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ON THE COVER

If you can tear your eyes away from the lovely Miss Kara Switzer for a moment, you'll notice she's showing off the prototype of this month's featured RC construction project, the Lazy-H electric biplane as designed by well-known Texas modeler Scott Hartman. Powered by a geared Astro 25 on 14 cells, the model offers simple all-wood construction and excellent performance on only rudder/elevator/throttle controls. A great way to get involved with larger electric power systems. Article begins on page 24. Photo by Don Rice.

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Lee E. Baker, Jr., sent along this photo of his Goldberg Ultimate, and listed the following information in this order: "1. Engine is a Super Tigre .90 with enclosed pipe. 2. Cowl and pants by Fiberglass Master. 3. Finish is Monokote & DuPont automotive two-part paint with ClearCote. 4. Gorgeous wife." Here's a tip from MB, Lee: In the future, list #4 first! Lee E. Baker, Jr., P.O. Box 3267, Apollo Beach, FL 33572-MB

Clark Calkins' latest project is a 3/8"-1" Northrop XB-35 Flying Wing, which took him a year to finish. It's powered by four Silver Streak motors from Peck-Polymers, all running on seven cells. Controls are mechanically mixed ailerons and elevator, and throttle. With fixed landing gear the model weighs 46 ounces. Clark writes, "I've done taxi testing with short hops to see if it will lift off. Interestingly, to get the nose off the ground I have to back off the throttle briefly." Clark A. Calkins, 1907 Alvarado Ave., Walnut Creek, CA 94596.



Col. R.O. Mosher of San Antonio, Texas took this photo of Roger King's scratch-built Ford Tri-Motor in front of the Wright Brothers monument in Kitty Hawk, North Carolina. The plane spans a huge 15-1/2

feet and is completely skinned with .005-inch aluminum sheet. It's equipped with three Saito 300 radials and an Ace MicroPro radio system. Roger King, 8631 Oak Timber, San Antonio, TX 78251.

This 28-inch Spitfire, built from a Guillow's kit, is his best model to date, writes 15-year-old Bernardo Monzon. The Mexico City flier began with rubber power five years ago and now is into control line. "I spent three months building the Spitfire, which is covered with three layers of silk, each covered with glue for strength. The plane was heavy, so I fitted it with a Cox .09 Tee Dee engine with 1-ounce tank. I painted it with water-soluble paints and gave it one layer of fuelproofing," he recalls. "When I went to fly it, the engine seemed to be too powerful for the airplane and it took off fast. I lost control at 5 feet off the ground and it crashed." Bernardo Monzon, Apdo. Postal 22-245, Mexico D.F., Mexico.



"I have been in this hobby for many, many years and it's one of my reasons for being happy in this complicated and fearful world," writes Johnnie Wong of Singapore, who sends along this photo of his recently built Astro Mini-Challenger, powered with an Astro 035 cobalt motor. The 50-year-old bachelor switched over from "wet" power flying to electric gliders and slope soaring a year ago, and

proclaims it's "like eating caviar and champagne!" He spent a month of evenings on the model, which is covered with day-glo green and translucent yellow Sig SuperKote. "It flies great and when I hit a thermal in hot, tropical Singapore, we don't even talk about flights less than 40 minutes." Johnnie Wong, Blk. 173, Yishun Ave. 7, #12-823, Singapore 2776.



SKYRAIDER



SKYRAIDER SPECIFICATIONS:

Wingspan: 62.5in; Area: 664sq.in; Length: 51.5in;
Engine: .60-.65 2-c, .90 4-c; Radio: 4-ch required

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Howard J. Burks drew his own plans for his version of the China Clipper, an RC ship with four electric motors. It's of stick-and-tissue construction reinforced with carbon fiber tape, and weighs just 28 ounces. Wingspan is 49 inches, with 430 square inches of wing area. Wing loading is only 6.7 ounces per square foot. Power is supplied by four Radio Shack 99c motors that are fitted with carbon brushes. "These are the most amazing motors," says the Wisconsin flier. "Each draws only 1 amp and gives 2 ounces of thrust, so the seaplane takes off drawing only 4 amps. It can fly for 10 minutes on a 7.2-volt, 600-mAh AA NiCd pack. Radio is a four-channel Futaba Attack E system. Howard J. Burks, HCR 60, Box 43, Shell Lake, WI 54871.

John Phillips rubbed elbows in the '30s with Sal Taili and the Skyscrapers gang in Brooklyn, flying in Brooklyn and Long Island at Creedmore, Hicksville and Crutiss Field. His first model was a Brown D powered Red Zephyr, recreated in the photo along with a Brooklyn Dodger, both of which are now being flown RC. Both have slide-in mounts; the Zephyr can use an O.S. Surpass .48 four-stroke or a 1938 Brown Jr., while the Dodger flies on an O.S. Max .15, O&R .23 or O&R .29 front-rotor. The 66-year-old modeler covered both with Coverite and clear dope. John says, "I've never lost my love for FF, but I'm deep into RC now due to the disappearing open areas." John Phillips, P.O. Box 23, Beach Lake, PA 18405-0023.



"I certainly appreciate the coverage *Model Builder* has given to electric flight," says Tony Turley of Dunbar, West Virginia. His white crop duster is an extensively modified Astro Sport kit from Astro Flight. As shown in the photo, it was originally powered by a geared Astro cobalt 02, but has since been flown with a direct drive cobalt 05. The radio is the Futaba 4NBL Attack E system. "It flies great with either motor, and I can switch between the two in minutes," says Tony, an RC flier for 12 years, the last year being devoted specifically to electric flying. Tony Turley, 229 Pine Circle, Dunbar, WV 25064.

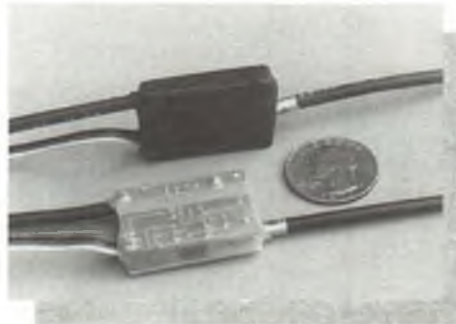
NEW! "Micro-Series" Speed Controls

These new electronic speed controls are the smallest and lightest ever produced!

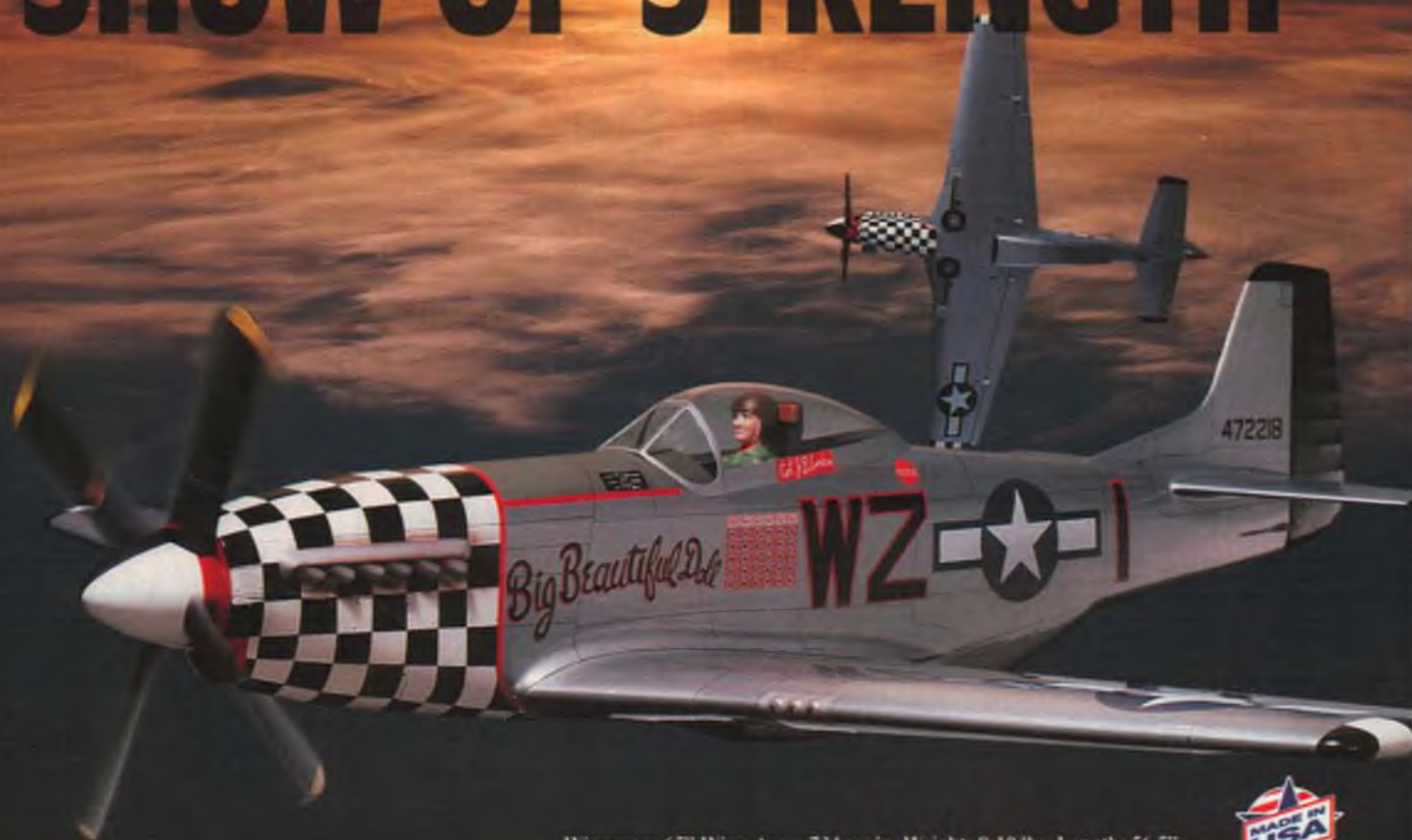
Designed for small electric airplanes powered by .01 to .15 size motors, the Model 217 Micro speed control will handle up to 25-amp loads, and 1 to 14 cells. Weighing only 15 grams and measuring 1.25" by .9" by .25" thick, the Model 217 Micro is a forward-only version, featuring extremely efficient low-loss transistors and 14-gauge power wires. The Model 215 Micro speed control, featuring brakes, will be released soon.

