 3554B **$8.95**

THIS AIN'T HELL BUT YOU CAN SEE IT FROM HERE, McWilliams. A Gulf War sketchbook by Barry McWilliams. Professional cartoonist at the front, portrays tank crews, Apache helicopter crews, men aboard ship, in tents, in the oil smoke, and in the wind-driven sand, showing that humor still helps coping with a far-from home war. 115 drawings, 256 pgs., 6" x 9", sfbd. 4725C **$8.95**

CONVERTING AUTO ENGINES FOR EXPEXPERIMENTAL AC 2901C **$20.00**

PUTNAM SERIES

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WINGS FOR THE NAVY: History of the Naval AC Factory, 1917-1956, Timble 1921C **$35.95**
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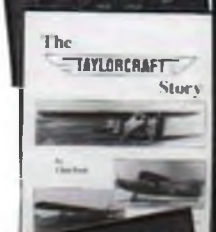
GENERAL DYNAMICS AIRCRAFT AND THEIR PREDECESSORS SINCE 1909 ..... 3396C **$42.95**
JAPANESE AIRCRAFT OF THE PACIFIC WAR, Francillon 3158C **$32.95**



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CONTENTS

JUNE 1993 • VOLUME 22 • NUMBER 9

COLUMNS

HELICOPTER WORLD

FEATURES

PRODUCTS IN USE

ON THE COVER

Wayne Dand, whose immaculately detailed Sig Spacewalker graced our December 1992 cover, is also responsible for this gorgeous 1/4-scale Proctor Nieuport 28-C1, powered by a Saito 325 five-cylinder radial engine. Ship weighs 17-1/4 pounds and had 70 flights in the logbook when photographed by Tony Stinson at the 1991 New South Wales Scale Championships.

CONSTRUCTION

DEPARTMENTS

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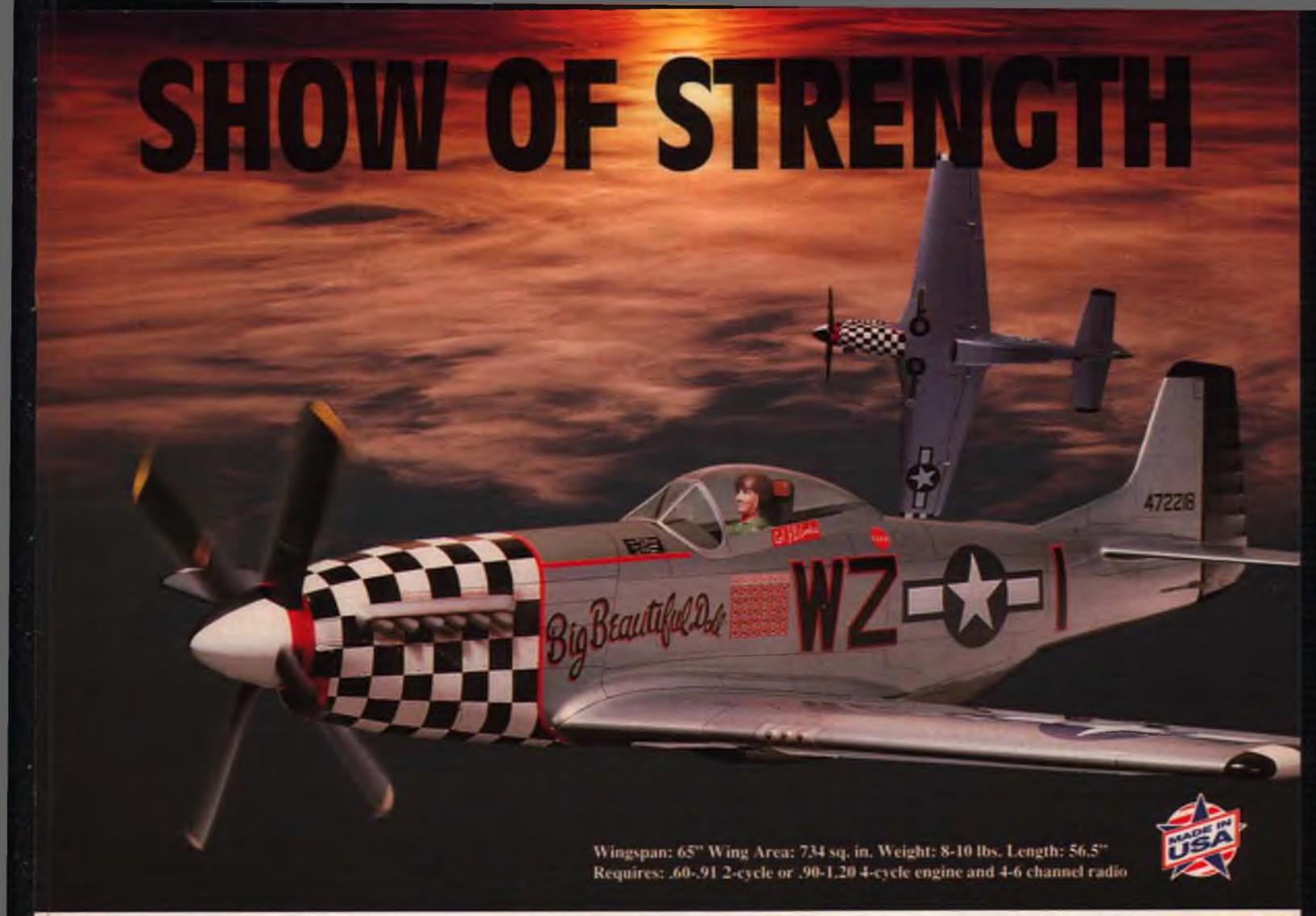
MEMBER RCHTA

SHOW OF STRENGTH



Wingspan: 65" Wing Area: 734 sq. in. Weight: 8-10 lbs. Length: 56.5"
Requires: .60-.91 2-cycle or .90-1.20 4-cycle engine and 4-6 channel radio

MADE IN USA

Top Flite's Gold Edition P-51D Mustang

GOLD EDITION™

"That's the plane I want!"

With one look at the Mustang in production, 8th Air Force General Carl Spaatz knew he'd found the perfect weapon: superior in speed, range and firepower. Mustang-escorted Allied bombers soon filled Berlin's sky...and even Hermann Goring admitted "the jig was up."

The last of World War II's 15,586 Mustangs retired from service only a decade ago. Now Top Flite's 1/7 scale Gold Edition P-51D carries on the legend.

It's not the first Mustang sport model. But—as the General might say—it's the plane you want. Here's why.

No other Mustang kit builds so easily and looks so good.

You need only average building skills to create an exact scale outline with Top Flite's computer-designed, interlocking Gold Edition construction. From the molded ABS half-cowl and radiator air scoop to the scale tail wheel location, this Mustang is a masterpiece of accuracy—already a Scale Masters qualifier.

Notice, for example, the smooth, realistic, fully-sheeted wing. And the bubble canopy, wing guns and exhaust ports —all vacuum-formed for easy assembly. Detailed instructions also thoroughly explain the installation of optional retracts and flaps.

Of course, your Mustang wouldn't be complete without lots of war paint. Here, two huge decal sheets duplicate the markings of "Big Beautiful Doll," flown by Colonel John D. Landers of the 78th Fighter Group. It's the ultimate P-51D...authentic down to the last blood chit.

And if you sight a foolhardy Focke-Wulfe FW190...

Like the greatest fighting aircraft (and best sport models), Top Flite's P-51D gives you the speed and maneuverability to pluck that enemy warbird down.

Just like it did as "one of the great miracles" of WWII. Only now, with Top Flite's Gold Edition kit, it's a miracle anyone can work.

For a free brochure and the location of the dealer nearest you, please call **1-800-682-8948 ext. 0392.**

Accurately-molded details like the trademark radiator scoop greatly simplify assembly.

TF TOP FLITE®

Distributed Exclusively Through
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P.O. BOX 9021, CHAMPAIGN, IL 61826-9021

Model pictured is covered with MonoKote® Aluminum, Black, Red, Olive Drab and White. Kit includes decals for most markings shown.

AIRMAIL

START 'EM YOUNG

My husband, Scott, is a long-time modeler and an avid reader of *Model Builder*. Our one-year-old son, Harrison, is following in Daddy's footsteps and has become obsessed with airplanes. In this photo, my guys are having a moment of male bonding with a couple of issues of *Model Builder*. One of them really enjoys the pictures!

Terri Dragoo
Colorado Springs, CO

UFO NO MORE

In your February issue, page 25, you show a picture of a modeler's car trunk with several models. You called it an unidentified flier, but on the opposite page, you show a picture of Oscar Smith flying a model that clearly shows to be one of the models in the car's trunk. Right?

So now I have identified the mysterious flier for you!

S. Ateca
El Paso, TX

JAKE 'N PEPPER

A word of advice: Lose "Dear Jake." Modelers buy model mags for modeling information. If they want comedy, they watch the comedy channel.

Tim Atkins
Town to come

One of the best things I like about your magazine is the "Dear Jake" letters. Very humorous indeed! Why not publish a book with all the "Dear Jakes"—not just some of them, *all* of them.

James Small
Apple River, Nova Scotia, Canada

Jake Doe is a little like pepper—a little is good, but a lot is too much!

WHAT YOU NEED...

I've been reading *Model Builder* since the very beginning, missing only the first two issues. Here's what I'd like to see:

More construction; more free flight scale, not necessarily Peanuts; monthly scale three-views like those from the Czech magazine, *Modelar;* Fernando Ramos' column on free flight scale; and an occasional control line construction article.

Keep Bill Hannan and John Pond by any means, fair or foul.

Peter Havriluk
Granby, CT

Peter, since you're missing Vol. 1, No. 1 of Model Builder, *a classified in last month's issue offered one for sale at $250.00!*

GOOD IDEAS DEPT.

Thanks for providing greater emphasis on free flight, rubber power and especially for reintroducing the Peanut construction articles.

"Dear Jake" does nothing for me. I don't even scan it, whereas other columns like "Big Birds" are read, even though I don't anticipate involvement in that facet of modeling.

Bill Hannan's column is splendid—informative, plus an awareness of the world in general.

How about a page or a half-page of ideas, tips, etc., to be solicited from your readers?

Model Builder could provide a service to new, returning or relocating modelers by listing local flying groups, not all of them being formal clubs. Some might even be groups who get together to fly in a small field, favorite slope for gliders, or a local gymnasium.

George Benson
Mill Valley, CA

What a pair of good ideas, George! First, readers are herewith invited to send in ideas, tips, hints, money-saving secrets, etc. We'll feature them individually or grouped on a page. Everyone who has a tip selected will receive a free Model Builder *T-shirt worth $14.95. Send your tips to Model Builder Tips, 34249 Camino Capistrano, Capistrano Beach, CA 92624. Specify whether you'd like a Large, XL or XXL shirt.*

Now, about the group/club listing: We will compile a free directory of such groups, large and small, and run this in the magazine when we have enough.

And because you were the first to come in with a good idea, we're sending you a custom T-shirt with our thanks!

HATE MAIL...

Some months ago, whoever is in charge wrote how the magazine was drifting aimlessly and how it would have direction in future. I agree with that—all downhill and for the worst.

Bill Ryan
Monterey, CA **MB**

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PLANE TALK

WE WANT *YOU* IN *MODEL BUILDER!*

Send in your favorite photos with a little information about the plane and yourself. If it's selected to run in "Plane Talk," you'll win a free custom *Model Builder* T-Shirt! Send your best to Plane Talk, c/o Model Builder, 34249 Camino Capistrano, Capistrano Beach, CA 92624.

Frank Camarda of Montreal, Canada, built this Sig Cub, shown ready for first flight in the early morning hours "to benefit from calm air," reports Frank. The Cub is painted with red dope. "This model was a bit heavy, which reduced flying time. Next time we'll use clear nitrate." *Frank Camarda, 7531 17th Ave., Montreal, Quebec, Canada H2A 2R7.*

"At age 51, I finally started the hobby I've watched for years," writes model builder Jim Dukes of Medford, Oregon. "My plane is a Sig Senior Kadet with an O.S. .40FP, covered with Coverite. I control it with a Futaba PCM system and spent somewhere around 120 hours in building. I was going to keep track, but got so engrossed in the project that I lost count!" *Jim Dukes, Box 4476, Medford, OR 97501.*

Nicholas J. Agneta, of North Bellmore, New York, scratch built this quarter-scale 1933 Gere Sport biplane. Specifications: 57-inch wingspan, 8-1/2 pounds flying weight, Supertigre .75 engine, covered in Century 21 cream/dark red fabric and controlled by a Futaba 6NFK six-channel radio. Built in 1992, the Gere had logged 52 successful flights when he wrote us. The cowl is made from a stainless steel mixing bowl, and the model is equipped with a homemade smoke system, shock absorbing landing gear and even a parachute jumper. *Nicholas J. Agneta, 854 Old Britton Road, North Bellmore, NY 11710.*

"Duane Combs is too modest ever to write about a plane he built, so I'm doing it for him," reports Ron Parker, whose 13-year-old nephew, Adam Warren, is pictured holding the model. Duane scratch-built the Stik 40 Plus from Balsa USA kit plans. "I used a three-year-old JR four-channel AM radio and PAW .35 diesel engine," says Ron Parker, a member of the Hou-Texins RC Club, N.W. Houston RC Club, Bayou City Flyers and SAM 82 in Houston. "Prop is a 13x6 Master Airscrew turning 7,000 rpm on Red Max diesel fuel. The wings and stabilizer are covered with red transparent MonoKote, while the fuselage is painted with white Rust-Oleum." How does she fly? "Floats like a kite and lands gentle as a whisper," says Ron, who owns the plane. "It's very slow and gentle, just the type to teach my cautious and eager nephew." *Ron Parker, 11055 Sands Point, Houston, TX 77072.*

"The 'TBVT' (Twin Boom, V-Tail) is a novelty airplane designed to get the tailfeathers out of the jet blast of a Dynajet," reports Paul Strengell of Claremont, California. "This prop version is a really good flier—quick and maneuverable, but slows nicely for landing. The retractable single landing gear has skids on the booms; controls are aileron and elevator only. I opted against rudder control since rudders that far from the centerline and canted off vertical would probably produce a proverse roll (right yaw with left roll and vice versa). Wing area is 530 square inches, weight is 5 pounds and power (plenty) is from a YS .45." *Paul Strengell, 2210 N. Navarro Dr., Claremont, CA 91711.*

DEAR JAKE

Advice For The Propworn

DEAR JAKE:

I've just completed installing an inlaid floor of alternating grain hardwood tiles. It looks fantastic, but I'm concerned about what kind of finish to put on it to protect it from wear and spills. I was wondering if some of the epoxy or polyurethane finishes we have available in our hobby would be appropriate for my floor. What do you think?

Remodeler in Racine, WI

Dear Remodeler:

I have an inlaid wood floor in my kitchen. It was professionally installed, but I insisted on finishing it myself. Epoxies eventually yellow, so I used a clear polyurethane. It is an exceptionally hard and durable finish and does not require waxing. I have had no trouble with the floor, other than one inexplicable incident shortly after it was laid.

I came home from work one day to an empty house and found a stick of butter melting into a puddle right in the middle of my new floor. Out of mostly disbelief, I called out, "Butter?!" A corner of the floor lifted up and answered, "Parquet!

Jake

Dear Readers:

I just received a very disturbing letter from a Mr. Robert Parker of Plymouth, New Hampshire. It is much too distressing to print, but it details the fiery crash of Mr. Parker's Stearman biplane and the attendant disruption of the lives of his buddy Claude, Mrs. Parker, and several ducks.

It is not at all clear whether Mr. Parker, who apparently uses an alias of John Dory, is describing a model aircraft accident or a full-scale aircraft accident in his letter. He claims to be in traction, with both arms and legs in casts. This could mean he was in the cockpit, or it could mean he fell off the factory roof trying to retrieve his model.

Nevertheless, Mr. Parker (Dory) is having a dispute with the FAA as to the cause of his crash. They are apparently blaming him for running out of fuel, and he is apparently blaming fate and running out of altitude as the cause of his Stearman's demise. The FAA is threatening to pull both his certificates, at least one of which seems to be for a free hour of Martinizing at the dry cleaners.

Robert's question to me was, "Can you help me, Jake?"

Dear Robert (John):

I seriously doubt if anyone can.

Jake

DEAR JAKE:

Hi! My name is Adolfo and I live in Mexico City. I have read your column, so I decided to ask you something. You see, my father suggested I go to a flying academy this Easter.

I already fly solo, but he wants me to learn how to fly pattern before we buy and construct our next model. Scale is what I really like best, so can you tell me of any RC academies near Chicago?

And by the way, do you recommend that I put a full body pilot figure in my 1/4-scale J-3 Piper Cub? Maybe a figure that looks like 13 years old since that is my age. BYE.

Adolfo Nieto, Mexico City

Dear Adolfo

First let me apologize, amigo. Due to publishing delays this will not appear before Easter, so I won't be able to help you find an RC academy. Not that I could have, anyhow. I try to avoid painful situations like root canal, insurance salesmen, and Chicago, so I just don't know very much about the Windy City.

I can help you with your second question, though. Sure you should put a pilot in your Cub, and I wholeheartedly agree with your idea to put in a full-figured pilot. I imagine Loni Anderson and Adrienne Barbeau were both qualified by age 13, so a quarter-scale doll of either of them would do just fine.

Good luck with your project. Send me a picture of the finished airplane. Adios!

Jake

DEAR JAKE:

There has been an alarming increase in the volume of mail coming in complaining about your column and recommending that we drop you. At the same time, letters of support have fallen off to a trickle. It's time for you to clean up your act and stop offending, annoying and insulting our readership. Consider yourself warned.

Managing Editor in Capistrano Beach, CA

Dear Editor:

You are quite justified in chastising me. I have been remiss, and for that, I apologize.

I have been extremely busy lately and there has been an illness in my immediate family. I know this is no excuse, but I have let these problems interfere with my usual output of fan mail. The 40 to 50 Dear Jake support letters that I send you under various imaginary names each month have indeed fallen off to a trickle.

I can only beg your forgiveness and pledge that I will get back on the ball. I promise that you will soon be inundated with letters from a vast cross-section of readers who love Dear Jake and just happen to have the same postmark as correspondence from me.

Jake **MB**

over the counter

All material published in OVER THE COUNTER is quoted or paraphrased from press releases, furnished by the manufacturers and/or their advertising agencies, unless otherwise specified. The review and/or description of any product by MODEL BUILDER does not constitute an endorsement of that product, nor any assurance as to its safety or performance.

CHECK THOSE BATTERIES!

The new "Abacus" from Ace R/C is a compact, affordable, easy-to-use NiCd battery capacity analyzer/cycler that will accommodate four-, five- or eight-cell packs of from 100 to 4,000 mAH capacity. You can use it, for example, to determine whether that 500 mAH receiver pack that's been in storage all winter still has 500 mAH of capacity, or whether it's going to roll over and die five minutes after you take off. The Abacus requires that you use your regular RC system charger for the recharge portion of the cycling process, a feature that keeps the unit's price down (suggested retail $69.95). Average accuracy is 5 percent. Ace offers a variety of adapter cables (available separately) for all brands of transmitter and flight pack batteries. The Abacus requires a 9-volt transistor battery for power and comes completely assembled and calibrated.

From Ace R/C, 116 W. 19 St., Higginsville, MO 64037-0472; (816) 584-7121.

THE LATEST FROM HORIZON

Horizon Hobby Distributors reports that the big Webra Speed 1.20 two-stroke now comes with a much-improved carburetor, and that the new carb is available separately for those who have one of the earlier engines with the TN carb and want to upgrade. The new piece features a machined aluminum one-piece throttle lever (replacing the crimped-on, two-piece steel version), an O-ring seal on the high speed needle, and a new throttle barrel engagement that's supposed to be much more durable than the previous pin. The carb alone retails for $79.95.

Also new from Horizon is the impressive JR X-388S computer radio system, which fills the niche between the popular x-347 radio and the top-of-the-line PCM-10S. Briefly, the system is offered in FM and PCM versions, has eight channels and eight model memory. There are three different transmitter options available—airplane, helicopter and sailplane—each with the switch and knob locations best suited to that specific type of flying; nevertheless, each transmitter still has all of the programming for all three model types.

These radios have far too many features to list here. You'll be hearing a lot more about them in the near future, but if you can't wait, you can get complete details by writing to Horizon Hobby Distributors, 3102 Clark Rd., Champaign, IL 61821.

GOT A MATCH?

One of the most intriguing new electric models in Hobby Lobby's current catalog is the "New Match" (who comes up with these names?), produced in Germany by Graupner. It's a compact 59-inch span motorglider-type ship that Hobby Lobby is touting for its high-performance aerobatic qualities rather than its potential as a powered sailplane, and is being aimed at experienced RC fliers who want to give electrics a try but who want to start out with a model that will really make the adrenalin flow.

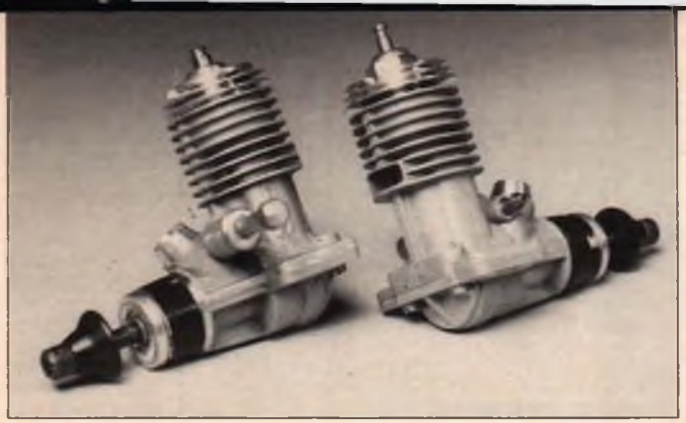
Properly powered, the New Match should do just that. Hobby Lobby recommends the Ultra 900 cobalt motor running on eight cells for maximum performance. That motor, coupled with the very thin RG-14A airfoil and a wing loading of 19 ounces per square foot, should make for a *very* fast airplane. The kit includes a molded ABS plastic fuselage and pre-sheeted foam wings for quick assembly.

Full specs on the New Match along with Hobby Lobby's equipment recommendations can be found in Catalog 21, which is free for the asking. Write to Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027, or call (615) 373-1444.

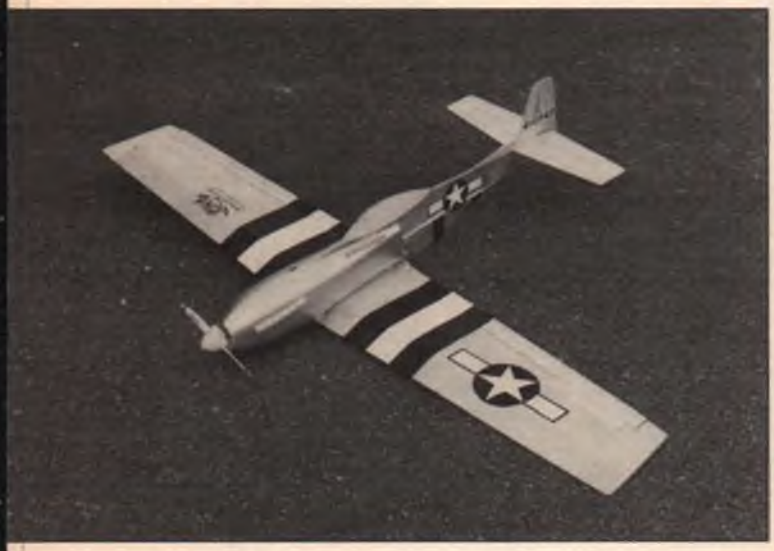
1/2A SCREAMER

Former *MB* CL columnist Dan Rutherford has been working very closely with top Russian engine designer Valentine Aljeshin to produce a lightweight, very high performance 1/2A engine for import into the U.S. The rear-exhaust VA .049 pictured is the result, and while Dan cautions that the ones shown in the photo are from a small batch of pre-production prototypes, the production pieces are expected to be quite similar. These being prototypes, Dan wouldn't release any definite performance figures, but says they're already faster than the best of his best Cox engines, and expects the production motors to do even better. At 34 grams or 1.2 ounces, they're also lighter than the Cox.

There's a teardown photo of the VA .049 and some descriptive text in this month's Free Flight column.



so we won't repeat that stuff here. Suffice to say that if you're interested—and if you're serious about 1/2A competition, you should be—you can get in touch with Dan at D&B Import/Export, Inc., 4705 237th Pl. S.E., Bothell, WA 98021, or give him a call at (206) 481-5760. Suggested retail is a very reasonable $45.00, and production engines were scheduled to be in stock by the time this issue hits the stands.



MINI ELECTRICS

Dickybird Models has come out with four new 39-inch span, 210 square inch electric model kits for the HiLine "Elf" or other four-cell, 50-watt motors, designed to be able to be assembled by the average builder in one evening. All four are based on a lite-ply profile fuselage mated to a hardwood keel and fitted with vacuum-formed plastic parts, and a sheet balsa wing and tail. Offered are a P-51 (pictured) and ME-109, and two versions of a powered glider called the "Gadfly," either with a standard tail and rudder/elevator controls or with a V-tail and ailerons. Each retails for $19.99 and can be purchased from your local dealer or direct from Dickybird Models, P.O. Box J, Westminster, CA 92684-000J.

SIG ENGINE MOUNTS

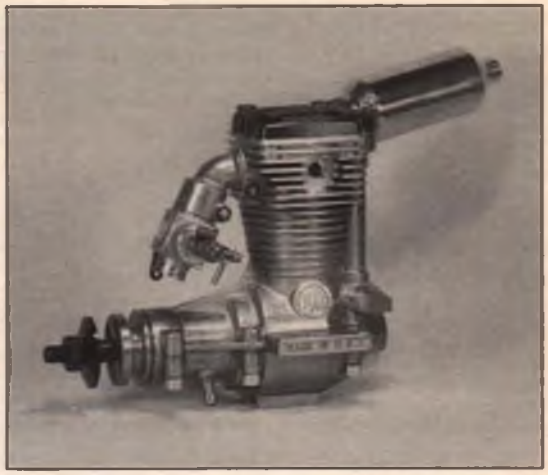
Developed to replace the split aluminum mounts in their kits, Sig's new composite mounts are designed to hold anything from a .19 to a .60.

They're molded from a special high-tech glass-filled plastic, are braced with webs, and are claimed to be quite a bit tougher than your common glass-filled nylon mounts. They have alignment marks molded in, and are also drilled in such a way that you can align them very accurately using a short length of music wire. Clever builders may also be able to use those alignment holes as a nose gear bearing, in the case of a side-mounted engine.

Sig's new glass-filled engine mounts sell for $2.95 a pair and come with bolts and blind nuts for attaching them to the firewall; engine mounting bolts are not included. From Sig Mfg. Co., Inc., 401-7 S. Front St., Montezuma, IA 50171; (515) 623-5154.

HP FOUR-STROKES

The HP line of engines, formerly made in Austria and now produced in Sierra Madre, California by RJL Industries, includes two sizes of four-strokes, the VT 21 and VT 49, which are unique both for the fact that they are the only U.S.-made four-strokes and are also the only ones with an overhead rotary valve instead of the typical intake and exhaust valves.



As the photo shows, these engines are quite different in design and construction from any other four-strokes on the market. In some ways, however, they are quite similar, with dual ball bearings supporting the crankshaft, hard chrome cylinder bores, low-expansion cast aluminum ringed pistons, and forged conrods with bushings at both ends. The rotary valve is supported by either a bushing or roller bearings in the head and cannot go out of adjustment.

Full particulars on these interesting engines and the rest of the HP line can be had by contacting RJL Industries at P.O. Box 5, Sierra Madre, CA 91025, or call (818) 359-0016.

ALTERNATIVE PLYWOOD

If you've been doing much scratch building lately, you're already aware that the price of aircraft-grade birch plywood has skyrocketed, much more so than the price of balsa. We recently received a sample of 1.5mm (1/16-inch) *plantation hoop pine* plywood being imported from Australia by Riteco Supply, Inc., in Houston, Texas. Neat stuff, and at less than a buck per square foot, very economical. It's quite flexible (see photo), has a very clear grain with no knots, is lighter than birch and just about as strong, and, for those in the kit business, is said to be great for die-cutting. Riteco sells the product to the general modeling public and is also offering it on a quantity wholesale basis to kit manufacturers and wood dealers.

For complete price and shipping information, contact Greg Ransom at Riteco Supply, Inc., 12999 F.M. 529, Houston, TX 77041; (713) 896-6200. **MB**

When contacting the manufacturers/distributors mentioned in Over the Counter, please tell them you read about their products in *Model Builder* magazine!

EYE IN THE SKY

The RCer's dream of being able to view the world from his model's cockpit is finally a reality, with the advent of Plane Talk's airborne micro video camera setup.

BY ART STEINBERG

Somewhere deep inside every RC pilot is the desire to be inside his airplane and look down at the ground passing by. In some of us, this yearning becomes so strong that the flying of RC airplanes is abandoned in favor of piloting ultralights and full-scale aircraft.

At the Pasadena IMS show in January, I ran into Monte Salot, owner of Plane Talk, who showed me an airborne micro video camera setup his company has developed for RC models. The system consists of a video camera weighing only 2.5 ounces and a transmitter weighing only 1/2 ounce! To this you simply add a nine-volt battery and a tiny antenna, stick it into your airplane, and you're in business!

Plane Talk can also supply the entire video setup enclosed in a small cardboard tube—total weight 8 ounces, including battery—for those who don't want to deal with separate components. This unit can be rubber-banded or taped to any handy spot on the airplane. Also furnished with the outfit is a receiver/downconverter which attaches to your TV set on the ground. To operate all of this on the field, you need either a DC TV or a generator to furnish AC power. What appears on the TV screen is the most amazing video you can imagine.

Monte Salot (left) of Plane Talk, with the author and the ground equipment for receiving video transmissions from the on-board micro camera, which Monte is holding. Complete airborne unit weighs only 8 ounces.

Charlie Strange (left) and Monte Salot strap the video unit to the landing gear of Charlie's big 1930s-vintage Miss Philadelphia. Stable, slow-flying Old Timers are a perfect platform for an airborne camera.

Some of the most interesting images came as a result of Dan Egelhoff taping the Plane Talk camera unit to his .60-size Kali helicopter. Dan was even able to follow Pete Stairs' RC sailplane around for some air-to-air scenes.

To preserve the image for show-and-tell, just hook up a VCR to your TV and put everything on tape.

What a dream for model aircraft enthusiasts! With practically no work involved, an entirely new dimension of RC flying is now open to us all.

Monte and I got together one weekend at a nearby paved strip and proceeded to test the airborne system on a variety of airplanes. It took only a few minutes to attach the cardboard canister to a Miss Philadelphia Old Timer. With its Saito .65 engine,

continued on page 28

NEW AVIATION BOOKS

Comprehensive histories of these classic and antique airplanes - and their builders - are detailed and illustrated. Hundreds of photos, in each book, including original factory photos. Includes the planes, the men, the families. The complete story. Internationally Acclaimed - Our authors are the leaders in Aviation Heritage. Our goal is to continue to give you the best in Aviation Heritage.

VISIONS OF LUSCOMBE - THE EARLY YEARS — By Jim Zazas

The definitive and revealing biography of aviation pioneer, promoter and entrepreneur Donald A. Luscombe, his airplanes, and the men who shared these ambitions. This comprehensive work draws upon factual sources, family records and former company employee interviews to detail the development, flight testing, production, financing and marketing of the Monocoupe, Monocoach, Monoprep, Phantom, Ghost, Model 4 and Model 8 airplanes. Highly illustrated with over 400 never before published black and white and color photographs. Great line drawings and color profiles. Includes MONOCOUPE History, 6 color pages. 8 1/2" x 11" 335 pgs., 475 photos line drawings & color profiles.
Softbound, #109, $26.95; Hardbound, #109-A, $36.95.

THE TAYLORCRAFT STORY — By Chet Peek

The complete story of the Taylorcraft Company and its airplanes are detailed in the new book, the Taylorcraft Story. The incredibly detailed history of C.G. Taylor and 65 years of Taylor and Taylorcraft airplanes. Hundreds of photos of famous people, planes under construction, original ads, articles, letters, and all the models from the first Taylor Chummy to the first Taylor E-2 Cub to the first Taylorcraft to the new F-22s, to include the production of the 13,000 Taylorcraft aircraft, including the British Auster model. 3-views of each model, plus a wealth of information from primary sources portrays the technical, financial, and marketing through the latest rebirth of Taylorcraft which still produces airplanes in 1992. Foreword by C.G.'s son, Bob Taylor. Specs, performance data, factory shots, early testing and construction, profiles of every model, engine specs, simply the most complete history available. The first and only Taylorcraft book! 8 1/2" x 11", 256 pgs., 423 photos.
Softbound, #108, $24.95; Hardbound, #108-A, $34.95.

WACO - SYMBOL OF COURAGE & EXCELLENCE — By Fred Kobernuss

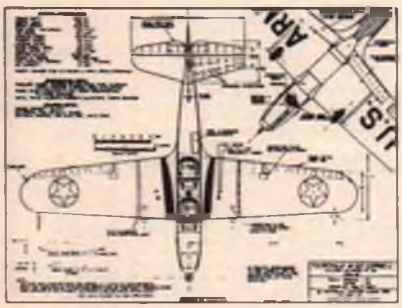
Deals with the evolvement of the largest producer of commercial aircraft during the 1920s and '30s. For example, in 1927 this company built 460 airplanes while Boeing rolled out 25. Detailed history of the early personalities, early airplanes, up to Waco Model 9, and early airplane companies which existed before the formation of the Waco Aircraft Company. Airplanes include: 15 hp biplanes, DBJ biplane "Scout", Cootie #1, #2 & #3, and Waco Models - Waco 4, Waco 5, Waco 6, Waco 7 and Waco 8. Includes the inside story of the developmental stages of the Ohio Aviation School, the DBJ Aeroplane Co., the Weaver Aircraft Co., and the Advance Aircraft Co. Comprehensive "Waco" history from 1910 to 1925. 8 1/2" x 11", 190 pgs., 150+ photos.
Softbound, #106, $24.95; Hardbound, #106-A, $34.95.

AERONCA - A PHOTO HISTORY — By John Houser & Bob Hollenbaugh

Includes interesting historical tidbits with comprehensive photographic treatment of Aeronca C-2, C-3, Model L (Low Wing), Model K, Pre War Chief, Model T (Trainer), TA (Defenders), Liaisons, TG-5 Gliders, Aeronca-built Fairchild Primary Trainers, Model 7 Champion, Model 11 Chief, Model 15 Sedan, Experimental Types, and Aeronca Engines. Includes All Variants. Illustrated with photographs the many different models of Aeronca aircraft, together with related photos of general interest, all arranged chronologically. 8 1/2" x 11", 138 pages, 250 photos, Chronological Listings, Pre War Production Chart, Post War Production Chart, Aeronca models with Power Plants, ATC Years of Manufacture, Comparison Specifications, & Appropriate Remarks per Model. Softbound, #701, Only $14.95.

PIPER CUBS — By Peter Bowers

A classic presentation of the most famous airplane in the world. The "Cub" is many airplanes as Model production stretched over more than a half-century. Model-by-model, Bowers traces the evolution of the Cub including more than 200 illustrations detailing the differences in models and the myriad ways the Cub has and does perform aviation activities. The book describes each of the designated Cub models in sufficient detail to enable you to distinguish visually between such J-3 Cubs as the J-3C-40 and the J-3-C-65, the prewar and postwar J-3C-65s, and the PA-18-125 and PA-18-135. Separate chapters describe some of the unique activities of the Cubs and the modifications that ingenious owners and operators have made to the basic tandem two-seater Cub to make it the world's most versatile airplane. 7 1/2" x 9 1/2", 240 pages, 227 photos & illustrations, 8 pages of full-color, 3-view drawings, Specifications, Index. Softbound, #248, Only $17.95.



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GETTING OUR YOUTH INVOLVED IN MINIATURE AVIATION

One of the most often asked questions among model airplane enthusiasts over the past couple of decades has been, "Where are the young people?"

Every now and then we hear of some modeler or group of modelers who finds the answer to the question by taking it as a challenge—they go out and find young people and spread the joy of flying miniature aircraft. Among such visionary modelers are David Narance and Jim Busch of the Marion, Ohio area. In addition to being members of the Marion Airfoils club, Jim and David are leaders of Explorer Post 7 of the Boy Scouts of America. It's a natural combination for the development of new model aviators.

"The last two years, the boys have built control line models to learn the fundamentals of balsa construction, covering and internal combustion engines," David writes. "Our last 'contest' was held on Father's Day in 1992. A dozen contestants entered 1/2A Stunt and Foxberg Race. . . Explorer Post 7 took four out of five places!"

David reports that the contest also featured a precision aerobatics flight demonstration for the students and the presence of a hobby shop that sold kits and supplies. Every entrant was given a Fox glow plug and a chance at a raffle.

The contest went so well that the boys have decided to do it again; the 1993 event is scheduled for Father's Day, June 20, at the Marion Municipal Airport from 1 to 5 p.m.

On Father's Day 1992, adults and youngsters alike gathered for the Marion, Ohio Control Line Fun-Test. The Foxberg Race winners were, from left: Pat Giles of Wooster, Ohio, 1st place; Jim Harris of Marion, 2nd; and David Narance, Galion, Ohio, 3rd. Photo provided by David Narance.