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SHOW OF STRENGTH



Wingspan: 65" Wing Area: 734 sq. in. Weight: 8-10 lbs. Length: 56.5"
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Top Flite's Gold Edition P-51D Mustang



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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.

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

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Inspired by Aviation's Golden Era. Although it looks like it's straight out of the 1930's, don't bother looking up this one in your aviation history books. The Spacewalker was designed by Jesse Anglin of Hendersonville, North Carolina, and first flew in 1986! Despite the fact that it is a new design, the Spacewalker manages to capture all the spirit of Aviation's Golden Era.

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over the counter

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SERIES II SEIDELS

The German company Seidel Motorenbau, which produces those beautiful model radial engines sold here in the U.S. by Proctor Enterprises, is celebrating their 10th anniversary by introducing their new Series II seven and nine-cylinder engines. New features include tubular pushrods, reprofiled cylinders and a redesigned scale hub assembly. The Series I engines will continue unchanged. For full details, contact Proctor Enterprises, 25450 N.E. Eilers Rd., Aurora, OR 97002; (503) 678-1300.

THE WONDER OF IT ALL

Here's one that looks like a lot of fun—the new "Wonder" from Sig Mfg. If you've seen the ads, you know that this sort-of flying wing (it really isn't) can be built in any of four different configurations—parts for all four are included—or mix



and match the parts to make your own custom design. Bruce Tharpe designed the 37-1/2 inch span, .15-size model for three channels, and engineered it for simple all-wood construction. Fast and furious, this one's definitely not for beginners! Priced at \$39.95, from Sig Mfg. Co., 401-7 S. Front St., Montezuma, IA 50171; (515) 623-5154.

ELECTRONIC MOTOR SWITCHES

Robbe's "Soft Switches" are radio-operated electronic on-off

motor controls, designed for electric models that alternate between full power and no power, such as electric sailplanes and racing boats. Three different versions are offered, for anywhere from six to thirty cells. The "soft" part comes from the

"soft start" feature; instead of hitting the motor with full voltage



all at once, the switch has a timed start-up that takes about a second to go from zero to full power, which is much easier on the motor. All of these units feature optical coupling, brake, and protection against overheating and overvoltage. From Robbe Model Sport, 170 Township Line Rd., Belle Mead, NJ 08502.

FOR WARBIIRD BUFFS

For you scale RC guys, Global Quality Kits has come out with a beautiful replica of the Douglas

Skyraider, the last of the prop-driven fighters. It's a large all-wood model designed for .46-.65 two-strokes and should make an excellent flier. Span is 62-1/2 inches, wing area is 664 square inches.

Nothing was mentioned about installing retracts, although the model

almost surely could be modified to accept them. The kit is distributed to hobby shops across the U.S. by



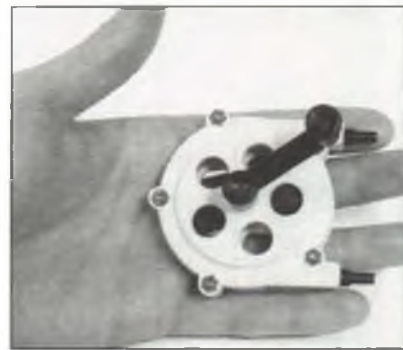
Global Hobby Distributors, 10725 Ellis Ave., Suite E, Fountain Valley, CA 92728-8610; (714) 963-0133.

Speaking of Global, we've learned that they have abandoned their position as the exclusive U.S. distributor of Thunder Tiger Model Co. products. Global's president, Paul Bender, felt that being tied so directly to a single source has not allowed Global to take advantage of other opportunities to grow and expand into a more promising

future. "We are now free to pursue higher quality, innovative goods to stimulate consumer demand, to increase dealer sales, and to realize the increased profits needed to survive difficult times," said Mr.

Bender.

Another bit of news from Global is that they are shifting their Magnum engine production to another manufacturer in order to offer a higher quality product at competitive pricing. Stay tuned to this column for details on the new updated Magnum engines, to be announced soon.



MINI FUEL PUMP

For small models or small field boxes, check out the "Smallest Hand Fuel Pump" being offered by Hobby Lobby. It measures 2-1/2

inches square by about an inch thick and is claimed to be able to deliver 6 ounces of fuel per minute. A rubber tube inside runs around half of the circumference and attaches to the two fuel line fittings; a roller attached to the crank collapses the tube as it goes around and forces the fuel to flow. It also works in reverse to empty a partially full tank at the end of the day. Priced at \$11.90, from Hobby Lobby, 5614 Franklin Pike Circle, Brentwood, TN 37027; (615) 373-1444. A catalog of all of Hobby Lobby's neat modeling goodies is available on request.



SAITOS FROM HORIZON

Horizon Hobby Distributors has announced that they are now the exclusive distributor for the complete line of Saito engines—all four-strokes, all of which have earned an excellent reputation in the field. There are presently 17 engines in the line-up, ranging from the single-cylinder FA-45S to the big FA-325R5D five-cylinder radial. Something else we learned from the press release is that four of those engines have two plugs per cylinder, which is said to improve idle and transition response. For a complete descriptive brochure on Saito engines, write to Horizon Hobby Distributors, 3102 Clark Rd., Champaign, IL 61821, or call the Horizon Service Center at (217) 355-9511.

HITEC'S BULLET-PROOF RECEIVER

The new RCD3000 Supreme series receiver from Hitec RCD is an FM, dual-conversion unit said to far exceed the AMA's narrow-band standards. It's an eight-channel

receiver, but nevertheless comes in a smaller size case than the seven-channel Platinum series receivers. Other claims include tighter adjacent channel rejection, higher 3OIP rejection, longer range and less sensitivity to vibration. Supreme series receivers are available for Airtronics, JR,

Futaba J or RCD servo connectors. From Hitec RCD, 10729 Wheatlands Ave., Suite C, Santee, CA 92071; (619) 258-4940.

DU-BRO'S RIGGING COUPLERS

In answer to many dealers' requests, Du-Bro is now packaging their 4-40 Rigging



Couplers separately. They're just the ticket for cable control systems, flying wires or other linkage requirements. A package of four sells for \$2.25. From Du-Bro Products, 480 Bonner Rd., Wauconda, IL 60084; (708) 526-2136.

LOOKS LIKE AN L-4 TO US

The latest in U.S. AirCore's line of "Fold & Fly" models is the ARMY AirCore 40, a sort of Piper L-4 look-alike, pictured

here on the company's optional Explorer floats. It's a 64-inch span,



four-channel, .40-size fun flier of durable AirCore construction, and comes completely pre-colored in olive drab and decorated as shown.

AA40 kits are available in hobby shops now, and carry a suggested list of \$129.95. From U.S. AirCore, 4576 Claire Chennault, Hangar 7, Dallas, TX 75248; (214) 250-1914.

REVISED SOAR BIRDY

The two-meter "Soar Birdy" from Buzz Waltz of Just Plane Fun Models is not a new design to the



soaring market, but has recently been re-engineered to today's standards. Features include a 684 square inch, two-piece D-tube wing with shear-webbed spruce spars and a 1/4-inch steel wing rod, and a balsa/plywood fuselage large enough for standard servos and/or an electric power or glow engine installation. The \$40 kit is complete with machine-cut balsa

and plywood parts, and is now available in hobby shops.

Produced by Just Plane Fun Models, 3390 Paseo Barbara, Palm Springs, CA 92262; (619) 327-1775.

J-3 CUBS FOREVER!

Everyone loves

the venerable old J-3 Cub, and now Great Planes is kitting what looks to be an especially nice all-wood RC version, claimed to be exact scale in



outline. The plans detail both the standard (76-1/2 inch span) and clipped-wing (61-1/2 inches) versions, which translates to a scale of about 2.2 inches to the foot—just over 1/6-scale. Decals are supplied for accurate markings, and includes various how-to tips in the assembly manual for creating a number of scale details.

Also new is a full line of modeling adhesives, being marketed under the Top Flite Supreme label. There are thin, thick and slow-cure CA glues in 1 and 2-ounce bottles, 6 and 30-minute epoxies in 9-ounce bottles, activator and debonder. They should be in your local hobby shop by now; why not give them a try?

From Great Planes Model Distributors, P.O. Box 9021, Champaign, IL 61826-9021; (217) 398-6300. **MB**

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

ELECTRONICS CORNER

BY ELOY MAREZ

•The Cox Flight Command RC System •Spark Ignition System Troubleshooting

The Cox Failsafe RC system (EC, December '91) has proven to be a very popular radio for those who prefer their airplanes small and simple. Being only a single-channel unit, there were a lot of queries about how to add another channel, which unfortunately can't be done simply. However, Cox Products has now come to our rescue with the introduction of its Flight Command system with, yes, two channels.

The Flight Command transmitter comes in the same package as the Failsafe, but is equipped with a two-axis, four-movement video game type of control switch on the left side of the case, providing left/right and up/down control. It comes only on 27 Mhz, and unlike the Failsafe, has no BEC or motor cut-off features in the receiver. Like the Failsafe, the servos will automatically return to neutral if the control button is held

down for more than a couple of seconds.

The idea of having the controls return to neutral after a preset time is a good one for the first-time flier; it will keep him from overcontrolling his airplane into the ground. However, the experienced flier will prefer a more normal control that will stay in position as long as he wants. As in the case of the Failsafe, this is an easy mod to make.

Refer to the photo of the printed circuit board as found inside the Flight Command transmitter. Small plastic-coated tubular capacitors were originally installed in the places indicated by the arrows; remove them and install wire jumpers in their place. No adjustments or tuning are necessary, and your Flight Command servos will now operate as long as the appropriate button is depressed.