Events will again be 1/2A Stunt and Foxberg Race. There will also be a new "weirdo" event for all ages, intended to encourage the design and flying of unusual control line models. For example, one of the Explorers has built an autogyro for the event, and another is building a ducted fan model using a Quaker Oats box!

Prizes and trophies will be awarded in all three events. Bonus points will be awarded for parent/child teams in 1/2A Stunt. The "weirdo" event requires the fliers to design and fly their own planes. Entry fees are a $1 donation to the Explorer Post 7 "Prop Nuts."

It sounds like a good way for novice CL fliers in the Marion, Ohio area to meet other fliers and get some experience. Club and Scout leaders interested in getting more information about the Marion group's youth education program should contact David Narance, president of the Marion Airfoils, 255 Chevy Chase Drive, Galion, OH 44833.

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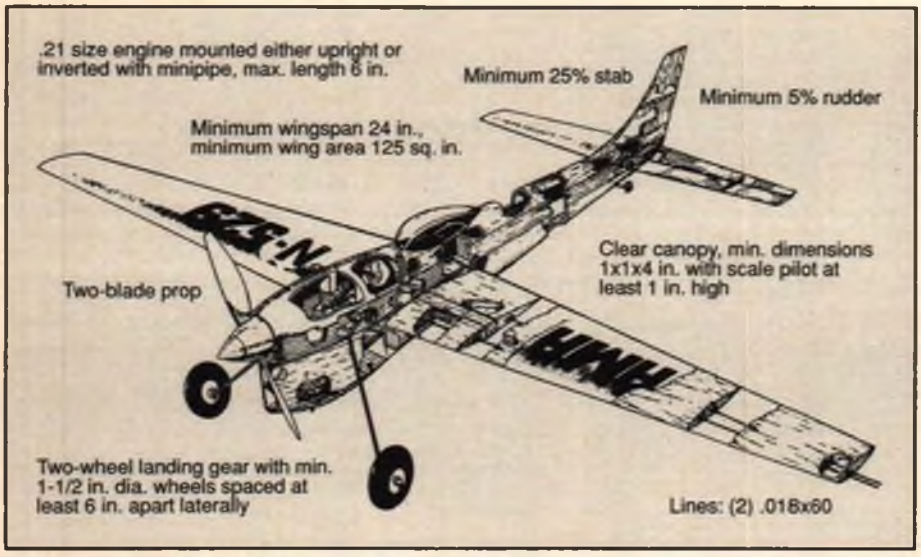
Speaking of new ways to have fun with



■ LEFT: This drawing, from the November-December 1992 edition of *Speed Times*, shows a typical example of a plane for the new .21 Proto Speed event being promoted by the North American Speed Society—details in text. ■ RIGHT: Nostalgia Stunt is booming, and one of its proponents is Joe Dill. Here he is at a 1992 Seattle, Washington contest showing off his beautifully built version of the famous Thunderbird design; it hadn't yet been flown at the time of the photo. John Thompson photo.

control line flying, the speed demons of the North American Speed Society have created another new speed competition, an outgrowth of their successful creation of the .21 Sport Speed event a few years ago.

This new one is called .21 Proto. NASS members across the continent helped in the development of rules and several fliers in the Pacific Northwest have begun building models to demonstrate at several contests in the region, hoping that interest will catch on.

Two of the contests will have taken place by the time you read this, but the event also will be held in Coquitlam, B.C., Canada, August 6-7 in Coquitlam Park, as part of the annual Northwest Speed Championships. Information about that contest, which may include other events, can be obtained from Chris Sackett in care of NASS, Box 82294, North Burnaby, B.C., Canada V5C 5P7. While you're corresponding, consider sending in the $22 dues ($27 outside the U.S. and Canada) to join NASS and receive the excellent newsletter, *Speed Times*.

The youthful 1/2A stunt winners at the Fun-Test. Standing, from left: Brian Dyer, New Blooming, Ohio, 1st place; Adam Turpin, Columbus, Ohio, 2nd; Jeff Allen, 3rd; and David Narance, contest director. Kneeling are Matt Thompson (left), 4th place, and Mark Denninger, 5th. Photo provided by David Narance.

"Back around 1954, when the original proto speed idea was conceived, it was to be a scale speed event, but the rules somehow got watered down to where guys were running asymmetric ships with full-wave pipes on 80 percent nitro with a canopy less than 1 inch long and no rudders," Sackett writes in the November-December issue of *Speed Times*.

"In other words, the whole idea of scale or semi-scale speed was lost due to weak rules. The new .21 Proto rules have been very carefully thought out at great length by experienced top modelers and should result in truly beautiful, realistic models."

Chris notes that this is an event that should appeal to the kind of modeler who likes a little realism to go along with full-bore competition. A unique aspect of the event, different from any other present speed event, is that the rules actually provide a bonus for appearance. It's a three-pronged approach: realism, beauty and performance. *Speed Times* published a handy appearance points chart, calculating the points stagger for up to

continued on page 82

.21 PROTO SPEED RULES

Third draft, January 1993

Objective: It is the purpose of "New Proto" to fly semi-scale, realistic airplanes in CL speed competition. Proto speed models need not be scale models, however, true scale subjects are highly encouraged.

Design: The model must have a full fuselage and rudder. Butterfly type stabilizers are not acceptable unless it is a true scale model. The engine can be mounted upright or inverted only, with no "sidewinder" type installations. A model with a small fuselage and helmet cowl used on traditional speed model designs is not acceptable. The model must have a cockpit or cabin as laid out in the specifications following. No pod-and-boom fuselages, flush or prone cockpits or flying wing designs will be accepted unless they are actual scale models of full-size craft.

The engine must be fully cowled except in the case of a scale model. If the builder wishes, the glow plug or head fins may be exposed. Wing area enclosed in the fuselage will be considered, but area of fillets shall not be counted. The model must be colorfully painted, with no all-clear finishes. The entrant's AMA or MAAC license must be permanently affixed to the upper right-hand wing surface, at least 1 inch high and prefixed with either "N" (USA) or C, CF (Canada).

Airplane Specifications: The model shall have a minimum of 125 square inches of wing area; the stabilizer must be a minimum of 25 percent of the wing area and the rudder shall be a minimum of 5 percent of the wing area. The minimum wingspan shall be 24 inches for a monoplane or 16 inches for a biplane. The minimum distance from the trailing edge of the wing to the leading edge of the stabilizer must be 5 inches. The model must have a clear canopy, a minimum dimension of 4 inches in length by 1 inch high and 1 inch wide, and shall house a scale pilot a minimum of 1 inch in height (Williams Bros. type or equivalent). The landing gear must be of the fixed type and similar to a real airplane. The main landing gear shall consist of two wheels spaced at least 6 inches apart between wheel centers. Wheels must have a minimum diameter of 1-1/2 inches. The wing and stabilizer must be of equal span with no asymmetry; maximum deviation is 1/4 inch. The weight limits of the aircraft (dry) shall be 18 ounces minimum and 20 ounces maximum.

Engine, Propeller and Fuel System: The engine shall have a maximum size in displacement of .2135 cubic inch. Only an open exhaust or mini-pipe type exhaust system can be used. A mini-pipe cannot be longer than 6 inches from the centerline of the engine bore to the end of the tailpipe. The inside diameter of the pipe shall be of constant size. Any fuel system is acceptable, and the use of a shutoff is encouraged. Only standard two-bladed propellers are acceptable, either wood or composite.

Flying Lines: Only two-wire type control systems are acceptable. Minimum two-wire size shall be (2) .018 inch by 60 feet. The minimum wingtip separation of the lines shall be .20 inch. The model and control system shall be subjected to a 40G pull test.

Fuel: Fuel shall be of standard composition containing 10% nitromethane, 10% castor oil, 10% synthetic oil and 70% methanol. The fuel will be supplied by contest management.

Distance of Timed Course: The model will be timed from the instant the model is released from takeoff for 14 laps (1 mile). The flier will be allowed 1-1/2 full laps to get the model airborne before entering the pylon. Any attempt to whip the model more than is necessary to get airborne during the first lap shall constitute a foul and the flight will be disqualified.

Judging: All models will be lined up where an experienced panel of three judges will place them in order of appearance from best to worst. The model aircraft will be inspected and judged on realism, construction and finish, and will receive points based on the formula of three divided by the number of entries, with each model receiving points according to position. Example: Six entries divided into three equals .5 stagger of points from best to worst, where the best model would get the maximum of 3 points, second would receive 2.5 points, third would receive 2 points, fourth 1.5 points, fifth 1 point and sixth .5 point. This works for any number of entries; the more entries, the tighter the competition. Points are rounded out to the nearest 1/100th.

Scoring: Each contestant takes his or her best speed in mph, converts that speed to points, and adds in the appearance points for the final tally. Example: Flier Joe Speedster's speed was 121.21 mph. He adds 1.5 points for appearance, for a total score of 122.71 points.

Records: All records, local or national, will be expressed in the actual speed of the model only.

GAS-TO-ELECTRIC CONVERSIONS, PART 2

In part two of this series, we'll examine construction methods and techniques for converting gas-powered kits and ARFs to electric power.

CONSTRUCTION TECHNIQUES

A large portion of a gas-powered aircraft's structure is devoted to absorbing engine vibration. Electric power gives you a significant advantage over gas because electric motors do not vibrate. Therefore, using an electric motor means that we can do without most of this extra structure.

We can scrap most of the plywood and hardwood and some of the sheeting used in the fuselage. The forward structure needs only enough strength to carry the weight of the motor and propeller. One technique that saves weight is to substitute a solid plywood firewall with a plywood/balsa sandwich. For example, you can replace a 1/4-inch solid plywood firewall with a sandwich made up of one piece of 1/8-inch balsa between two 1/16-inch plywood pieces. You can still bolt the motor mount to the firewall, yet have a significant weight savings. You can do the same thing with other bulkheads or large plywood members in the fuselage.

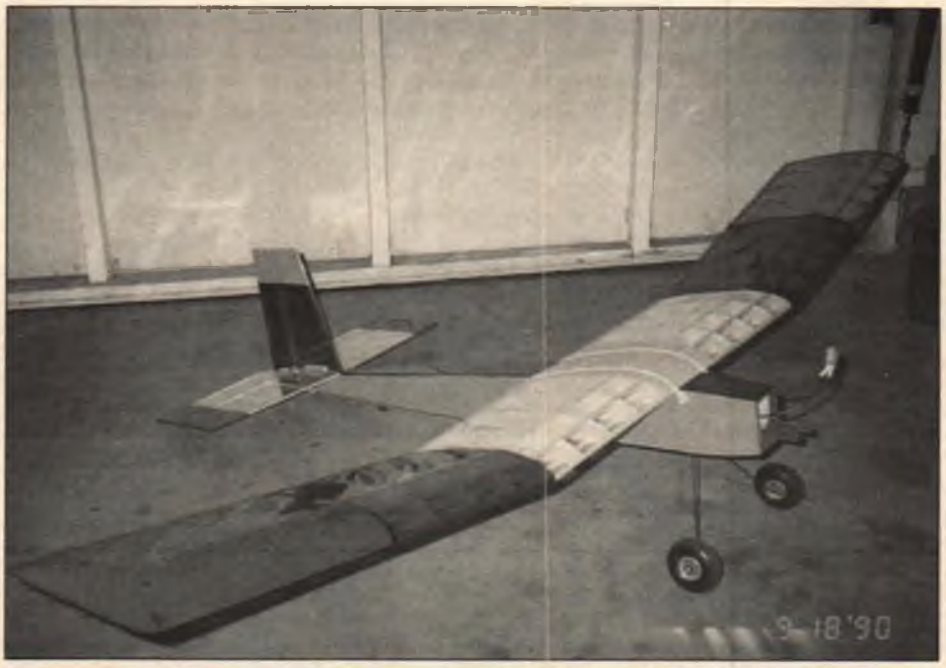
Plywood/balsa sandwiches can be laminated using CA or wood glue. Plywood doublers on the forward fuselage sides can be changed to balsa, or in many cases, eliminated altogether. Simply speaking, the only plywood you need in the fuselage is limited to the firewall (in a sandwich configuration), around the landing gear, the tailwheel mount, and to secure the wings to the fuselage (hold-down blocks, etc.).

Everything else should be balsa. Try to eliminate as much sheet balsa from the sides, top and bottom as possible. If sheeting has to remain for shear strength, you may be able to cut some lightening holes in it without compromising the structure.

Turning to the wing, only the wing joiner and spars should be hardwood. You shouldn't need plywood or hardwood anywhere else. Change a dowel or arrowshaft leading edge to a balsa stick and sand it to shape. Use balsa ribs in place of plywood ribs unless there is a structural reason for plywood (like the landing gear mount or engine nacelle). If the original kit uses balsa spars, so much the better!

(Editor's note: Former MB Electric Power columnist Mitch Poling reviewed an early draft of this article and took exception to the idea of using balsa for wing spars—he's sold on spruce, and feels the extra weight is a small penalty to pay for the extra strength. So here you have two differing expert opinions—use your own judgment as to which kind of spars to use, based on the kind of flying you'll be doing with that particular model.)

Moving to the tail, eliminate as many sheet surfaces as possible. Many models use a simple 3/16 or 1/4-inch sheet stabilizer/elevator and fin/rudder. By making a built-up, trussed structure similar to that of the Sig Kadet or Goldberg Eagle, you'll save some weight. Use CA glue on all balsa joints; its speed and bonding strength can't be matched. CA can be used on balsa-to-hardwood joints, but be sure you have a tight fit when gluing. Use epoxy or woodworker's glue on hardwood-to-hardwood joints.



The Electri-Lifer as designed by Randy Randolph is really little more than an electric sailplane with a landing gear. A model like this is ideal for training new pilots because of its low flying speed and docile handling.

A WORD ABOUT BALSA GRADES

When modifying kits for electric power, you'll probably have to purchase some balsa and substitute it for the material supplied in the kit. Try to use contest grade balsa whenever possible. This is the lightest grade—each cubic foot weighs between 4 and 6 pounds. This compares to regular grade balsa, which ranges from 8 to 12 pounds per cubic foot. Only balsa wing spars and long structural members (like fuselage longerons or stabilizer trailing edges) should be the heavier grade.

Wing ribs, fuselage trusses, tailfeathers and window frames can be contest balsa. It's a bit more expensive than regular grade balsa, but it's worth the weight savings. Also, no modeler should be without the Balsa Stripper manufactured by Master Airscrew. Stripping sticks from sheet balsa versus buying ready-made sticks can save you a surprising amount of money. For example, a 1x3x36-inch contest grade balsa plank costs $1.85, according to the 1991 Sig catalog. This can be stripped into eleven 1/4-inch square sticks. Buying that many ready-made sticks at 29 cents each will cost you $3.19, and they are usually not contest grade balsa. You're saving 42 percent and you're getting much lighter balsa. The Balsa Stripper only costs a few dollars and is worth the investment.

ARF CONVERSIONS

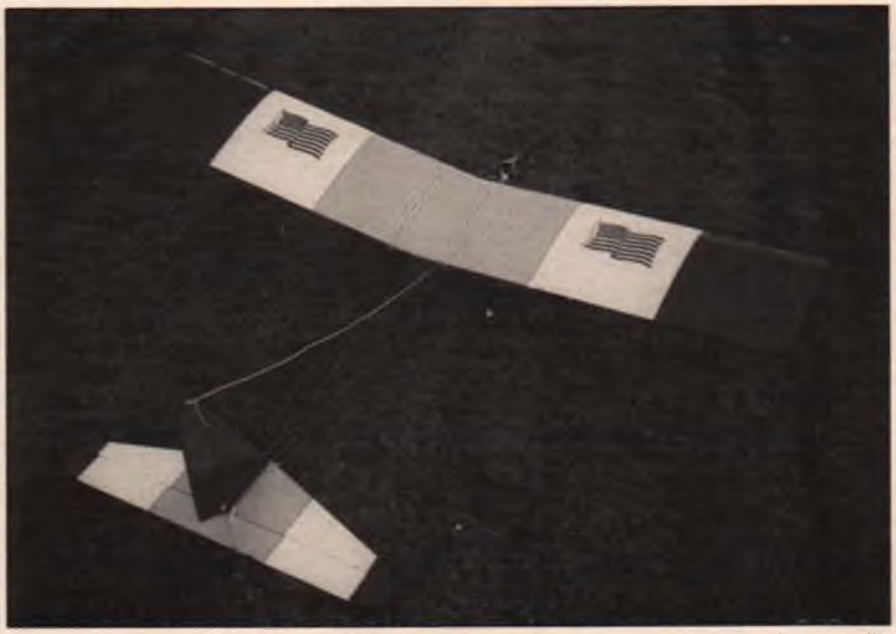
I have found that there are few gas-powered ARFs for the beginning pilot that

are suitable for conversion without major structural modifications. Let's look at a popular gas ARF, the EZ Cessna 25T, to get an idea of why this is so. According to the box, this plane is advertised as a trainer, has a span of 52-1/2 inches, a wing area of 411 square inches, and the ready-to-fly weight is 60 ounces. For the conversion, we'll use a geared Astro 15 motor and an Astro Flight Model 205 speed control.

First we need to figure the weight change. The EZ Cessna is designed for a .25 cubic inch gas engine. According to the O.S. Max specification sheet, an O.S. Max .25FP weighs 6-1/2 ounces. Add 3 ounces for the fuel tank, fuel, fuel tubing and throttle pushrod. Add another 2 ounces for the throttle servo. The total weight deduction of gas equipment comes to 11-1/2 ounces.

Let's take a moment to look at radios. Using the micro receivers and servos available from most radio manufacturers is a good idea, as we need to save weight whenever possible. Substituting a standard four-channel receiver and four standard servos with a miniature receiver and three micro servos (a throttle servo is not necessary) will save you about 4 ounces. The weight savings is significant, and the smaller equipment will make room for the other electric components.

Assuming that you'll use the micro servos and the miniature receiver, we can add another 4 ounces to get a total weight reduction of 15-1/2 ounces. Now let's figure the weight increase from the electric equipment. According to the Astro Flight motor specifications (summarized last month in Table 1), a 15 motor with gearbox and batteries weighs 28 ounces. Add to that another 3 ounces for wire, switches, connectors and a fuse. Also add 2 ounces for the speed control to get a total weight gain of 33 ounces. Subtracting the weight savings above gives a net weight gain of 17 ounces. Now our EZ Cessna 25T weighs 77 ounces and the motor delivers 185 watts of power. The statistics can be summarized as follows:



Old Timer free flight models lend themselves perfectly to RC electric conversion, as they're lightly built and usually very stable. Pictured here is a 1936 Flying Aces Stick with squared-off wingtips, powered by a geared Astro 05 cobalt. The annual Astro Flight Electric Championships has events for both 7-cell and Unlimited Old Timer events.

Constants:

- Wingspan: 52.75 in.
- Wing area: 411 sq. in.
- Motor system weight: 28 oz.
- Motor system power: 185 W
- Aircraft flying weight: 77.5 oz.

Computed Parameters:

- Wing loading: 27.15 oz./sq. ft.
- Power-to-Weight ratio: 2.39
- Total weight to motor weight ratio: 2.77
- Aircraft Performance Ratio: 0.0879

Comparing this to the other electric planes listed last time in Table 2 tells us that this aircraft probably won't get off the ground. Although the wing loading is high (but acceptable) and the power-to-weight ratio is fair at 2.39 W/oz., the APR is extremely low, even lower than the HiLiner which had marginal power. Taken another way, for the plane's weight, there is enough power, but the wing area is too small, making the wing loading too high. The plane will have to fly very fast to stay in the air, but the motor doesn't have enough power to pull it at the required speed.

Unfortunately, most every ARF gas-to-electric conversion analysis turns out like the EZ Cessna 25T. They use too much hardwood and plywood, and they are built to absorb engine vibration and rough handling. As a result, they are built much stronger than needed for electric power. Gas ARF conversions aren't the way to go when venturing into electric power.

Mitch Poling, in our correspondence, summed it up best by saying, "I know how to make it better, but that means building it from scratch. How many beginners can do that?"

WHAT'S THE PILOT NEW TO ELECTRIC TO DO?

The experienced gas pilot entering the electric flight arena has two ways to go. First, for those who don't want to build a kit, there are now a few electric-powered ARFs

TABLE 3—ELECTRIC AIRCRAFT PARAMETERS (AVAILABLE KITS)

	Davey Systems Flybaby	Midway Fast Eddie	Airtronics Eclipse	Midwest Electric Hots	Goldberg Mirage	Top Flite Phasoar	Great Planes PT-Electric
Type of Plane	Sport	Aerobatic	Glider	Aerobatic	Trainer	Glider	Trainer
Wingspan (in.)	40	Unknown	78	41	54	56	56
Wing Area sq.(in.)	275	284	660	374	464	335	580
Motor	AFI 05	AFI 05	AFI 05	AFI 05	AFI 05	AFI 035	AFI 05
Motor Power (W)	125	125	125	125	125	90	125
Motor Wt. (oz.)	16	16	16	16	16	11	16
Weight RTF (oz.)	32	40	45	44	46	27	58
Wing Loading (oz./sq. ft.)	16.76	20.28	9.82	16.94	14.28	11.61	14.40
Power/Weight (W/oz.)	3.91	3.13	2.78	2.84	2.72	3.33	2.50
RTF Wt/Sys. Wt.	2.00	2.50	2.81	2.75	2.88	2.45	3.13
APR (W-sq.ft./oz²)	0.2331	0.1541	0.2829	0.1677	0.1903	0.2872	0.1736
Wing Loading	Moderate	Fast	Slow	Moderate	Moderate	Slow	Moderate
Power/Weight Ratio	Good	Good	Fair	Fair	Fair	Good	Fair
RTF Wt./Sys. Wt.	Good	Good	Fair	Good	Fair	Good	Fair
APR	Good	Fair	Good	Good	Good	Good	Good

on the market. When equipped with cobalt motors, they are generally good performers. For the electric flight beginner who is proficient with gas-powered aircraft, any type of plane with which you would feel comfortable as a gas model should not be above your ability as an electric. Remember that the electric will be heavier and will need to fly a bit faster.

Second, for those who enjoy building, there are numerous aircraft kits available that have been designed for electric flight. It becomes obvious that the plane is designed for electric power when you see very little plywood, no reinforcement around the engine and firewall area, and little or no sheeting. Experienced gas pilots may want to try their hand at the Davey Systems LeCrate, the Carl Goldberg Mirage or the Great Planes ElectriCub. More experienced builders can try the Astro Flight Porterfield Collegiate or the Davey Systems Fokker Eindecker. All of these are proven electric designs.

For the beginning pilot, one of the electric-powered gliders on the market is highly recommended. Just like learning to fly a gas-powered plane, the slower it is, the more time you have to react to it and the less likely you are to crash. Some suitable training models are the Carl Goldberg Electra, the Astro Flight Challenger and Mini-Challenger, and the Airtronics Eclipse.

When you become proficient with entry-level electric aircraft, take a look at a few of the advanced electric kits available. The Astro Flight Partenavia P68 twin is a good one. It's relatively heavy and flies fast, but it's a sharp looking plane and a good flier. Twin electrics are particularly satisfying because the motors synchronize automatically and there is never an "engine out" problem. As there is no vibration, it is structurally simpler to put engines in the wing. There are no pushrods to run, no linkages to hook up and no fuel tanks to install.

ELECTRIC KITS

Table 3 lists the various parameters for seven widely available electric kits. The Goldberg Mirage and Great Planes PT-Electric are good trainers, although they're a bit fast. The Davey Systems Flybaby is good for an intermediate pilot/builder. The Midway Models Fast Eddie and the Midwest Electric Hots are for experienced pilots and builders. They are fast, but fun to fly.

MOTORS

Practical and affordable electric-powered aircraft have only been around for the last eight years or so. Electric motors and rechargeable batteries have come a long way in that time. When flying electric, I prefer to use a cobalt or other high-performance motor whenever possible, as they have more power and can run with a wide variety of battery pack sizes and propellers without damage. Most ferrite motors are very voltage and current specific. Exceeding the recommended power will damage them very quickly. For the most part, those kits and ARFs that come with ferrite motors will not perform as well as a plane equipped with a high-quality cobalt motor.

After building a few electric kits, I guarantee you'll want to try your hand at building from plans and even from scratch. There are many plans available for electric aircraft of all types. Scouring the plan catalogs of the modeling magazines will yield many suitable designs. The analysis presented here works equally well for non-kitted aircraft designs and for your own creations.

Next month we'll look at two gas-powered designs that I converted to electric and a 1/5-scale model that was built for electric using a three-view of the full-size aircraft. ***MB***

TECH STUFF ODDS & ENDS

Our columnist catches up on some of the smaller items that have come across his desk.

When I think of or hear about something I feel would make good material for this column, I write it up and store it in my computer for future use. The feature-length stuff gets used rapidly, but the little stuff, most of which I consider equally interesting, tends to collect. This is a housecleaning month, but I think you'll enjoy the sweepings.

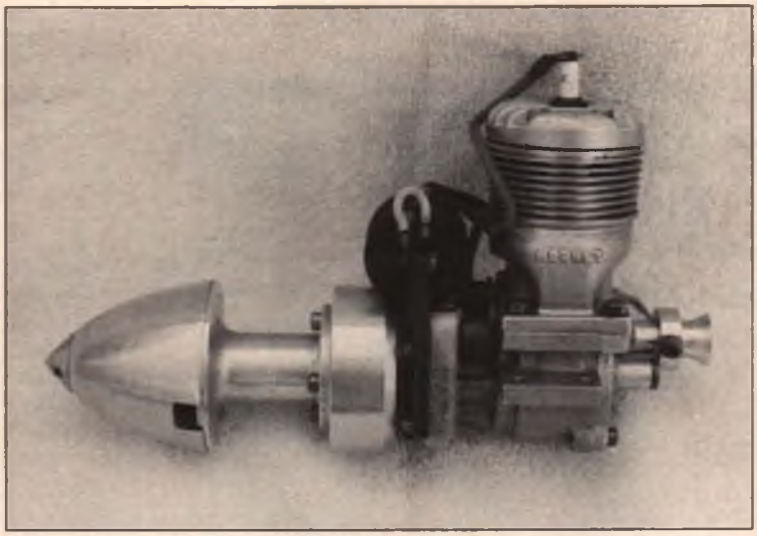
MODEL MAGNETOS

In the November 1992 issue we talked a bit about model engine history. That column generated plenty of mail. There are a lot of old engine lovers out there. (Also, a lot of lovers of old engines.) In particular, I thank Earl Poynter of Fort Worth, Texas; Tom Pearson of Hickory Hills, Illinois; and Jerry Greaves of Newtown, Connecticut.

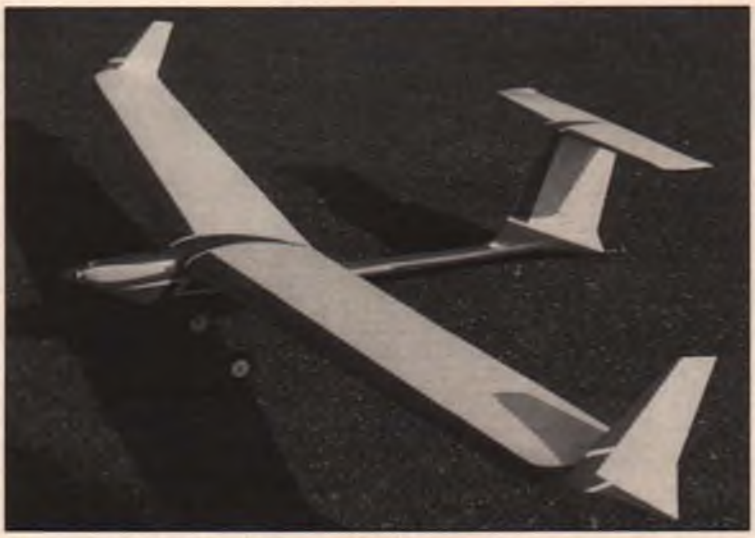
In that column, a photo showed a magneto I designed and built in 1941 and used on a Super Cyclone. I wrote, "Several other people also experimented with miniature magnetos, but none were produced in quantity for engines smaller than the chainsaw type."

Both Tom and Jerry took me gently to task for that statement. They both sent me copies of old ads for model magnetos produced by Emil Vollenweider of Sacramento, and they both have had Vollenweider magneto-equipped engines in their collections. Vollenweider did far more with magnetos than I did, but my work was a few years earlier. His main market was race cars and boats with Hornet, McCoy and Dooling engines, but a few were sold for airplanes, as proven by the photo of the "magged" Hornet provided by Jerry.

Mags were used because they got rid of the on-board dry batteries (no NiCds in those days) and boosted the power of the engines. In the dynamometer tests I conducted on a Super Cyke with and without my magneto, I got two percent more horsepower with the mag. Since a little power is required to drive the mag itself, that means the power gain due to the hotter spark provided the mag-driving power and two percent more.



Contrary to what our columnist wrote back in the November 1992 issue, there was indeed a commercially made miniature magneto back in the early days of model engine development. Jerry Greaves sent this photo of a Hornet .60 fitted with a mag unit produced by Sacramento's Emil Vollenweider.



The graceful and exceptionally clean Maxi-Fli took 1st place in the Cargo event at the recent Astro Flight Electric Championships for designer/pilot Chuck Hollinger. The geared Astro 05 cobalt, running on seven cells, had no trouble at all getting the Maxi-Fli's 14.3 pounds off the ground for the prescribed flight task. At that weight, the wing loading is over 2 pounds per square foot!

Interestingly enough, within narrow limits, the faster the engine ran, the faster the magnetic flux lines were cut, the greater the induced voltage, the hotter the spark, and the faster the engine ran. But nowadays the glow plug beats the pants off of mags on small engines, with less weight, less cost and less trouble.

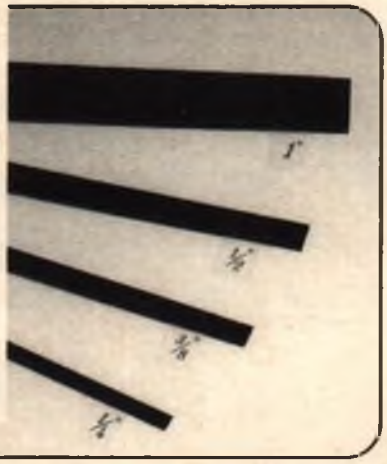
WEIGHT-LIFTING ELECTRICS

Chuck Hollinger, an expert and innovative modeler who has been a friend of mine since about 1938, sent me a photograph of his "Maxi-Fli," which he designed and built for the Cargo event at the last Astro Flight Electric Championships. The rules specify an 05 electric motor, seven cells, a projected area limit of 1,200 square inches, and a wingspan limit of 100 inches. The winning plane is the one which can take off from a 200-foot strip, fly for at least one minute and touch down in the same 200-foot strip, while carrying the most cargo (lead bars).

Chuck didn't mention the tip plates in his letter to me, but they are the first thing I noticed, and I know why he used them. Tip plates reduce the tip vortices and therefore increase the lift. In this case the tip plates are rule beaters because, while they do not increase the span or the projected wing area, they do increase the effective aspect ratio. Chuck's plane won the event.

By the way, big tip plates do not normally pay for themselves if span is not limited. Increasing the span and the tip area by the area of the proposed plates will usually improve the lift-to-drag ratio more than the tip plates will.

Chuck has always been a fantastic designer and craftsman; the tip plates were only one of the reasons for his success. The plane is beautiful, Chuck, but I have one complaint: your color detailing makes it



look like the wing is held on with rubber bands, which it definitely is not. Rubber bands would be horrible on that masterpiece!

Maxi-Fli weighs 4 pounds 1 ounce, and lifted an additional 10 pounds 4 ounces—14.3 pounds total lifted off and flown for a minute with an 05 motor and seven cells! Fantastic!

In the January issue of *Model Aviation* there is an article on the annual SAE Aero Design weight-lifting contest for university engineering students. Again the projected area is limited to 1,200 square inches, but the power is roughly 10 times as much (unmodified K&B .61s). The 1992 winner of the SAE event lifted 18 pounds of cargo. Pretty good with a .60, until you compare it with Chuck's 10-1/4 pounds of cargo with an 05 electric! The men and the boys are still separated. *(Editor's note: There's more info on the Maxi-Fli and the other Astro Cargo entries in the Astro Champs story in the April '93 Model Builder.)*

BURT RUTAN

I just finished reading the book, *Burt Rutan, Reinventing the Airplane*, by Vera Foster Rollo, Ph.D., published by Maryland Historical Press in 1991. Except for the fact that the writing is a bit repetitious, I enjoyed it very much. Ms. Rollo is a pilot and flight instructor as well as a writer and publisher of aviation books.

Burt Rutan is the designer of the "Voyager," in which his brother, Dick, and Jeana Yeager flew around the world nonstop in December 1986. The public is more apt to remember the pilots, Dick and Jeana, but my hero is Burt, the designer.

The book has several chapters on Dick and Jeana. It covers the full story of the Voyager design and its flights, the relationships between the Rutan brothers, Burt's earlier development of the homebuilt VariEze and Long-EZ composite canards, his several other designs, their involvement with the Experimental Aircraft Association and Oshkosh, and a great deal more; a total of 289 pages.

This column doesn't normally publish book reviews, but I think many of you airplane nuts and airplane designers would enjoy this semi-technical book as much as I did.

THE "COMPLETE" *MODEL BUILDER?*

As we become more commercialized, we become less self-sufficient. In many ways that is regrettable. Those of you in my age bracket remember when even kits were rare. We carved our own props, cut wheels out of balsa, and some of us even made our own model glue by dissolving celluloid scraps in acetone. I used to buy balsa timbers and saw them into sheets myself.

It hasn't been too long since I carved a prop (a special pusher prop I couldn't buy), but I am quick to buy ready-made things that are better and cheaper than I could

continued on page 34

THE BEST OF BOTH WORLDS
PERFORMANCE AND DURABILITY

New from Cox, kits that set the standard for ease of assembly.

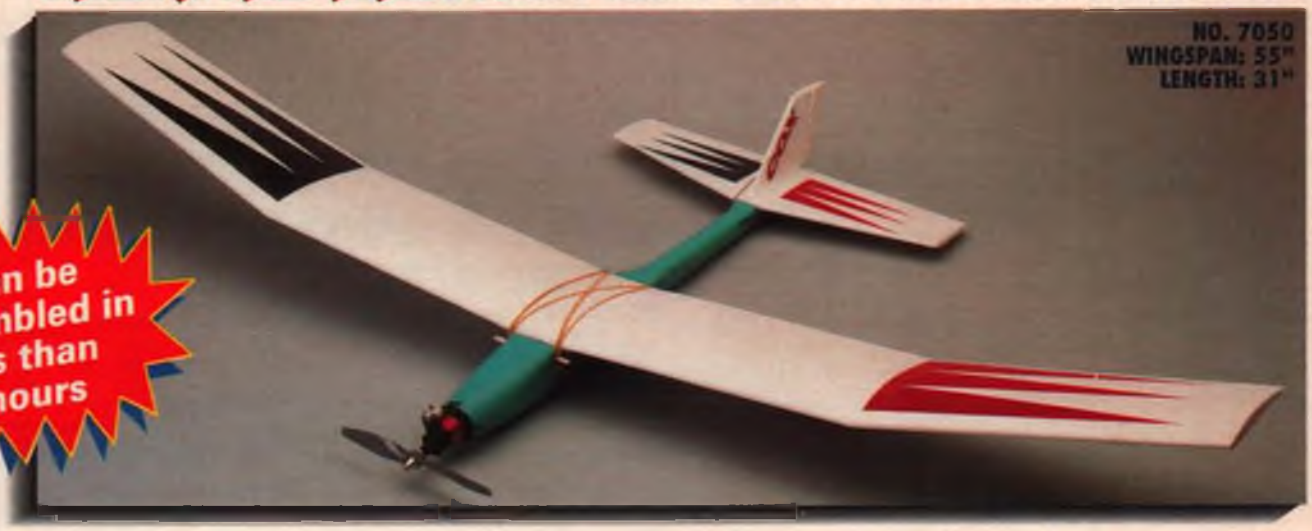
Each kit is designed for two channel radio control (rudder and elevator). Radio System and Cox 1/2A engine must be purchased separately. All other necessary hardware is included. A durable, blow molded fuselage and molded poly wing and tail surfaces provide excellent aerodynamics and durability.

RIDGE HAWK

SLOPE SOARING GLIDER

THERMAL HAWK

.049 TEXACO ENGINE POWERED COMPETITION GLIDER



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USING THE SWITCHES: RADIO TECHNIQUE FOR THE '90s

How do you set up your radio for flying the pattern, now that turnaround style is the rule in all the classes? It used to be a big part of the bag of tricks to play the dual (or triple) rate switches between maneuvers, like a rock guitarist setting up for a solo. Click. Low rate elevator for the loops. Click, click. Low rate aileron and rudder for the point rolls. Click, click, clickety-click. Everything back to normal and rudder to high rate for the stall turn. Click, clack—WHUMP! Huh? Whoops, forgot to set the elevator back to high rate for the square loop! Such fun we had, right?

Whether you think it was fun or not, not many people do it now. All of the time we had between maneuvers disappeared when turnaround style came in, and the fine and fast art of toggle switch piano disappeared along with it. The in-flight use of multiple control rates has been superseded by the increased use of exponential and VTR (Variable Trace Rate). Using these features, it's very possible to tailor response in such a way as to have "automatic" dual rates, where servo travel behaves one way (perhaps a moderate rate with normal expo at 25 or 30 percent) up to a certain percentage of the stick travel, then switches over to a totally different mode (fast linear rate, maybe) for the remaining stick travel. Automatic rudder rates coupled to the throttle setting are a common and well-used feature of many top line radios. With features like these, the benefits of multiple rates are available without taking precious time or breaking concentration to flip a switch.

The rate switches themselves still exist, bristled up along the tops of our new radios like a bunch of misaligned porcupine quills. Presumably, the scale and glider people still find them advantageous. The question is, do they still have a use from a pattern pilot's point of view?

When I recently talked to pattern folks around the country, the answer was a nearly universal "yes." Many people mentioned using the rate switches during trimming. The common technique is to use the different switch positions to initially set up the flight controls two or three different ways, with different rates or exponential/VTR curves. This enables the pilot to try different combinations during the flight, just by flipping the appropriate switch or switches.

This is the way it works: If Aileron Position 1 at 72 percent travel is too hot and Position

Pretty LA-1 by Mike Barbee of Columbus, Ohio. Futaba radio, Y.S. .61 powered.

Paul Verger of Lafayette, Louisiana brought his CyClone 1.20 design to the N-PAC contest. Futaba radio, Y.S. power.

2 at 67 percent is too slow, then the setting has been bracketed; simple deduction tells you that the right travel setting should be around 70 percent. Expo curves and settings can be determined in a similar fashion. It's the same old "fly and try" approach; you just get more "tries" during the same "fly." Things go a bit faster, and you can investigate more combinations in a shorter time.

After the trimming is finished, I have another use for the switches. It's a favorite of mine, and should prove useful for anyone who flies under a wide range of conditions. To understand it, you first need to understand the concept of Density Altitude.

Density Altitude is a way of talking about and comparing aircraft performance under different air density conditions. When we say that the density altitude is 5,000 feet, that means that, regardless of the true runway elevation or temperature conditions, the airplane will perform the same as it would at 5,000 feet on a "standard" (about 70 degrees F.) day.

Air density has a big effect on aircraft performance. Air density is affected by three major factors: pressure, temperature, and humidity. At 18,000 feet, air pressure is just about half of what it is at sea level—15 in. Hg (inches of mercury) versus 30 in. Hg. As pressure decreases, density decreases. The air molecules are farther apart. Temperature works the same way; hot air expands, the molecules are farther apart, and density decreases. A cubic foot of air on a hot day simply has fewer molecules in it. Humidity doesn't help much either. The more water molecules in the air, the fewer air molecules (no room!), and density decreases. The effect of humidity is slight compared to the effect of pressure and temperature, so it is usually disregarded when computing density altitude.

For our purposes, we don't really need to know how to compute density altitude, all we need to know is that low air density equals high density altitude, and that high runway elevations, high temperatures, and high humidity all mean lower-than-usual air density. For example, the nominal runway elevation in "mile high" Denver might be 5,280 feet, but the density altitude on a humid, 86 degree Fahrenheit (30 degree Celsius) day in August might be as much as 9,000 feet—a very large difference!

When we think about this, all that usually comes to mind is the effect on engine performance. High density altitude equals low available horsepower (less air to support combustion). However, the other flight parameters also change, sometimes in a pretty dramatic way. The reason is that air density also affects lift and drag. In low density air, the aircraft has less horsepower, lower propeller efficiency, less lift, and less drag. Weight, unfortunately, remains the same.

Obviously, the flight controls are going to be affected, and the airplane is going to "feel" different. The usual fix is to dial up the rates a little and dial down the exponential, and again, this is a "fly and try" deal. The elevator and rudder commonly need more help than the ailerons, but every airplane is a little different. Some are affected more than others, depending on wing area, airfoils, control surface size and location, tail moment, etc. The point is, it's possible to use the rate switches to hold more than one setup. I keep three tuned up and ready to go: Sea level (my home field elevation) normal day, sea level hot day, and a basic high density altitude (low air density) setup.

Density Altitude is a way of talking about and comparing aircraft performance under different air density conditions.

It's possible to do this with the basic radio templates if you have a computer radio with memory; it's just not as convenient or as instantly available as using the rate switches. The new Futaba 9ZAP radio has a switchable flight plan setup with five flight plans for each template, designed to accomplish the same thing. Give this idea a try if your pattern itinerary leads you through a lot of different conditions in the course of a season. Your airplane won't feel absolutely identical to the way it does at home, but you can tune the setup so that the differences aren't so extreme. And that might be all the edge you need.

THE SUITCASE 1.20

The photos tell the story. The airplane is the new Python from Piorun Models. Designer Henry Piorun set out to solve the transportation problem posed by the 79-inch fuselage length, and this beautifully done two-piece fuselage was his answer. The tube-and-socket arrangement assures perfect and repeatable alignment, and the overall weight penalty is a tiny 2.5 ounces. The small tray in the aft fuselage opening holds a rudder servo. The elevator servos go in the stab halves, the forward fuselage half holds the receiver, throttle servo and retract servo, and all of it—wing halves, stab halves, and both fuselage pieces—will fit in a box approximately 42 inches long by 21 inches high by 12 inches wide—just about suitcase size. Should be just the thing for popping across the country for a weekend contest. This isn't a stock item, but Henry will make the modification for you for an extra $200.00. Not exactly cheap, but then, this is a lot of very skilled work. Piorun Models does business at 10247 Wilkinson

Henry Piorun's new Python fuselage is 79 inches long. To make his own personal model easier to transport, Henry engineered a clever joiner system that allows a two-piece fuselage, split just behind the wing trailing edge. Careful use of carbon fiber and Kevlar makes for a very strong and light unit.

The Python's demounted fuselage halves show off the beautiful workmanship. The formers are made of fiberglass and end grain balsa laminate. The "tongue" on the aft section (right) carries the rudder servo.

The tube-and-socket arrangement slides together so precisely that the parting line is almost invisible.

St., Mission, B.C. V2V 4J1, Canada; (604) 820-9335.

PAYING THE BILL

A good part of this job consists of answering questions from and providing help to beginners. This is fine; I wouldn't have it any other way. There are some aspects of this that do disturb me, however. One is the still small but unfortunately increasing number of people who expect *all* of the questions to be answered, *all* of the information to be instantly given, and all of the bumps on the road to be graded level for them.

This is not a wish on their part, it's a sort of demand or minimum expectation. Doing the work to actually learn something isn't part of their plan, practicing bores them, and what they mainly want to know is what magic equipment they can buy to guarantee winning. There isn't much anyone, myself included, can do to help somebody with that attitude, and truthfully, I don't worry much about them. I don't feel I owe them anything.

But most of the beginners looking for data are different, and I do owe them something. We all do. The people who get in touch with me often have considerable amounts of expert help in their own club or local area, but somehow can't connect with it. Either they are too embarrassed to ask the questions, or worse, they have approached a pattern flier and asked for help and didn't get it. Maybe the local expert was too busy with his own problems, maybe he thought the question was silly or a put-on and gave a flip answer, or (worst case) maybe he can't remember the people who helped him and simply doesn't feel a responsibility to pass the favor along. The last two scenarios are the ones I most often hear about.

For those of us who have been at this pattern game for awhile, it's easy to overlook how hard it was to accumulate that big database we've built up. We forget just how difficult some of this stuff was to deal with when we were neophytes. It may have taken us an entire agonizing year to learn to do point rolls or round loops or put three rolls together without scaring the daylights out of ourselves and winding up in a strange zip code, but five years and two or three classes down the road from that point, we forget the pain and take the gain for granted as ancient history.

When we were brand new pattern chums, little things like installing a firewall in a fiberglass fuselage or hooking up retract linkages were stumbling blocks that required major research and planning. Trimming an airplane (especially before whizbang computer radios came along) was less a routine process than a sacred rite; a catechism we studied and learned and repeated to each other while we struggled to understand the physics behind the dogma. There was so much to learn. How to change bearings. How to set up a tuned pipe. How to diagnose a sick engine or fuel system or radio. How to make wing skins and sheet foam wings. How to calm down and put in a good flight under pressure. And how to deal with repeated failure while we learned how to (occasionally) win.

In the course of accomplishing all of that, most of us asked a fair amount of dumb questions. If they weren't really dumb questions, they were questions we would consider to be pretty dumb now that we have arrived at whatever advanced pinnacle of knowledge we are currently squatting on. Nobody likes to remember being ignorant. We forget those times, because it embarrasses us to remember them. We forget the difficulties and frustration, and remember the good times. Human beings are built like that. If mothers could remember just how much fun pregnancy and childbirth actually are, more of us would be only children.

It would help the cause and grease the ways for quite a few beginners around the country, not to mention making my job easier, if a few of us would stop and search our memory banks for some of those silly questions we once asked. We need to remember those questions and the people who answered them, and remember to pay the bill we owe. You can't pay the guy you really owe. The rules of the game dictate that you pay the next guy in line, the guy whose job it is to be asking the dumb questions this time around. While you're at it, you might remind him to pay his own bill when it comes due. **MB**

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THE 'DESAFIO II' FROM R/C CITY

We usually think of ARFs as airplanes intended for quick, time-saving assembly—something that will get us away from the workbench and into the air in short order. On the other hand, this month's project, the Desafio II, is an all-out, world class, state-of-the-art pattern ship, and its pre-built components are intended not so much to save time and labor as to insure a dead-straight, perfectly aligned competition machine.

Designed by Quique Somenzini, who placed 2nd at the 1991 FAI F3A World Championships and 3rd at the 1992 Tournament of Champions, this kit is one of several top-notch competition pattern models offered by R/C City, located in Suisun, California. This firm states it offers "the world's finest fiberglass products," and thus far I haven't heard or read anyone dispute that statement. With its one-piece, balsa-covered foam wing and stab, the Desafio II is set up for either a YS 1.20 four-stroke (which Quique used) or what we used, a two-stroke rear-exhaust YS .61. Wingspan is 68.5 inches and the overall length is 65 inches.

The price for the basic kit is $250. Additional expense options are available, such as factory sheeted wings, etc. The kit includes an exceptionally good set of building instructions, which will be welcomed by those who are just getting started in pattern and who may be unfamiliar with some of the basic tricks in constructing this kind of model.

The YS .61 AR is a super-powerful two-stroke pattern engine from Futaba. We also used a Futaba 9UAP PCM-1024 nine-channel radio with S9101 coreless ball bearing servos, Prettner-type mechanical retracts, a Greg Frohreich fueler, and aligning pins and servo rails from Tom McNichols. Painting was done using a fuselage holder built by Steve Steele, which proved to be an immensely useful item.

On the whole, we followed R/C City's excellent instructions quite closely, but we did incorporate a few additions of our own. We reinforced the firewall by sinking six bamboo pins through the fuselage directly into the firewall, which adds substantial strength. Also, when it came to gluing the two halves of the wing together, we reinforced the center section with carbon fiber.

In finishing the aircraft, we followed the procedures outlined in the painting article in the October, 1992 issue of *Model Builder* by Wayne Apostolico and Gene Rodgers. This article was full of great ideas on how to put a really lightweight finish on an airplane using automotive acrylic lacquer. We decided to use Coverite's 21st Century paint instead, as we had had excellent success with it on previous projects.

Work on the virtually pinhole-free fiberglass fuselage was begun with a thorough sanding and filling, after which we primed the surfaces with an automotive lacquer primer. This coat was almost completely sanded off. Next came a light coat of silver lacquer, which was then lightly sanded. We masked off only the areas we wanted for the particular Coverite paint colors, then applied our paint coats. Contrary to accepted practice for getting a super finish, all Coverite paints were applied straight out of the spray cans, and the resulting finish was really outstanding. Next, graphic trim was applied, then the entire fuselage was given a clear coat of automotive acrylic enamel.

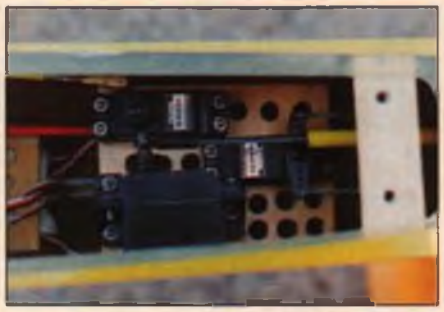
The wing and horizontal stab were covered with Coverite's 21st Century film, which proved to be an excellent match for the Coverite paint. We find that the Coverite film goes on very easily, as it is a polyester material, and has previously proven itself to be quite durable. It seems to be a little thinner than other films, and we find that we can apply Coverite film trim over a base of the same material with practically no bubbling, by doing it carefully with a covered sealing iron at the proper temperature.

On completion of the finishing process the engine and radio were installed. A Hatori pipe and header were attached to the engine, set 16.5 inches from the glow plug to the high point of the pipe. We used a 13.5x10 APC prop, which tached in the neighborhood of 10,000 rpm. This turned out to be almost 1,000 rpm more than we can get with our standard YS .61 Long Stroke, which indicated that our Desafio II would be no slouch in the performance department. The airplane's moments are actually better suited to the heavier YS 1.20 four-stroke engine, and some nose weight was therefore needed to bring our model into proper balance, ending up at 8.5 pounds ready to fly—a bit on the heavy side.

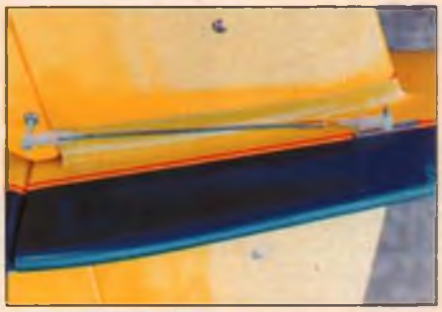
Test flying a new airplane is always a thrill, especially when the test pilot is Steve Helms, the noted world class pattern flier. Steve's first flight was uneventful, with only one click of down elevator needed to trim for straight and level flight. Because of the sharp leading edges on both the wing and stab, snaps were very clean and positive. The colors chosen afforded excellent visibility. Yellow is an especially good color to distinguish at a distance on a bright, sunny day.

Overall, we found the Desafio II kit a pleasure to build and fly, and would recommend it to both novice and expert pattern fliers as a very fine flying competition pattern aircraft. However, more than cursory building, covering and painting skills are required to do justice to this airplane, so be prepared to put a greater-than-average effort into building it. The kit is produced by R/C City, 96 Railroad Ave. #F, Suisun, CA 94585; (707) 428-3119. **MB**

Removing the cowl reveals the inverted YS .61 AR, one of the most powerful of the current crop of two-stroke 10cc pattern engines. Engine is mated to a Hatori header and tuned pipe. Designer Quique Somenzini uses a YS 1.20 four-stroke in his model, which would eliminate the nose weight our columnist needed with the much lighter .61.



Servo installation is simple and efficient. Futaba S9201s were used for all flight controls.



R/C City's pushrod system, seen here in a slightly modified form, provides smooth and slop-free elevator action.

Author's model was finished with Coverite 21st Century paint on the fuselage, 21st Century film on the wing and tail. The eye-catching design was done in bright colors, which makes for good visibility in any attitude.

EYE IN THE SKY cont. from page 12

the airplane didn't even know it was carrying an extra 8 ounces. I mostly circled the field, doing an occasional loop and a barrel roll or two, while the crowd of onlookers gathered around the 13-inch TV screen. All I could hear were screams of delight. After I landed, I viewed the tape myself. Even though it was in black and white and had no sound, I was completely mesmerized by what I saw!

We went on to test the unit in a number of airplanes. First we used two gliders, both launched from a winch. At first, all we could see on the screen was open sky. Once the launch was complete, however, the nose dropped and the ground came into view in a magnificent panorama. Everything we saw had an air of realism, right down to the thrill of going through the approach and landing as if we were sitting in the tiny cockpit! Just as exciting was the subsequent flight in an electric powered glider, with the camera aimed through the whirling prop. Next, we flew a big Laser powered by a Supertigre 3000, and after a series of spins and Lomcevaks, we found that the video picture could actually induce dizziness in those watching the picture.

The absolute highlight of the day was mounting the unit on the side of a Kalt Baron Alpha II helicopter. With pilot Dan Egelhoff at the controls, the videos were rock-steady and a joy to behold. The chopper was hovered, then suddenly whisked up to about 500 feet, rolled, looped, and put through every maneuver in the book. Every scene we witnessed on the TV screen was absolutely spectacular. Then a glider was launched, and the helicopter followed it in flight, sending us a video picture from takeoff right up to the landing. When I arrived home I spent hours watching the tape over and over, enjoying it even more after we dubbed in a nice music background.

Views from a model sailplane's perspective were provided courtesy of Pete Stairs and his Synergy competition glider.

The possible uses for the airborne micro video camera system are limitless. There are plans to mount a unit in one of the Unlimited racers at the Madera Unlimited RC Races coming up in October. Then imagine the possibilities of flying combat, using multiple units in different airplanes. How about installing it in a glider for aerotowing? Or aiming the camera straight down for bomb and parachute drops? Of course, it will be a long time before we tire of just regular RC video flights.

There are a couple of considerations to take into account when getting into airborne video. First, a ham license is presently needed, but since the Morse code requirement was dropped, you only have to pass a multiple choice test—no big deal. Nevertheless, by the time you read this, Plane Talk should have a unit available for which no license is required. Also, because of its low power, range is limited to perhaps a mile. The system is available for about $500 from Plane Talk, P.O. Box 11364, Costa Mesa, CA 92627. Monte Salot will be glad to answer any technical questions by telephone at (714) 650-5004. **MB**

VISIONS OF LUSCOMBE, THE EARLY YEARS, BY JIM ZAZAS

Sixty-five years ago, a new and affordable light airplane made its debut. It wasn't just another tandem seating biplane or underpowered monoplane—those types were common. Instead, this airplane was unique, offering side-by-side seating, an enclosed cabin, a sexy fuselage, responsive flight controls, a powerful engine and a single high wing that offered good visibility. All of these features combined to lure sport pilots and wanna-be's to take a second inquiring look.

And what did Don Luscombe call it? "Monocoupe."

Designed by Clayton Folkerts and perfected by such notable aviation engineers as Jerry Lederer, Fred Knack and Ivan Driggs, the Monocoupe became synonymous with a new breed of graceful styling and sprightly performance.

The Monocoupe incorporated many new improvements and changes, positioning itself well to meet the growing demands of a growing market. Other designs included the Monocoach, the Monoprep and the Monosport. Some Monocoupes evolved into exceptionally sleek and powerful aircraft that were used for air racing.

Luscombe's Monocoupe work was comparatively brief, lasting only seven or eight years. Market forces and corporate events compelled Don Luscombe to pursue the means to mass-produce his airplanes. Eventually, this idea included "all-metal" in his planes and ad descriptions.

From 1933 through the next six years, Luscombe founded at least three other airplane companies that carried his name. He pursued his "mass produced, all-metal" visions with an unmatched enthusiasm. His factories produced stylish and robust airplanes with catchy names such as Phantom, Sprite, Ninety and Sixty-Five. Much like the sleek Monocoupe designs that preceded them, these later designs offered class with performance.

It was the Luscombe Model 8, however, that truly fulfilled Don's goals of an affordable, mass-produced, all-metal airplane for the private owner. This chic design became the number one choice of sportsman pilots, flight schools and the aviation-hungry media.

Combining corporate history and individual biographies, author Jim Zazas describes Don Luscombe and his clairvoyant visions and illustrates the men, airplanes and companies that kept those visions alive. Personal interviews, corporate records and contemporary publications enhance the historical value of this work, which includes numerous never-before-published family and factory photographs and several three-view scale drawings that modelers will find very useful.

Visions of Luscombe, the Early Years is 8-1/2x11 inches, has 335 pages, 475 photos and a full-color foldout. It's available from Aviation Heritage Books, P.O. Box 665, Destin, FL 32540; (800) 999-0141. The price is $26.95 for the softbound or $36.95 for the hardbound edition, plus $3.50 shipping and handling. ***MB***

BY ROBERT AFFLERBACK

The 'MicroPeaker' From Baylor Electric Products

One of the necessary tasks involved in flying electrics is charging the flight batteries. Undercharge your batteries and your flights will be short; overcharge and you can damage the battery.

The two most popular ways to charge a flight pack are to either time the charge or use a peak detection charger. Timing can be done with a relatively inexpensive charger and will get you to a good 80 percent charge on a regular basis, but this is of course not the way to go for maximum flight times. Peak detection will give you a full charge every time, but good automatic cutoff peak chargers capable of handling over 20 cells are quite costly.

For the past few years, the most popular charger for the bigger electric power systems has been the Astro Flight Model 112 DC/DC constant amp charger, which can handle up to 28 cells and is designed to maintain a constant current throughout the charge cycle. It's not a peak detection charger, at least not one that automatically shuts off when full charge is reached; you *can* use it to peak charge a battery by plugging a digital voltmeter into the jacks provided and monitoring the battery pack voltage, but this is something of a nuisance that requires your constant, undivided attention—time that could be much more enjoyably spent socializing with your flying buddies.

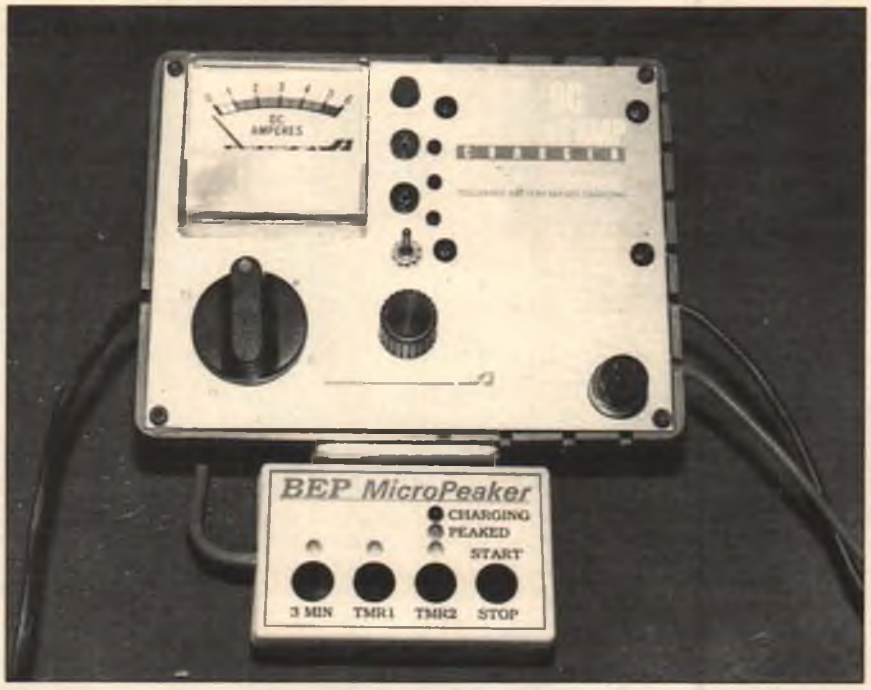
Astro Flight no longer produces the Model 112 charger, having recently replaced it with the new Model 112 PK peak charger (suggested retail $189.00). However, there are still an awful lot of folks who own and are using the standard Model 112 chargers, and it is for these that Brad Baylor of Baylor Electric Products (BEP) developed his "MicroPeaker," an automatic cutoff peak detection add-on unit designed specifically for the Astro Flight Model 112 charger.

The BEP MicroPeaker requires no major modifications to the Astro Flight charger. There are just six wires to be soldered to existing connections, and four of the six are not polarity sensitive. It took me longer to take the pictures for this article than to install the MicroPeaker to my Model 112 charger.

Another nice feature of the MicroPeaker is that it doesn't change the operation of the Astro Flight charger. If you have a battery that for some reason you don't want peak charged, just plug it into the charger, crank up the timer, and set the amperage. The charger will shut down when the timer runs out.

About the only thing I found that could be a problem is the MicroPeaker's small susceptibly to false peak. What I mean is that if you're charging a battery and something interrupts the current flow, the peaker will kick off and show a peak, even though the battery is undercharged.

Fortunately, Brad has even this covered. On the face of the MicroPeaker is a button marked 3 MIN; just press this button and restart the charger. If the time runs out before the battery peaks, it wasn't fully charged. If the pack peaks before the time runs out, it's time to fly.



The BEP MicroPeaker installed on the author's Astro Flight Model 112 charger. The MicroPeaker comes with an aluminum mounting bracket and gets stuck to the side of the charger case with double-sided tape. Astro Flight recently came out with a peak detection version of the Model 112, but for those who already have one of the standard 112s and would like to upgrade it to peak detection at minimum expense, the MicroPeaker is the way to go.

INSTALLATION

To install the BEP MicroPeaker, simply remove the four screws from the front and lift out the electronics. If you have one of the 112s that is equipped with a fan, you will not be able to completely remove the front panel, but this isn't a problem because the fan wires are long enough to allow you the room you need.

The next step is to drill a 5/16-inch hole in the left front corner of the case, to allow the six wires coming from the MicroPeaker to reach inside the charger.

The two heavy 18-gauge black wires get soldered to the terminals on the back of the charger's timer; don't worry about the polarity. The two thin 28-gauge gray wires go to the same terminals as the charger output wires. These are the wires the MicroPeaker uses to monitor the battery pack voltage, and again the polarity of these wires is not important.

The remaining two 28-gauge gray wires are marked with red and black ink; the one with the red mark goes to the back of the fuse holder, the one with the black mark gets soldered to the negative side of the switch.

With the front panel reinstalled and the charger sitting on a flat surface, the MicroPeaker unit can be mounted to the

plastic charger box by means of the two-sided tape provided. That's all there is to it.

Anyone who can solder a set of connectors to a battery pack can handle this installation. But if you don't feel comfortable going inside your charger, Brad will install your MicroPeaker for a nominal fee.

Let's go charge some batteries!

SETUP AND OPERATION

The BEP MicroPeaker unit has three pre-programmed buttons on the face. The first button is marked 3 MIN and is used to peak already charged batteries, or to check for a false peak. It is hard-programmed, and cannot be changed.

The other two buttons are marked TMR 1 and TMR 2; these are safety shutoffs for the charger. They are there to shut off the charger at a predetermined time, should a peak not be detected for any reason. These buttons come preset for 20 and 30 minutes, but can be adjusted as needed by means of the DIP (dual inline position) switches on the side of the unit.

I left these switches alone. I found that when charging the 1400-mAH, 28-cell pack in my Dalotel, the 30-minute timer gives me about a 6-minute leeway, and the 20-minute setting is good for everything else I do. If you want to change these settings, a chart is provided to stick to the back of the charger and gives you all of the useful DIP switch combinations.

Another adjustment available on the the MicroPeaker requires that the case be opened up. On the circuit board is a small pot which determines the minimum voltage that will operate the MicroPeaker, so as to prevent running your battery down so far that you can't start your car. This adjustment comes from BEP set at 10.25 volts.

Again I left this adjustment alone. I usually charge from my car battery, and find that 10.25 volts leaves me with enough power to start the car when the unit kicks out. Anyone who has found themselves with a dead battery at the end of a flying session will appreciate this feature. The instructions tell you how to adjust this minimum voltage, for those who charge off of a separate battery or who don't mind the walk.

Okay, we have the MicroPeaker hooked up, we have it set up to our liking, and we want to charge a battery. Connect the battery to the charger, make sure the charger's high/low switch is in the proper position, crank the amperage all the way down, select a timer setting on the MicroPeaker, and press the Start/Stop button.

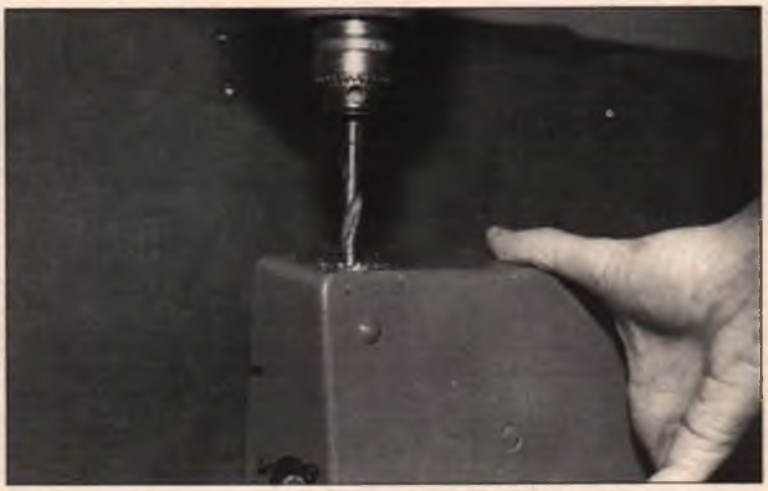
The first thing you will notice is that the red charge light will start to flash. It will continue flashing for about 30 seconds, to give you time to set the charging amperage. Once the light stops blinking, charging has commenced, and turning the amperage adjustment will kick off the charger.

When the battery has reached its peak, the charge light will go out and the PEAKED light will come on. If there was any time left, the light above the appropriate TMR button will start to blink. If the TMR light goes out, and the PEAKED light is not on, the battery didn't reach a peak in the time set. Simply check to see if the battery is hot, and if it isn't, restart the charger.

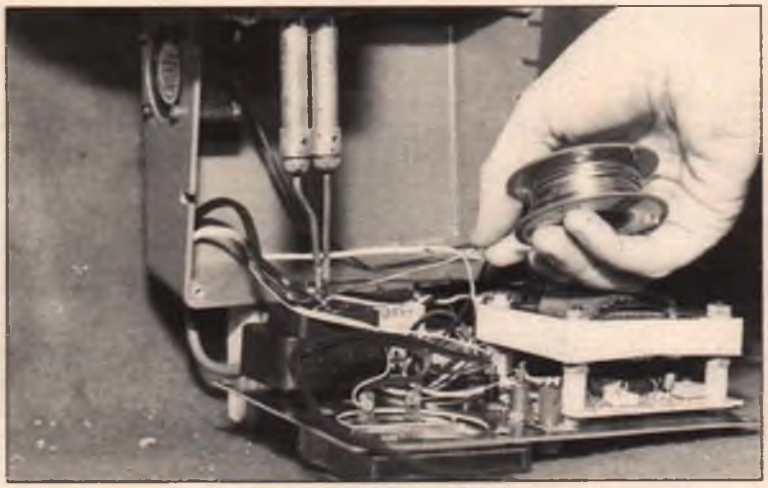
So let's say you return to check your battery, and find the PEAKED light on and the TMR light flashing. This means that a peak was detected before time ran out. If you're not sure the battery is really fully charged, simply press the 3 MIN button and restart the charger. If a peak is detected before the three minutes runs out, the pack was fully charged. If not, you got a false peak, so charge the pack again.

I have to say that the only time I got a false peak on my MicroPeaker was when someone turned on the car ignition switch while I was charging. You could also get a false peak if someone turns the charger current adjustment knob, or hooks something up to your battery while you're charging. All in all, false peaks haven't proven to be a problem.

As you can tell, I'm quite pleased with my MicroPeaker. Anytime I can spend $69.95 plus $3.00 S&H for something I can add to my existing charger to make it do the same thing as chargers costing up to $300, I'm tickled to death. So if you have an Astro Flight Model 112 charger and would like to get away from having to babysit your battery packs, get in touch with Brad Baylor. I think you'll be as happy as I am. Write to Baylor Electric Products, 7701 Willowbrook Rd., Fairfax Station, VA 22039-2127; or call (703) 323-4768. ***MB***



Installation of the MicroPeaker is simplicity in itself. The only modification needed to the Astro Flight charger is to drill a 5/16-inch hole in the plastic case for the MicroPeaker's wires.



After running the six wires through the newly drilled hole, they are soldered to the various terminals as clearly illustrated in the MicroPeaker instructions.

The DIP switches on the side of the MicroPeaker are used to set the two safety shutoff timers. The unit comes with TMR 1 set at 20 minutes and TMR 2 set at 30 minutes. By moving the DIP switches to different positions, the timers can be set anywhere from 10 to 45 minutes.

BY DAVE LINSTRUM

The Peck-Polymers Dietrich 'Convertable' For O.T. Rubber

This reviewer's previous experience with Peck-Polymers kits has been limited to small stick-and-tissue designs such as the Peck R.O.G., Stringless Wonder, Peck Pup Bostonian and an almost endless variety of Peanut Scale subjects. In this latter category, our most memorable was the Peck Nesmith Cougar, designed by Clarence Mather, which we built in a villa in Kuwait City and shipped (by ordinary mail) over 9,000 miles to *Model Builder* for the magazine's 1974 Parcel Post Proxy Peanut Contest. We won 1st place for the most distant entry, edging out a submission from Sydney, Australia!

We also enjoyed building (in Florida) the Peck Lacey M-10 Peanut designed by scale ace Butch Hadland of England. This kit, which has sold more than any other Peanut, was selected for a 1992 Ten Models of the Year Award by the National Free Flight Society. This is a fitting tribute to both Bob Peck (who engineered the kit) and Hadland—a posthumous award, as they have both passed on to that great flying field in the sky. We know they have plenty of tall grass for testing and abundant gentle thermals.

Why do we mention the above miniscule models as a prelude to reviewing this relatively behemoth-sized cousin? The answer is contrast and consistency. The contrast is clear in the packaging and wood sizes. When you open a bright orange-and-blue Peck Peanut kit box, out comes a bundle of slim sticks (1/16 square—1/20 on the Lacey), delicate thin printwood and an itty bitty silver prop, complete with nylon thrust button and bent shaft. The plans measure a mere 11x17 inches and there is a photo-illustrated instruction sheet.

The vivid contrast of opening the Dietrich Convertable's bulletproof, man-sized white box (no shipping damage here!) could send you reeling when the machine-cut prop blank and huge 24x36-inch rolled plans (with balsa timbers inside, along with brightly colored tissue) are unpacked. You immediately observe that this is a macho model, and that you will be dealing with a brute of a model, both in building and flying. This is not a negative remark—just a statement of contrast. You will have to actually *carve* that monster prop blank by hand (almost a lost art in these days of molded plastic props), and the huge hank of 3/16-inch FAI Tan Rubber challenges you to make up a motor and wind it to max turns! This is not a kit for kids or wimps. Whether you build it for a sense of *deja vu*, recalling your own Thirties youth (this design dates to 1938), or just to join the Old Timer crowd as they celebrate the model designs of a bygone age, this kit will provide a rugged and

Dave strikes a classic pose with his 1938 O.T. rubber model. Last August, Rick MacEntee fitted this same ship with floats and flew it to 1st place overall and 1st place in the Mass Launch event at the Fifth Annual Florida Keys R.O.W. meet, at Jeanne and Millard Wells' place on Plantation Yacht Harbor.

DIETRICH 'CONVERTABLE'

WINGSPAN ..... 34 inches

WING AREA ..... 134 square inches

Originally designed in 1938 by Tad Dietrich.

Qualifies for SAM O.T. rubber events.

Kitted by Peck-Polymers, Box 710399-MB, Santee, CA 92072-0399; (619) 448-1818

Suggested retail price $28.95

eminently flyable airframe.

We must note that the name "Convertable" derives from the easy conversion from a spindly-legged, slim-wheeled R.O.G. to R.O.W. (rise off water) configuration. This means you can enjoy a quick liftoff from a sheet of plywood or a swift rise off of the nearest lake. All you need to enjoy the wet stuff is the clip-on balsa floats. The one on the subrudder keeps the tailfeathers from being splashed.

Enough contrast commentary—what of consistency? Here the reply is the "Q" word—genuine, old fashioned *quality*. A hallmark of the small Peck kits, it is seen here in depth in the lovingly drafted plans, accurate stripwood and vacuum-formed clear canopy (a treat on a cabin model—easy to install). We do feel that the covering material should be original Japanese tissue in place of the inelegant yet sturdy Peck domestic tissue paper. However, you can always mail order the former (try Litespan for the fuselage—it is tough as nails) when the airplane is close to being ready to cover. Save that prop carving trauma for last!

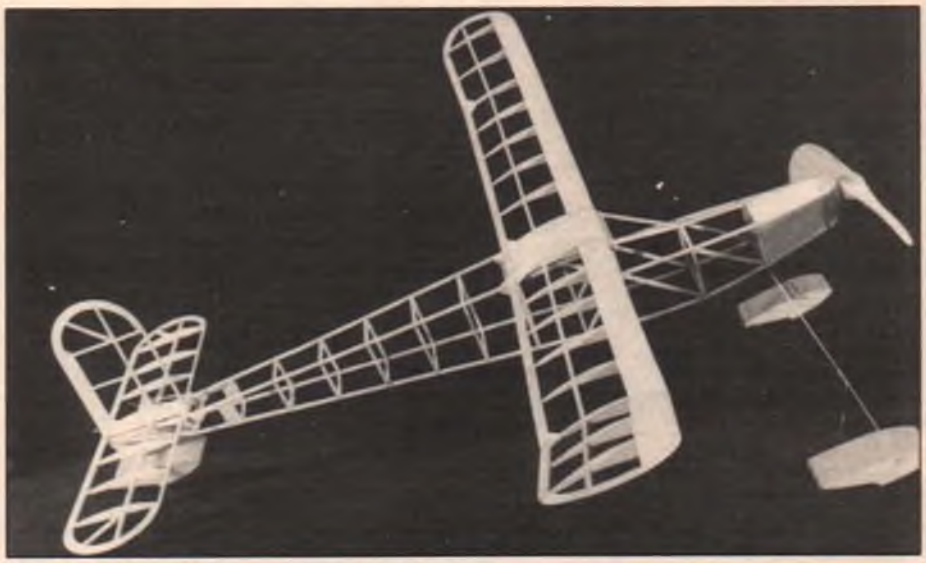
One comment on the color: make it bright! This model will climb very high and you will need all the visibility you can get. We used bright blue Litespan on the fuselage and a combination of orange and white on the flying surfaces. While this choice may be the corporate Peck colors, it is also highly visible. We recall watching orange/white tissued models built by C.O. Wright drifting in dreamy circles above the Kansas hills (there's that nostalgia trigger working!). Avoid dark colors—they never show up in the weeds when you DT. You may want to consider a small Tomy-geared DT timer instead of a fuse if you live in a fire hazard region.