Regular readers will remem-

ber the January '93 issue, in which we showed how to convert the Failsafe into a fully proportional, stick-operated system, resulting in what must be the smallest proportional system now available. Could a similar treatment be made to the Flight Command? The answer is a qualified Yes! The only problem is that there is simply not enough room inside the case for the installation of a stick assembly of any sort; the whole thing would have to be installed into a larger case. This is not a major undertaking, and like the Failsafe conversion, with proper instructions, is well within the capability of any ambitious RCer. It's in the works, my friends—bear with me.

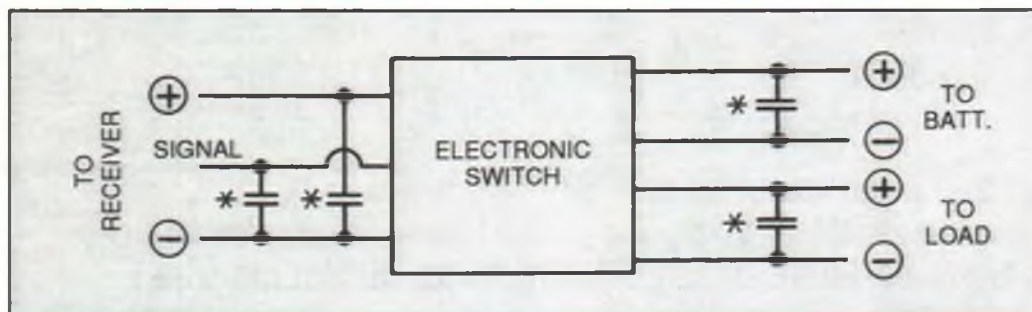
The Flight Command system is being offered with two Cox ARF packages: the .049 Babe Bee powered "Commander," and the "Lectra," obviously electric powered. By itself, the system is priced at \$78.65 retail. Further info is available from Cox Products, Inc., 350 W. Rincon St., Corona, CA 91720-2004.

SPARK IGNITION ANOMALIES

I had a query from a local flier who flies an RC Old Timer with a spark ignition engine. (Note that I said "spark" ignition, not just "ignition" as is commonly and incorrectly done. In this case we are referring to a model engine with a true spark plug, which creates a "spark" that causes the fuel/air mixture to ignite.) The engine was apparently operating just fine until he added a radio-operated switch as an ignition

For the many who wrote asking if it was possible to add a second channel to the Cox Failsafe, your prayers are answered: the new Cox "Flight Command" system is exactly that! Airborne unit is similar to the Failsafe, except that there are now two servos and they are not packaged in the receiver case as before. Receiver measures 2-3/4 inches long by 1-3/8 inches wide by 3/4 inch high; servos are 1-5/16 inches long by 9/16 inch wide by 1-1/4 inches high. Complete airborne unit, minus batteries, weighs 2-1/2 ounces.





Block diagram of a common receiver-operated electronic switch. As cited in the text, such a device can be used to control a spark ignition system in an RC Old Timer. Capacitors marked * have been added to eliminate electrical noise that can feed back into the receiver and cause erratic operation (i.e. glitching!).

cutoff; now the engine runs erratically.

His question about what might be causing this and what to do about it, as simple as it sounds, cannot be answered easily. In the first place, it's difficult to troubleshoot something you can't put your hands—and test probes—on! Then too, locating something as invisible and elusive as an electrical impulse that lasts maybe a thousandth of a second can be a most frustrating experience. In this case, the "glitch" can be caused by any of the various components in the ignition system, so the job becomes twofold: first to find the culprit, then to apply the proper cure.

There are several radio-operated switches on the market. They all use circuitry quite similar to that found in the common servo, except that instead of driving a motor, they switch either a relay or a semiconductor device such as a common transistor, an SCR (Silicon Controlled Rectifier) or in the more

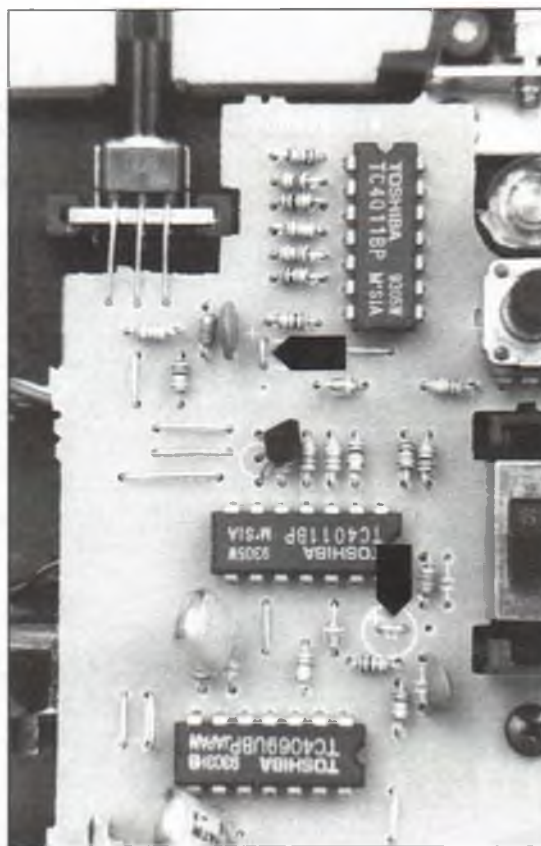
modern ones, a MOSFET (Metal Oxide Semiconductor, Field Effect Transistor). Basically, they differ only in the amount of current that they can control.

Although the problem is claimed to have started with the installation of the cutoff, we should not arbitrarily blame it. It may be that the ignition system was operating marginally anyway, and the new addition caused it to malfunction more noticeably. We also have to be absolutely sure that the radio itself is not the culprit. It is entirely possible that the spark ignition system is interfering with the radio and is causing the ignition cutoff switch to operate erratically. Obviously you'll never get the engine to run properly if this is the case!

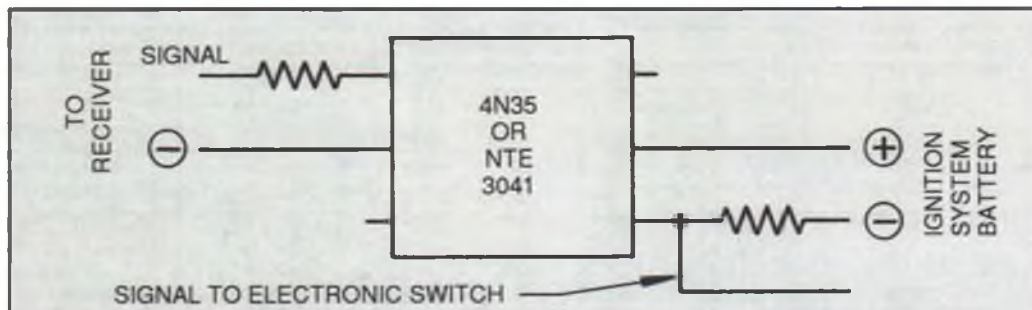
The first step toward effecting a cure is to make sure that all spark ignition system components have been properly installed. This means keeping all spark ignition components as far as possible from everything in the RC system—including batteries and switches. Most

definitely, install the receiver antenna going straight back from the receiver. And no sharing of batteries—each system must have its own!

All connections should be kept as short as possible, and solidly soldered. No wires held together only with a couple of twists, and definitely no spring contact battery boxes. The high voltage lead to the spark plug must be perfectly secure at both ends. At this point, the spark ignition system should be in-



Like the Failsafe, the Flight Command system is timed to automatically return the controls to neutral to prevent overcontrolling. If you're past the beginner stage, you can easily disable this feature by removing the two capacitors and adding wire jumpers as indicated by the arrows.



Extreme cases of electrical noise in add-on units such as the electronic switch discussed here might require the addition of an optically coupled isolator, which provides complete electrical isolation. Note that two separate power supplies are required; only the control signal is common.

stalled without the RC cutoff device.

On the ground, with the transmitter antenna down and the engine off, establish a distance at which the RC system works solidly. To do so, place your model 2-3 feet off the ground on a non-metallic support. Have a helper standing by the model to tell you when the radio signal begins to drop out, and to turn the airplane 45 degrees at

continued on page 40

THE F5B TEAM SELECTION

Three of the best and most experienced electric fliers in the U.S. will be traveling to Australia in '94 to compete in the World Championships—and there's a very good chance they'll bring home all the marbles!

It was an honor for me to attend the recent F5B (formerly known as F3E) team selection contest to determine the three electric fliers who will represent the United States at the 1994 World Championships, to be held next fall in Australia. The team selection took place at the excellent Torrey Pines Gulls field in the town of Poway, near San Diego, California.

You might remember that the U.S. team of Jerry Bridgeman, Jason Perrin and Steve

elsewhere in this issue.) Bryan Chan from San Francisco, George Joy from San Diego and John Wyss from Boulder, Colorado provided some stiff competition.

Most modelers are not familiar with the F5B event, so let me acquaint you. The Federation Aeronautique Internationale, or FAI, has created many different contest categories for model aviation. These include free flight, control line and radio control events, including electrics. The F5B

can be turned back on and the ship flown back to altitude, but the motor must be shut off prior to re-entering the course. Average motor run was about 10 seconds per climb, and from that altitude the contestants were flying six laps before exiting the course at ground level and powering back up to do it all again. To be competitive in F5B these days, you must be able to do at least 26-27 laps within the 3-minute window.

After the distance task is completed, the



The six contestants who converged on Poway, California to vie for a spot on the 1994 U.S. F5B team. From left: Bryan Chan (6th place, 3625 points), George Joy (5th place, 3838 points), Jerry Bridgeman (1st place, 4154 points), Steve Neu (2nd place, 4033 points), Bob Sliff (3rd place, 3939 points), and John Wyss (4th place, 3896 points). John, from Boulder, Colorado, was the only out-of-state contestant at the meet.



Jerry Bridgeman gets up a good head of steam before giving the javelin treatment to Bob Sliff's airplane. With around 2 horsepower up front these models climb like rockets, and with a surface loading of 24 ounces per square foot they glide fast and land fast also.

Neu brought home the team gold at the 1992 Championships, and that individually Jerry placed a very close second to Austrian flier Rudi Freudenthaler. Jerry Bridgeman and Steve Neu will go for the gold again in 1994 and will be joined by Bob Sliff, a well-respected electric modeler and proprietor of Hobby Horn, a hobby shop located in Westminster, California, just south of Los Angeles. (See their ad

event is for Electric Powered Motor Gliders and includes distance, duration and landing goals. Scoring is based on how well the contestant achieves these goals.

The distance task is run on the course shown in the sketch. The planes fly as many laps (one trip down the course is one lap) as possible between Base A and Base B in 3 minutes with the power off. Each lap counts 10 points. Outside the course, the motor

pilot has 1 minute to set up and execute a pass through a gate which is 65 feet wide and 10 feet high. The duration clock starts when the plane passes through the gate. The task here is to thermal soar without power and then land in a specified circle at exactly 5 minutes. Landing in the center circle nets 30 points; the outer circle nets 15 points. Flight scoring is one point per second, with overtime being deducted at

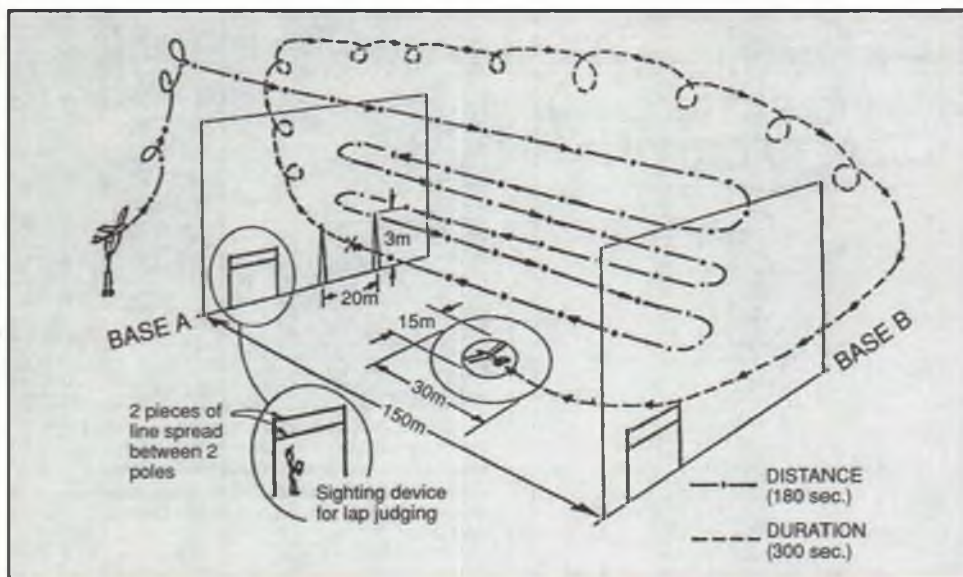


Diagram of the official F5B course. Distance and duration tasks are both flown on each flight, with bonus points given for precision spot landing.

the same rate. Running the motor is allowed during this part of the flight, but each second of motor run time is deducted from the total duration flight score.

Eight rounds were flown at this contest, with the lowest scoring round being thrown

The motor weighs 20 ounces and the 27-cell battery pack weighs 38 ounces (battery weight is limited by the rules to 1,100 grams maximum), so the airframe, radio and propeller weigh about 27 ounces. Although there is an 11-pound weight limit, the real



From left, Chuck Grim, Jerry Garrison (timer) and Steve Manganelli (caller) watch a flight in progress. Callers stationed at both ends of the 150-meter course would sound a buzzer when the model passed their end of the course, signaling the pilot to turn.

out. The top three finishers will go on to the World Championships. Sounds easy, right? Not by a long shot! The planes and motor systems that F5B pilots use are at the cutting edge of electric technology. With one exception, the planes at this contest had not one stick of wood in them. Everything was fiberglass, carbon fiber and other composite materials. Even the props were molded. A typical F5B plane weighs about 85 ounces.

restriction is the maximum surface loading (wing area plus horizontal stabilizer area) of no greater than 24.52 ounces per square foot. The airplane and battery pack weights are measured very carefully before and during the contest.

Looking at the sketch of the course, you'll see that it's 150 meters or almost 500 feet between Base A and Base B. An average distance task of 27 laps requires flying a

total distance of over 2-1/2 miles! Flying this in 3 minutes means an average speed of over 50 mph. And this doesn't include time spent climbing under power to altitude and turning. All in all, these planes are fast, aerodynamically clean and streamlined, and during the contest fly in excess of 90 mph.

All of the aircraft entered sported either the Astro Flight 60 FAI or Plettenberg Hecktoplett 355/40/5 motors with a 27-cell, 1,000-mAH battery pack (give or take a few mAH). These motors are treated similar to a loaded gun—the power they generate is awesome. Current draw is on the order of 60 amps, meaning the static power is over 1,500 watts or 2 horsepower. The power-to-weight ratio is incredible; these planes will literally climb straight up from your hand if given the opportunity.

The contest was organized by Steve Manganelli, Chuck Grim and the members of the Silent Electric Flyers of San Diego. Many thanks are due the volunteers from both clubs for their splendid help with timing, pylon judging, spotting, and of course cooking lunch for the hungry people.

Thanks are also due to manufacturer sponsors for their generous donation of prizes. Sponsors included Ace R/C, Aero-



Jerry Bridgeman's T-tail backup ship is typical of the configuration used for most F5B aircraft. The airframes on these models are designed to be as light as possible; this particular ship has an all-Kevlar fuselage, minimal paint, no rudder (and therefore no rudder servo), and hollow, molded wings with carbon spars.

space Composite Products, Astro Flight, Carl Goldberg Models, Composite Structures Technology, Futaba, Hitec RCD, Hobby Horn, Hobby Lobby, Midwest Products, Peck-Polymers, SR Batteries, Sanyo, Sig Manufacturing, and Tower Hobbies.

The time I spent at the contest was the most fun I've had at a flying field in a long time. Above all else, outstanding sportsmanship and camaraderie was the name of the game and it made me proud to be a part of such a great hobby.

GOODIES FROM SCIENTEXT

I recently received ScienText's new gem of an electric aircraft catalog. ARF lovers beware, this is a builder's catalog—especially builders of small, multi-motor electrics. All but one of the aircraft are seaplanes, including the Grumman G-44 Widgeon and the Dornier Do26V1 Seadler.

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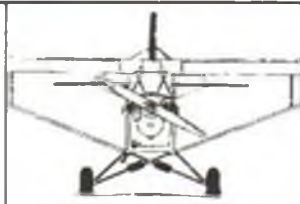
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ScienText is Connecticut-based company specializing in electric powered free flight; pictured here is the framework for their 36-inch span Mitsubishi Ki-46II Dinah. ScienText kits include motors, props, vacuum-formed parts, plans, etc.—everything but the wood. More in text.

ScienText's newest release, pictured here, is the Mitsubishi Ki-46II Dinah. All of the aircraft are constructed using conventional stick-and-tissue techniques, "with very little of so-called 'space-age' materials."

All of the models are electric powered free flight, but one could be modified for single-channel radio control. I have no doubt that you creative bunch of talented electric people can bash these planes to use just about any type of control you want!

Most of the kits are supplied with the motor systems and, where appropriate, vacuum-formed nacelles, spinners, and the like; you supply the wood. Except for the RC models, ScienText promises that you will not spend more than \$25 on extras that aren't supplied in the kit. All of the plans have separate template sheets, so it's a snap to photocopy and then make the pieces.

Now I have the Dinah on my already lengthy wishlist. For a catalog, send \$2.00 with a #10 self-addressed, stamped (52 cents) envelope to ScienText at 48 Whitney St., Westport, CT 06880; (203) 221-1326.

Thanks to all of those who have called and written with your comments. I appreciate the new ideas and the feedback. My address is 6462 Sunny Brae Dr., San Diego, CA 92119; or you can call me at (619) 463-4453 between 8 and 5 weekdays, Pacific time. **MB**

STATEMENT OF OWNERSHIP, MANAGEMENT AND CIRCULATION, (REQUIRED BY 39 U.S.C. 3685).

1. MODEL BUILDER MAGAZINE. 2. September 30, 1993. 3. Monthly. 4. P.O. Box 2459, Capistrano Beach, CA 92624-0459. 5. P.O. Box 2459, Capistrano Beach, CA 92624-0459. 6. Mark Thiffault, P.O. Box 2459, Capistrano Beach, CA 92624-0459. Phillip D. Bernhardt, P.O. Box 2459, Capistrano Beach, CA 92624-0459. 7. Gallant Models, Inc., C.P. Lewis, R.W. Arsenault, M.J. Pettygrove, P.O. Box 2459, Capistrano Beach, CA 92624-0459. 8. None. 10A: 99,126; 98,743. 10B: 1, 77,434; 76,128. 2, 18,372; 18,433. 10C: 95,806; 94,561. 10D: 851; 712. 10E: 96,657; 95,273. 10F: 1, 488; 563; 2, 1,981; 2,907. 10G: 99,127; 98,743.

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COMMON SENSE: AN ESSENTIAL INGREDIENT

A little common sense applied to such tasks as routing ignition wiring or selecting servos for your Big Bird goes a long way toward avoiding a possible catastrophe. Also discussed: Robert's new "Snake Oil" engine and fuel treatments.

I recently received a phone call from a local Big Bird enthusiast, a call that left me hoping he was an isolated case. The gentleman had just test-flown a new model, which has a magneto spark ignition engine. He experienced erratic radio operation throughout the flight and was able to land safely

read all of the Big Birds column before he came to grief by missing some important tips. I spend a good deal of time doing research and testing products so that *Model Builder's* readers will be well informed about developments in the Big Bird field. My friend has since shortened his leads and installed a resistor spark plug, and is now

enjoying glitch-free flying.