Building this big bird is perhaps simpler for the ham-handed than a Peanut, though it does have more parts, plus the accessory floats. You might try making these from 1/16-inch sheet foam or even hewn from solid blue foam. This waterproof matrix avoids waterlogging—there's nothing worse than gurgling, hollow floats! Be sure to use permanently waterproof aliphatic resin glue (not white glue) when you tissue cover foam floats. If you fly ROW, the entire model must be well doped.

There's no need to do the "Glue Part A to Part B" routine here—the plans are a marvel of clarity. We suggest you save the prop carving job for last. Get a sharp folding knife or an X-acto with the long, straight woodcarving blade. Put on some soothing music, work in good light (a back porch on a sunny day is ideal) and keep a plastic bag or a box beside you for those wood chips. Carving the underside first and then the upper camber allows you to shape a good airfoil. If you have never carved a prop, use a Peck silver plastic prop as a visual guide and hack away at some scrap balsa blocks until you master the method. This will avoid tragedy on the block provided. A balanced, properly carved wood prop is the key to performance on this or any other large rubber model.

Sandy Peck launches the prototype Peck kit on a trimming flight. The model gets its name from the fact that only a few seconds are needed to convert from wheels to floats or vice versa. The Peck kit is an authentic replica of Tad Dietrich's 1938 cabin rubber model and is legal for SAM O.T. rubber events. Peck-Polymers photo.

It's obvious that a lot of effort went into engineering and producing this kit—the "Q" word again. It is significant that this was a solo effort by Sandy Peck, who carried on the business after she lost husband Bob. Apparently he taught her a lot during their long collaboration (which produced a successful business and two lovely daughters), as the attention to detail is clear. They truly understand Free Flight.



The framed-up Dietrich Convertable, ready for covering. Simple, straightforward structure shows up well here. Photo courtesy of Peck-Polymers.

Criticism? Minimal. We think a photo on the label would be better than a line drawing. And while the construction photos are handy for a first-time builder of a model with a box fuselage and multi-spar flying surfaces, they should include instructions on prop carving. Also, more comprehensive trimming advice might be in order for novice fliers. Our personal preference is a right/left pattern with right and down thrust working against rudder trim to left, with a bit of left side up stab tilt to assure a thermal-seeking circle. Floats will have only a minor effect on the glide.

Taking a tip from our indoor flying pals, who make scale models this size (Coconuts) which completely disassemble for packing, we made the fin and the wire gear removable (but still firm for flying). This is easily accomplished by fitting round toothpick studs to the fin which fit into paper or aluminum tubes in the stab, and by clamping (friction fit) the base of the gear wire into a 1/16 plywood box in the bottom of the fuselage. Be sure this is sealed if you fly R.O.W.

They rate hotels and restaurants with stars, so if you get four of 'em you know you have the "Q" word down cold. In the case of Old Timer models, perhaps cumulus clouds make a better symbol, signifying thermals. Continuing the Peck-Polymers tradition, the Dietrich Convertable rates four fluffy white ones. Take a trip down memory lane with this multi-purpose gumband bird! ***MB***

MODEL DESIGN *cont. from page 20*

build them. I buy my engines and radios and lots of fittings. I don't normally buy ARFs, because I like to design my own models. In 1946 I built the first radio control set I ever had (I still have it), but I can't compete with today's RC system manufacturers.

I admire modelers who not only design and scratch-build, but go beyond that. Occasionally I read of modelers who build their own beautiful engines, and there may be a few of you who build your own radios yet. Congratulations!

I don't think I will ever hear of a "complete" model builder, because taken to the extreme, that would mean a person who grows his own balsa, mines and smelts his own metals, makes the covering materials, and distills the methanol for fuel or formulates and cures the rubber motor strip.

But please let me hear from those of you who go beyond the usual. I won't publish photos of your ARFs, but I would love to publish photos of your unusual designs, your homemade engines, and your do-it-yourself electronics, along with the facts and figures. Let's hear from *Model Builder's* outstanding model builders.

NH4OH

Household ammonia, a dilute solution of ammonium hydroxide, is handy for bending balsa and other woods to radii much smaller than they will normally conform to without breaking or splitting. The chemical somehow temporarily softens the wood fibers. I have read that tip in the model literature several times over the years, and have occasionally used it. It works. Soak the wood in ammonia and clamp the wet wood in the shape you want it until it is thoroughly dry. Ammonia soaking will permit considerably tighter bends than water soaking.

A question that occurred to me was whether the ammonia would permanently weaken the balsa, so I ran a test. Bending and splitting-strength tests were run on two samples of 1/16 balsa cut from the same sheet. A control sample was left alone; the other sample was soaked in full-strength household ammonia for 24 hours, then allowed to dry without rinsing. The two test samples were then tested to destruction. The results were the same; the one that had been soaked in household ammonia was fully as strong as the untreated one.

Ammonia soaking is a good technique for making bends in wood. Use it without fear; but keep your nose out of the ammonia bottle and hold your work at arm's length.

RAZOR BLADES

I'm not poor, but I was raised to be frugal and that frugality has increased with our new awareness of environmental waste. I use X-Acto knives and snap-off blade knives, but I also continue to use razor blades for some jobs. When I use a razor blade it is

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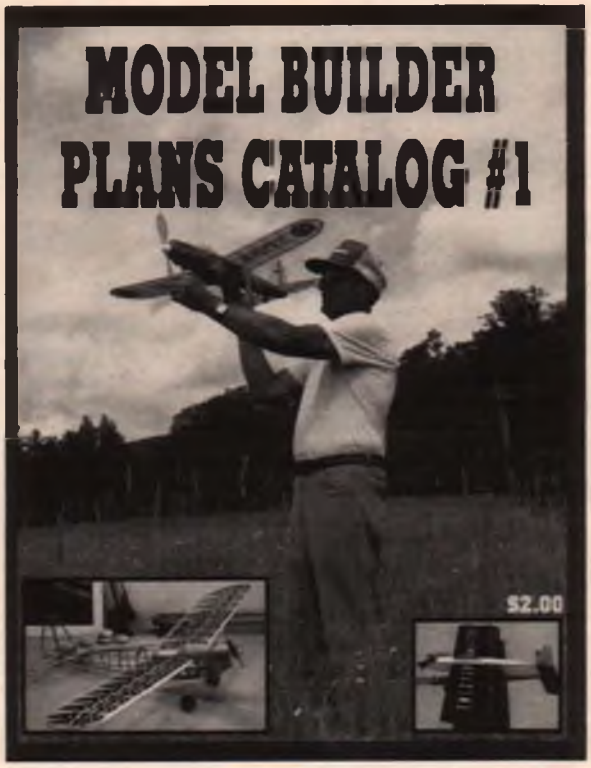

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usually for cutting balsa strips and such, where only the tips of the blade get dull. Therefore, when the tips of a razor blade get dull I break them off with a pair of pliers, and can then use the blade a second time. Some sort of eye protection is *mandatory* when doing this, so be forewarned!

TAXIING CAN BE DANGEROUS

A year ago I was giving my 11-year-old grandson Donzi a beginner RC flying lesson. He had received a little in-flight stick time in a previous session. He had also done a little closely monitored taxiing (with a trainer) on the previous occasion.

This time we were going to fly a hotter .60-powered model. Grandson asked if he could taxi the plane to the runway. Sure, why not. I largely ignored the operation because of his previous taxiing experience. I was standing about a hundred feet away from boy and transmitter, which turned out to be a mistake. All went pretty well until he tried to turn the plane around at the end of the runway to line it up for me to take-off.

The model had come to a complete halt and its wheels had sunk down in the grass a bit. This is a situation that experienced pilots take for granted and get out of by gradually advancing the throttle until the plane starts to roll and then quickly cutting back on the throttle to prevent excess acceleration.

The lad didn't have the experience to handle the problem safely. To get unstuck he gave it full throttle and the plane jumped forward with a roar. I also jumped and yelled from my remote vantage point, but was not in control of the situation. Fortunately he didn't panic and lock onto full throttle, but pulled it back to idle after a couple of seconds. Because he was also holding full rudder the plane cartwheeled violently, but stayed on the ground.

I was upset, the boy was frightened (both by the sudden action of the plane and by my yelling) and his mother was upset with me for yelling at him and for leaving him alone with a machine that was obviously too advanced for him. I was guilty as charged. But, no risk, no gain; anything worth doing is going to be difficult; we learn by our mistakes (both his and mine); etc.

If he had left it at full throttle for several more seconds the plane would have been in the air and out of control, with no qualified pilot near the transmitter, with plenty of people in the pits and spectator area, and with other planes and parked cars close by.

There is, of course, no moral to this story, so I won't search for one. I didn't learn a thing and will continue to leave students unsupervised in the future.

PARTING WORDS

"He is a lucky person, and the harder he works the luckier he gets."—from the book *Burt Rutan, Reinventing the Airplane*, by Dr. V.F. Rollo.

Francis Reynolds, 3802 127th Ave. NE, Bellevue, WA 98005-1346. SASE please. (206) 885-2647. ***MB***

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HANNAN'S HANGAR

BY BILL HANNAN

"Modeling makes friends all over the world; ours is an international hobby."

Our quotation this month is from cellist Enrique Maltz, who takes along Peanut scale projects while traveling through many countries. His Farman Carte Postale was started in Japan, worked on in the Canary Islands and Europe, and completed in Israel. The 10.4-gram craft has flown for up to 76 seconds, and Enrique plans to send it back to Japan for a proxy contest. Circle complete! Confirming just how international our model building is, is demonstrated by our photos and their captions.

The well-traveled Farman Carte Postale of Enrique Maltz, who builds models during his world orchestral tours. More in text.

WHERE TO FIND IT

Most of the mail we receive is from readers seeking information about organizations or products. Some of our other mail is from organizations or manufacturers trying to make their services or products known. So here is an update which may help solve both situations:

FLYING ACES NORTHWEST

The Flying Aces Club, originating in Connecticut during the 1960s, continues to gain new branches as their low-pressure, fun-oriented philosophy spreads. The most recent group, based in Washington state, calls themselves the Eagle Squadron, in tribute to the American volunteer pilots who flew with the Royal Air Force during WW II. The Eagles plan indoor and outdoor events and invite new members to share in the action. Contact Len Sherman, 24629 S.E. 200th St., Maple Valley, WA 98038.

KAPA

Kits and Plans Antiquitous is a club for people interested in preserving vintage model kits and plans, as well as the history of the individuals and firms who created them. Membership includes a quarterly newsletter, edited by Lou Buffardi, plus free advertising privileges. It is anticipated that a wide range of interests will be accommodated, including three-views, solid models, gliders, power, free flight, control line and radio control. KAPA memberships are $6 per year, payable to Jim Alaback, 12366 Nacido Drive, San Diego, CA 92128.

Truly a "mixed bag" of International Peanuts by George Benson, of Mill Valley, California. From left: an American VP-1 homebuilt (bearing German markings!), Polish Drzewiecki canard, French Farman Carte Postale, and British Wight Quadruplane.

Heinz Neumann, of Germany, built this Baby Ace from a Peck-Polymers kit and mounted a photograph of his son Moritz in the cockpit. Broken exhaust pipe and replaced wing strut testify to the long flying career of this model.

PUBLICATIONS

F.Y.I Model Flight, compiled by Don Edberg, is subtitled *The Sourcebook for Everything for Flying Models*. Sounds comprehensive, and indeed it is, containing a massive amount of carefully arranged information. Want to locate the nearest model club? The closest hobby shop? The address of an obscure cottage industry or a well-known manufacturer? Their phone numbers? Very likely it is here and easy to find, too.

Other sections compare specifications of free flight, control line and radio controlled models, their powerplants and accessories. One can only imagine the time and effort required to research, organize, typeset and proofread this publication! To obtain a copy, send $19.95 postpaid in the U.S. (California residents add $1.55 tax), or for first class mail add $1.40 more. International readers should write for postage costs. Send to Dynamic Modelling, 4922 Rochelle, Irvine, CA 92714-2941.

TIGHT LINES

Anyone for kite flying? *Tight Lines*, a newsletter edited by Leonard Conover, is published six times a year, and is a good-humored compilation of kiting history, contest schedules and handy hints. To subscribe, send $10 to The Greater Delaware Valley Kite Society, P.O. Box 888, Newfield, NJ 08344.

VOL LIBRE

The title of this outstanding French magazine/newsletter translates to "Free Flight," and it concerns all aspects of that ac-

Even Peanuts are available in ARF form! This model of an American Taylor E-2 Cub is hand-built in Czechoslovakia and is marketed by SAMS of England. More in text.

tivity, indoor and outdoor, with the accent on international categories. Typically, articles are in French, although some are in English and German. The plans, sketches and photos are, of course, a universal language. Rather curiously, a few pages feature control line models. Subscriptions in the U.S. are available for $24 per year, from Peter Brocks, 313 Lynchburg Dr., Newport News, VA 23606-1617.

PLANS

Flying Scale Incorporated, now operated by Danny Galloway, offers more than 70 free flight scale model plans of all eras. The WWI BE-2E sample we received was finely detailed and expertly drawn by the late Bill Galloway. An SASE will bring you the complete list: Flying Scale Incorporated, 1905 Colony Rd., Metairie, LA 70003.

Harold J. Towner has more than 40 scale model plans ranging from tiny Peanuts through free flight, control line and RC designs. Intended for experienced builders, the subjects cover from WWI through WWII and beyond. One dollar will obtain a list: Authentic Scale, 238 Kings Drive, Eastburn, East Sussex, BN21 2XE, England.

SAMS OF ENGLAND

This bountiful catalog features such diverse products as CO_2 systems and model kits from Czechoslovakia (see photos), publications, tools, plans and supplies. We were astonished by the variety of offerings representing suppliers from several countries, and had the opportunity to examine some of the items. The Taylor E-2 Cub Peanut was truly a surprise; lifting the box lid revealed a completely preconstructed framework!

Designed and hand-built by Jurai Jurovic, the kit includes, in addition to the pre-made components, tissue for covering, molded plastic cowling and wheels, proof-of-scale three-view, construction plan and instruction sheet. Although adaptable to rubber power, the model is intended for Gasparin CO_2 propulsion. At about $30 plus postage, the kit might appeal to collectors and may also be an inspiration to someone who may never have attempted to build a small stick-and-tissue model. The matching Gasparin CO_2 system, at something over $100, would result in a model the buyer might hesitate to launch under thermal conditions! On the other hand, such models can be successfully flown indoors, which may be a more logical way to keep track of it.

Another unusual kit marketed by SAMS is a 23-inch long flying model of the Lockheed F-117 stealth fighter, designed by P.A.

A variety of the Czechoslovakian Gasparin CO_2 systems as marketed by SAMS of England. Note the different sizes and configurations.

Shepherd, who must have faced quite a challenge arriving at the many strange configuration angles. Of conventional balsa-and-tissue construction, the model may be flown as a tow-line glider or with a removable rubber-driven propeller assembly.

We also examined one of the fine Gasparin CO_2 units, which is a gem of workmanship. We intend to test it and report our findings in a future column. Available in various sizes and price ranges (prices rise as sizes shrink), these powerplants are especially well suited to flying scale models. Five dollars will fetch a copy of the illustrated SAMS catalog via air mail: SAMS, The Chapel, Sandon, Buntingford, Herts, SG9 OQJ England.

MORE ENGINES

Dan Rutherford recently returned from Russia with news of a fresh assortment of model engines, including CO_2s, glow .049s, Russian engine collector handbooks and assorted items of collectors' value. For an up-to-date price list, Send the usual SASE to: D&B Import/Export, Inc., 4705 237th Place S.E., Bothel, WA 98021. Dan's literature is always fascinating!

VIDEOS

Dennis Norman favored us with a copy of Bill Harding's latest videotape, covering the 1992 Flying Aces Club Nats. If you've never been to a Flying Aces meet, this is the next best thing! Lots of close-ups of the modelers and their entries, and marvelous flying sequences including the famous mass-launches, with models flying in every direction!

Bill's background includes 12 years as a CBS news cameraman as well as a lifetime of model building, so he is well qualified to produce such a videotape. Highly recommended. The cost is $24.95 postpaid from: Harding Productions, 4782 Unity Line Road, New Waterford, OH 44445.

NFFS VIDEO

The National Free Flight Society is marketing "The Joy of Flying Free," also produced by Bill Harding with an assist by Bob Clemens. It covers the many facets of indoor and outdoor free flight in a way that has appeal for anyone from a casual spectator to an expert modeler. Ideal for clubs, mall shows or just appreciating the magic of free flight. The price is $28, from Tony Italiano, 1655 Revere Dr., Brookfield, WI 53005.

GEE BEE GOODIES

Delmar and Tana Benjamin's full-color brochure of Gee Bee memorabilia, including audio and videotapes, kits, plans, lapel pins and much more, may be obtained by sending a 6x9-inch SASE. It's a work of art! Deltana Airshows, Inc., Deltana Dr., Shelby, MT 59474.

When contacting any of the aforementioned sources, please tell 'em *Model Builder* sent you!

SIGN-OFF

According to Carl Stokes, of Seattle, Washington, "Once you've reached full maturity, modeling becomes 90 percent camaraderie and 10 percent modeling." ***MB***

A modified Fike E from an American Micro-X kit beautifully photographed by Juan Moreno, of Spain.

BIG BIRDS AT THE NORTHWEST MODEL EXPO

Cliff Sand drove from Eagle Point, Oregon to show his Monocoupe on floats. Built from an Ikon N'wst kit, the ship weighs 22 pounds and is powered by a Super Tigre 3000.

Dan Nalley placed 3rd in the Seaplane Category with this pretty Schneider Sport 120.

John Eaton, who runs J&K Products out of Long Beach, California, offers a big Stihl engine for Unlimited racing with either a Tillotson gas carburetor (left) or a Mikuni alcohol carburetor (right). The alcohol carb is $135 plus postage and handling.

Boyd Newman really enjoys flying his Cap 10 B, when he's not selling his world famous Zurich Sunglasses. The plane was built from a Yellow Aircraft kit, weighs 13.5 pounds and is powered by an S.T. 2500.

The Northwest Model Exposition has just concluded its twelfth successful season. I'm happy to report that there were several new items on display that will be of benefit to those of us flying Big Birds.

To start with, Dick Phillips and Col. John de Vries now have their third volume of plan reviews in print and for sale. Dick and John's *V.I.P.'s Directory of Giant Scale Plans* reviews 50 sets of scale plans, including a bit of background history on the full-scale aircraft and a detailed description of the model plan. They rate each set of plans on a complexity scale of 1 to 5, with 1 being the simplest and 5 the most complex. This is particularly beneficial to scale model builders, because it's disappointing when you spend a lot of money on a set of plans only to discover they are too complex for you, or not quite what you had in mind. *V.I.P.'s Directory of Giant Scale Plans* will help you determine whether a particular set of plans is suitable for your next Giant Scale project. If you would like a copy of Volume 1, 2 or 3, or all three, send $14.95 to V.I.P. Aero Publishers, Inc., P.O. Box 16103, Colorado Springs, CO 80935. The books are also available from Gallant Models, Inc., 34249 Camino Capistrano, Capistrano Beach, CA 92624.

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John Eaton, owner of J&K Products, was showing off his 92-inch span, all-wood T.R. 260, offered both in kit ($250) and pre-built ($595) versions. The pre-built model comes

covered with Goldberg Ultracote. The T.R. 260 should put you firmly in the driver's seat if you like to do aerobatics.

If you are interested in Giant Scale Unlimited racing, John has a highly competitive P-51 that will put you in the competition. His fiberglass racing wing is really something.

Should you wish to run alcohol in your Unlimited racer's engine and use glow ignition, John has found that a Mikuni 34mm carburetor will allow you to make the conversion. It fits the same mounting holes as a Tillotson carburetor and is available for $135 plus shipping and handling.

For a list of John Eaton's line of Big Bird goodies, write to J&K Products, 306 Golden Ave., Long Beach, CA 90806; (310) 426-8085.

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At the Futaba booth I asked Richard Verano about his experiences as the lead pilot for Team Bridi's F7F Tigercat Unlimited racer at the 1992 Madera races. The team was plagued with weight problems in 1991, and in their effort to lighten their racer, the problems just seemed to multiply. In 1992, their entry was light enough to meet the rules, but the extreme torque made the plane a real handful if it did not have a really stiff headwind to take off into. And naturally, the wind was dead calm at Madera during most of the qualifications and racing.

Competition events like Giant Scale Unlimited racing are frowned upon by many Big Bird enthusiasts, yet competition is what makes an idea grow. All Big Bird and Giant Scale people are going to benefit from it in the long run.

• • •

Those of you who enjoy flying your Big Bird from water may be interested in a set of B.J. floats, made by Model Magic Products, Inc., P.O. Box 19784, St. Paul, MN 55119; (612) 653-9548. They have five sizes of floats; the largest are 56 inches long and are capable of supporting up to 45 pounds.

• • •

I had a very nice time visiting with Hap and Nancy Miller, of Miller RC Products. Hap tells me that several of our Canadian friends stopped by to say how impressed they were when a certain Big Bird columnist came to their fly-in and started over 10 balky big engines with a Miller geared starter. Hap Miller tells me there is even more help on the way with a considerably larger starter in the works, which should be able to start practically any of the larger Big Bird engines on the market.

• • •

Harold Leininger not only attended the Puyallup Expo with a beautiful sport biplane named the "Why Not," but has a new business called Air Craft 3 Views. Harold currently has three-views for over 1900 planes and engines. For more information, write Air Craft 3 Views, 800 29th St. S.E., Auburn, WA 98002; or call (206) 939-1790.

• • •

I visited the MACS Products booth and talked to Wally McAllister, who was explaining the many MACS items. I only wish I had known about some of their stuff when

Oregon modeler Ed Hess tackles some difficult projects—his latest is a Custer Wing CCW-5. It weighs 48 pounds, wingspan is 10 feet 6 inches, power is two Saito 300 twins mounted as pushers.

Walt Wyrick's latest project is this 70-inch span Great Lakes biplane, powered by an O.S. 108.

Mike Brewer adds a lot of detail to his projects—here's a close-up of the cockpit of his Fokker Triplane, built from a Glen Torrance kit. Power is an O.S. 1.60 twin four-stroke; plane spans 72 inches and weighs 16.5 pounds.

Bob Benjamin's Ace Big Bingo is still flying great with its Astro Flight Cobalt 90 electric power system. Bob built the airplane specifically to test the prototype of Astro Flight's biggest motor—see the story in the March '93 *Model Builder* for a full report.

"Bill the Cat" looks ready for action from the cockpit of this colorful Lanier Stinger 120. Unfortunately the card with the builder's name was missing. Our columnist is finishing up a review article on the Stinger 120—should appear in these pages soon.

I was fitting the engine to my recent Spacewalker II review project. The engine header and flexible stainless exhaust pipe would have saved me a load of work.

If you have some special needs for the muffler systems on your latest Big Bird, give MACS a call or drop them a line at 7935 Carlton Rd., Sacramento, CA 95826; (916) 456-6932. I would be very surprised if they do not have a system to meet your needs.

• • •

I had a pleasant surprise when Roger Smith, editor of the IMAA's *High Flight* magazine, turned up at the IMAA booth. I have known Roger for some time, but only by phone, so it was a real pleasure to meet him in person.

One of the many things we discussed was the possibility that the IMAA's big annual Festival might be held in the Puget Sound area in the near future. It would be a wonderful opportunity to extend our Northwest hospitality to the many Big Bird pilots who are not familiar with our area. I'm hoping the big event takes place, especially since it will be almost in my back yard!

• • •

Art Steinberg, Rick Allison and I have all told you about those wonderful Zurich Sunglasses. Or should I say sun and *safety* glasses, to be more accurate.

In a recent phone conversation with Boyd Newman, the U.S. distributor for Zurich Sunglasses, I learned that a local RCer escaped losing the sight in one eye when a glow plug shot out of a running engine. He was standing about 20 feet away, but the Zurich Sunglasses deflected the plug and were barely scratched. Should your sunglasses and eye safety need updating, contact Boyd Newman, 5083 Ridgedale Dr., Ogden, UT 84403; (801) 479-7733.

• • •

I took the Northwest Model Exposition as an opportunity to congratulate Bob Banka of Scale Model Research on his new *Scale Aircraft Documentation and Resource Guide*. Not only does Bob claim to have the world's largest commercial collection of aircraft documentation drawings and photos, but there are also several articles by scale experts that will be of particular interest to the avid scale modeler. For further information, contact Bob Banka, Scale Model Research, 2334 Ticonderoga Way, Costa Mesa, CA 92626; (714) 979-8058.

I cannot say enough good things about the beautifully made German Seidel radial engines that Proctor is handling.

• • •

Proctor Enterprises visited the Northwest Model Expo again this year and had some nifty new items on display. One was a very small battery monitor, made in England, which can be plugged into a spare channel, connected to a Y-harness or direct to the flight pack. It is simple to mount and its signals easy to understand. A green LED indicates it's alright to fly, green and red together indicates it's still safe to fly, and red only means stop flying, your batteries are getting low.

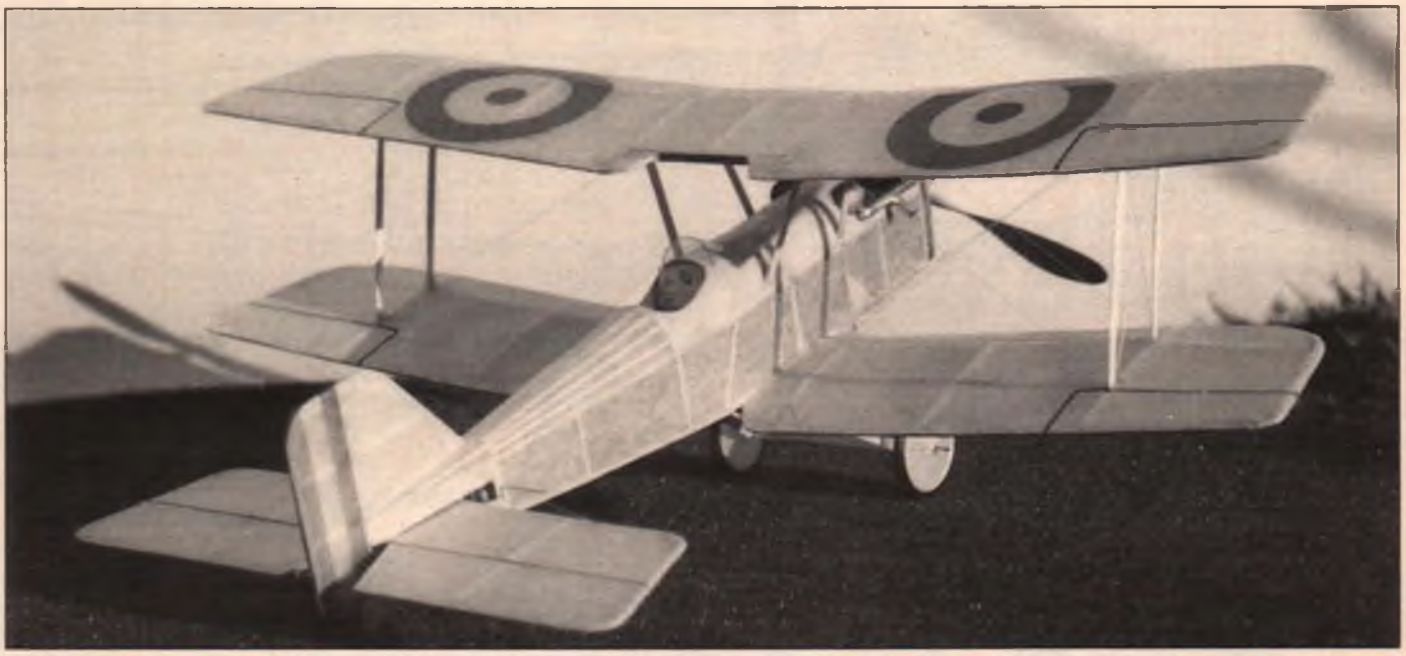
I cannot say enough good things about the beautifully made German Seidel radial engines that Proctor is handling. You can get them with five, seven and nine cylinders. They are quite expensive, but quality and power never come cheap. If you have a super-scale round engine plane, the Seidel may just be that final touch that can help you into the winner's circle. To inquire about the Seidel engines, write to Proctor Enterprises, 25450 N.E. Eilers Rd., Aurora, OR 97002; (503) 678-1300. **MB**

PEANUT SCALE SE5

BY WALT MOONEY

There have been a lot of models of the SE5A, but not too many of its predecessor, the SE5. The SE5 is a little simpler than its later version, and makes up into a very nice Peanut. It has plenty of dihedral, lots of wing area, and good nose and tail moments, considering that it is a World War One aircraft.

The model is fairly simple for a biplane, so the discussion that follows will touch only on the more difficult features. The aft end of the fuselage sides are constructed with a slot for the horizontal tail. Note that this slot is deeper at the front than at the aft end, where it is only deep enough for the tail. The extra room at the front of the tail slot allows you to shim the leading edge up or down as required for flight trim.



The classic SE5 has all of the design features needed to make it an exceptional Peanut flier. It's also one of the simplest biplanes to build. Photo by Fudo Takagi.

Mounting the wings is perhaps the most difficult task. There are four cabane struts to support the center section of the top wing. The forward pair are vertical in the side view and the aft pair are hiding behind the rear wing struts. Cut out a little of the top fuselage sheet covering so that the cabane struts can be cemented in place on top of the upper longerons.

It may help to make a jig to hold the top of the cabane struts while they dry. This can be done by taking a scrap piece of 1/8-inch sheet balsa the size of the center section and cutting a tight notch at each location for the top of a cabane strut. Push the top of the struts into these notches and then cement their bottoms in place on the longerons. This fixture is easier to locate than the whole top wing. It can be twisted and nudged into perfect position before the glue dries. When the bottoms of the struts are firmly in place and the glue is really dry, pull the fixture off the top and cement the top wing in place.

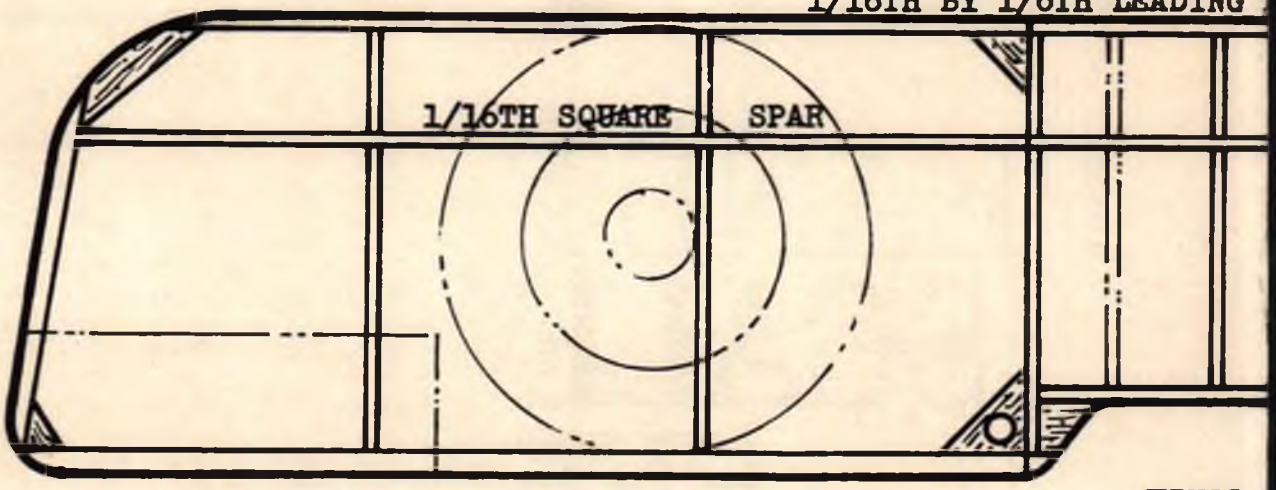
Note that the bottom wing has two center section ribs. These are supposed to just fit on each side of the fuselage. The top spar is removed between them, and of course there is no covering on the top between them. The bottom wing is simply cemented to the bottom of the fuselage.

Check the wings before the glue is dry to see that they are parallel when you look down on them from above.

Note that the SE5 had short exhaust stacks and no headrest. It also had quite a large windshield.

Good luck with your SE5! ***MB***

1/16TH BY 1/8TH LEADING



WING TIP PIECES AND GUSSETS ARE 1/16TH THICK BALSA

WINGS

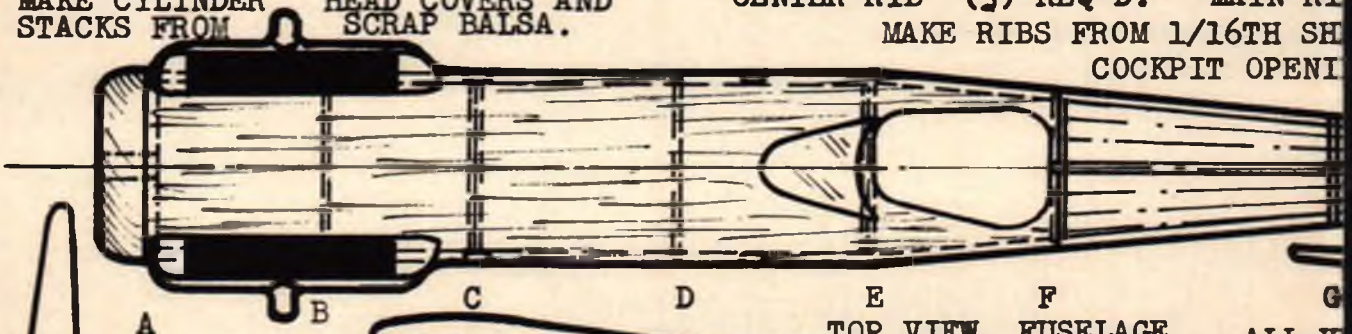
TOP OF FUSELAGE BACK TO FORMER "F" IS COVERED WITH 1/32ND SHEET BALSA.

MAKE CYLINDER HEAD COVERS AND STACKS FROM SCRAP BALSA.

CENTER RIB (3) REQ'D. MAIN RI

MAKE RIBS FROM 1/16TH SH

COCKPIT OPENI



TOP VIEW, FUSELAGE

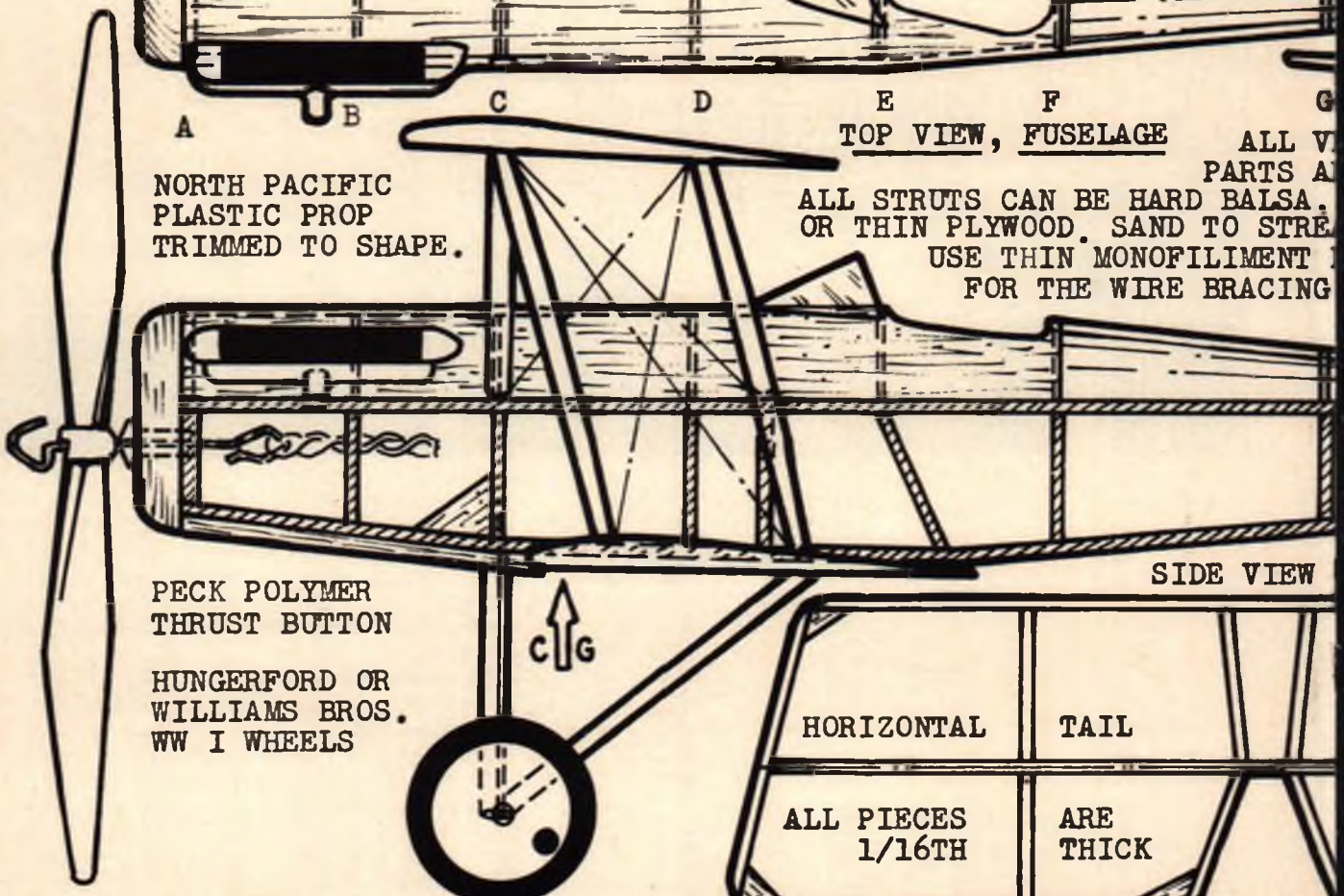
ALL V

PARTS A

NORTH PACIFIC PLASTIC PROP TRIMMED TO SHAPE.