Another Big Bird pilot called to say that while attending a fly-in and talking with other pilots, the subject of servos came up. The visiting pilot asked if the other fellows had read this column's recent servo reviews. One or two pilots said they had, but a couple others said they never used big



First place in Precision Scale at the 1993 Northwest Model Expo went to Wendell Ward's magnificent Vultee BT-13, built from a Bert Baker kit. Wendell also brought the model to the Whidbey Island Radio Control Society's first Big Bird fly-in this past August.



Much of the cockpit detail in Wendell Ward's BT-13 is made from thin aluminum litho plate.

only because he is a very talented pilot.

From our subsequent conversation I learned that he had strung the ignition cutoff wiring back into the fuselage, close to the ignition cutoff servo. I told him the ignition cutoff wires should be kept as short as possible and should *never* go past the firewall. I also asked if he was using a resistor plug; he wasn't.

I have mentioned these two items numerous times in this column and told my friend so. I was rather stunned when he informed me that he just looks at the pictures and never reads the text!

Needless to say, my caller received a great deal of encouragement from me to

Powered by an O.S. 1.08 two-stroke, Walt Wyrick's 11-pound Great Lakes Special is an outstanding aerobatic performer in the hands of a capable pilot.



servos in their large planes. They didn't feel large servos were required.

Fortunately, most Big Bird pilots do use servos of at least 42 ounce-inches of torque, as recommended by the International Miniature Aircraft Association's safety guidelines. Many pilots are using even larger servos than the minimum recommendation.

I recommend large servos for large planes because little servos have little gears, and although they may hold up under flight loads for a while, every landing puts the loads from the large control surfaces on the small servo gears. The gears may eventually strip and you may find your favorite Big Bird reduced to rubble.

Large servos also have large mounting lugs and adequate mounting hardware that will withstand the rugged conditions a big model may face. I have personally had servos with inadequate mounting lugs and hardware pull loose on a Big Bird even though the servos were in the 70 ounce-inch torque range.

Small servos have small output arms that can snap off easily when the plane is



Another Great Lakes Special, this one the handiwork of Harold Leininger, sports a polished aluminum cowl, landing gear and wing struts. Power is a Zenoah G-38. Model was photographed at the '93 Northwest Model Expo.



One of the classiest lightplanes of all time, the Warner radial equipped Fairchild F-24-W as modeled from an Ikon Northwest kit by expert craftsman Lynn Lockrow. Engine is a Super Tigre 3000.

being moved around in your workshop or at the flying field. A small fracture may lead to catastrophic in-flight failure. In short, it's impossible to predict when a small servo in a large plane is going to fail. It makes no sense at all to put ourselves and the folks flying with us in jeopardy by using inadequate equipment in our big planes.

ROBART'S "SNAKE OIL" ADDITIVES

Tom Walker of Robart Manufacturing sent me a box full of fuel additives which contain Robart's new line of "Snake Oil" lubricants. Tom sent the products because he read about the corrosion problem that developed in my Saito 270. He informed me that all of the Snake Oil products have moisture-dispersing agents that should,

among other things, help prevent corrosion inside our model engines.

So far, I have used the Power Rev RC Engine Treatment (an after-run oil) and the Power Rev RC Fuel Treatment. It will take some time to determine whether the Engine Treatment will keep the corrosion down in my Saito 300 and my O.S. 1.20 Surpass, but the effect of the Power Rev RC Fuel Treatment was evident right away.

The first test of the Snake Oil Power Rev RC Fuel Treatment was on my O.S. 1.20 Surpass. The fuel used was Cool Power with 10 percent nitro, 18 percent oil. The prop was a Graupner 15x8 from Hobby Lobby. Without the Fuel Treatment the O.S. turned 8,500 rpm and idled at 2,100; with the Fuel Treatment added the engine maxed out at 8,700 rpm and idled at 1,900

rpm consistently.

The next test was with my Saito 300 four-stroke twin. The fuel was Davis Nitrothane with 15 percent oil and 10 percent nitro. With standard fuel the O.S. 300 turned a Top Flite 20x10 at 6,800 rpm max and idled at 1,900. With the Fuel Treatment added the engine topped out at 7,050 rpm and idled at 1,800.

Lastly, with a Zinger 18x8-14 the Saito 300 would do 7,000 rpm tops and idled at 2,100 rpm on standard Davis fuel; with the Fuel Treatment the engine ran 7,200 rpm and idled at 1,900 rpm.

The Snake Oil Power Rev RC Engine Treatment showed a definite improvement in every case. Top-end rpm went up by over 200, and the idle was consistently 100 rpm less than when no fuel additive was used.

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According to the brochure that came with the Snake Oil products, an additive called Sp-10 causes opposing metal surfaces such as piston and cylinder walls to become negatively charged. This causes the two surfaces to repel each other, creating less friction between the moving parts. Less friction means less heat and longer engine life.

I intend to continue to use Robart's new Snake Oil fuel additive and after-run oil and will keep you updated on developments with their continued use. In the meantime, you can get more info from Robart, P.O. Box 1247, St. Charles, IL 60174; (708) 584-7616.

WIRCS FUN-FLY

Congratulations are due to the Whidbey Island Radio Control Society. The WIRCS club held their first annual Big Bird fly-in on August 22, using IMAA rules. Thirty-seven pilots with outstanding sport and scale Big Birds braved fairly stiff winds to make a good day of it. I even managed to put some more flying time on my Lanier Stinger.

Big Bird pilots are a close-knit group who look after each other. When CD Tim Sparks experienced a death in his family just a few days prior to the WIRCS fly-in, club president and fellow CD Doug Francis stepped in to save the day and did a great job of

officiating his first Big Bird meet.

The WIRCS club flies on a small Naval training facility that is not used on weekends. Imagine, a 5,000x200-foot runway! The type of Naval aircraft using the facility during the week is susceptible to foreign object ingestion, so it is particularly important that the WIRCS fliers police up all modeling debris. To date they are batting a thousand.

Hal Seligmiller did such a neat job inspecting the models at the WIRCS fly-in that I am trying to recruit him for the inspection team at the IMAA's 1994 Festival of Giants, to be held at Arlington, Washington on July 15, 16 and 17, 1994.

continued on page 49

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THE LAZY-H BIPE FOR ELECTRIC RC

A lot of enjoyable, laid-back flying is in store for those who build this three-channel biplane, designed to go together quickly and perform well on a geared Astro 25 power system.

Well, the creative part of me has been working again. This time the result is a geared 25-size electric biplane, a model I call the "Lazy-H." As the name implies, this airplane builds easily and fast. It lacks the difficult features found on most bipes such as wire cabin struts, wheel pants and wing struts. It's designed for the true Sunday flier who lacks the time to build a more complex model.

The Lazy-H possesses excellent low speed characteristics and is capable of short takeoffs and landings. The model can easily take off in 15 to 20 feet, and landings are a joy with the extra drag associated with a biplane. The prototype is flown

the model. This was my first geared electric system, and to say I was impressed would be an understatement. The motor turns a 13x8 Rev-Up propeller slowly and lifts the 5-pound model off the ground in short order. Endurance is achieved by cutting back on the throttle when full power isn't needed. I normally achieve 5 to 7 minutes by flying a mixture of full throttle takeoffs, mid-speed aerobatics, low speed flight and touch-and-go's. This airplane is well suited to schoolyard type flying in a limited area.

CONSTRUCTION

Proceed by first cutting out the sheet balsa pieces to make a



BY SCOTT HARTMAN

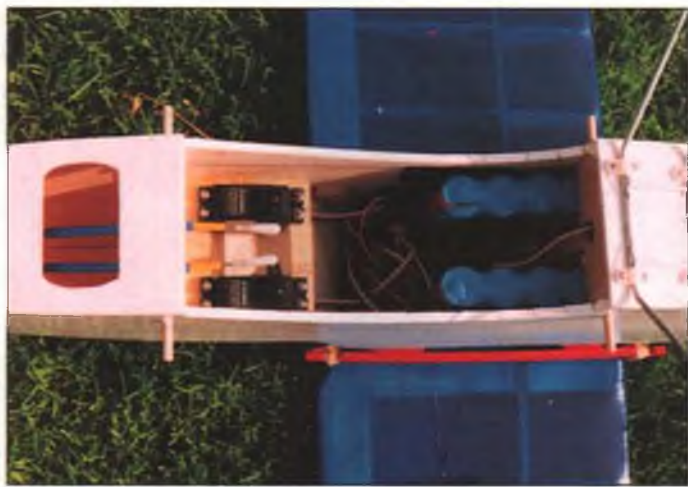
SPECIFICATIONS

WINGSPAN	49-1/2 in. top, 46-1/4 in. bottom
WING AREA	810 sq. in.
FLYING WEIGHT	5 lbs.
WING LOADING	14.3 oz./sq. ft.
OVERALL LENGTH	41 in.
POWER	Astro 25 cobalt (geared) on 14 cells
RADIO	3 channels required (rudder, elevator, throttle)

with rudder, elevator and motor control. It's capable of loops, rolls, horizontal eights, spins and most other simple maneuvers.

An Astro Flight geared 25 with 14 Sanyo SCR cells does an excellent job of powering

kit. Use light grade balsa unless noted. Lone Star Models (1623 57th St., Lubbock, TX 79412; 806-745-6394) will ship the desired grade if specified on the order. All glue joints should be made with medium or thick CA glue and accelerator.



■ **LEFT:** Removing the bottom wing provides access to the cavernous interior. Large rectangular opening at the left is the cooling air outlet. Power for the Astro 25 is provided by two individual seven-cell packs attached to the fuselage sides with Velcro; packs go in and out through a forward hatch on top of the fuselage. Receiver is located above the batteries. ■ **RIGHT:** The author's flight box is made from a pistol case and holds the transmitter, Astro Flight Model 112 charger, ESV, and assorted tools. ■ **BELOW:** See any curved shapes here? Darn few, which is why the Lazy-H goes together so quickly and easily. We've seen a video of the model in action, and it does fly exactly as claimed. Be sure to build it light for best performance.

TAIL SURFACES

Build the tail surfaces over the plans using 3/16-inch thick hard balsa stick and light sheet

struts out of 3/16x3/4 spruce. Pin the 3/32 balsa fuselage side to the plan and glue the cabin strut and doublers in place. Mark the locations of the form-

together at the rear, then tack-glue the formers to the remaining side and adjust until the fuselage is straight. When satisfied, glue the formers solidly to

fuselage from the lite-ply landing gear block to F2A with 1/8-inch light balsa. Glue F1 to the sides with the side thrust and down thrust as per the plans. Install the 1/2-inch balsa triangle stock and scrap pieces to the nose as shown. Test fit the motor into the nose. You will have to replace the gearbox screws with ones 1/8-inch longer to compensate for the thickness of firewall F1. Glue F2B to F2A while test fitting the motor.

Glue the upper 3/16-inch balsa sheeting to the nose. Add the remaining 1/8 balsa sheeting and make the hatch. Add the 3/32 balsa sheeting in the cockpit area. Glue on former F4A. Glue on the tail surfaces. Glue on the top and side rear decking and sand as required. Test fit the wing rubber band dowels, but don't glue them in place at this time. Cut a hole in the bottom fuselage sheeting for cooling air to escape. Also cut a small hole below the gearbox to allow for lubricating the gears.

Trial fit the landing gear. A 13-inch Hobby Lobby ready-made wire landing gear, part #RA1093, was used on the prototype. A 1/16-inch wire brace was added to reduce bouncing. A slight toe-in on the main gear will help tracking on the ground.

Sand the fuselage in preparation for covering.

WING

Choose either the top or bottom wing to start on first. Join the two halves of the spruce



stock. I used light balsa sheet for the rudder and tapered sheet for the elevator. Join the two elevator halves with a short piece of dowel.

FUSELAGE

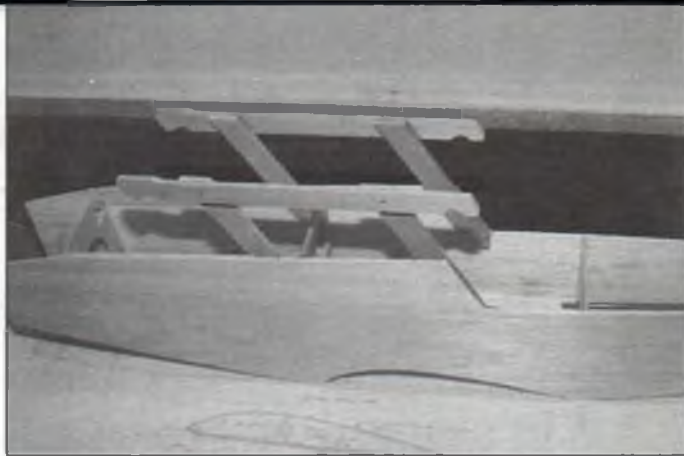
Begin by building the cabin

ers on the side. Make the other side the same way.

Tack-glue formers F2A, F3, F4B, F5 and F6 on one of the fuselage sides. The angle that the formers join the side should be estimated based on the plans. Tack-glue the fuselage sides

the sides. Install the flexible pushrods (I used Sullivan Golden-Rods on the prototype).

Glue on the 1/8-inch lite-ply landing gear block and the 3/8-inch triangle stock. Sheet the bottom rear with light 1/16 balsa. Sheet the bottom of the



■ LEFT: Cabane struts are made of 3/16x3/4 spruce and are glued directly to the 3/32 balsa fuselage sides. As shown on the plans, the joints between the vertical and horizontal strut members are reinforced with a short piece of dowel—don't omit it! ■ RIGHT: Here the fuselage sides have been joined and are ready for the top and bottom sheeting.

wing spar with the plywood dihedral braces. Slightly feather one side of the 1-3/8x1/16 balsa trailing edge to allow for a good fit as per the plans. Pin the trailing edge sheeting to the plans. Use a rib to spot the spar over the plans, then pin the spar to the board. Pin spacers of 1/16 scrap balsa at the location

harness as per the sketch on the plans. For best performance, I recommend using Sermos connectors and 14-gauge wire.

RADIO INSTALLATION

The prototype uses a Futaba Conquest FM radio with two S148 standard servos for

the same time it takes to charge for one. This is done very easily when using Sermos connectors, as these connectors come apart and will connect to each other. Please note that charging this way requires that all cells be of the same capacity and that all packs be dead before beginning the charge.



■ LEFT: Ultra-simple tail surfaces are glued permanently to the fuselage before adding the upper turtledeck sides and top. ■ RIGHT: The electric system wiring harness is shown full-size on the plans and therefore can be made up outside the model. The Flightec SEC II speed control features optical isolation and has proven to be an excellent piece of equipment.

of the R2 ribs to allow for the center section sheeting. Install all but the center rib and glue them in place. Install the center rib, angling it for the proper dihedral.

Glue on the 1/4-inch square balsa leading edge. Glue short pieces of 1-inch trailing edge stock at the center to allow for trimming the trailing edge as shown on the plans. Glue on the top 1-3/8x1/16 sheeting. Glue on the wingtip at a 45 degree angle. At this point the panel is finished, so remove it from the plans, slide it over and make the other side. When finished, add the 1/16-inch balsa center section sheeting. Round off the leading edge and sand the remainder of the wing until it's ready to cover. Make the other wing the same way.

COVERING

My personal preference in covering materials has been MonoKote. The Lazy-H's open framework wing and tail lend themselves to transparent covering. If a warp appears in the wing or tail, it should be removed by having a helper twist out the warp while you reshrink the covering.

MOTOR INSTALLATION

The motor and gearbox are held in place with the gearbox screws. The prototype model uses a Flightec SEC II electronic speed control with optical isolation. Wire up the wiring

rudder and elevator control. Adjust the control throws as per the plans.

CHARGING

The motor battery is held in place with Velcro for easy removal. I normally charge my battery packs outside the fuselage, although a charging jack is also provided on the nose. My old Astro Flight Model 112 charger will charge up to 28 cells at one time, so I charge two sets of batteries consisting of two seven-cell packs each. This allows charging batteries for two flights in

FLYING

Pick a calm day for the test flight. Charge the motor battery and complete the normal preflight checks. Take off into the wind by gradually feeding in throttle. Make small corrections with the rudder and gradually feed in up elevator until the airplane comes off the ground.

The geared Astro 25 with a 13x8 propeller provides an impressive climb at full throttle. After it's up to altitude, reduce power to extend the motor run time.

The Lazy-H is capable of loops and rolls as well as most sport type maneuvers. However, the most fun I have with this design is just putt-putting around, doing touch-and-go's and slow fly-bys. Build a Lazy-H biplane and return to fun flying! **MB**



The geared Astro 25 is mounted by means of the two gearbox screws, which have to be replaced with slightly longer ones to make up for the firewall thickness. Motor is supported at the rear by former F28.

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HANNAN'S HANGAR

BY BILL HANNAN

"In soloing—as in other activities—it is far easier to start something than it is to finish it."

Our quotation this month, by famed aviatrix Amelia Earhart, was supplied to us by retired airline pilot and lifelong model builder, Ed Toner.

FABULOUS FOTOS

Notice the unusually high quality of our featured photographs, taken by Ivo Ceresnak of the Czech Republic during the 1993 Openscale international contest. Quite apart from being portraits of model aircraft and their builders in action, these feature exceptional clarity and dramatic compositions. Those of you who have tried capturing such memorable moments on film know that it is not easy! Our congratulations to Mr. Ceresnak for his consummate photographic skills.



English modeler C. Newman and his rubber-powered Comper Swift, which deservedly earned the top static scale judging score.



Great shot of frequent Hangar contributor Lubomir Koutny of the Czech Republic launching his 1/20-scale KI-61 "Judy." All photos this month were taken by Ivo Ceresnak at Openscale '93.

WINGLESS WONDER

Frank Ehling must surely rank among the most prolific designers of model airplanes, with a history of versatility and origi-

nality dating back to aviation's Golden Age. Yet, he seems best remembered for his beginner designs, especially the rubber-powered Delta Dart. (Incidentally, some of Frank's many projects were credited to other

names, among them "Elliot Ford," "Old Timer," and "Capt. Frank Van Buren"—all pen-names Frank employed because certain magazine editors feared having too many Ehling designs appear at once.)

We are pleased to present Frank's most recent and probably simplest creation, the Wingless Wonder. John Thornhill's drawing shows all the details of this curious indoor glider, which requires minimal materials and time to construct. The just-for-fun model may be gently hand-launched, of course, but for maximum duration should be drop-launched from a helium balloon.

Health difficulties have severely limited Frank's model building, and readers are encouraged to send him some cheerful words of appreciation for his lifetime of devotion to the hobby. His address is 11004 Harding Rd., Laurel, MD 20723. Our thanks to Joseph W. Harris and Thomas Ogden for supplying this information.

WEDELL-WILLIAMS BOO-BOO

Walt Grigg's fine photograph of the Roscoe Turner Wedell-



Perfect launch style is demonstrated by Vladimir Kunert, seen here with his sleek 1/20-scale rubber-powered KI-83 twin. Note the four-bladed propellers.

Williams racer reproduction in our October column was incorrectly captioned. Not only did we misspell Jim Clevenger's name, but we failed to give credit to other people involved. Our apologies to Steve Halpern and Jim and Kevin Kimball for not recognizing their vital contributions to the project.

BELGIAN INTERNATS

The 17th annual international indoor contest of Flemalle, Belgium attracted 67 entrants from 11 different countries, according to event director Fernand Van Hauwaert. As usual, the

flying scale categories were most popular, with 76 Peanuts and Pistachios along with CO₂ and electric powered models in contention for the prizes. Countries represented included Austria, Belgium, the Czech Republic, England, Finland, France, Germany, the Netherlands, Japan, Switzerland and the United States.

And in Japan, the Nagoya Nuts international Peanuts and Pistachios contest took place in spite of inclement weather brought on by a nearby typhoon. A total of 93 models were entered, representing Australia, Germany, Israel, Japan



Well-known scale modeler T. Rees, of England, carefully commits his highly detailed Westland Widgeon Mk. III to the Czechoslovakian sky. Can you imagine a more perfect site to fly FF scale?

and the U.S. Outdoor flying was hampered by cloudy and rainy skies, so the indoor portion of the event offered welcome relief from Mother Nature's whims.