ALL STRUTS CAN BE HARD BALSA. OR THIN PLYWOOD. SAND TO STRE

USE THIN MONOFILIMENT FOR THE WIRE BRACING

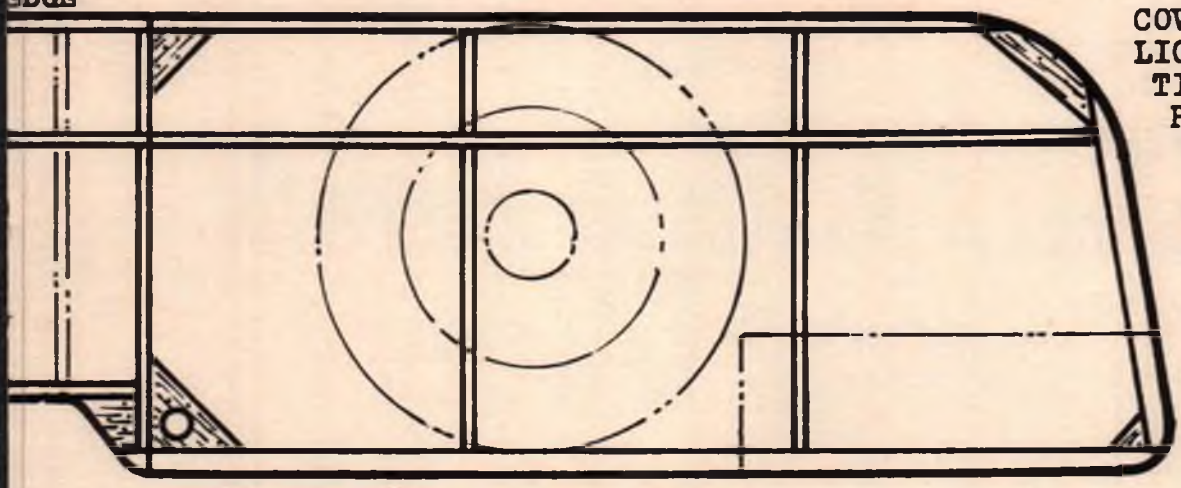


SIDE VIEW

PECK POLYMER THRUST BUTTON

HUNGERFORD OR WILLIAMS BROS. WW I WHEELS

EDGE



COVER WITH LIGHTWEIGHT TISSUE, NOTE ROUNDAL POSITION AND RUDDER STRIPES

POWER WITH ONE LOOP OF 1/8TH OR 3/16TH RUBBER

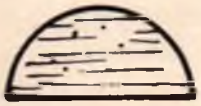
1/16TH BY 1/8TH TRAILING EDGE

B (12) REQ'D.
EET BALSA
NG IS UNSYMMETRICAL

G

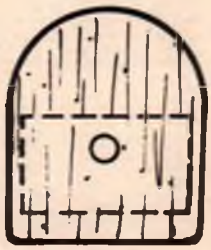
H

F



B,C,D,E

1/32ND SHEET BALSA FORMERS



A

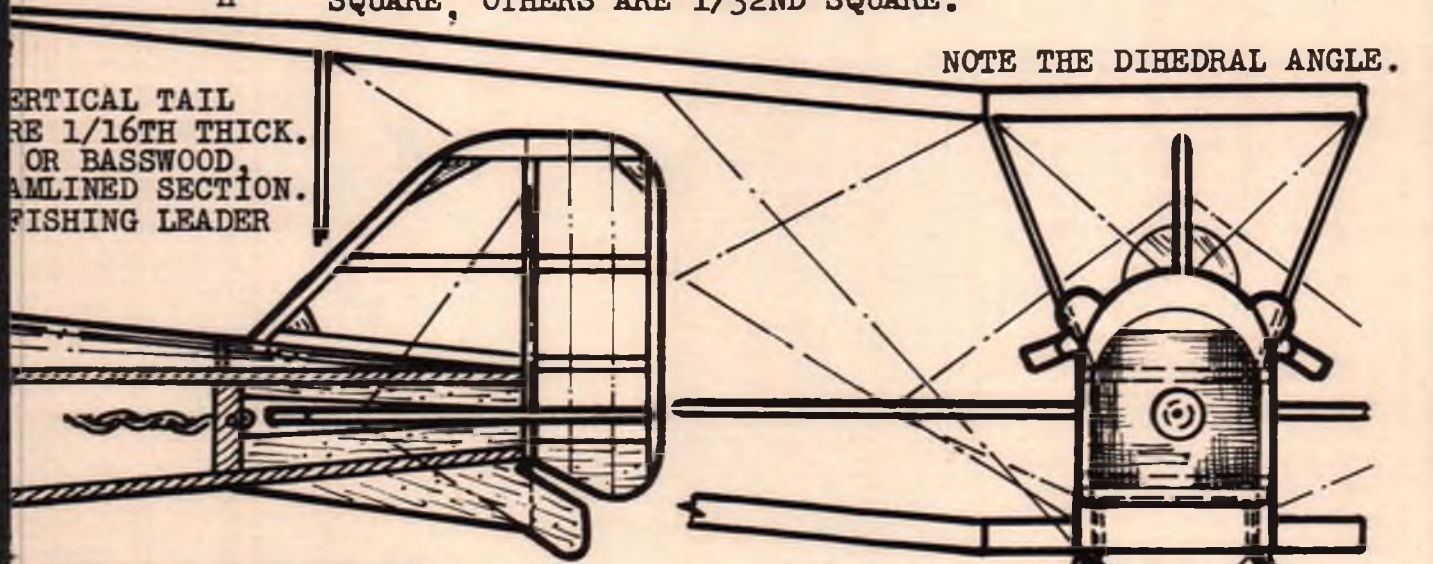
1/4TH SHEET
1/8TH BACK PLATE

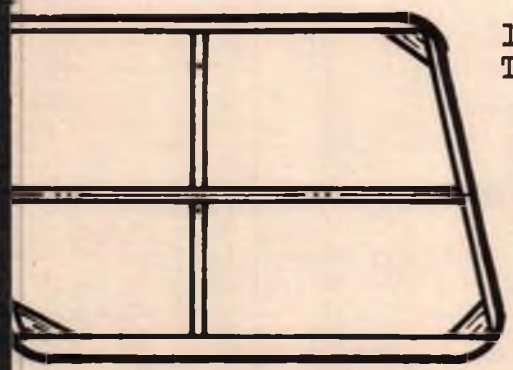
H

TOP CENTER STRINGER IS 1/16TH SQUARE, OTHERS ARE 1/32ND SQUARE.

NOTE THE DIHEDRAL ANGLE.

ERTICAL TAIL
RE 1/16TH THICK.
OR BASSWOOD,
AMLINED SECTION.
FISHING LEADER





1/32ND SHEET BALSA
TAIL SKID.

1/32ND DIA. PIANO WIRE FOR LANDING GEAR -- DO NOT CEMENT TO THE LG STRUTS.

PEANUT SCALE
SE5
BY Walt Mooney

FRONT VIEW

BY BILL FORREY

The Cox Ridge Hawk RC Slope Glider

The Cox Ridge Hawk sailplane is designed for sport slope soaring and basic RC flight training. It's designed to take the hard knocks and abuse that beginners tend to dish out, and to keep coming back for more. It's a simple aircraft that first-timers will find easy to assemble, and is stable enough to give the beginner his or her best shot at learning to fly.

The Ridge Hawk may look vaguely familiar to fliers who have been around a few years. If so, it's no doubt due to the fact that this new airplane is a clever adaptation of parts of previously existing, well-proven designs.

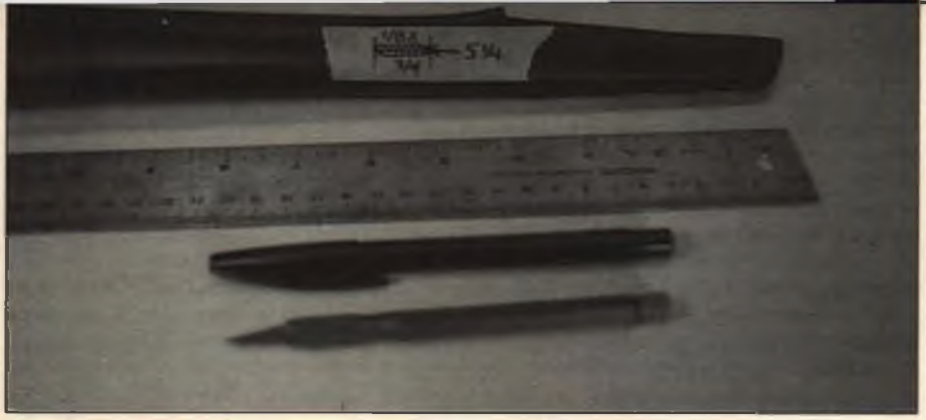
The Ridge Hawk incorporates the nearly indestructible, blow-molded polypropylene fuselage of the Cox Silhouette and Hurricane gliders. Inside the canopy-less fuselage is ample room for mini-size two-channel radio equipment. An injection-molded radio tray is provided which fits the mini

COX RIDGE HAWK

WINGSPAN	42 inches.
WING AREA	290 square inches.
FLYING WEIGHT	20 ounces.
WING LOADING	10 ounces per square foot.
OVERALL LENGTH	32 inches.
RADIO	2 channels required (Cox Cobra used on review model).
SUGGESTED LIST PRICE	$68.95.
MANUFACTURER:	Cox Hobbies, 350 Rincon, Corona, CA 91720.

Sharp-eyed readers will notice that the Ridge Hawk is being flown here with the longer 55-inch wing from the Cox Silhouette Hurricane Thermal Hawk models. This wing, along with all spare parts for the Ridge Hawk, are available direct from Cox Hobbies at very reasonable prices.

Kit contents. It's all here except the optional covering material and the epoxy glue. Cox Cobra two-channel radio system is an extra purchase.



■ ABOVE: Marking the pushrod exit holes on the black plastic fuselage is best done using masking tape and a felt-tip marker. Drill two holes, one on each end of the slot, then use a sharp hobby knife to finish cutting the slot. ■ LEFT: The Ridge Hawk's stab is borrowed from the single-channel Cox Hurricane glider, which has no separate elevators. Cutting them out and hinging them is a relatively easy job left up to Ridge Hawk builders. Mark the elevator halves and then carefully remove them using a straightedge and a new single-edge razor blade. Make several light passes to cut through the foam, instead of one hard slice.

■ ABOVE: The vertical stab pieces. Unique design is a three-layer lamination with the center layer serving both as a stiffener and the hinge material. The U-bolt is epoxied between the fin halves and holds the stab in place using aluminum nuts. ■ RIGHT: Use five-minute epoxy to glue the elevator joiner dowel in place while making sure the elevators align with the stab. Square hole is for the elevator control horn.

servos and switch harness of the Cox Cobra radio system.

The Ridge Hawk's wings are modified from Cox's injection molded foam RC airplane wing, the one used on the Cox E-Z Bee II .049-powered trainer, the Electric Sundance motorglider, and the Hurricane and Silhouette sailplanes. In all of these models, the full 55-inch span of the original wing is used, but in the Ridge Hawk it is cut down to a tip-to-tip span of just 42 inches. The airfoil used is a modified Eppler 214 (the trailing edge is thickened up a bit, and the leading edge is blunted a bit so that it can be injection molded). The stabilizers are also injection molded foam parts which feature a racy-looking, relatively new, swept design borrowed from the Hurricane.

ASSEMBLING THE RIDGE HAWK

If you are not yet a model building hobbyist and the thought of cutting, sanding and gluing a bunch of balsawood parts together into a trainer sailplane turns you off, then you should seriously consider the Ridge Hawk. As you can see from the photo of the contents of the kit box, there aren't very many parts to put together. From start to finish, even a beginner should be able to assemble a Ridge Hawk in just a few hours. If one decides to beautify the model by covering the foam wings and tail with a colorful heat-shrink film (an optional but recommended step), it can take two or three times as long, or the better part of a weekend.

The first steps in building a Ridge Hawk involve preparing the fuselage. Because it's made of a plastic that can't be glued, all joints are mechanically fastened, so you are going to need a power drill or a hand drill and a set of drill bits.

The fuselage is molded with protrusions ("nubs") where the wing dowels locate. When these are cut flush with the fuselage side with a single-edge razor blade, holes will appear that will require a little routing with a #11 X-acto blade to achieve a snug fit for the dowels, which are simply shoved into place.

Molded indentations and/or nubs mark the locations of the stab bolt holes and also the radio access opening in the wing saddle area. Other holes are determined by measuring and marking the fuselage, then drilling. A handy hint given in the instructions for marking the unmarkable, shiny black plastic fuselage is to put masking tape over the general areas to be drilled, then, using a ruler and a pen or pencil, measuring and marking the spots required.

Assembling the horizontal and vertical stabs comes next. As mentioned, the horizontal stabilizer is borrowed from the single-channel Cox Hurricane, which has no moving elevator. You'll need to use a ruler and pen to first mark the hinge line of the elevator, then use a straightedge and a new single-edge razor blade to separate the elevator halves from the rest of the stab. Either sanding (as recommended by the instructions) or careful cutting with a new razor blade plus sanding (our method) creates the necessary 20-degree bevels required for hinge area movement. The elevator halves are then notched and joined using a 1/8-inch dowel and epoxy.

The vertical stab is cleverly designed as a laminate, with foam outer halves and a plastic sheet inner layer which serves both as a stiffener and as the rudder hinge. The stiffener/hinge material is sticky on both sides for laminating purposes and has a peel-off paper backing for handling. The sticky adhesive doesn't allow for repositioning if you have an accidental misalignment, so be careful! Just prior to joining the halves, the control horn and hold-down U-bolt are put in place. The U-bolt requires some five-minute epoxy for a crash-resistant bond inside the fin.

The wing comes next, and is the simplest part of the model. It consists of the two halves, two joiner dowels, and two pieces of tape (supplied). The two wing halves are predrilled for the two wing dowels. All that's required is to insert the dowels halfway into each wing panel and then slide the two panels together. A long piece of joiner tape is provided to hold the halves together and give additional strength. Also, a thick, hard plastic tape material is provided for protection against rubber band damage at the leading and trailing edges. You must cut this tape into four pieces, then fold and bend the pieces to fit around the wing's edges.

Radio installation is perhaps the trickiest part of the whole assembly, especially for a beginner. Pay particular attention to the wire pushrods; in our model, the rods were too long, and the pre-bent Z-bends at the servo ends had to be cut off and redone.

The receiver and servos must first be installed before the pushrods can be hooked up. My recommendation is to ignore the pushrod bend placement measurements in the instructions; ours didn't quite match up.

Instead, custom fit your rods to the pushrod exit holes you drilled. Place your elevator and rudder in neutral, attach the two clevises to the pushrods and the control horns, then mark the rods with a felt-tip marker at the mid-point of each pushrod exit hole. This is the correct place to make the first 45-degree bend in each rod. The second 45-degree bend can be placed 1/2-inch away per the instructions to return the pushrod to parallel. At this point, disconnecting the rods, inserting them through the fuselage, reconnecting the clevises, and checking for neutral in both servos and both control surfaces is in order. Now the pushrods can be cut to length and a new Z-bend made so that the vertical portion of the Z-bend is centered on the correct servo arm hole. There are a couple of Z-bend pliers on the market (mine are made by Thunder Tiger) that make this job a snap.

Once the model is completely assembled, check for the proper balance per the instructions. If the model is tail heavy, as ours was, you will need to add nose weight. Our model required about 1-1/2 ounces in the nose, bringing the final weight to 20 ounces.

FLYING THE RIDGE HAWK

If you are a beginner, we highly recommend that you follow Cox's directions for trimming the model before you attempt to fly it. Cox even provides the beginner with instructions for recognizing and flying in slope lift. Landings are also covered in the instructions. As an added safety measure, it's a good idea to secure the services of a flight instructor if at all possible.

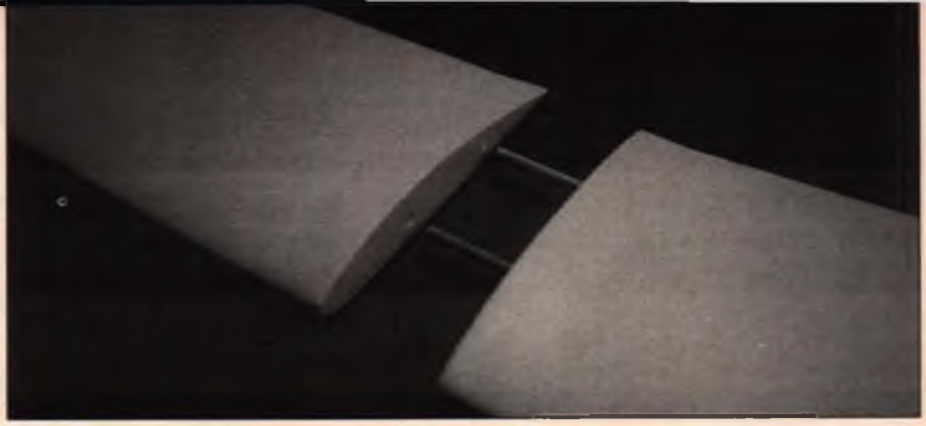
Our test model, balanced where indicated and with all trims set to neutral, flew perfectly on the first toss, requiring no trim adjustments at all on the transmitter! Turns were stable, predictable and gentle. A little up elevator brought the banked-up Ridge Hawk around as nice as you please. With the pushrod clevises attached at the rudder horn in the center hole and the elevator clevis attached at the inner hole, we never felt shy of control power, nor was the Hawk overly sensitive or jumpy.

The modified E-214 airfoil works tremendously well. We put in over 30 flights in conditions that ranged from at most a 5 mph breeze down to a bare 1 or 2 mph whisper, and *the Ridge Hawk stayed up!* I was extremely impressed!

This model is not only capable of some outstanding light lift flying performance, it can handle the heavy stuff, too. With a wing loading of 10 ounces per square foot, the Ridge Hawk can be flown in winds as strong as 30 mph, unballasted.

SPARE PARTS AVAILABILITY

Cox sells spare parts directly to modelers. Should you break a wing panel, for instance, a replacement can be had for $12.00 plus shipping. Break a vertical stab, send $9.50. Break a horizontal stab, send $3.00. You want a full-size wing set, *a la* the Hurricane/Silhouette/Thermal Hawk? That's $24.00. We test flew the longer wings in the light lift of the first day and found the extra span and wing area (2.48 square feet total) and lighter wing loading (8.06 ounces per square foot) enabled us to fly a little higher in the lift zone of the slope and slow down a little more.



■ ABOVE: The two wing halves simply plug together with the two hardwood dowels joiners—no glue needed or desired! If you damage one wing panel beyond repair, it can be unplugged and replaced quickly and easily. Supplied tape holds the two halves together for flight. ■ LEFT: If you want to apply a covering material to dress up your model and increase its durability, sand the foam parts smooth with 400 or 600 grit paper and use a low-temperature heat-shrink film such as Hobby Shack Flite-Kote (used here) or Top Flite EconoKote.

■ ABOVE: The slight difference in wing root chord lengths is more of an eyesore than anything else. This was the only flaw our author noted in the kit. Has no effect whatsoever on the flight characteristics, nor is this mismatch visible at a distance. ■ RIGHT: The Cox Cobra two-channel, single-stick radio system is highly recommended for the Ridge Hawk. Transmitter and receiver are 1991 narrow band certified and gold stickered. Bill found the combination of the curved transmitter shape and single stick knob very comfortable.

SUMMARY

In many ways, the Ridge Hawk is the perfect two-channel RC trainer. It is simple, builds quickly, is very rugged, flies very easily and very well, its flying surfaces are easy to repair, and it's a good value for the money. At a suggested list price of $68.95, the Ridge Hawk is a long-lasting bargain. And what's more, it's a whole lot of *fun* to fly! ***MB***

HANDY HINTS AND A FEW NEW WRINKLES

Imagine you're in a contest. You've just landed your sailplane and received your landing bonus. Now it's time to open the canopy and shut off the receiver. Problem is, in your rush to finish the plane in time for that last big contest, you never took the time to install a proper canopy hold-down. In fact, *none* of your ships have had one because it was always a detail that was too much trouble for too little gain. Your solution was down-and-dirty simple: tape the canopy in place!

So here you are, swallowing your pride as you peel off the tape. Only now the embarrassment is compounded as a small patch of paint peels off the fuselage. . . ! It's not a pretty sight, and it's time to do something about it.

Perhaps this scenario isn't you. Perhaps you've just lost landing bonus points because you've had your canopy turn into a "shed part" in the center of the landing circle. Perhaps you are finishing up a sailplane project and don't like the kit manufacturer's recommended hold-down technique. No matter. Here are three proven ways to do it differently and maybe a whole lot better!

Northeast Sailplane Products' new Culpepper Models "Dove" 2-meter competition sailplane features an exceptionally clean, lightweight fiberglass fuselage and a high aspect ratio, fully sheeted foam core wing. Controls are ailerons, rudder and elevator; flaps are optional but highly recommended. The SD7037 airfoil plus the 23-ounce flying weight equals great thermal performance.

CANOPY HOLD-DOWN METHOD #1

Many of the kits I've built over the years have recommended a direct, point-to-point rubber band hold-down system. This usually involved two wire hooks, one on the underside of the canopy and one at the bottom of the fuselage or front of a former. The recurring problem was finding a rubber band that was the right length to span the short distance between the hooks, had sufficient tension to hold the canopy down, yet had enough stretch to allow easy access to the radio compartment. Most of the time it was difficult to get the dad-burned band stretched far enough to get your fingers between the canopy and the fuselage.

The solution is to increase the total length of the rubber band so that more

THE U.S. FAI/F3B TEAM NEEDS YOUR SUPPORT

To raise funds for their upcoming trip to Israel, the U.S. FAI/F3B team is organizing a raffle and is selling T-shirts, caps, patches, pins and stickers.

Team members this year are Daryl Perkins, Larry Jolly and Randy Spencer. World Champion Joe Wurts is invited back to defend his title. Team manager will be former World Champion Skip Miller, with field support given by Airtronics' Tim Renaud and Steve Condon. In short, this is the finest team ever to represent the U.S. in a World Championship F3B contest!

Send an SASE to Skip Miller at 3629 21st St., Boulder, CO 80304, and ask for an order form. The raffle prizes will no doubt be killer and are not to be missed!

The "Chuperosa Combo" from Northeast Sailplane Products offers the HLG and 2-Meter competitor a real run for the money. Two complete wings and one of everything else means lots of new flying opportunities!

stretch becomes available when needed to lift the canopy and service "under the hood," and to pre-tension the band when the canopy is closed. Method #1 features a viable solution. From Alan Cooper of the Capitol Area Soaring League.

CANOPY HOLD-DOWN METHOD #2

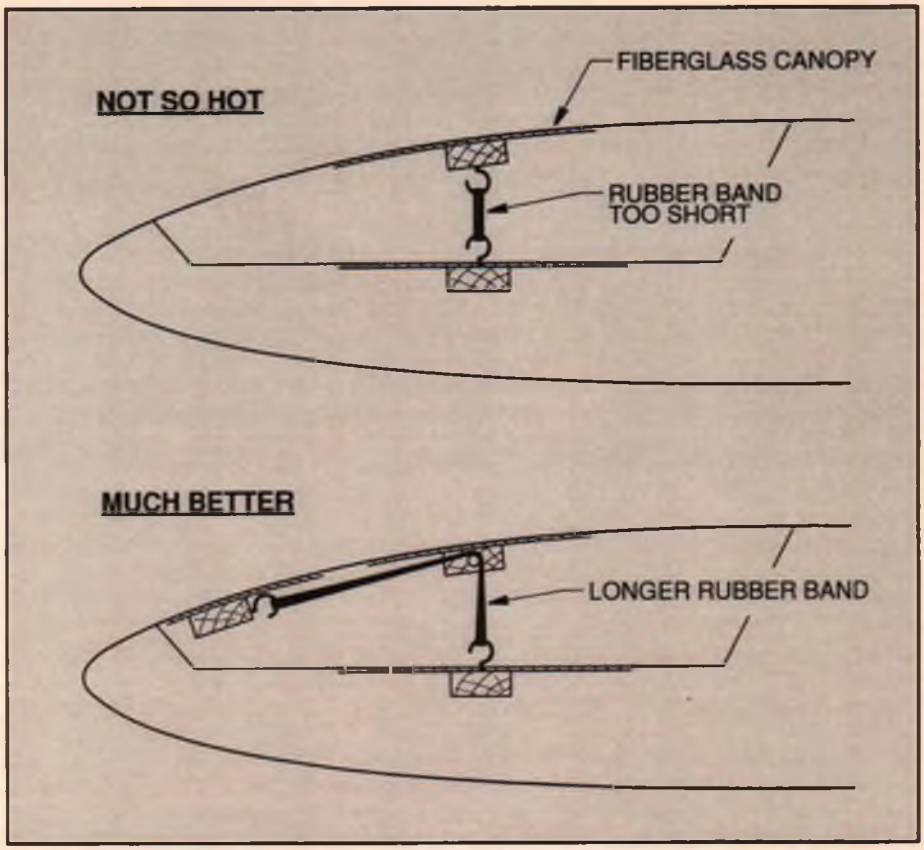
Raphael Boguslav, of Newport, Rhode Island, is credited with this friction-fit hatch hold-down system. Here the friction between a wooden dowel and a rubber tube holds the rear of the canopy in place, while the more usual plug-in dowel holds the front of the canopy to the nose block. Looks very simple, and judging from Boguslav's name for it, "The Ultimate Attachment," it must work pretty well.

CANOPY HOLD-DOWN METHOD #3

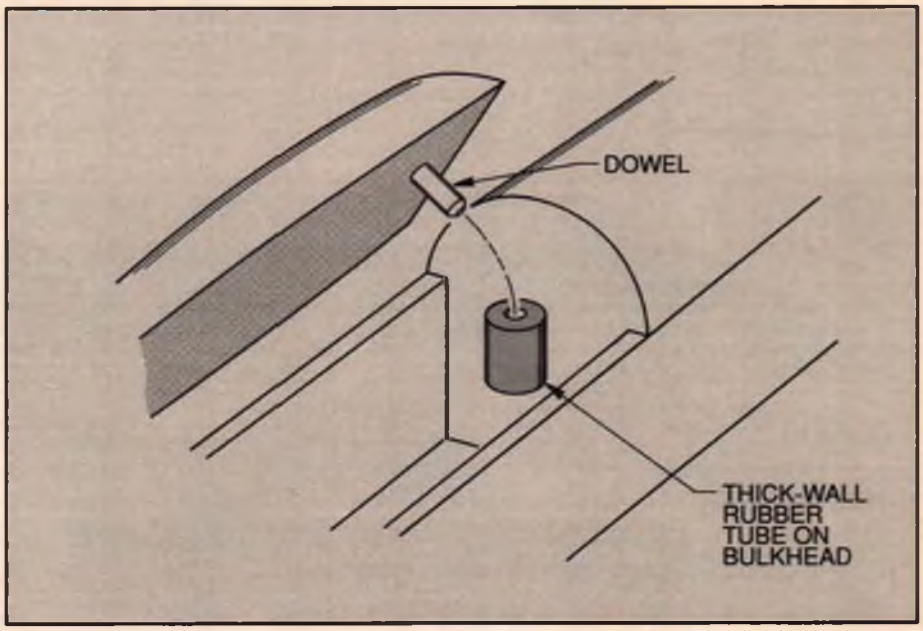
The prerequisite to employing this method is having a fiberglass canopy that mounts flush with the outside surface of a fiberglass fuselage. The fuselage must have at least a 3/16-inch lip recessed sufficiently to hold the canopy in place and to hold it flush.

Two Popsicle sticks are glued at their ends to the inside of the canopy, using a slurry of epoxy and micro balloons or cotton flox. The Popsicle sticks protrude from the front and rear of the canopy by 1/8 to 1/4 inch. To mount the canopy, the rear stick is slid rearwards under the rear fuselage lip, then the forward stick is slid under the forward lip and the canopy moved forward. When the canopy is centered over the recessed fuselage lip, let it go and it will snap into place. The pressure of the sticks against the inside of the fuselage keeps the canopy from raising up, while the recess keeps the canopy from sliding around.

As in Method #2, this system allows unlimited, unhindered access to the radio compartment because the canopy can be completely removed from the fuselage. It's a simple and effective system which I used on my Falcon 880. I borrowed the



When a short rubber band is stretched between two hooks to hold down a canopy, it's usually tough to attach the band and still have enough tension to hold the canopy down positively. Alan Cooper solved the problem by using a bridging wire on the canopy, which permits him to use a heavier, longer band that not only holds the hatch securely, but also allows it to be lifted well clear. Credit CASL newsletter, June 1991.



This is a friction-fit hatch hold-down that, according to its originator, Raphael Boguslav, hasn't yet lost a hatch for him. The thick-walled rubber tubing supplied with Sullivan nylon pushrods (or the equivalent from an auto parts store) can be glued to a fuselage former as shown. A suitably sized dowel in the underside of the hatch just plugs into the rubber tube while the forward end of the hatch can be retained by the usual tongue or pin.

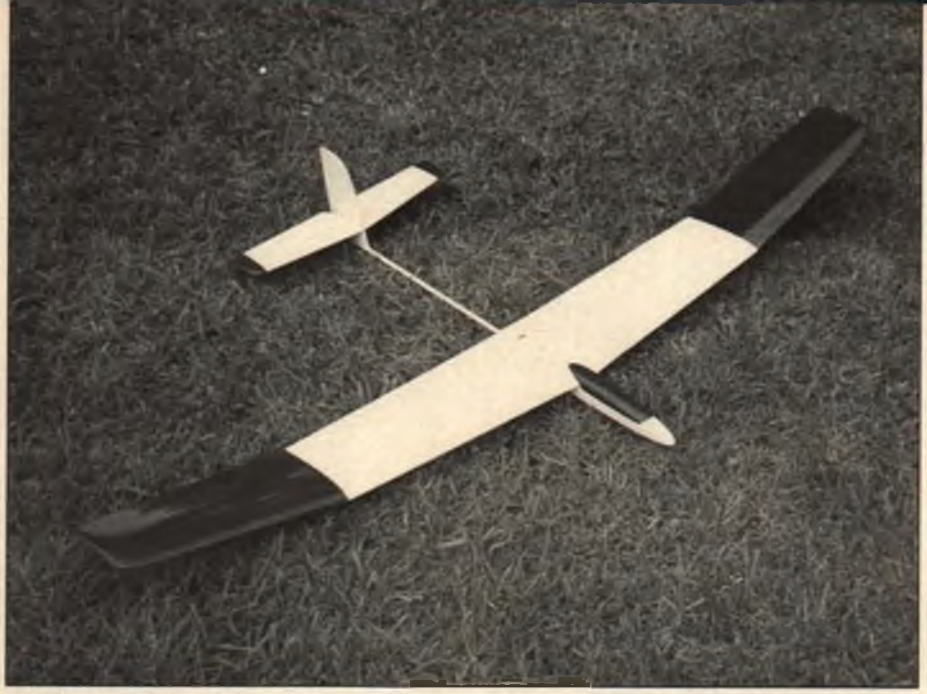
AIRTRONICS TO MARKET FLITE LITE COMPOSITES

The rumors which have been floating around since shortly before the IMS Show in January have finally come true. At the WRAM Show in New York in February, Airtronics announced that it will be taking over the marketing of one of America's premier competition sailplane manufacturers, Flite Lite Composites (FLC).

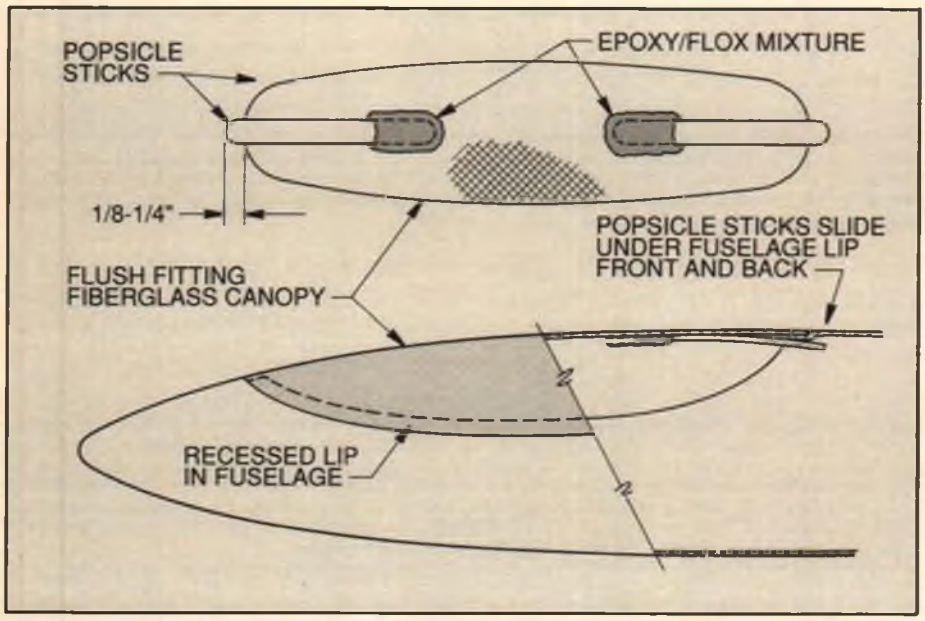
In a late-night phone call to FLC owner, Ron Vann, *Model Builder* learned that Vann will continue to produce his line of sailplane kits, but they will no longer be available factory direct. Mark Allen, FLC's founder and former design consultant, will branch off to form Allen Development Co. and will manufacture and further develop the FLC F3B Eagle exclusively under this new name.

The Airtronics facility in Irvine, California, will receive factory-finished parts directly from FLC. The kits will be completed by Airtronics and will include items formerly not found in FLC kits: towhooks, bellcranks, control horns, landing skids, etc.—basically a full hardware package. Furthermore, Airtronics will have vastly improved plans and new comprehensive instructions to include in each kit.

Ron Vann indicated that Airtronics will build up an inventory of FLC kits for distribution through its Airtronics Specialty Division (ASD). Delays in shipping should be a thing of the past!



Greco Technologies' new "Javelin" is now available. This competition HLG features many trick items: fiberglass/Kevlar pod with fiberglass boom, foam core wings, obechi sheeting and much more. Details in text.



This simple method is used by our columnist and several soaring friends to retain canopies. A severe nose-down landing (and subsequent sudden deceleration) may cause the canopy to pop off if the Popsicle sticks do not protrude far enough under the fuselage lip. For extra security during contests, a small piece of tape over the canopy joint will prevent *all* pop-offs.

idea from Jerry Arana of the South Bay Soaring Society, who likewise used it on his Falcon fuselage.

All of these methods have their shortcomings. Rubber gets old and needs replacing (easily done in #1, not so easily done in #2). Over time, Popsicle sticks take a set and their spring action gets weaker. However, for their simplicity, you can hardly beat any of these ideas. Give your favorite a try.

SOARTECH #9

It's my privilege to report that *SoarTech #9* has just been released. Like the previous eight volumes, which are still available, this latest one is a lengthy technical journal filled with information capable of enriching your soaring experience—126 pages worth of enrichment!

Chapter titles are: "The Use of Wind Tunnel Data in the Design of Radio Controlled Contest Model Sailplanes," by Martin Simons; "Static Longitudinal Stability with the CROCCO Method," by Ferdi Gale; "Fear the Flying Wing," by Noel Falconer (fear it as a competitor, not as your plane); "On Wing Load Computation," by Max Chernoff; "What Can Be Learned from Paper Airplanes," by Hewitt Phillips; and a construction tip article called "Built-In Sheeting," by Dennis Oglesby.

The price of *SoarTech #9* is $8 in the U.S., $9 in Canada, and $10 (surface mail) or $12 (air mail) to other foreign countries. U.S. currency only; no CODs or credit cards accepted. Virginia residents add 4.5 percent sales tax. On request, a data sheet detailing the titles and authors of *SoarTech* issues 1 through 9 is available.

One last item. Before his tragic and untimely death in an aircraft accident, David Fraser had been one of the active team members who helped produce *SoarTech #8*. Fraser's wife, Lee, who was seriously injured in the same accident, has given *SoarTech* editor Herk Stokely permission and encouragement to distribute Fraser's complete Princeton wind tunnel test data as well as his own sailplane performance analysis program (both on 360K/IBM diskette). The wind tunnel test data comes in ASCII text format for virtu-

ally universal use and costs $12 (U.S./Canada) or $14 elsewhere. The compiled, IBM compatible program costs $35 (U.S./Canada) or $37 elsewhere and includes all test data from the Princeton wind tunnel, plus several pre-entered aircraft parameter files, plus an instruction manual. Such a deal!

For any of the above, contact *SoarTech* Journal, Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451.

P.S.: *SoarTech #10* is expected to be about 200 pages and is already well underway. The lead feature article is a photographic essay covering all aspects of composite model construction, by Martin Baemert. This 60-page paper is worth 60x1,000 words, and is in fact priceless. If you wish to be the first on your block to get a copy, the in-advance sale price is $16 for U.S. modelers ($18 Canada/Mexico, $20 surface, $23 air elsewhere). No publication date is promised, but it will come. So, lock in a low price, act now!

The Dove flies "very much like a cross between an open class sailplane and a hand launched glider; its flying characteristics include a surprisingly flat glide, low sink rate, and agility."

NEW FROM NORTHEAST SAILPLANE PRODUCTS

The Culpepper Models "Dove" 2-meter is now available from its exclusive distributor, Northeast Sailplane Products (NSP). Designed for intermediate builders and fliers, the Dove features the modern SD7037 airfoil in a foam core, carbon spar, balsa sheeted wing. It has a higher-than-usual aspect ratio and tail moment (more like an unlimited class ship), which is claimed to give it "exceedingly good performance"—as expected! The Dove has flaps and ailerons and flies "very much like a cross between an open class sailplane and a hand launched glider," according to NSP. "Its flying characteristics include a surprisingly flat glide, low sink rate, and agility."

The Dove kit includes a very streamlined, lightweight fiberglass fuselage, all-moving stabilizer, complete hardware package, plans and instructions. Span is 78.75 inches, wing area is 510 square inches, flying weight is 23 ounces, and the wing loading comes to a light 7 ounces per square foot. NSP's price is a very reasonable $114.95.

Next up from NSP is a new wrinkle on an old but still potent model, the Culpepper Models Chuperosa. Now you can obtain a 1-1/2 meter Chuperosa HLG kit along with an extra wing kit that will convert the Chup to a full 2-meter class competition sailplane using the same fuselage. NSP calls it the "Chuperosa Combo." The advantages of having the two wings are obvious. The price is, again, a very reasonable $89.95 and includes the usual complete treatment from Culpepper.

Contact NSP at 16 Kirby Lane, Williston, VT 05495; (802) 658-9482.

JAVELIN HLG FROM GRECO TECHNOLOGIES

More information has come through the pipeline from Greco Technologies regarding their new "Javelin" HLG. This ship is designed for competitive HLG flying. It comes in kit form and is claimed to be extremely easy to build. It features white foam core wings with the SD7037 airfoil, obechi veneer sheeting, machine-cut balsa parts for the stabilizers, a fiberglass/Kevlar pod and fiberglass boom fuselage.

Specifications: span, 59 inches; wing area, 380 square inches; weight, 14 ounces; wing loading, 5.3 ounces per square foot. Plans are computer-generated, the instructions are computer illustrated and said to be easy to follow.

Contact Greco Technologies, P.O. Box 10, South Pasadena, CA 91031; (213) 680-2070 for prices or further details. **MB**

FREE FLIGHT

BY BOB STALICK

New for Nostalgia—the 1/2A Greene Hornet

It's rare that we uncover a design these days that was a true trendsetter—a genuine original. When I think of such ships, I automatically think of Carl Goldberg's Zipper, Sal Taibi's Starduster and Ron St. Jean's RamRod. But there were other designs that set the trend but were uncelebrated during their time, superseded by other more popular designs that took credit for the new development. Such is the case with this month's drawing.

Jack Greene was a well-known midwest free flighter in the 1950s. Jack designed the Greene Hornet, the ship that originated the high thrustline/low fin configuration. The T-Bird is usually credited with being the first high-thrust, sub-fin equipped free flight. In fact, the Greene Hornet flew at least a year before the T-Bird. Subsequently, a large number of designs came out with similar features—the most successful of which was the Starduster series by Sal Taibi.

With that kind of build-up, I'll turn the column over to Jack Greene, who provided the following comments:

Going back to Chicago in 1955, we see Jack Greene launching for another max with his original Greene Hornet FAI design, powered by a Webra .15 diesel. This is the model that spawned the 1/2A Greene Hornet described here and for which full-size plans are available—details in text.

Jack Greene in a recent photo with his potent 1/2A Nostalgia model.

JUNE THREE-VIEW—THE GREENE HORNET

"The 1/2A version was copied from the Webra .15 diesel powered FAI model. The photo of this latter model was taken in 1955 at the FAI eliminations near Chicago. I could have gone to the FAI finals, but I screwed up my last official. Russ Hansen asked me for a set of plans, which I sent to him. He and Gerry Ritz then came up with the T-Bird design and Midwest kitted it.

"In 1953, I started building high-thrustline, .15-size planes. I had seen Maynard Hill's very high-thrust design in the *Zaic Yearbook*. This ship had the wing on the body and the engine on a pod over the wing. I'd seen Sal Taibi's Spacer with the rudder and fin on the bottom of the fuselage. Don't ask me why, but I tried putting the engine on top of the pylon and the rudder on the bottom of the body. I got about four flights in when I found out that with the engine on the top and the rudder on the bottom, flying with power to the right was not a good idea. I rebuilt the wing and body.

"The next try I got the plane to fly, but when I dethermalized, the body would break behind the pylon. After several models, I found the secret to stopping the breaking of fuselages: I built a high-thrust version with a V-tail. It would go either to the left or the right if you used a 2 square inch rudder on the bottom of the body.

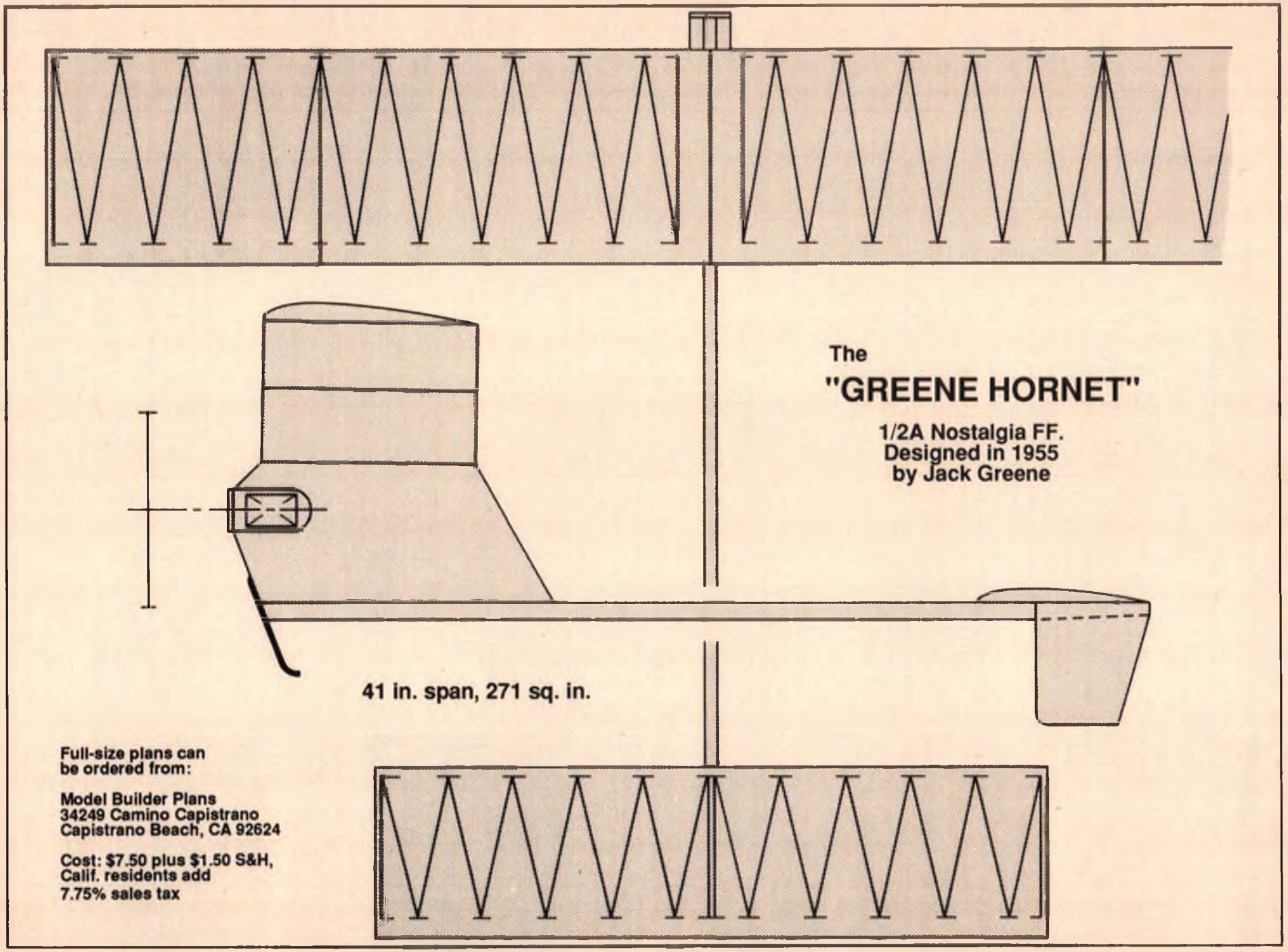
"In 1955, I made a 1/2A Greene Hornet, which flew well with an Atwood Signature. In 1957, I installed a Holland Hornet .049 Mk. I. The model became competitive with this engine. The reason I used hardwood for the bodies on my 1/2A designs was that they did not break as easily on dethermalizing. I just guessed at the wingspan versus chord. The tail moment arm was the same as the .15.

"In 1978, I threw away a lot of plans of old models—among them the plans for my original high-thrust design."

The Greene Hornet is featured as a three-view this month. It has been accepted as Nostalgia legal by the NFFS Nostalgia rules committee. A quick perusal of the drawing shows a really simple fuselage with the engine mounted on a balsa block pod just below the wing. The wing and stab feature a diagonal rib layout for stiffness. The wing can use either a flat-bottom or undercambered airfoil; I would suggest sticking with the flat-bottomed section. Since the power pattern was to the left with a left glide, the left main wing panel was washed in about 1/8-inch. The model is very simple and would be an unusual ship to fly at the local Nostalgia event.

The Greene Hornet is a pacesetter model. You should build one just to say that you've helped to re-create history.

(Editor's note: The Greene Hornet drawing presented here



The

"GREENE HORNET"

1/2A Nostalgia FF.
Designed in 1955
by Jack Greene

41 in. span, 271 sq. in.

Full-size plans can
be ordered from:

Model Builder Plans
34249 Camino Capistrano
Capistrano Beach, CA 92624

Cost: $7.50 plus $1.50 S&H,
Calif. residents add
7.75% sales tax

is drawn 1/4 full-size and is mainly to give you an idea of what the ship looks like. Full-size construction plans are available from Model Builder Plan Service—see page 86.)

JUNE MYSTERY MODEL

Here's a real ringer for you. According to the article in the 1950s magazine, this ship was completed between the hours of 10 p.m. Friday, July 27 and 9:30 a.m. Saturday, July 28 at the Dallas Nationals. The wing is from a handlaunch glider. The thing was powered by a Jetex 50B and won Junior 1st place in the PAA Jet event. On its last flight, it flew out of sight. The designer was a well-known youthful contestant during the late 1950s and early 1960s. Full-size plans were carried in the magazine, so that any aspiring PAA Jet jockey could build one in a matter of hours and be competitive.

So, enough clues already. Here's what you do. If you think you know the name of this model, send it to *Model Builder* magazine. If you have the correct model name and your entry is the one pulled out of the hat, you'll have won yourself a free one-year subscription to *Model Builder*. That's one heckuva deal! Do it now.

The new Russian-made 1/2A screamer being imported into the U.S. by Dan Rutherford, shown with a Cox Tee Dee .049 for size comparison. Note the unusual split crankcase. More in text.

Kathy Brown displays husband Jerry's two new mini FF ships. On the left is a Half Wild Goose with a Tee Dee .020, on the right is an .010-powered L'il Pearl from the January '93 *MB*.

An original 1960s design and very high performance .010 model by Bob Hatch, unfortunately lost in a lake (the model, not Bob). Story in text.

MARCH MYSTERY MODEL WINNER

We thought this was an easy one and that we'd be swamped with entries, but it turned out to be just the opposite: *two* entries! E.B. Turner, of Ft. Worth, Texas, scored himself a complimentary one-year *MB* subscription by correctly identifying Frank Ehling's "Thermal Kid" towline glider, which appeared in the 1955 *Air Trails Model Annual*.

NEW FROM THE NFFS

The National Free Flight Society has been an excellent source of free flight information for the past 25 years. Now, free flighters have the opportunity to take advantage of two new offerings:

1) The 1992 *NFFS Symposium* is now available. It's the 25th Annual Report and contains the last word from Hardy Brodersen, who has stepped down from his directorship, and a collection of articles on all aspects of FF—indoor, outdoor, rubber, gliders and power. In addition, there are 10 three-views and features of the models of the year. Order yours from NFFS Publications, c/o Fred Terzian, 4858 Moorpark Ave., San Jose, CA. 95129. Cost is $16.00 for NFFS members, $18.00 for non-members. Postage is $2.50 per copy.

2) "The Joy of Flying Free" is the title of a new 42-minute video from the NFFS. This is the finest and most enjoyable video covering our hobby that I have ever seen. I believe it would be useful as a program to provide to local service clubs and to the general public. It gives a fascinating glimpse at an enjoyable sport that is also a skillful hobby. The video is available from NFFS, 1655 Revere Dr., Brookfield, WI 53045. Cost is $25 plus $3.00 postage and handling.

NEWS FROM THE .010 FRONT

Interested in hosting an .010 MiniPower Postal Contest this summer? I'm right now in the process of organizing just such an event. The conditions are that the event must be held in conjunction with a sanctioned AMA FF contest. Pre-entry is required, and the prizes will be provided by *Model Builder* and Cox Hobbies. If you are interested in flying some competitive .010 power this summer, send me an SASE and I will send you complete rules and information: Bob Stalick, 3066 NW Picadilly Circle, Albany, OR 97321.

I got a nice letter from Jerry Brown of Avalon, California, who built the .010 L'il Pearl. Jerry wrote that he built this ship and a Half Wild Goose for a Cox .020. These two models got him back into the free flight scene and even back into the AMA—he even got back his old AMA number!

I also received a nice letter from Bob Hatch, who is an old time free flighter hiding in the Northwest. Bob writes that he has "been following, with rekindled interest, the recent references in your column concerning .010 power. I have had brief experience with two such aircraft. The first was built in the early '60s when the engine was first made available, and was test flown during an early Misery Meet held in a cow pasture in the Kent Valley. It was small, squarish in planform and very light. This last, coupled with Leroy Cox's very potent little screamer, provided excellent transitions, and the airplane was going so fast at the end of the power that it just rolled out into the glide without a hint of stall. It was short lived, however, lost on its first official when it DTed into a lake during a contest held at Sandpoint NAS.

"The next airplane was built in the early '80s, a serious effort to fly .010 competitively in 1/2A, and was test flown at Hart's Lake Prairie on one of those mornings you dream about. It liked a right-right pattern, was very fast in the climb, transitioned just like the first one, and it had an even better glide. Ten-second runs and two-minute fuses produced consistent DTs at at least half the climb altitude. Beautiful!

"The only drawings made were of the wing and stab—long gone. I think the rib spacing was 1-1/2 inches, which makes a 24-inch span. I think you have a great little event on your hands. Keep promoting!"

Thanks, Bob, I will. Nice to hear from you again after all those years.

RUTHERFORD RESURFACES AGAIN

Longtime readers of *Model Builder* may remember Dan Rutherford, aka Dirty Dan, who wrote *MB's* control line column in the '70s and early '80s. I hadn't seen Dan here in the northwest for quite some time, but recently he showed up at a swap meet in Washington, touting some products he had picked up in Russia. I understand that Dan has established some contacts in Russia and visits there on a regular basis. Most recently, he made arrangements to have a competition .049 engine produced.

Dan relates, "I have been working with a couple of guys for some time now and they have finally gotten serious about

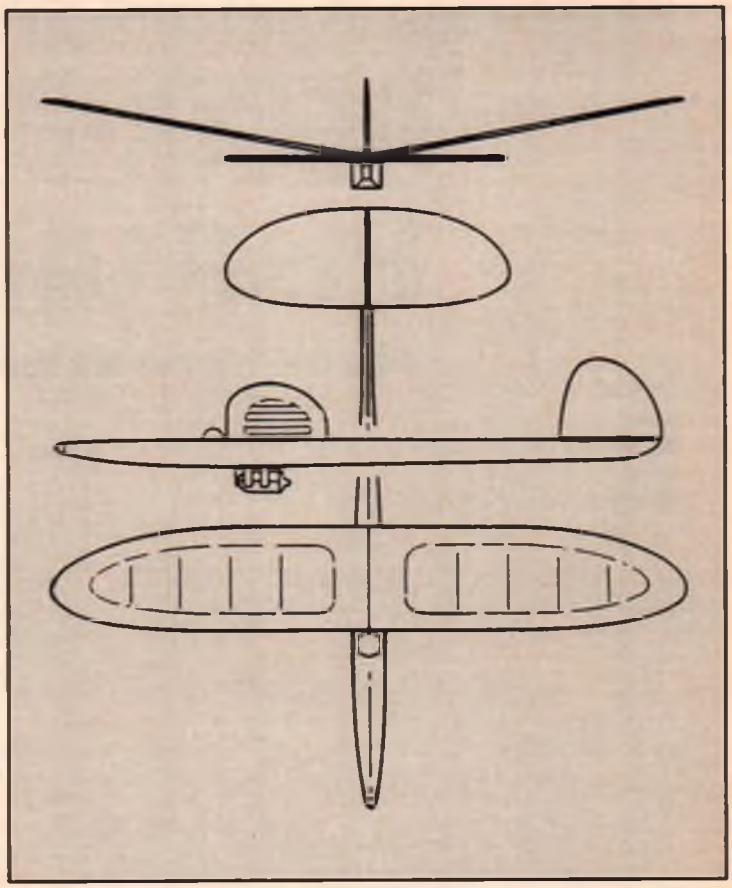
producing engines for me. Following a lot of design work, temporary crankcase tooling was produced and 10 prototype engines were built for testing, several of which I worked with. The results were promising for prototype engines—34 grams all-up weight, 25,400 to 25,600 rpm on 40 percent on a Grish 5x3 prop.

"Before describing the engines, I want to clearly make the point that they truly are prototypes, and while I expect most will run pretty strong, a few will possibly be substandard. The only real value here may be a very limited run piece for your collection. Also, there is some variety to the engines—most are AAC, the rest AAN and these have the nickel-phosphorous coating on the exterior of the case as well as on the bore. Construction is unusual in that the engine is a bottom loader with the crankcase split horizontally and directly through the mounting lugs. A black anodized threaded aluminum nose ring holds things together at the front and two screws at the rear keep it all in alignment, the primary clamping force coming from the engine mounting bolts."

These engines are nearly 1/2 ounce lighter than a comparable Cox Tee Dee .049 engine. They can use either a Cox head or a GloBee. If you are interested in finding out more about these engines or placing an order, contact Dan at D&B Import/Export, Inc., 4705 237th Place S.E., Bothell, WA 98021. Send an SASE.

THE END

It should be good flying weather just about everywhere these days. I'll be out there flying on the weekends—hope you do the same. Thermals to all until next month. ***MB***



MYSTERY MODEL

RECORD SETTING PERFORMANCES

Now that records are being kept, they're falling fast!

Records in pylon have been a long time coming, and now that they are recognized by AMA, they're being rewritten with every contest—at least it seems so in some areas. Without national recognition, a pilot/caller heat resulting in the "best in the country" was nothing more than that meet's fastest time.

A couple of years ago, a proposal was submitted to the AMA Contest Board to recognize those times deemed "the best." The odd thing about the proposal was not what you might think. One would assume that those going fast complained about the lack of recognition and something was done about it. This wasn't the case, though. The proposal was submitted because in F3D (FAI Pylon), we had people who had set what we believed to be "world records." However, the FAI had not yet accepted the proposed rule to recognize world or continental records (it has since been passed and will take effect shortly).

To that end, we—the AMA Contest Board—discovered FAI recognition would be non-existent if not recognized by the individual NACs (National Aero Clubs) first. In other words, if the AMA did not recognize a record set at our Nats, the FAI wouldn't, either. Out of this came the current rule and we now support that recognition.

We had a hard time with the proposal because there were some who supported the idea that all records had to broken by a certain percentage, and several people felt that all record times had to be backed up by another time within a certain percentage of the first.

This was to eliminate nine-lap times or fast-thumbs by a timer, all legitimate arguments. Everyone agreed that we certainly did not want to recognize a suspect time, however, there were arguments and examples of where record times could not be backed up, at least at the same race—which is where everyone felt the deed must be done.

A person setting a fast time in his or her last heat of the day was one case. Another is what happened at the last F3D Team

Rich Verano, current record holder in Form I with a blistering 1:03.16 set at El Monte, California, in March of last year. This is almost a full two seconds faster than the record he passed.

Current Quarter Midget record holder, Paul Benezra, on left, who set the time of 1:11.20 at the 1990 Nats. His caller, "Racer Rick" Landers, holds the Nats "Fast Time" award.

Trials, where Gary Hover set what we believed to be a new world record or, if not, at least a national record. After his heat, he folded the wing on his good ship and had no backup equipment with him that equaled this crashed plane. Therefore, he had no way to turn in a legitimate backup time.

To deny recognition to people who legitimately turn in the best time in the country or the world was not the plan. We crossed our fingers that times would be reported correctly, and worded the proposal in such a way that several people on the course had to agree, including the starter and timer.

We hoped that any racer who, after hearing their time, felt it was not a legitimate 10-lap time, would listen to their conscience and not try to claim a "record time." We now know there are some who don't care. Any hint of a record feeds their ego, and they will take the recognition, conscience or not!

Fortunately, it all comes out in the wash, as they say. I believe all current records are legitimate, and they keep falling.

When we first started, we urged anyone turning in a good time to get things moving, because we didn't recognize records set in the past. The new rules require submission within 14 days of the flight, and require rechecking of equipment and course layouts—therefore, accepting older records was impossible, even though they probably were legitimate.

We know that with time, those who set records will end up owning them again, because they are the guys who always go fast. You know who they are—the ones with a room full of "fast-time" awards. They don't always win contests, but somewhere they always get in a fast heat and win some more "wood for the walls."

The first year for record acceptance was 1990, and two of them came out of the Nats in Lawrenceville: Paul Benezra's Quarter Midget time of 1:11.20 and Bob Lamb's Quickie time of 1:15.73.

To this date, Benezra's time has stood; in fact, the only known times faster than this were credited to Ken Hulik and Dave Latsha, who turned in times a few one-hundredths faster at a race in 1989. However, both times were questionable, and even if records were recognized at the time, these in all probability would not have been accepted because of certain doubt as to whether cuts were or were not called. The result is that Paul Benezra has a two-year-old record. It's time for someone to crack it. They don't usually last that long.

An example of a short-lived record is Lamb's Quickie performance at the Nats, as mentioned above. Before that record could even get into print, Craig Grunkemeyer went 1:13.61 at the TURN Championship in Kentucky, booting Bob Lamb right out of the top position. Craig's record didn't stay too long either, as early in '91 the new Nelson Quickie engine arrived and records

continued on page 85

Three current or past record holders are featured in this group: front left is Dub Jett, who holds the current FAI record of 1:06.6 set at the World Championships in Wangarrata, Australia; front center is Lyle Larson, who held the Quickie 500 record of 1:04.81; and Dave Shadel, second from right in back, who held the Form I record twice. Others pictured are Henry Bartie, front right; John Shannon, back left, who builds engines and calls for Jett; Gary Hover, third from right in back; and Jim Shinohara, Dave Shadel's caller.

The man and his craft: Henry Nelson, center, produces the engines that hold most of today's records. On the left is Clark "Buckwheat" Wade, 1990 Nats Form I winner, and on the right is Dave Shadel, who has held the Form I record on two different occasions.

Second from right in the front row is Mike Pate, who held the Senior record in Quickie 500 with a 1:17.27 set at Nashville in 1991. Others pictured are, from left: Dana Swah, Joe Dodd, Jerry Salisbury and Doug Whitaker, with his caller, Jon Lemmons, standing.

ELECTRONICS CORNER

BY ELOY MAREZ

•BECs and Automatic Motor Cutoffs Explained

•Building a Variable Voltage Adapter

BECs and motor cutoffs are in the news this month, as requested by reader Joe McCulloch, of Altoona, Pennsylvania. The subject has been discussed here before, but there are always new RCers and new readers, and I have some new information to share with you. The subject also has a bearing on something else in which a lot of interest has been shown: Wee RC. Joe writes:

"Requesting your assistance with devising a BEC circuit that will operate on four NiCds. I would like to fly indoor RC at our local sports arena, and am building a very light 28-inch span model powered by a HiLine motor using four 110-mAH NiCds. For control, I intend on using a Futaba R-114H micro receiver, which idles at 18 mA, and a single Futaba S-133 servo, which idles at 8 mA. And of course this is why I am seeking help with a BEC circuit, in order to eliminate the receiver battery pack.

"I know that Cox has already done this with its Failsafe system on the FlyBoy electric plane, but I want to stay on the 72 MHz band, as I still have vivid memories of all those bad crashes we used to have when flying with tone receivers on the 27 MHz band.

"According to Bob Aberle's report on the Cox electric Failsafe system in the August '91 issue of *Flying Models*, he could consistently get 1-1/2 minutes of motor run time with the FlyBoy before the BEC cut off. He reported the plane could get surprisingly high in 1-1/2 minutes, and evidently had sufficient receiver power to get back down safely from that altitude. I would be real happy if I could get 1-1/2 minutes using the HiLine motor in my setup.

"Also, since all of the components are going to be in close proximity to each other in the model, what is your recommendation for a diode between the brushes for arc suppression? Please give a specific diode number.

"I was hoping you may have a chance to examine an electric version of the Cox Failsafe receiver to see what components they use in their BEC circuit."

I enjoy hearing from those who are not afraid to tackle original and difficult projects; to me, that is more of what modeling is all about than boring holes in the sky with a machine-built plastic flying thing. We'll certainly do our best to help Joe get into the air.

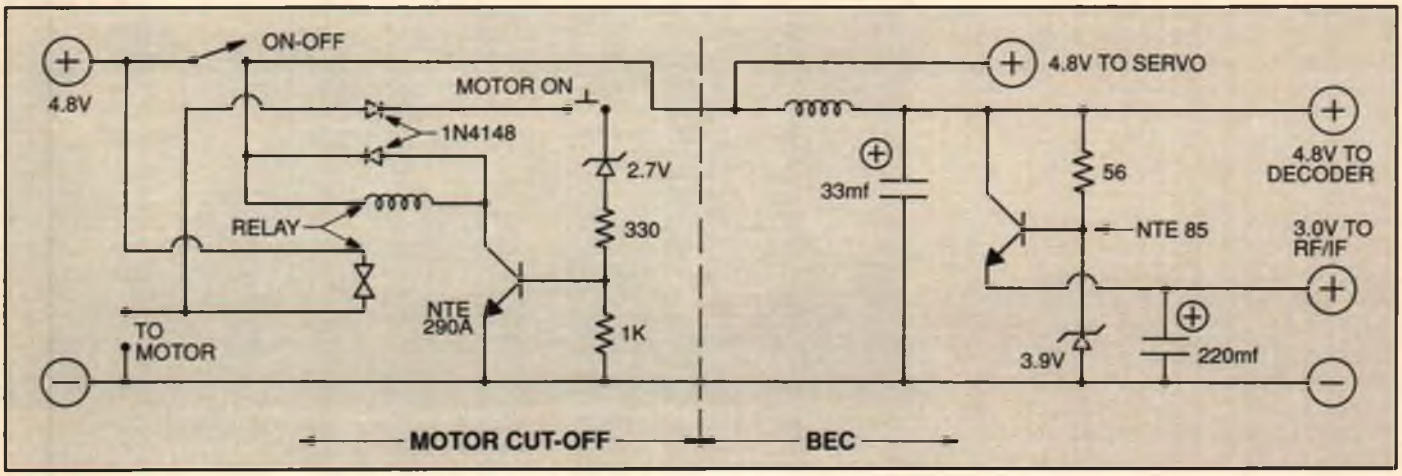
First, though, let's remove some of the misconceptions, starting with the ones about 27 MHz and tone receivers. The biggest enemies of 27 MHz flying, the "good buddy" CB'ers with illegal power and frequencies, seem to have disappeared, or at least diminished to numbers small enough not to be a problem. There is a lot of flying now being done on 27 MHz, and of course a good percentage of RC car and boat operations are done on that band. It definitely helps that most of the latter, as with small airplane flying, is done within a relatively small radius, and with high signal strength levels at the receiver.

Additionally, the Cox Failsafe receiver, even though it has only one channel, is not a "tone" system, but a true super-het. It is not the latest in receiver technology, not dual-conversion or narrow-band, but considering its size and weight, it is as good as a lot of receivers that were considered top-notch until the present closely spaced channels required us to tighten up on receiver requirements. In some respects, it is even better, for reasons I will explain as we go along.

Another misconception—BECs (Battery Eliminator Circuits) and voltage sensing motor cutoffs. *They are separate and completely different things!* You can have one or the other, or both, but they are completely different circuits, with absolutely no circuit or operational features one to the other.

The so-called BEC is really nothing more than a voltage regulator. Like all voltage regulators, its function is to produce a desired low voltage from a

Figure 1. A diagram of the motor cutoff and BEC circuits used in the Cox Failsafe receiver. Note that they are separate and distinct units, with completely different functions. Fully explained in text.



higher voltage source. That's all! The BEC/voltage regulator can be a simple IC, such as one of the small transistor-size 78L05s, or it can be a transistor biased to pass a certain amount of voltage and no more. The former is simple, requiring only three connections: in, ground and out. However, voltage-regulating ICs have some limitations, in that they must have minimum and maximum operating voltage ratings. Also, when the input and output voltages differ widely, a lot of heat is generated and has to be dissipated.

An example of the latter, a voltage-regulating transistor, is presented here, and is exactly the one used in the Cox Failsafe receiver—more about it later. Generally, such voltage regulators do not suffer the limitations as do the ICs, though they take up more space and are often more expensive to produce.

Figure 1 is a schematic of the Cox Failsafe BEC and motor cutoff. Notice that the only thing the two have in common is that they are both connected to the 4.8-volt power source; other than that, there is no input from one to the other. The motor cutoff is a common relay with its coil in series with a transistor biased to be on when full circuit voltage is present. In this case, when that voltage drops down to 2.70 volts, the transistor stops conducting and the relay drops out, cutting off current to the motor. The cutoff point is determined by the action of the Zener diode and the resistors in the base circuit of the transistor, which could be tailored to provide a similar action at different voltage levels.

The current carrying capacity is determined by the contacts of the relay; 2 amperes in the case of this little receiver. The circuit should work with any 5-volt coil relay with heavier contacts if required.

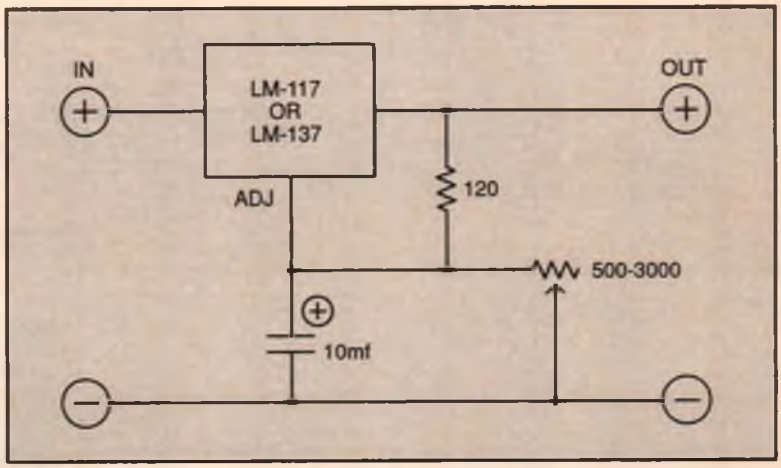


Figure 2. Circuit diagram for a variable voltage supply adapter which can be added to a common battery, charger or fixed power supply to provide continuously variable voltages as required for test purposes.

That, then, is a voltage sensing motor cutoff, which has

continued on page 83

The JR PCM-10S Helicopter Radio

PART 1 OF 3 • BY JAMES WANG

This month we begin a detailed three-part review of the new JR PCM-10S helicopter radio, distributed in the U.S. by Horizon Hobby Distributors. In this first installment we'll go over the differences between the old and the new PCM-10, and will talk a bit about programming it for the .60-size Kalt Excalibur helicopter. Next month we will discuss setting up the PCM-10S for 3-D hotdogging with the Concept 30.

The PCM-10S was introduced in 1993 as a successor to the JR PCM-10, which we reviewed in the September 1990 *Model Builder*. We also described how to set up the pitch curves, throttle curves and tail rotor mixing in March 1991, so we won't repeat the graphs for the pitch and throttle curves here.

There are quite a few major differences between the old and new PCM-10 radios. One of the best new features is the ability to transfer model programs directly from one PCM-10S transmitter to another by using the optional JR trainer cord. Let's say your friend has a particular helicopter and has been flying it for a while already, so it's completely dialed in. You have just built the same helicopter; now you can copy his setups and use them as a starting point.

The program transfer feature is also useful when you want to fly a friend's helicopter, but he flies mode 1 while you fly mode 2. With the PCM-10S, you can use your transmitter to fly his helicopter, even though the modes are different.

The new PCM-10S has enough memory to store programs for ten different models, while the original can store only seven models. Another major change from the old PCM-10 is the servo resolution and receiver coding scheme. The old PCM-10 used 512 discrete steps for the total servo travel; the new PCM-10S uses 1024 steps. The new PCM-10S also employs a different PCM coding scheme. The new JR 940S receiver must be used in order to benefit from the 1024-step resolution, however, the new PCM-10S transmitter can also work with the old 512-step ZPCM receiver (910XZ), as well as any of the standard JR FM/PPM receivers, such as the seven-channel 327X.

The new liquid crystal display is easier to read than on the old PCM-10, in that it's a deeper green in color and has better contrast. The intensity is adjustable to suit different lighting conditions. The 10S retains the PCM-10's nice touch-screen programming capability; all programming is done by pressing directly on the LCD display. So far, only this radio and the Airtronics 1000H have this capability.

The PCM-10S has the same number of programming functions as the original PCM-10. The only new function is for transferring data between two transmitters. Functions such as servo reverse, adjustable end points, auto dual rates, and five programmable mixes are still there; there are still two idle-ups, one throttle hold, one normal curve and one invert; and each of the throttle and pitch curves is still defined by seven points. There are no new functions because the original PCM-10 already had all of the necessary

The JR PCM-10S transmitter is one impressive looking piece of equipment. And all those bells and whistles aren't just fluff, either; they're all very worthwhile features that most heli fliers will be able to use to their advantage. Photo courtesy Horizon Hobby Distributors.

features for advance flying. But programming the radio has been made easier. For instance, you no longer have to cycle through all of the different programs one at a time; now the screen displays nine selections at once.

Another improvement in programming is that the pitch and throttle curves now have a crosshair at the location on the pitch curve or throttle curve where you are adding a point. The old PCM-10 used a dark dot which is sometimes difficult to see; the new crosshair system is very easy to see.

A very commendable improvement over the old PCM-10 is the new instruction manual. Scattered throughout are several small boxes called "Practical Applications" that offer hints on how and why you should program the radio a certain way—for example, why you should use exponential, how to set up the throttle hold switch, how to adjust the stunt trim settings, how to program the radio to automatically kick the gyro from high rate to low rate when idle-up is turned on, etc. I found all of the suggestions offered to be practical. I think every helicopter radio manual should offer helpful hints like these.

At the end of the manual is a printed worksheet for you to record your program settings. It would be nice if the manual came with a few example worksheets already filled out for some of the different helicopters on the market. I filled out the worksheet for my Kalt Excalibur and have included it with this article. Even though Kalt has replaced the Excalibur with the Baron Alpha II, you can use the worksheet as a good starting point for all of the .60-size helicopters on the market. Next month I will go into the details on why I programmed each function that way, and will also provide the worksheet for my Concept 30.

(Editor's note: Yes, James did include the worksheets for the Kalt Excalibur with this article—two full pages worth! Rather than take up that much space in the magazine, we put them aside and will send copies to all who send an SASE to the Model Builder office. The same goes for any other similar worksheets that James submits later as part of this review.)

The PCM-10S transmitter is extremely comfortable to hold; it's not slippery and there are no sharp corners. Two self-adhesive rubber grips are included for you to attach to the back of the transmitter for an even better grip. The shape of the new transmitter is practically the same as the original PCM-10. All of the toggle switches are also in the same locations, so you won't be confused, if you already own a PCM-10.