We expect to have more details and photographs from these two international competitions in our next column.

NEW PRODUCTS

Spoked wheels, anyone? Stan Fink, editor of the *Domeduster* indoor model newsletter, has revised and updated his spoked wheel instruction booklet. This do-it-yourself guide to making lightweight wheels gives detailed methods of making rims with or without power tools, and different approaches to

spoking wheels, with easily available materials. The extensively illustrated booklet is \$8 postpaid from Stan Fink, 1810 Pine St., Philadelphia, PA 19103. To quote Stan: "If you make your own spoked wheels, you will get a little taste of

the craftsmanship of the past..."

MODEL PLANS AND KITS

Newly available from John Bell is a catalog of detailed three-views, model construction plans, decals and kits. The plans are primarily for rubber-powered scale models, although they are adaptable to other forms of propulsion. A subject sampling: Spitfire, Mustang (several variations), Corsair, Kittyhawk, Hughes racer, Knight Twister, Lockheed Altair, Curtiss R3C-3 racer, Rearwin Speedster and many more. An illustrated catalog is available for \$3 from Bell Model Aircraft Co., 650 Pine Crest Dr., Largo, FL 34640.

SEMI-KITS

Al Lidberg has extended his line of Mini Old Timers to include the Carl Goldberg Interceptor, the Kerswap and Rocketeer A. Suited to rubber, CO₂ or electric power, the offerings feature detailed plans, instructions and balsa printwood. Earlier semi-kits such as the Buzzard Bombshell, New Ruler, Playboy Jr. and Trenton Terror are also still available. A complete catalog of these and other model plans costs \$1 from A.A.

Electric powered Auster 84 earned 98 static scale points for builder/flier D. Knight. Note the twin tail wheels.



HANNAN'S HANGAR

Lidberg, 614 E. Fordham,
Tempe, AZ 85283.

HISTORY FLIES AGAIN

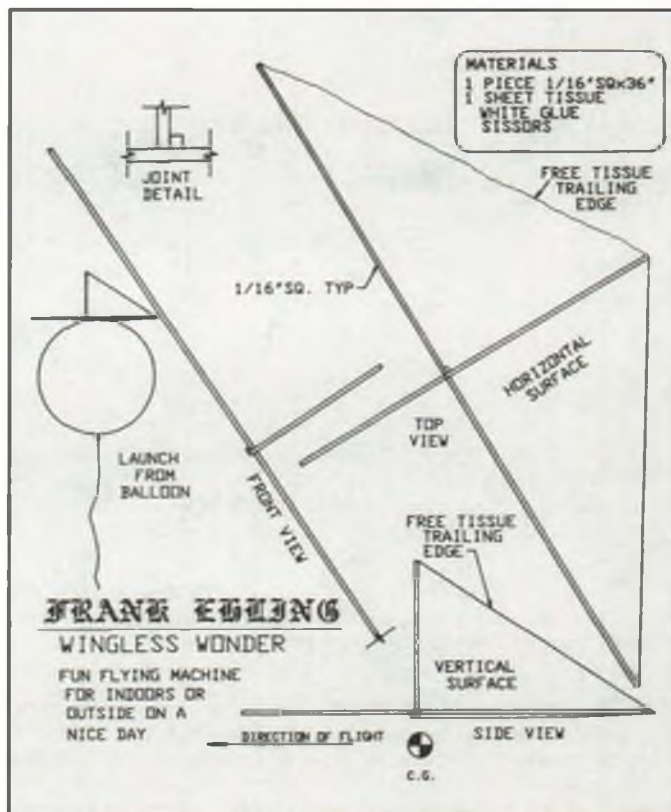
Perhaps the most exciting and inspirational aviation videotape we've seen provides extensive coverage of Delmar Benjamin's marvelous Gee Bee R-2 and the personalities involved in the monumental replication project. Professionally produced by Anne Byers and Tom McArthur, the 48-minute presentation gives a brief history of the original Gee Bees and documents the construction and flying of the new R-2. Modelers should particularly appreciate seeing the Gee Bee being built and assembled by the team of Steve and Liz Wolf, Delmar Benjamin, Duane Trappen and Jim McAllister. Beautifully documented are early taxi tests without the cowling and fairings, final roll-out, and the exciting first flight (which included inverted flying!).

Unlike so many "nuts and bolts" type videos, "History Flies Again" is people oriented, providing rare insight into the personalities involved. Watching the emotional reactions of Tana and Traci Benjamin to the test flight is a moving experience, as is seeing 92-year-old Howell

"Pete" Miller, steadied by Tana Benjamin and his wife Dot, witnessing Delmar and the R-2 in action. Miller, who engineered the original R-1 and R-2, exclaimed: "I wish I could do it! Oh Wow, Oh boy! Wow!"

Others who appear briefly in the video include Gladys Granville, Vern and Maureen Clements, Henry Haefke and Premo Galletti. Interviews with Delmar and Tana Benjamin are truly fascinating and touching. Imagine operating a 2500-acre Montana ranch, performing in airshows and operating a mail-order business! Delmar, a philosophical man-of-few-words, compares learning to fly the Gee Bee with riding a unicycle: "A lot of things to learn in a short period of time... It's really fun to fly; not so fun to land." Then there is Steve Wolf's summary: "A Gee Bee with a good pilot is a good airplane; with a bad pilot it's a bad airplane."

The "History Flies Again" video and many other items of Gee Bee memorabilia are available directly from Deltana Airshows, Deltana Dr., Shelby, MT 59474. Write or phone 1-800-342-4272 for a complete catalog. As one enthusiastic airshow announcer said: "1932 is living again!" Please mention to Delmar that you were sent by



For a change of pace, try building this ultra-simple, intriguing tailless indoor glider as devised by Frank Ehling. Drawing by John Thornhill.

Model Builder magazine.

SIGN-OFF

Ken Thompson, of Taylorsville, Georgia, offers this histori-

cal thought: "Professor Langley might have been first with a successful airplane, if he hadn't tried to invent the aircraft carrier at the same time." **MB**

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ROBBE'S CALIBRA— A PREVIEW

Bill also talks about a new HLG design now on the market and has a report on slope flying in Japan, courtesy of Dr. Paul Clark.

In a recent telephone conversation, I spoke with a very enthusiastic modeler from Port Angeles, Washington, by the name of Neal Capener. Neal has lately been flying a Robbe "Calibra" electric sailplane and has been having a ball with it. He had heard that I was building a Calibra for

standing performance of his Calibra. He described out-of-sight climbouts in less than 15 seconds, vertical climbing ability at high speed and stall-resistant soaring flight. I asked Neal to send photos of his model and a short write-up, which follows. However, I should first clarify

view plane. He writes:

"The Calibra's performance is *fantastic!* It requires no down elevator with the motor on. After launch, it goes wherever you point it. Straight up? Yes! Accelerating going straight up? Yes! I checked the rate of climb with an Avocet altitude watch and found an



All eyes are on Neal Capener every time he flies his Robbe Calibra Pro at the local power field in Port Angeles, Washington. One would assume he has broken all preconceived notions about sluggish and underpowered electric sailplanes with his 100 feet per second climb rate! *MB* columnist Bill Forrey is finishing up a similar version of the Calibra with a 10-cell power system, to be the subject of a review article in the March '94 issue.

an upcoming *Model Builder* review article, and wanted to compare experiences. Primarily he wanted to see if I was as excited about my model as he was about his. My answer was a qualified "yes"—qualified only because I was just finishing up the assembly and had not flown it yet.

Our conversation went on for quite a while, during which he related the out-

standing performance of his Calibra. He described out-of-sight climbouts in less than 15 seconds, vertical climbing ability at high speed and stall-resistant soaring flight. I asked Neal to send photos of his model and a short write-up, which follows. However, I should first clarify



Says Neal: "I know you're supposed to hand launch a plane level or slightly nose down, but with the Calibra it doesn't matter"—thanks to the tremendous power developed by the Robbe Keller Pro motor running on 22 cells! In spite of the 26-ounce wing loading, Neal reports his Calibra Pro climbs vertically and is "specked-out" in 15 seconds or less!

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The Slope Skeeter makes a low, fast pass over the Yodo River levee with Jonathan Clark at the controls. On a recent 3-1/2 hour trip to Oishi Kogen mountain, a cold solder joint let go in one of the Sullivan cable aileron linkages, sending the Slope Skeeter into 35-foot high cedar tree on its first flight. The plane survived to fly another day, but that day was shot!

Model 205. Covering is Goldberg Ultracote Plus in fluorescent red on top and black on the bottom. The fuselage was painted with Simprop fluorescent red paint (sold by

flying the plane the full length of the runway (400 feet) without losing speed and only dropping from 10 to 5 feet. I had to go around four times!

and from my experiences with the sport version so far, I can heartily agree. In the March issue I'll have a full report on the 10-cell Calibra, so stay tuned!



Like Babe Ruth showing the crowd where he's going to hit his next homer, this young fellow is pointing out where he's about to throw his "Lil' Bird," a 54-1/4 inch hand-launch design based on the planform of Dave Thornburg's famous open class "Bird of Time." Kits and pre-built ARF versions of the Lil' Bird are being offered by Ray Hayes of Sky-Bench Aerotech—details in text.



Dr. Paul Clark sent this photo of the Yodo River levee where he and his son Jonathan go flying near their home in Osaka, Japan. This time their often-repaired and now worn out Ariel is joined by a Dynaflyte Skeeter, modified by flattening the wing and adding ailerons for slope flying. Handles the light lift of the 35-foot high levee with ease, but the ailerons need a little help—see text.

Hobby Lobby as a matching paint for its Oracover film). Radio is a JR PCM-10 with a 225-mAH receiver pack. Neal continues:

"Even with its high wing loading, I get average flight times of between 13 and 14 minutes. It's easy to fly. It's hard to slow the plane into a stall—you really have to push it. The Calibra just wants to fly fast.