I really like having the idle-up switch on the top left corner, and the throttle hold on the top right corner. This setup is ideal for Mode 2 fliers. When you are ready to enter an autorotation, you want to be ready to move the throttle/collective stick, so it's better to trigger the throttle hold switch with the right hand. I also like having a single three-position switch controlling the normal mode and idle-up 1 and idle-up 2 together.

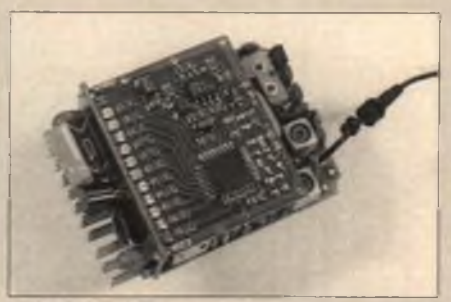
The new PCM-10S has a selectable time delay for the SPCM failsafe feature. With the failsafe function activated, whenever there is radio interference the servos will automatically assume a position preset by the user—for instance, moving the throttle to idle immediately, or putting the model into a shallow spiral turn. As soon as the interference disappears, control of the helicopter is restored. The new PCM-10S allows you to choose the amount of time after the interference starts that the servos assume their preset position. They can be 0.25, 0.5, or 1.0 second. The old PCM-10 had only the 0.25 second delay. I chose the 1.0 second option for the throttle, and let the throttle go to idle during a failsafe. For the other controls, I chose the "hold" feature, which automatically locks the servos at their last command position before losing the signal.

All JR receivers now feature JR's patented ABC&W (Anti-Blocking Cross Modulation with Window) circuitry. JR claims this design

A comparison of the old JR PCM-10 (left) and the new PCM-10S. Most of the differences are internal rather than external. In the foreground is the optional JR base loaded whip antenna, which is about 18 inches long. James has been using one of these and reports no reduction in range over the standard antenna.

The PCM-10S transmitter has a very easy-to-read liquid crystal display screen. The radio is programmed by pressing directly on the screen. The PCM-10S displays nine function names at a time; the old PCM-10 displayed only one function name at a time. Photo courtesy Horizon Hobby Distributors.

This is the author's Kalt Excalibur used to test the new PCM-10S. The beautiful canopy is one of the pre-painted units available from Hel-x in New Jersey. The plastic collective slider ring has been replaced by an optional Kalt metal slider ring (#0401-078-8). Engine is an O.S. .61 fitted with a Hatori U-shaped tuned pipe.



■ LEFT: The new JR 940S SPCM 10-channel receiver. It is dual-conversion and has a further enhanced version of JR's patented "ABC&W" noise reduction system. The new PCM-10S with the 940S receiver uses 1024-step resolution for the servos, and has a 20 millisecond signal update rate. JR says this is the fastest in the industry. Photo courtesy Horizon Hobby Distributors. ■ CENTER: Inside the Kalt Excalibur. A JR 4721 servo is used for collective pitch control, with 4131s on the cyclics. Both have a coreless motor and double ball bearing supported output shaft. A standard JR 517 servo with a three-pole ferrite core motor and single ball bearing is used for the throttle. The JR-120 gyro used here is still one of James' favorites. Notice that the JR 940S SPCM receiver and battery are both wrapped in foam and then enclosed in a plastic bag, which traps air and further enhances the vibration isolation qualities of the foam. ■ RIGHT: Inside the new JR 940S receiver. Notice that most of the components employ surface mounted technology (SMT) to reduce weight and prevent vibration damage. The servo connector pins are all gold plated for good contact. A 32-pin IC chip is used. Photo courtesy Horizon Hobby Distributors.

is better than traditional dual-conversion receivers because the ABC&W circuit is better able to filter out noise. Dual-conversion receivers filter out noise by going through two IF sections sequentially. JR's ABC&W uses only one filter, but the signal keeps circulating through the same filter many times until the signal becomes very clean.

The top-of-the-line 10-channel 940S receiver and the new 949S receiver have an even more refined ABC&W circuit, and are also dual-conversion. JR says this makes these receivers nearly immune to 2IM or 3IM interference.

How good the JR receivers are is very difficult to measure. I am using the 10-channel 940S SPCM receiver in the Excalibur, and a relatively inexpensive JR seven-channel 327 FM receiver in the Concept 30, and have not experienced a single glitch in either model. So I can say that both the PCM and FM receivers work very well with the 10S transmitter.

The servos I'm using in the Excalibur are JR's new 4131 and 4721. Both have coreless electric motors. The difference is in speed and torque; the 4131 puts out 90.4 ounce-inches and travels through 60 degrees in .23 second, while the 4721 is rated at 119.6 ounce-inches and has a transit time of .22 second.

Servos with coreless motors often make a humming noise under even the slightest load. This is completely normal. What you're hearing is the motor, which is constantly making very small movements to re-center the servo arm. Due to the enhanced electronic feedback loop, excellent motor accuracy and double ball bearing supported output shaft, these top-of-the-line coreless motor servos have excellent centering capability, meaning no slop!

The output shaft on both the 4131 and 4721 servos is supported by two ball bearings. A single ball bearing can still allow the shaft to wobble or tilt under load, but two cannot. When the servo has dual ball bearings, there is almost no need to have push-pull linkages on the helicopter because the servo shaft will not tilt. I am using the 4721 on the collective pitch and 4131s on the cyclics.

Always use a high-torque servo on the collective pitch and cyclic controls, because any main rotor blade that does not have a symmetrical airfoil always produces an aerodynamic pitching moment that wants to twist the leading edge of the blade down. For helicopters with the pitch horn on the leading edge side of the blade grip, such as the Excalibur, this moment puts a compressive load on the pushrod. The load is transmitted to the swashplate, the bellcranks and all three servos (collective, pitch and roll cyclic). If a cheap servo is used, then there will be play in the blade pitch and control paddles.

If you have a high-quality helicopter, then I recommend using a high-quality, high-speed servo for the tail rotor. Modern electronic yaw rate gyros such as the JR-120 have a very high bandwidth, which means the gyro can respond immediately to very rapid perturbations in yaw motion. The end of the bandwidth is reached when the disturbance is so fast that the gyro can no longer pick it up. Presently, on our models, the limiting factor in how fast the gyro can correct yaw disturbances is dependent on how fast the tail rotor servo can react. On a good helicopter, it is worthwhile to install the 4131 or the 4721 servo for the tail rotor.

The JR-120 and JR-130 gyros are two of my favorites. The 120 is

continued on page 84

DU-BRO Announces The Birth Of A Feather Weight Champion.

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DU-BRO's New Shock Absorbing Feather Lite Wheels offer a high quality product made from the latest in high tech foam, tough enough for paved runways as well as grass strips. Unlike those injected foam wheels, hard on one side, soft on the other, **DU-BRO** Feather Lites feature consistent balance throughout resulting in smoother take offs and landings. And they look like a tire! Feather Lites' treaded design gives you that sporty feel to complete the look of your aircraft. So if your particular model calls for "Taking A Load Off", go for the best, get **DU-BRO** Feather Lites. A Class Champion.

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	2.50L	**3.50L**		**5.50L**
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THE WEBRA .61 LONG STROKE

■ LEFT: The beautifully built Webra .61 Long Stroke with Dynamix carb is unquestionably the equal of any of the 10cc two-strokes currently being used in F3A Precision Aerobatics competition. Rear exhaust configuration is almost *de rigueur* for today's pattern aircraft. ■ RIGHT: The .61 Long Stroke and the unusual tuned pipe designed specifically for it—see diagram also.

Pilot skills in the fiercely contested international F3A (RC Precision Aerobatics) class are inevitably at a very high level, given the demanding nature of the flying involved, and it would be correct to say that these skills are the focal point of the event. Other contributing factors are a contestant's engineering skills, aerodynamic knowledge, model design and general logistic support.

Somewhere in this wide band of requirements lies the powerplant, that vitally necessary item that often takes on a "fit and forget" role. And rightfully so; an engine used in F3A competition must provide such consistent performance that it *can* be forgotten, so that the flier can concentrate fully on flying.

The powerplant that U.S. F3A team member Chip Hyde used to win the 1991 World Championships in Australia was, somewhat surprisingly, the Webra .61 Long Stroke. Surprising, that is, when one considers how long it's been since a Webra engine reached the top position in this event, which has been dominated by O.S., Supertigre and YS in recent years. Perhaps not surprising, though, to anyone who has actually handled this relatively new Webra product.

DESIGN AND MECHANICAL DETAILS

To begin with, this engine has a stroke/bore ratio somewhat removed from accepted long-stroke norms—1.11/1. The supposed virtue of the long-stroke engine is its torque—not necessarily more of it, but achieved at a lower-than-normal rpm. I've personally tested a number of engines which contradict this idea, however. For example, the Cipolla 3.5, with a stroke/bore ratio of 1.08, delivered its peak torque at 16,800 rpm, while the P.A.W. .29, S/B ratio .88 (short stroke), yielded max torque at just 4,600 rpm.

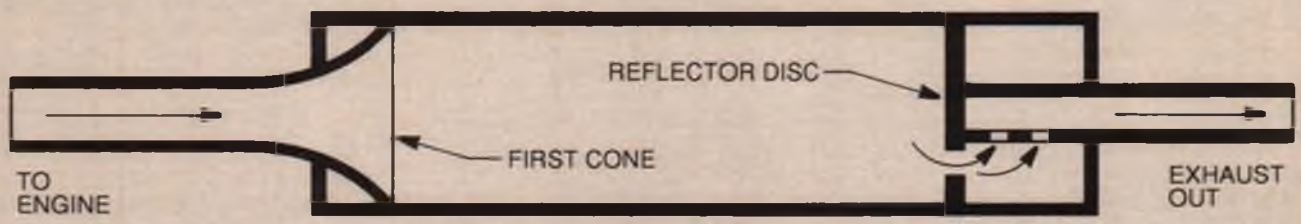
The fact is that at the same cylinder volume and port timing, a two-stroke engine's port areas increase with longer stroke/bore ratios, which means greater volumetric efficiency (easier breathing). This is of course highly desirable and would be much more widely used in high-rpm engines were it not for the detrimental effects of high reciprocating inertias, which effectively forces the use of shorter strokes for racing engines and the like. It therefore becomes more feasible to use the more efficiently breathing longer S/B ratio if a lower rpm is the goal, in which case more *power*, not just more torque, will be developed at the same rpm as a shorter S/B ratio engine, because more charge will be induced into the cylinder.

The best test of this would be to run back-to-back tests of two like engines having only an S/B ratio difference between them. Even more meaningful would be the results from testing a batch of each type. However, the writer, not being a millionaire, can at present offer only some surmise and the

SPECIFICATIONS

CAPACITY	.6066 cu. in.
BORE	.8862 in.
STROKE	.9835 in.
STROKE/BORE RATIO	1.11/1
TIMING PERIODS:	Exhaust 156°; Transfer 118° (angled up 5°); Boost 112° (angled up 50°); Front induction opens 41° ABDC and closes 55° ATDC; Total period 194°; Blowdown 19°
COMBUSTION VOLUME	1.0cc
COMPRESSION RATIOS	Geometric 10.94/1; Effective 7.9/1
EXHAUST PORT HEIGHT	.301 in.
CYLINDER HEAD SQUISH	.014 in.
CYLINDER HEAD SQUISH ANGLE	5.5°
SQUISH BAND WIDTH	.152 in.
CARBURETOR BORE	.294 in.
CRANKSHAFT DIAMETER	.6695 in.
ENGINE HEIGHT	4.048 in.
WIDTH	2.36 in.
LENGTH	3.63 in.
WIDTH BETWEEN BEARERS	1.625 in.
WEIGHT	19.4 oz.

THE WEBRA .61 LONG STROKE TUNED PIPE



NOTE: TUNED PIPE NOT AVAILABLE IN THE U.S. NOT TO SCALE

results of a recent test of a Webra Speed .61 (standard stroke/bore ratio of .9/1) with which to compare the .61 Long Stroke. Not much significance should be placed on this comparison, as there are several small differences between the two engines other than their respective S/B ratios:

WEBRA SPEED .61

- Torque/rpm: 121 oz.-in./10,960
- Horsepower/rpm: 1.73/17,460

WEBRA .61 LONG STROKE

- Torque/rpm: 135 oz.-in./11,400
- Horsepower/rpm: 2.07/19,100

Both of these engines were tested with open exhaust.

As can be seen, both torque and horsepower in the long-stroke engine occur, contrary to rumored expectation, at higher rpm. This could be due to the hand-fitting of the new L/S engine, or the fact that the L/S is rear exhaust, or the small design differences alluded to above.

Moving on to the rest of the engine,

PERFORMANCE

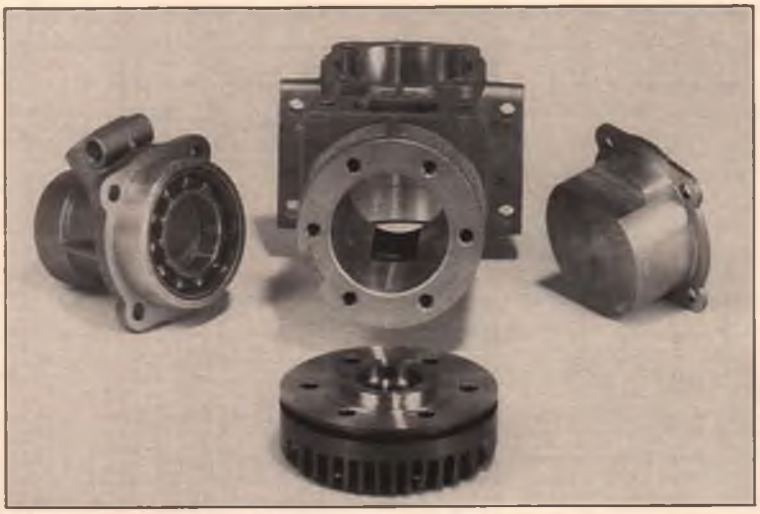
MAX BHP: 2.07 @ 19,130 rpm (Open exhaust, 5% nitro); 1.65 @ 9,252 rpm (Webra 470mm tuned pipe, 5% nitro);

MAX TORQUE: 177 oz.-in. @ 9,252 rpm (Webra 470mm tuned pipe, 5% nitro); 135 oz.-in. @ 11,400 rpm (Open exhaust, 5% nitro)

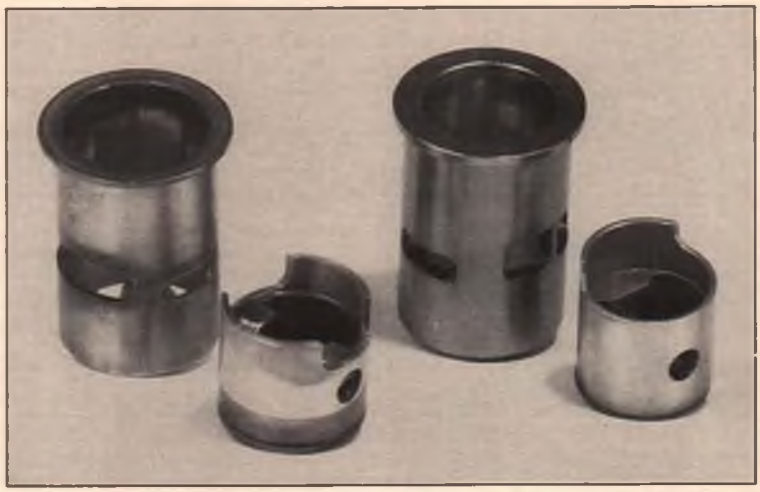
RPM ON STD. PROPS	OPEN EXHAUST	470mm PIPE	560mm PIPE
16x12 APC	—	—	5,326
13-1/2x12-1/2 APC	—	—	7,927
15x8 APC	—	—	7,930
13x10-1/2 MK	—	—	8,041
15x8 Graupner	6,960	7,370	—
12x12 APC	8,156	9,401	—
14x8 Airflow	8,433	9,344	—
13x6 MK	11,160	10,210	—
11x10 APC	11,765	10,750	—
11x7-1/2 Airflow	12,979	11,768	—
10-1/2x6 Graupner	15,090	—	—
10x6 APC	16,717	—	—

PERFORMANCE EQUIVALENTS

BHP/cu. in.	3.41
BHP/lb.	1.71
Oz.-in./cu. in.	291.79
Oz.-in./lb.	145.98



Webra's castings are of exemplary quality. Standard boost and twin transfer passages are just visible here.



The Webra Speed .61 liner and piston (left) as compared with that of the smaller bore Long Stroke. Note the difference in the thickness of the liners, and that the Long Stroke's liner has a bar in the exhaust port to retain the Dykes ring.

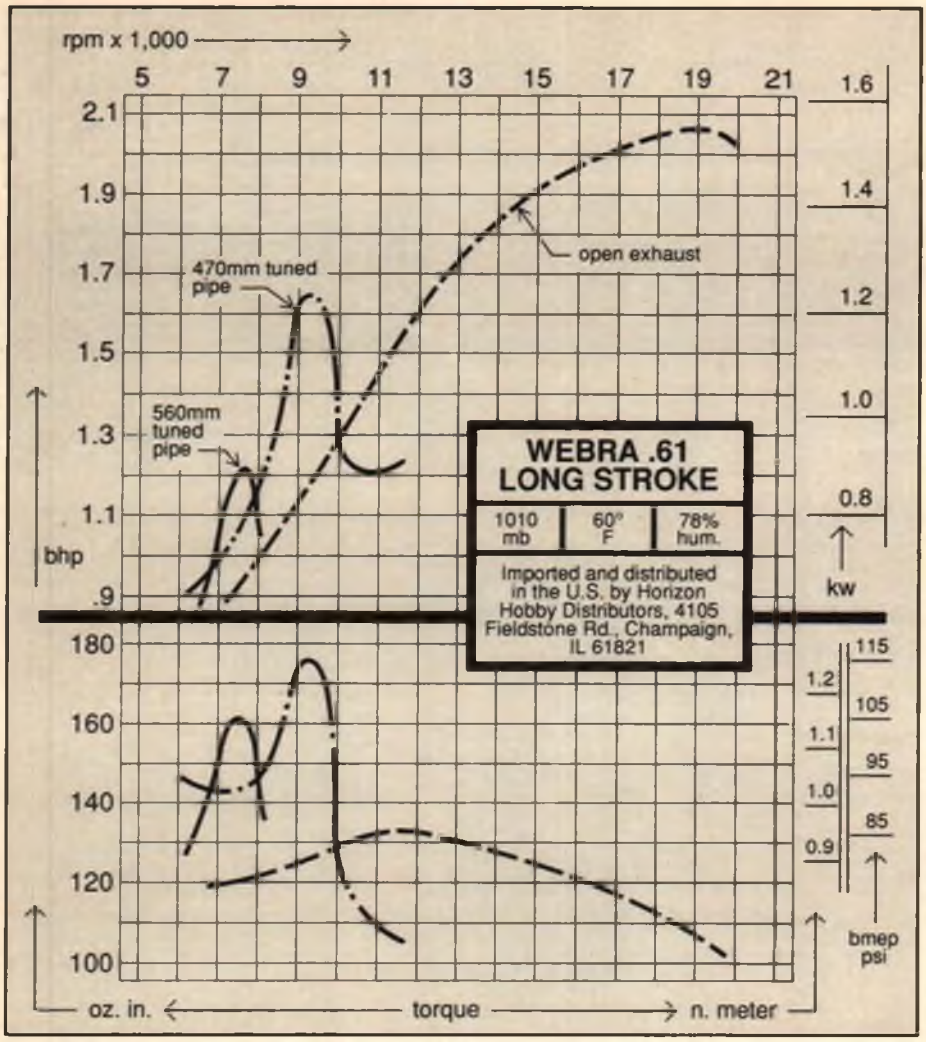
Webra has produced a finely made, .1-inch thick chrome-plated brass cylinder liner and a longer-than-normal piston, fitted with a Dykes ring. When good compression over long hours of running is needed, the close-fitting ringed piston is becoming the way to go.

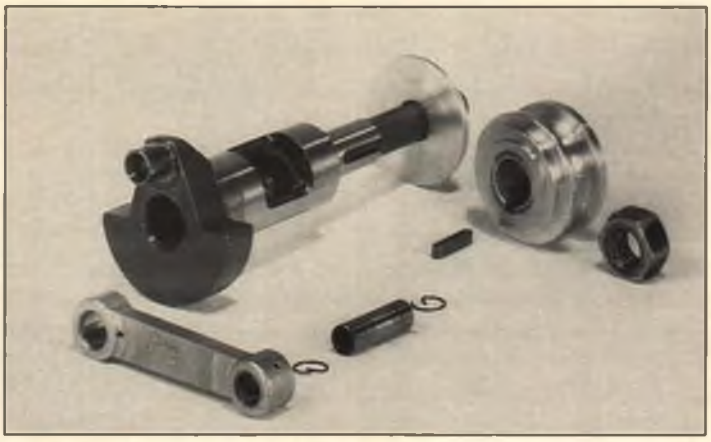
Not as close as a real ABC ringless piston setup, but the Webra piston is indeed close for a ringed design—just .001-inch clearance at the top of the stroke and .0015 at the bottom. Obviously, Webra is using some low-expansion aluminum alloy here. The conrod is 2mm longer than that in the Speed .61, but even so, the piston still requires a hefty cutaway to clear the crankshaft web at BDC.

The wrist pin is bored from either end, leaving a solid section in the center for stiffness.

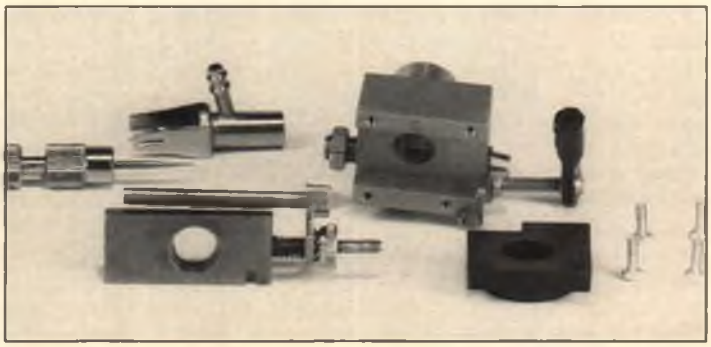
Crankshaft bearings have corrosion-free and high-duty plastic cages. The rear bearing is a slightly freer fit in the front housing than normal.

The crankcase bore is honed to a precise sliding fit for the liner, which makes for





Hardened crankshaft is well finished and uses a square key for the prop driver.



The makings of the Webra Dynamix carburetor. The flat plate throttle is at front left; attached to it is the movable spray bar, which is adjusted by the knurled knob. This acts as the secondary fuel constriction as the throttle closes onto the main fuel needle.

excellent heat transfer (i.e. cooler running) and eliminates the possibility of the liner becoming distorted.

The carburetor is Webra's famous Dynamix unit with sliding plate throttle valve and a uniquely adjustable secondary fuel control for mid-range and idle mixture. This carb supposedly gives improved controllability over the normal rotating barrel types. Dynamometer tests showed it to be certainly equal to the best of the rotating types, with perhaps only the YS rotating blade throttle, with its heavy pump assist (6-8 psi), being superior in response speed.

The Dynamix carburetor's throat bore is a small .294 inch, indicating the need for only a low pressure assist from a tap on the tuned pipe (usually about 1-1/2 psi). Webra does produce a fuel pump for this engine, and I understand that Chip Hyde's engine was fitted with one, but his carb still had the .294-inch bore, which means he wasn't getting any more power out of the engine, only a more positive fuel flow under high-G maneuvers.

TUNED PIPE

Information on this particular pipe, apparently privately developed for the Webra Long Stroke, is hard to come by. The drawing shows the principles, but not the precise dimensions/angles. Use of the flat reflector disc is an increasing trend, maybe more for its simplicity of manufacture than for performance advantages—if any. What does appear to be new is the layout of the front "cone". . . a misnomer now, as this one is more of a trumpet shape, a concave accelerating curve, rather than the normal straight-sided cone or the shallow convex curve of some proprietary pipes. Another design feature is the long constant-diameter section between the end of the "trumpet" and the flat disc. Whatever the theoretical advantage of such a design, it does result in a pipe free of necessary welding and turning/spinning of long cones.

PERFORMANCE

Fuel for the following tests was 5 percent nitro, 10 percent castor and 5 percent ML70 synthetic oil. Glow plug was an OPS 250.

Test 1: Open exhaust

The Webra was run run at speeds of from 6,810 to 19,605 rpm, with very consistent, stable torque output maximizing at 11,400. As mentioned earlier, the engine's long-stroke design failed to keep it from reaching high rpm figures.

Test 2: Tuned pipe at standard 470mm length

Used with Webra's 11-inch curved steel exhaust manifold, the tuned pipe length from glow plug to "first maximum diameter" was a long 18-1/2 inches; long enough to expect a quite low best resonance rpm point.

Starting at a likely "off-resonance" rpm of 6,117 and working up, initial torque figures above open exhaust levels were followed by a truly solid and remarkable flow at

9,250 rpm, where a max torque of 177 ounce-inches was recorded. This calculates to a bhp of 1.65, and an average cylinder pressure (bmep in psi) of 116, a figure this writer has seen equalled only once before. However, these results were reached at the lowest rpm of any of the top pattern engines tested, so clearly, the Webra Long Stroke/pipe combination has been the subject of much development.

Moving on past that 9,250 rpm peak showed achingly small increases in rpm as the load was reduced. The pipe had become a strongly repressive influence on the engine's ability to run faster. This is a typical characteristic of a tuned pipe, but here the effect was quite marked. Thus, operating the engine on the ground at or just past the 9,250 max resonance rpm looks like a good strategy. The in-flight rpm would of course rise a small amount—say to 9,600 rpm, where the engine is then ideally placed to deal with either the increased load while climbing—in this case the rpm would decline back toward max power at 9,250 (just what's needed)—or with the reduced load as the aircraft dives, in which case there would be some propeller braking effect as the engine rpm would barely change. Maximum rpm on a 12x12 APC prop was 9,400, which looks ideal.

Test 3: 560mm Pipe

In the pursuit of further information on the ever-longer pipe situation, a 3-1/2 inch length of tubing was inserted between the pipe and manifold, bringing the overall length from the prop nut to the end of the pipe to 3 feet.

Using heavier loads resulted in peak resonance appearing at 7,500 rpm, with a measured torque of 162 ounce-inches. That calculates to 1.23 bhp and a bmep of 105 psi. This is less powerful than the standard length pipe, so it looks like more optimizing of pipe parameters is required to improve the figures at these much lower speeds.

IDLING

An easy idle of 2,200 rpm was achieved; the geometry of the carburetor slide linkage inhibits much movement toward an even slower idle. Pick-up to max rpm was very brisk and reliable following a simple adjustment of the secondary fuel needle.

SUMMARY

The Webra .61 Long Stroke is continuing proof that the 10cc two-stroke is still capable of taking on the 20cc four-strokes. Admittedly, the tuned pipe is a major additional weapon in this fascinating duel, but it is a legitimate compensation for the relative inefficiency of the two-stroke cycle. This lack of efficiency is often circumvented by the high rpm route to power, so, as the push downward in rpm continues, the question becomes just how much lower can (or should) the 10cc two-stroke be taken? Webra's move along this road indicates that there is probably yet more mileage to be had. ***MB***

PUSHCART

An out-of-the-rut 1/2A sport model featuring a mix of traditional and unconventional construction, by one of the most innovative designers in the hobby.

BY ROY L. CLOUGH, JR.

Didn't you ever, right in the middle of a well-considered and carefully planned project, start to daydream about some other intriguing but totally different configuration?

Did the notion nag you by floating details of various components before your mind's eye? Did you finally try to relieve the pressure by taking a few minutes from your main squeeze to glue a few pieces together?

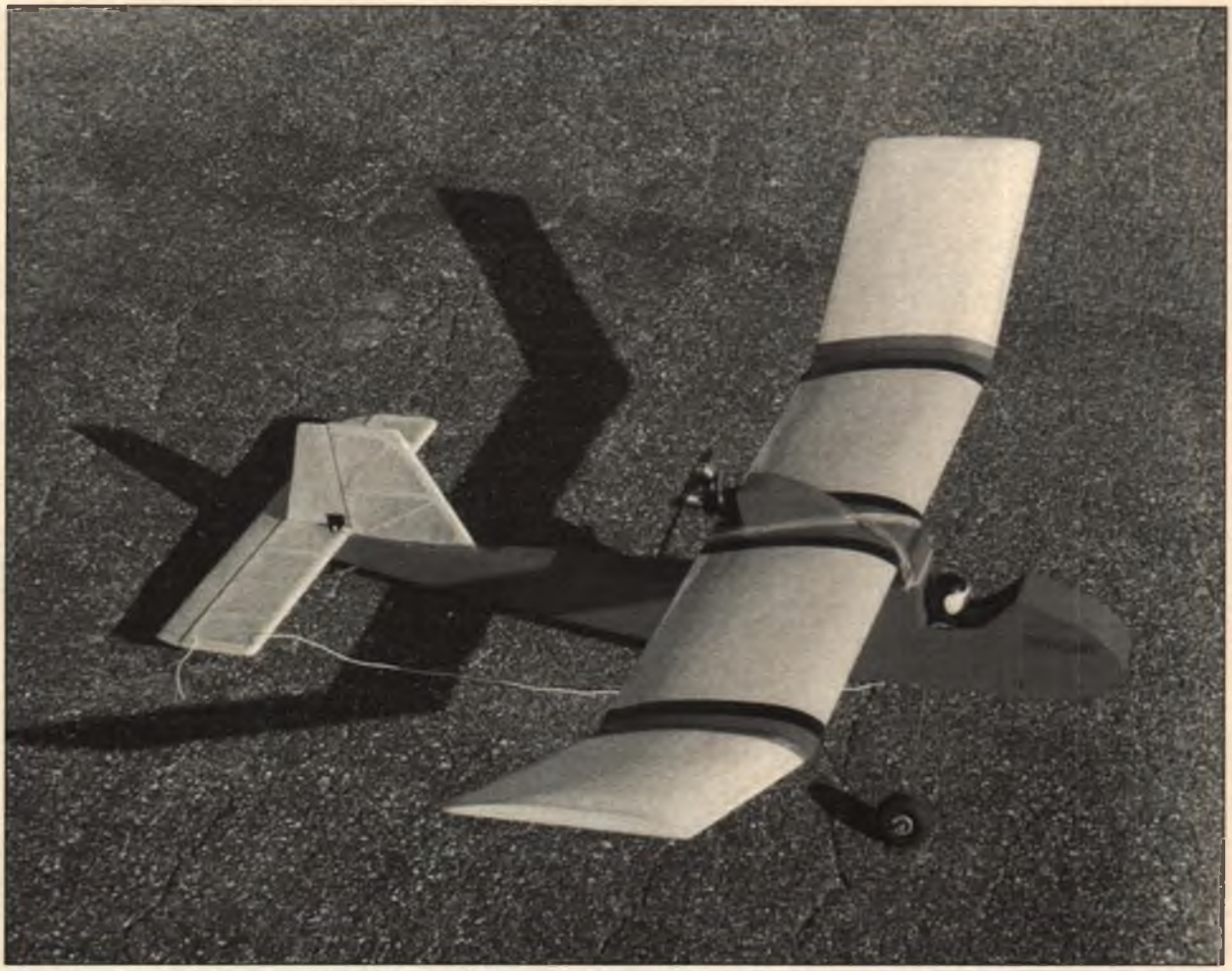
Then did you push the new assembly to the back of the bench while you turned back to the main job at hand?

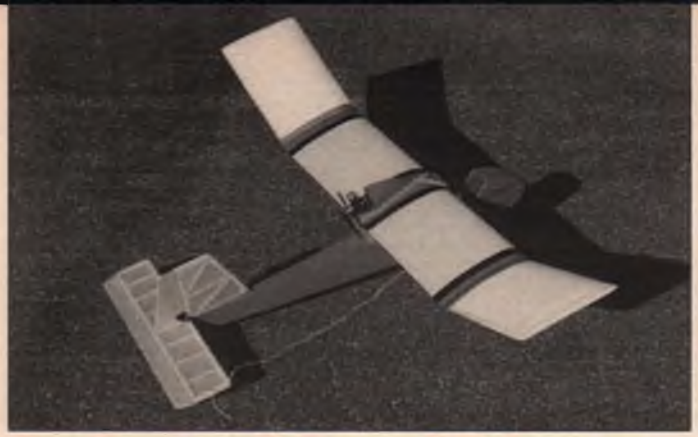
Me too.

I suspect the malady is as common to scratch-builders as toenails. Partial yielding to the urge is no cure. Once started, the thing just sits there demanding further resolution. So, every so often you sneak a little time to sketch details and assemble another component. Eventually, maybe months down the road, you find you've built another airplane on the back of the bench while waiting for the glue to dry on the one in front. The day I started Pushcart, I hadn't intended to—I was working on something else and let my mind wander.

I'd long wanted a good conventional pusher along the classic lines of the 1931 Curtiss-Wright Junior, or the more recent Woody Pusher homebuilt. But not exactly like those. I was doing this for fun and didn't want to mess around aligning a cabane. The 1935 BAC Drone's shoulder-wing was more to my taste. The model also would have to be a taildragger. It's more fun taking off with your tail in the air and greasing on three-point landings.

I had a bargain two-channel





Two views of an earlier version of the Pushcart. For safety's sake, the designer recommends fitting the engine with a left-hand prop so you can retain the use of the stock Cox spring starter. Fuselage is a simple sheet balsa box and will accommodate standard-size radio gear with ease.

radio outfit kicking around, so I gave the model enough wing and internal volume to haul a bigger battery and those inexpensive standard-size servos. Open cockpit, of course, but sunroofed against the drag of the usual foxhole, and staffed by Pong the Puissant, my long-suffering test pilot and victim of 50-odd years of design meanderings.

Thus jelled Pushcart:

Major masses, radio equipment and engine, are divided between the wing and the fuselage. Like on Wall Street, distribution cuts your losses in a major crunch. In line with this philosophy, the foam wing rests on friction strips of flat rubber so that it will stay put with fewer rubber bands but still knock off easily.

With the engine mounted on the wing, won't nosing over send the propeller chewing into the fuselage? Nope. Look closer. If the wing skates forward, the prop will hit the rearward-pointing hold-down dowel and stop.

CONSTRUCTION

The fuselage is 1/16 sheet balsa, edge-glued with CA where necessary to get the required width. There are two key bulkheads. The front one is 3/32 birch plywood, located at datum zero. The rear 1/8 balsa bulkhead holds the fuselage "boattail" formers and the rear dowel anchor. Note the use of appropriate battens and cross members to give the thin-skinned center section rigidity.

The landing gear is .078 wire; a bit rubbery but very shock absorbent. It is ruggedly sandwiched between the front bulkhead (B) and a plywood mounting plate (A).

I covered the fuselage the old-fashioned way—silkspan sealed on with clear butyrate dope. This was painted with Red Devil water-base latex, which, when absolutely dry, was sprayed with clear gloss butyrate. After all of this work, I decided that if I had to do the job over again I'd use MonoKote or some similar product. Suit yourself.

Pushcart was tested both with the cockpit completely open and completely canopied. The best arrangement was the compromise sunroof of acetate sheet supported by Teriyaki sticks. It permits easy access to the radio and battery.

I never hard-mount the battery or radio. The nose of the fuselage is lined with 1/2-inch urethane upholstery foam, against which rests the battery holder. Another layer of foam is between it and the receiver, which is held in place with more foam. This allows instant access with good protection in a crunch. The antenna is led down the inside of the fuselage and dangles out the rear.

Two Futaba S148 servos are mounted in the center section and are attached to the rudder and elevator with 1/8-inch hardwood dowel pushrods tipped with easily bendable paper clip wire.

The fixed tail surfaces are stick balsa with silkspan covering, watershrunk and tightened with butyrate dope. Again, nostalgia be damned, iron-on film is better. The movable surfaces are 1/8 sheet balsa. The only revision made to the original Pushcart was a mainly cosmetic increase in fin area (compare the photos to the plan).

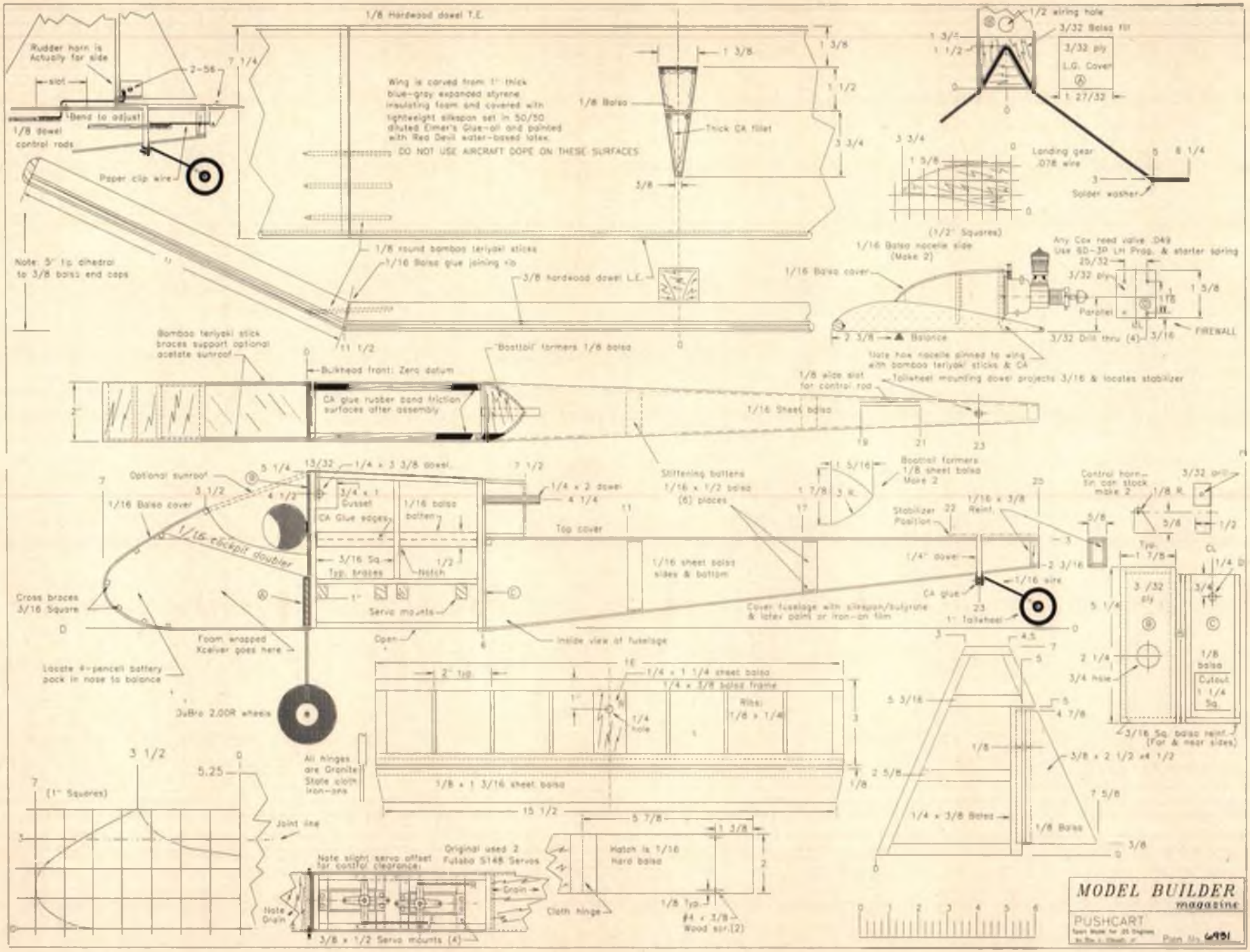
The author's Pushcart coming in after a late afternoon flying session. This is the latest version, as shown on the plans, with the semi-enclosed cockpit and taller vertical stab.

The wing is carved and sanded from 1-inch blue-gray builders' styrene insulating foam. Begin with a 4-foot slab of foam 7 inches wide. Make sure the edges are straight and true. Lay it on a flat surface and, with a razor blade guided by an angled block, cut a 1/4-inch V-groove along one edge. Wrap a small piece of 100-grit sandpaper around a short length of 1/4-inch dowel and enlarge and deepen the V-groove until the 3/8-inch hardwood dowel leading edge can be pushed into place. (You can control the diameter of the sandpaper-covered sizing dowel by the thicknesses of sandpaper you wrap around it.) When the fit is right, run a bead of white glue the full length of the groove and push the dowel into place. Rub more glue into any visible seams and allow to dry thoroughly—at least overnight. When dry, lay the wing on a wax-paper covered surface and, using UFO thick CA, glue a 1/8-inch hardwood dowel to the trailing edge.

Make a stiff cardboard airfoil template to guide you in carving the wing to shape. It is quite easy to shape the wing by slicing it with a big kitchen knife and finishing it off with 100-grit sandpaper, but foam seems to dull knives rapidly. I keep a roller-type, draw-through sharpener handy and touch up the blade often. Chefs and other professional knife wielders despise these hardened steel roller sharpeners for the very reason that makes them great for honing foam shaping knives: the rollers tend to leave a microscopically ragged sawtooth edge, and that's exactly what cuts foam best. Note that the dowel leading and trailing edge spars are very useful guides for the flat of the knife when shaping the leading and trailing edge tapers.

When sanding the foam, use a sanding block with light spanwise strokes. Circular or scouring motions tend to gouge and produce low areas. The airfoil shape should be smooth and regular, with the same section over the full span. Proceed with care and you just may decide, as many have, that this way of building wings is much easier than ribs, spars and sheeting. Wear a shop mask when sanding; styrene particles are no better for your lungs than any other kind of crud.

Now cut the wing apart at the dihedral breaks with a razor-


1/8 Hardwood dowel T.E.
Rudder horn is Actually far side
slot
2-56
Bend to adjust
1/8 dowel control rods
Paper clip wire
7 1/4
Wing is carved from 1" thick blue-gray expanded styrene insulating foam and covered with lightweight silkspan set in 50/50 diluted Elmer's Glue-all and painted with Red Devil water-based latex.
DO NOT USE AIRCRAFT DOPE ON THESE SURFACES
1 3/8
1 1/2
3 3/4
1/8 Balsa
Thick CA fillet
3/8
1/2 wing hole
3/32 Balsa fill
3/32 ply
L.G. Cover
1 27/32
1 3/4
1 1/2
1 5/8
Landing gear .078 wire
8 1/4
Solder washer
(1/2" Squares)
Note: 5° tip dihedral to 3/8 balsa end caps
1/8 round bamboo teriyaki sticks
1/16 Balsa glue joining rib
3/8 hardwood dowel L.E.
11 1/2
1/16 Balsa nacelle side (Make 2)
Any Cox reed valve .049 Use 60-3P LH Prop. & starter spring
1/16 Balsa cover
25/32
3/32 ply
1 5/8
Parallel
FIREWALL
2 5/8
Balance
3/32 Drill thru (4)
3/16
Note how nacelle pinned to wing with bamboo teriyaki sticks & CA
Bamboo teriyaki stick braces support optional acetate sunroof
Bulkhead front: Zero datum
"Boatlail" formers 1/8 balsa
CA glue rubber band friction surfaces after assembly
1/8 slot for control rod
Tailwheel mounting dowel projects 3/16 & locates stabilizer
1/16 Sheet balsa
19
21
23
Optional sunroof
5 1/4
13/32
1/4 x 3 3/8 dowel
7 1/2
3 1/2
4 1/2
3/4 x 1 Gusset
1/16 Balsa cover
CA Glue edges
1/16 balsa batten
1/4 x 2 dowel
4 1/4
Stiffening battens 1/16 x 1/2 balsa (6) places
1 5/16
1 7/8
3 R.
"Boatlail" formers 1/8 sheet balsa Make 2
Control horn— tin can stock make 2
3/32 drill
1/8 R.
5/8
1/2
1/16 x 3/8 Reinf.
Stabilizer Position
Top cover
1/16 cockpit doubler
1/16 sheet balsa sides & bottom
1/4" dowel
2 3/16
1/16 wire
CA glue
1" Tailwheel
Cover fuselage with silkspan/bulgrune & latex paint or iron-on film
Cross braces 3/16 Square
5/16 Sq. Typ. braces
Notch
1/2
Servo mounts
Open
Inside view of fuselage
Foam wrapped Xcelver goes here
Locate 4-pencell battery pack in nose to balance
DuBro 2.00R wheels
2" Typ.
1/4 x 1 1/4 sheet balsa
1/4 x 3/8 balsa frame
Ribs: 1/8 x 1/4
1/4 hole
1/8 x 1 3/16 sheet balsa
15 1/2
All hinges are Granite State cloth iron-ons
3 1/2
5.25
(1" Squares)
Joint line
Note slight servo offset for control clearance
Original used 2 Futaba S148 Servos
Grain
Note Grain
Hatch is 1/16 hard balsa
Cloth hinge
1/8 Typ.
#4 x 3/8 Wood scr.(2)
3/8 x 1/2 Servo mounts (4)
3/32 ply
1/8 balsa
Cutout 1 1/4 Sq.
3/16 Sq. balsa reinf. (For 4 rear sides)
3/4 hole
5 3/16
4 7/8
2 5/8
7 5/8
1/4 x 3/8 Bolss
1/8 Balsa
3/8 x 2 1/2 x4 1/2
MODEL BUILDER magazine
PUSHCART
Plan No. 6491

saw or something similar. Be sure to cut the dihedral breaks with the angle equally divided between the two sections! This way, when the butts are glued together, the joint will be the same thickness on both sides. Refer to the plan.

CA glue 1/16 balsa joiners to the butt ends of the center section, and when set solid, glue the dihedralled outer panel butts to this. Don't omit the balsa joiner—it makes a much more rugged joint than foam-to-foam. When the assembly is set completely solid, poke three 3-inch lengths of bamboo Teriyaki sticks into the joint for added stiffness. You can pilot the holes with a sharpened length of stick in a hand drill; just don't break through the wing top surface! Squirt the holes full of white glue, shove the 3-inch lengths of stick in until the ends are just below the surface and wipe off the excess glue.

Assemble the engine nacelle to the top of the wing with CA glue. Let the assembly dry for a day or two before you cover the wing and nacelle all over with medium weight silkspan laid on with a 50/50 mix of white glue and water. Allow another couple of days to dry and then paint with water-base latex paint in your favorite colors. *Do not* use regular model airplane dope or spray-on lacquers, as the fumes will erode the foam under the covering.

Accent stripes can be pressure-sensitive colored decorator tape. Once again, you could use iron-on film, something low temperature like EconoKote, which will be somewhat easier to apply. If you use film, wipe down the finished foam surface with a very thin white glue and water mix (say 10/1) and let it dry thoroughly. Be very careful to apply the film at the lowest temperature it will take. Film-covered foam is easy, but you may find it needs a careful touch of the heat gun now and then to retighten it.

Pushcart was tested with both the Cox Black Widow and the Texaco .049. The Black Widow has more power, but the Texaco runs longer. In either case, follow Cox's instructions to reposition the fuel line.

After flying Pushcart for two seasons, I happened to mentioned it to Big John Elliot, who was working for Cox Hobbies at the time. He was happy that I found the performance of the engines satisfactory and had had no trouble with them even after quite a few hours of use, but he stressed that these engines are not set up for pusher operation. To take the thrust loads, Cox can supply a thin steel thrust washer that goes between the prop hub and the crankshaft journal. A self-addressed stamped envelope will bring a couple of thrust washers to Pushcart builders. Send to Customer Service, Cox Hobbies Inc., 350 West Rincon St., Corona, CA 91720-2004.

Any engine sprays oil mist, but with a pusher like this, the messiness is largely limited to the aft fuselage and tail surfaces. I've found rubbing alcohol to be the easiest and cheapest cleanup between flights.

Flying offers no problems, but if this is your first RC effort, have Pushcart test-hopped by an experienced pilot. If you have inadvertently built in any surprises, let them be discovered by somebody better able to deal with them.

When starting the engine or adjusting the needle valve, it seems much easier to stick one's fingers into a spinning pusher prop. Hand flipping is a no-no. Invest in a couple of left-hand props so you can use the starter spring which comes with the engine. Failure to observe this precaution could cost up to half a box of Band-Aids and a week's supply of naughty words. Suitable left-hand propellers are available in 5-1/2 to 6-inch diameter and 3- to 4-inch pitch.

With wing and tail incidences correct and the balance point in the right place, you should be able to fly without cranking in much trim. When the engine stops, the model should not tend to pitch up or down to any great extent. If it does, adjust the thrustline with thin washers between the engine mounting lugs and the firewall.

Pushcart will loop, wingover, chandelle, etc. The glide is good and landings a lot of fun. Plan your flight to be circling at an altitude of 100 feet or so when the power quits. Set up a flat glide, double check the wind direction and kill off altitude with S-turns to land exactly where you wish. **MB**

PLUG SPARKS

BY JOHN POND

The SCAMPS "Old Ruler" Event Gets A Second Chance

Several years ago the SCAMPS free flight O.T. club drew up a set of rules for their so-called "Old Ruler" event. The intent was to allow fliers to design, build and compete with any model conforming to the 1940 AMA rules. As it turned out, very few responded to this "one-off" type contest. Jim Adams, now president of SAM, built a model he called "Der Fledermaus" (seen in Photo No. 1), and Bob Oslan produced a pleasing-looking, deep-bellied cabin design called the "Swift" (Photo No. 2). Some fellows took standard O.T. models and "improved" them by adding a few modifications, the most prominent being to increase the rudder area on the Comet Clipper MKI.

The event was tried for a year, but was eventually dropped for lack of participation. Now, Gene Wallock, newsletter editor for the SCAMPS, announces the re-establishment of this event for all 1993 SCAMPS contests. This would allow swapping of parts from old designs, as long as the old 1940 rules are met. How about a Playboy wing on a Gladiator fuselage?

In this same line, the "Sod Busters" club (SAM 53) ran an article written by Mark Glammier, wherein Gene Ireland uses a Lanzo Bomber wing and tail (scaled up 20 percent) in combination with a Lanzo Record Breaker fuselage (also 20 percent enlargement) to make a nice flying RC model.

Photo No. 1. Back in the late '70s, SCAMPS member Jim Adams came up with this strut-braced cabin design for the Old Ruler event. Dubbed "Der Fledermaus" (German for "bat"), the airplane flew well with an inverted Anderson Spitfire for power.

Photo No. 2. The graceful "Swift," sort of reminiscent of the So-Long in profile, was master designer/builder Bob Oslan's Old Ruler entry. Covered in silk and dope, of course, and powered by a Forster .29.

As Ireland reports, the standard Bomber fuselage is no fun to build and the pylon is ugly. The Record Breaker fuselage with the superior Bomber wing makes an attractive combination.

Actually, this Old Ruler idea is quite intriguing, as variations can sprout like weeds. How about wartime models and some of the early English designs such as the "Frankenstein" as seen in Photo No. 3? It wasn't until late 1948 that the English designs started to resemble the American models. The Limeys liked realistic cabin models which, in essence, is the Old Ruler idea.

WINTER CONTESTS

With the running of the Florida Winter Fly meet at about the same time as the annual Southwest Regionals in Phoenix, O.T. modelers can now choose between contests on the east or west coasts. The Texas boys are lucky, as they are about halfway in between. This year, a sizeable gang of Texans attended the Florida meet, which made things

great from a social standpoint.

As usual, during the winter months, the weather in Florida can be rather "iffy." Temperature on Friday was 65 to 70 degrees; however, this was accompanied by 18-20 mph winds. The Contest Director, Fred Mulholland, kept reassuring people that better weather was coming. The only hero, Bruce Norman, flew his Dallaire (Photo No. 4) in the early morning high winds. The wind finally did subside somewhat, but then the modelers were treated to an off-and-on rain condition for the last 90 minutes of the day's competition.

The second day was slightly better and the boys were able to get in some pretty good Texaco flights. Bob Peru came in 1st, followed by Larry Davidson and Tom Jozwiak.

The third day showed more improvement, with low clouds breaking up around 10:30 a.m. After the meet was concluded, the boys visited the Naval Air Museum in Pensacola. Fred Mulholland reportedly did a fine job as CD, ably assisted by his wife, leading many fliers to say it was a good meet and well worth attending.

SOUTHWEST REGIONALS

Almost a carbon copy of the Florida Winter Fly, Angus Crosbie reports that the weather was not all that hospitable at the alternate site for the Southwest Regionals, south of Phoenix, Arizona.

Photo No. 5 is a shot of SAM 49 member Dale Tower with a fleet of his blue MonoKoted Lanzo Bombers. Dale travels around quite a bit and always collects a share of the trophies. Those Bombers are extremely hard to beat. And it seems that most everyone is using them. Even this writer, who won't build one, has succumbed, winning the SAM 21 Electric 05 Perpetual Trophy using a Leisure Bomber custom built for him by the SAM 21 membership.

The lone dissident, Eut Tileston, has been able to prove the Bomber design is not invincible. Seen in Photo No. 6 is a rarely seen model, a Thunderbird Mk. I as marketed back in 1938 by the New Cyclone Model Aircraft Co. Despite the rather ponderous size of this model, Eut is able to extract maximum performance. Takes perseverance and lots of practice!

Looking over the results of the RC portion of the S.W. Regionals, one finds that Eut Tileston won or placed in eight of sixteen events. Needless to say, he was the Sweepstakes winner! The nearest in Sweepstakes was Ed Hamler of SAM 27, with four wins.

LAS VEGAS MEANDERINGS

Received an interesting letter from Sonny Soto of Las Vegas, who sent in Photo No. 7 showing both him and George Niebauer of SAM 25 (VAMPS) with McCoy .60 powered free flight Comet Sailplanes, at Henderson Dry Lake.

We are running this photo in response to a request from Sonny, whose mother complains that he is never in any of the model magazines. Sonny is such a great guy, we can't resist his mom's request.

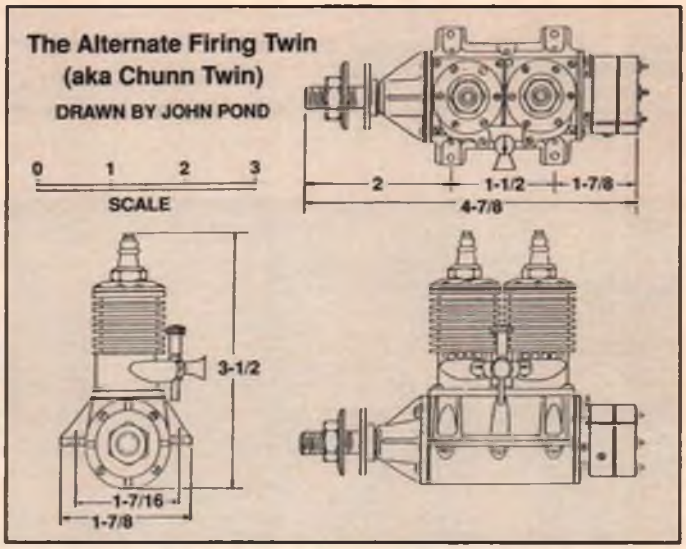
ENGINE OF THE MONTH

This engine was advertised as the "Alternate Firing Twin" and was marketed by the Southern Model Engineers of Nashville, Tennessee. Any collector worth his salt, however, will immediately recognize the engine in the drawing as the "Chunn Twin."

The emergence of this company and engine was brought about by Chunn Model Motors being forced out of business by the 1938 spring recession and by the appearance of more heavily financed engines such as the Pee Wee, Elf, Trojan, Brat and Husky. Producing engines is one thing, but without sufficient advertising, good companies and good engines get swept away in the competitive market.

To overcome the tremendous competition for the small engine market, Bob Chunn decided to produce a twin designed around components of the 1938 Chunn. It is interesting to note that although Chunn no longer owned the basic Chunn design, he had more than enough parts to use in the new twin-cylinder engine.

As a sample of Chunn's ingenuity, the back timer body used to cover the small miniature distributor was machined from a bakelite radio tuning knob. As



ENGINE OF THE MONTH

Photo No. 3. Typical of English designs that could be adapted to the Old Ruler concept is this "Frankenstein" cabin job. Is there a place in SAM for an *RC* Old Ruler event?

Photo No. 4. The big Dallaire Sportster continues to be a popular subject for RC Texaco. Texas flier Bruce Norman flies this one with one of the early open-rocker O.S. .60 four-strokes.

PLUG SPARKS

Photo No. 5. Dale Tower has built himself a formidable fleet of Lanzo Bombers, each one a potent performer. Took two 1sts and a 3rd at the 1993 Southwest Regionals in Arizona.

Photo No. 6. Eut Tileston really goes for the offbeat designs; this is his Mk. I Thunderbird, produced by the New Cyclone Model Aircraft Co. in 1938.

Photo No. 7. Two of the hottest Comet Sailplanes around are those belonging to Sonny Soto (left) and George Niebauer, both members of the Las Vegas VAMPS club. Both models are powered by McCoy .60s.

Photo No. 8. Pictured here is probably the only example of a TOMASCO "Clip-Air" flying anywhere in the world. What's more, this is the original 1937 prototype, designed and built by Cliff Steuer and recently restored by Bob Stykemain. It's the featured Model of the Month. Photo by Bud Perry.

shown in the drawing, no spark advance lever was provided. Advancing the spark was accomplished by loosening the two screws that positioned the timer and then retightening the cover.

Looking at the large mounting lugs, one gets the impression that the engine was modeled after full-size auto engines. The manufacturer claimed these engines were practically crash-proof.

This .319 cubic inch engine developed a rather surprising 1/5 horsepower at 3800 rpm. This, combined with its comparatively smaller size, gave any model a smaller frontal area and an engine easier to cowl. Complete weight of the engine, including coil, condenser, fuel, propeller, and two standard flashlight cells, was 18-19 ounces. An impressive figure for those modelers who like their models light for superior performance!

For those interested in the technical details, the cylinders were aluminum alloy castings fitted with alloy steel sleeves; pistons were grey cast iron; wrist pins were made of tool steel; and the conrods were machined from Linite aluminum alloy with

brass caps, all connected to a one-piece steel crankshaft.

MODEL OF THE MONTH

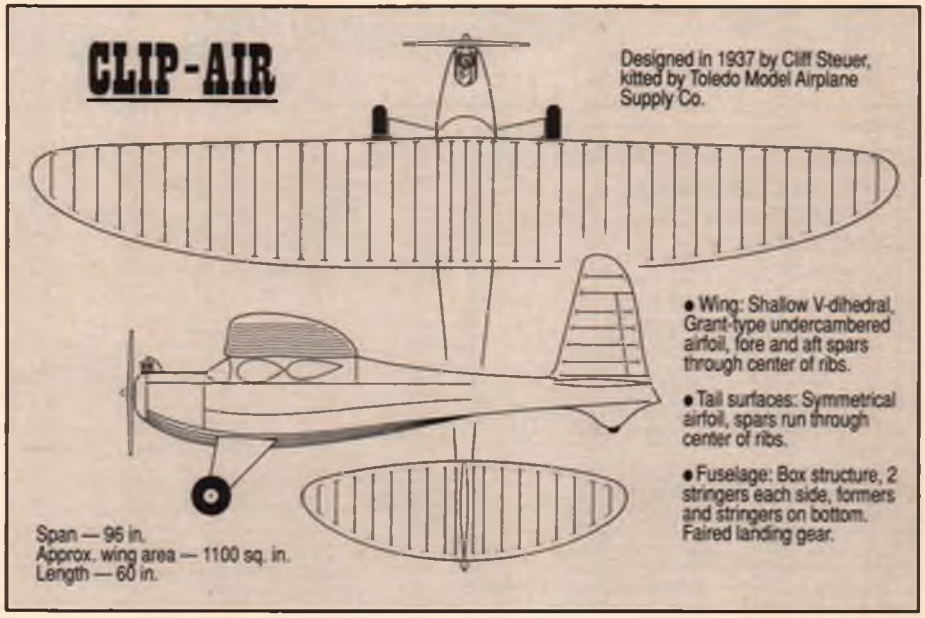
This month, we must acknowledge a photo (No. 8) from Bud Perry, of Jasper, Alabama, showing the little-known TOMASCO "Clip-Air." Bud says the photo should be credited to his old pen pal, Robert Stykemain of Toledo. (TOMASCO is an acronym for Toledo Model Airplane Supply Co.)

Perry states that this 8-foot model was designed by Cliff Steuer back in 1937 and made an appearance in the Berryloid Finish event. The photo is of the original plane as restored by Bob Stykemain. The original kit box featured a photo of this same model.

AEROMODELLING DIGEST

Received the 1992 version of the *Aeromodelling Digest* from author and publisher, Mervin Buckmaster. This is his third one, and it shows continued improvement in number of pages, quality and quantity of plans, and a new slant wherein Australian models are not featured exclusively.

There is something for everyone in these books, with articles on RC, FF and CL, plus plenty of interesting plans and hints. This writer highly recommends these books as a source of new ideas. For those interested in obtaining a copy or copies, write to Samaria Concepts, RMB 1798, Samaria Road, Benalla, Victoria 3673, Australia. Costs are as follows: Digest 1990, $15.00; Digest 1991, $16.00; Digest 1992, $17.00. All prices include postage, however, air mail to the U.S. is $9.00; to Canada, $18.00. These quotes are in Australian dollars. MasterCard and VISA are accepted.



MODEL OF THE MONTH

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Just received the announcement from Jim Adams as promulgated by Dave Baker, England's premier Old Timer promoter. This ambitious three-day meet, featuring the 10th Anniversary Wakefield events, will be held Saturday, August 28 through Monday, August 30, all at Middle Wallop.

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Those interested in obtaining information regarding events, accommodations, etc., should write to Dave Baker, SAD 1066, 24 Pinetrees, Weston, Flavel, Northhampton NN3 3ET, England. If you are late, try calling Dave at 0604-406822. ***MB***

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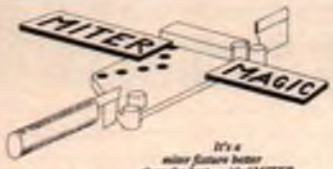

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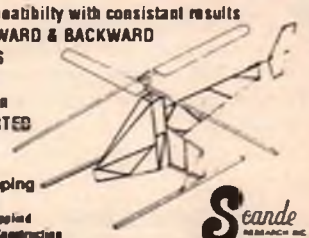

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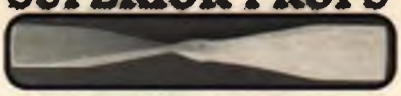

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CONTROL LINE *continued from page 15*

15 contestants. A copy can be obtained from Chris Sackett at the above address.

Chris reports that former U.S. CL world championship team member Tom Knoppi has been one of the top promoters of this new event, and has brought some old-time speed fliers out of retirement as a result. Chris also says that inquiries about the event have come from people who have not traditionally been speed fliers.

Included with this column are the rules for the .21 Proto Speed event. There has as yet been no proposal for putting the rules in the AMA rulebook, but this could happen in the future after the event has been tested in local competition.

As mentioned here often before, special interest newsletters are an invaluable source of information about control line products and services. For example, *Speed Times*, mentioned above, has numerous listings and advertisements for speed products and services.

So does *Stunt News*, the official publication of the Precision Aerobatics Model Pilots Association (PAMPA), on a regular basis. However, *Stunt News* outdid itself in its February 1993 edition. That issue is devoted entirely to an expanded look at stunt product suppliers. By my count, the edition contains expanded information about 25 such suppliers of—you name it—kits, handles, control systems, pipes, mufflers, plans, tanks, finishes, stooges, videos, foam wings, fuels, engines, and so on.

To join PAMPA and get the newsletter regularly, send your $15 dues ($20 in Canada and $25 elsewhere) to PAMPA, 1019 Creek Trail, Anniston, AL 36206.

Speaking of stunt, a passing remark by World Champion Paul Walker in the January 1993 edition of this column evidently generated quite a bit of reaction among eastern fliers in support of the Patternmaster series of precision aerobatics aircraft.

Asked to list his favorites among aircraft, Paul mentioned his likes, and also mentioned that on the other hand, he didn't care for the Patternmaster series. However, we've heard indirectly that there are quite a few fliers out there who do indeed like the Patternmaster and have jumped to defend it.

Here's an invitation to Patternmaster fliers to send in some pictures of their favorite planes from the series, and to tell us a little about the virtues of that particular design direction. As a matter of fact, we'd be glad to hear from any flier—in any type of competition—who has some information to share about aircraft design.

Correspondents take note: Our address has changed. Newsletter editors and anyone else with information to share with the column will want to update their mailing list. Send club news, photos, technical tips and other information of interest to John Thompson, 295 W. 38th Ave., Eugene, OR 97424. **MB**

ELECTRONICS continued from page 61

nothing to do with providing operating voltage for anything other than the motor. And it furnishes only full battery voltage, nothing more, nothing less!

Now for the BEC. First of all, it should be stated that BEC circuits are not quite as versatile as those for motor cutoff. True, any BEC circuit designed to provide an output of 5 volts will work well with any receiver/servo combination, assuming the current is high enough. However, the Cox BEC is unusual, as the requirements are unusual.

First of all, notice the different outputs. The total supply input, the original 4.8 volts, is directed to and used to supply the servo electronics and servo motor. Next, we again pick up the full voltage, though on the other side of a choke, probably there to remove servo motor noise. This voltage is used to power the decoder and audio stages of the receiver. Now the real regulating action takes place, the output being 3.0 volts. This voltage is applied only to the RF/IF portion of the receiver. Remember that I said that in some ways the Cox receiver is as good or probably better than many designs we used to depend on? Well, this is one way—most receivers, including the R114H Joe plans to use, are going to roll over and die on 3 volts. This particular BEC, then, is not going to work with any other normal system receiver that I know of, though it could come in handy for many of the pulse types still being flown by some.

But wait, we aren't through with either the BEC or the receiver yet! All of the above values were taken with a fully charged battery; i.e., with 4.8 volts being applied. What happens when the voltage drops down to the 2.70-volt cutoff level? First off, along with the motor voltage, all of the voltages are reduced, though things go right on humming with little noticeable difference. However, operating at 2.10 volts less, the servo speed and power has to be considerably less, and some loss of receiver range is to be expected. With the 2.70-volt input, the output of the BEC is now only 1.9 volts, but that super little receiver keeps right on working!

The bottom line is that the Cox Failsafe BEC is not useful for Joe's application with the Futaba receiver, so let's tackle that problem. Obviously, we do not have any voltage to spare in the 4.8-volt supply, so we can't BEC that down for the R114H.

The first thing we need to know is the lowest voltage at which the receiver will operate reliably. Such information is not published, but is rather simple to determine. First establish a transmitter-antenna-down range for the receiver, then try it on three cells (3.6 volts). It should work; most modern receivers will, though you may lose a little range. If it works, you can plan to cut off the motor at 3.6 volts with enough radio time to land normally.

If the receiver will not work at 3.6 volts,

continued on page 86

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HELICOPTER *continued from page 64*

a dual-sensitivity gyro; the 130 is a less expensive single-sensitivity gyro. I am using the 120 in the Excalibur. The gain setting on the high rate is set to about 70 percent, and the low rate is at 50 percent. The low rate is set up to allow the Excalibur to do a 540-degree stall turn cleanly. If the gyro setting is too weak, the 540 stall turn is too snappy. If the gyro setting is too high, the 540 stall turn is sluggish. The high rate gyro setting is reserved for hover. It is cranked up to as high as possible, or until the model's tail starts to "hunt" or wiggle. At the high rate setting, if you give a sudden tail rotor input to spin the model 90 degrees about the main rotor shaft, the high gyro gain can cause the model to squeak to a stop and lock onto the new heading the instant the tail rotor stick is released. That is how good a modern gyro can be!

Now let's discuss the Excalibur programs. I use the normal pitch curve for hovering and slow forward flight. In the normal mode, the tail rotor mixing is programmed to keep the model's nose straight when the throttle/collective is punched. A slight amount of tail rotor acceleration mix is also used. At low throttle stick, the ATS tail rotor mixing will bring the tail rotor blade pitch to 0 degrees. A U-shaped tail rotor mix is not necessary for the normal mode.

Idle-up 1 is used for forward flight aerobatics, such as loops and rolls. The throttle opening is bumped up at 1/2 and 3/4 stick to help keep the rotor rpm high. At 3/4 stick to full stick I want the throttle to be nearly full open. It will reach its fastest forward flight speed not at the full throttle/collective stick position, but rather at about the 3/4 to 7/8 position. The reason is that at the 7/8 stick position, the throttle is nearly full open and you are already getting at least 95 percent of the available power from the engine. Pushing the throttle/collective stick to the top will only add more pitch and not much more horsepower, and the main rotor will actually slow down. The extra collective pitch is there to allow me to climb suddenly for a short while, as the rotor speed falls off slightly.

Idle-up 2 is reserved for switchless inverted flying and 3-D hotdogging. The throttle becomes 100 percent open at the low stick position, and there is so much negative pitch that my Excalibur will climb inverted as fast as it does right side up.

I will stop here for now. Next month we will talk about how to get the model to climb ballistically while inverted, and will discuss the auto dual rate capability and the rest of the setups. ***MB***

ADVERTISER INDEX

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PYLON *continued from page 59*

jumped a bunch!

A race at Mile Square Park in Fountain Valley, California, saw Lyle Larson bolt on a new Nelson and immediately turn in a 1:04.81, almost 10 seconds faster than the record. This was a big jump, something unusual in record-breaking, because many timed events are only lowered by tenths or hundredths of a second. A 10-second jump is quite a large leap, but this is indicative of the Nelson engine. Quite a powerhouse!

Lyle's Quickie record lasted the summer. However, at the TURN Championship again, that same guy, Craig Grunkemeyer, went 1:04.23 and we said goodbye to Larson's hold on the record. This time the drop was as expected, only .58 better.

Craig held it until this spring, when we went full circle again as Bob Lamb went 1:03.37 in Nashville—and reclaimed the best in Quickie 500. He may still hold it by the time this gets into print. Then again. . .

All of the above fliers are AMA Open members, but we have classes in records, meaning the Seniors and Juniors would also be recognized. In Quickie, Senior flier Mike Pate went like stink at the annual spring race in '91 at Nashville, turning in a very respectable 1:17.27, only 2 seconds slower than the Open record. In the fall of '91, at San Gabriel Valley, California, Tim Lime set a new Senior record of 1:11.94. A couple of months later he went even faster, lowering his record to 1:07.95 during a race at Courtland, Alabama.

In the Junior ranks of Quickie 500 racing, there have not been any record submissions.

Form I, the unlimited event in RC pylon and an area you would expect records to drop by nanoseconds, also saw some big jumps; not as big as Quickie, but substantial. The first involved Mike Helsel, who went a very respectable 1:09.20 at California's Sepulveda Basin in June 1991. This lasted until "Mr. Perennial," Dave Shadel, went 1:05.88 at the California Championships in Modesto that same year. This dropped the record by over 3 seconds—a large jump considering the event—however, that Nelson guy had his new Form I engine on the market and once again it set the standard.

Dave's record lasted the winter, but in March at Wittman, Arizona, he again lowered his record by a few one-hundredths, to 1:05.81. This lasted only 27 days, however, because at El Monte, California, Richard Verano set the current Form I record of 1:03.16, a full 2-1/2 seconds faster! Richard was also using a Nelson, so Henry's engines are dominating several areas.

In the Senior ranks of Form I, Timothy Lime holds the current record of 1:25.88, which he set at Whitman, Arizona, in '91. A.J. Seaholm went a very respectable 1:15.20 at the '91 Nats in Lawrenceville to set the Junior mark.

In FAI (F3D), Gary Hover set the first Open record at the '90 Team Trials with a time of 1:10.4. (All F3D times are rounded to the nearest tenth, which is why no hundredths are included with the times.) At the '91 Nats, Dub Jett broke Gary's record by going 1:08.9, and this held up until the World Championships in Wangaratta, Australia, where Dub again lowered his hold on the record by turning a 1:06.6.

This creates an interesting topic for many, as the Form I and F3D courses are different in shape, but are very close in length and times. One event allows unlimited nitro and maybe a touch of propylene oxide, while the other requires a straight 80-20 mix of alcohol and oil and allows tuned pipes—the great equalizer.

Records in 1/2A have not been submitted, so each class is wide open at this time—plus there have not been any submissions for Senior and Junior in Quarter Midget or F3D.

If you have a Junior or a Senior flying at one of your meets, fill in the record application form included with your AMA sanction package. Give credit where it's due. Help promote racing by promoting the future in racing, the Juniors and Seniors. ***MB***

ELECTRONICS *continued from page 83*

insert a power diode (1N4000 series) into the positive lead of the four-cell pack, with the band on its body away from the battery side. This will reduce the voltage by .7 volt; i.e., down to 4.1 volts. If the receiver still works, this then will have to be your motor cutoff voltage. And since one of the two will be the output of the battery, there is no need to regulate (BEC) it any further for the receiver and servo—what you have is what you get!

Now for the motor cutoff. Let's take another look at the Cox Failsafe voltage sensing motor cutoff circuit. Setting the cutoff to operate at a different level would involve only the changing of the Zener and the related resistors. I can't give you any exact figures, as I do not know the required voltage, but it shouldn't take more than a couple of tries to get it pretty close to that indicated. Start by replacing the 2.7 Zener with a higher voltage unit, and test its effect on the cutoff voltage. Zeners are available in voltages of 3.6, 3.9, 4.3, 4.7 and upwards; I would expect that something in that range is going to get you in the ballpark. You may also have to vary the base resistors; if so, stick to the same 3:1 ratio of the original ones.

Touching on the last point in Joe's letter, motor noise suppression is best done not with diodes but with capacitors, .01 ceramics being the best choice. The requirement varies with the type of motor and its current requirements. In many cases, a single capacitor across the brushes will suffice; at other times, one from each brush to the motor case is required. Worst cases can often be cured with a combination of all three capacitors. The test is simple—an antenna-down range test of the unit with and without the motor running. A drastic range reduction tells you that a motor noise problem exists.

Joe, please let me know what your solution is, how it works, and send a picture of the little one in the air.

DO-IT-YOURSELF VARIABLE VOLTAGE SUPPLY

Variable voltage supplies come in quite handy when one is experimenting with circuits like the not-BEC/voltage sensor described above or testing the low-voltage operation of the receiver. Figure 2 details a simple circuit that will supply from 1.5 volts up to around 90 percent of the source voltage, which can be any fixed output battery charger or power supply—even your eight-cell transmitter battery will do. The circuit is well regulated and good for 1.5 amps. For voltages in the range indicated (less than 5), a 500-ohm pot will desensitize the adjustment, though it will limit the total voltage available.

Eloy Marez, 2626 W. Northwood, Santa Ana, CA 92704. ***MB***

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see page 35

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