"My first landing attempts resulted in

"When I get ready to fly, all other activities come to a halt. Everybody wants to watch! It's hard not to grin from one ear to the other after a flight!

"P.S.—I also won yesterday's club fun-fly against all of the glow-powered planes! Hee, hee, hee. . ."

Really, folks, this guy is about as sold on his Robbe Calibra Pro as anyone can get,

HLG-SIZE BIRD OF TIME

Long-time *MB* readers will no doubt remember the many "Bird of Daylight Savings Time" (or BODST for short) photos and write-ups in the early and mid-'80s. Designer Bob Davis had taken Dave Thornburg's "Bird of Time" and scaled it to 60-inch wingspan. Contest Director John



Dr. Paul Clark's latest project is this Hobby Shack Super Ridge Runt, which he modified by adding rearward-swept wing tip and stab tip blocks. He also installed individual aileron servos so that flaperon mixing could be used. Unusual covering job is actually clear MonoKote over spray painted balsa. Has a nice airbrushed look!



Lupperger was so impressed with the looks of the plane that he got together with Davis, worked out a few bugs in the design, and two years later was selling plans and partial kits.

I was one of the early pilots to build and fly one of these partial kit BODST HLGs, which I entered in the 1987 ISS HLG contest at Riverside, California. That year, BODSTs were the most numerous of any single design. They flew outstandingly well and looked terrific from all angles—especially aloft.

The days of BODST partial kits from Lupperger are long gone, but now something very similar has come back on the market. Enter Ray Hayes of Sky-Bench Aerotech, 69598 Brookhill Dr., Romeo, MI 48065. Ray says he is now producing a kit for an RC HLG called the "Lil' Bird" for \$29.95 plus \$6 S&H. Specifications: wingspan 54.25 inches, wing area 270 square inches, and flying weight 12 ounces, for a wing loading of 6.4 ounces per square foot. At this point, I'll let Ray tell the story himself:

"I have competed in RC sailplane contests in most parts of the USA since 1973, and I have witnessed the progression of new designs. None have been as unique in shape as Dave Thornburg's open class Bird of Time, first kitted by Dave and then by Mark's Models (now Dynaflyte). Aside from its great aesthetics, in most people's view, it has been an excellent performer. Our Lil' Bird, in the hands of Richard Burnoski, finished in 4th place at the 1993 LSF Nationals Hand Launch Golf Contest.

"The construction of the 'Lil' Bird's wing is unique, being of built-up construction with 1/32 contest grade balsa sheeting top and bottom. The kit contains construction plans, building instructions, machine-cut parts, pre-cut wing sheeting, spruce and balsa spars, pre-cut plywood and balsa shear webs, hardware, and 1/64 plywood fuselage doublers.

"In general terms, an RC sailplane's flight performance is predictable based on airfoil and wing loading. Lil' Bird's airfoil is 9 percent thick. This means it will float, penetrate, and launch extremely well. A sky-high Lil' Bird is a very enjoyable sight. If you have an open weekend free from interruptions, you can start construction on a Friday evening and fly the Lil' Bird on Sunday afternoon, provided your battery is charged."

Ray concludes with a couple of paragraphs indicating the availability of "Op-

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tion A," colored tissue covering for \$4.95, and "Option B," an almost-ready-to-fly Lil' Bird built on a jig for accuracy, for \$78 plus \$15 continental U.S. shipping.

THE WORD FROM OSAKA

Recently I received a large mailing from my friend Dr. Paul Clark, president of Osaka Bible Seminary. In the package were many photos from different slope and flat-land sites, in places ranging from near Osaka, Japan to the outer banks of North Carolina. Dr. Clark is an enthusiastic modeler who really loves RC HLGs and slope ships under 60-inch wingspan. He has built more models in this size range than I ever could hope to build, and most of his models are still flyable.

One of the projects is his "Slope Skeeter," which was modified from a Dynafite Skeeter kit. The idea was that flattening the wings and installing ailerons would give the Skeeter an added dimension of aerobatic flight without harming the light-lift capabilities of the original design.

To a large extent the idea worked. Dr. Clark writes: "It fairly hangs in the air... it finished out at 15 ounces, but needed to be ballasted up to 18-3/4 and the CG moved forward for optimum flight." The ailerons proved to be a little on the small side, though. To quote Dr. Clark: "It's a lot of fun, but a little too tame. I should have put strip ailerons on it." As built, the Slope Skeeter's ailerons go from the tips inward five rib bays to the rib corresponding to the leading edge break (i.e. the tip panels). Perhaps extending the ailerons an additional two rib bays on each side would also do the trick?

Anyway, there are an awful lot of guys kit-bashing Dynafite Skeeters these days, and why not? You can certainly afford to, given their low price. Skeeter kits typically run anywhere from \$15.99 to \$23.95.

Another project tackled recently by Dr. Clark was the Hobby Shack Super Ridge Runt. He writes: "As in the review in *Model Builder* (August 1993), mine also came out heavy at 29 ounces. I wouldn't be so kind about the material selection! One leading edge stick was heavy and the other was light, so I cut each leading edge piece in half and spliced it so that the light pieces were towards the tips for equal balance. Also, the aileron material was too thick, and when cut to proper size, was too thin to last, so I laminated 1/64 plywood to them and got knife-edge trailing edges. It's too heavy to fly over our 35-foot high levee overlooking the Yodo River in Osaka, but on a couple of windier days it has been flown, and it looks great in the air.

"I like the action movement I see in Southern California (Torrey Pines, etc.), but I still like to fly something that looks like it could be the real thing, as does the Super Ridge Runt. Even F3Bs look like I could climb in if I'd get back to my fighting weight—fly weight, ha! Like Leroy Satterlee said in *RC Report*, September '92, page 72, 'Jeers for the Sig Samurai's square tips,' so I put swept-back tips on the Super Ridge Runt's wing and stab. It looks great!"

To this I feel must add that the Super Ridge Runt was designed for sport aerobatics in moderate to heavy lift, which is where it truly comes into its own. It features the Eppler 374 airfoil which is famous for being a great choice for all-around slope racing or slope aerobatics. Just wait, Dr. Clark, until you get it flying on top of your Oishi Kogen mountain on a good day. You'll be smiling all the way home!

TIME TO FLY

Next month I'll have my usual report on the biggest annual soaring event in the United States, and no, it's not the AMA Nationals. I'm speaking of the Visalia Fall Soaring Festival. This year the cut-off for entries was boosted to 230 pilots, and at least six of them are coming from countries as far away as Guatemala and the UK!

Until then, if you have questions, call me at (909) 245-1702 between 7:30 and 10:00 p.m. weekdays, or anytime (pot luck) on weekends. Anything you'd like to share with the soaring community at large, send your photos and a brief write-up to me at 3610 Amberwood Ct., Lake Elsinore, CA 92530. **MB**

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PATTERN COMPETITION— WHAT'S NEW FOR '94

Rick brings us up to date on the new maneuver schedules and also presents some tips on how to go about analyzing and improving your flying.

Coverage of the Masters and Nats has crowded the news off of the front page for the last couple of months. The news is that many of us will have new maneuver schedules to fly, starting the first of the year. The AMA RC Aerobatics Contest Board (of which distinguished body I am counted a member) has voted to accept the new schedules that were proposed in AMA Novice, Sportsman and Advanced classes, with only Masters

(finally!) been scrapped; in its place are two new scored turnaround maneuvers, both very simple to fly. A 1/2 Reverse Cuban 8 now connects the two Straight Flight maneuvers, and the Immelmann Turn is now followed by a Split S. All of the maneuvers are now required to be flown within the 120 degree aerobatic box. The difficulty of the pattern has not been significantly increased by these changes, and most four-channel trainer type aircraft can still do a

tacked on at the end of the sequence. A 1/2 Cuban 8 is entered from the Three Horizontal Rolls, followed by a Square Loop and Landing. The Cuban provides more turnaround practice, and the Square Loop will teach the flying skills and trimming expertise needed for the long vertical lines to be found in the classes to come. Total K is now 26.

Advanced class needed a major overhaul and got it, with four new maneuvers



Competitors at a meet in Easton, Pennsylvania, from left: Pete Plenninger with his Boxer 60, Mark O'Connell with his Cursor, and Rob Larson with another Boxer 60. Mark O'Connell photo.

left untouched. The AMA Competition Regulations for 1994 and 1995 (known as "da roolbook" in Chicago) are being compiled by the Headquarters staff in Muncie, and should be ready for shipment by January '94. There will be no movie made; buy the book.

In Novice, the old Procedure Turn has

capable job. The pluses are that the huge overfly area needed for the Procedure Turn is no longer necessary, and the requirement to stay in the box will push the flights out a bit from the edge of the runway, enhancing safety. Total K stays the same at 14.

Sportsman gets another scored turnaround and a new center maneuver

and an increase in total K from 31 to 44. This positions the class better between Sportsman and Masters and gives competitors a longer sequence to fly, mending the two most often criticized aspects of the old pattern. Complex multi-sided maneuvers are now provided with the addition of the Triangle Rolling Loop and Six-sided Out-

side Loop, a Snap maneuver has been added with the Avalanche, and a Three Turn Spin has been added. All of this is much better preparation for the Masters and F3A patterns to come, but there are no real "airplane breakers" among the new maneuvers. Advanced pilots will have to hold their concentration longer, but most will have little difficulty adjusting.

Almost all of the rules changes for the new book come under the "housekeeping" heading; clearing up ambiguities and so forth. One is more sweeping in impact. This is a further 2 decibel reduction in the acceptable sound level, to 96 db measured over any hard surface, and 94 db over grass or dirt. This mirrors the recent change in the FAI Sporting Code to the same levels. The 10 percent penalty level drops to 98 db from 101 db. The provision giving the Event Director the option of deleting the noise level requirement with prior notice remains in the book.

I personally hope this latest change marks the beginning of a slowdown in our "rush to quiet." Quiet is fine, and pattern is now one of the quietest of all powered events. I enjoy it that way. Nonetheless, a 2 decibel cut represents a reduction by a full one-half in

heavy enough, and it's time for a break to let the technology catch up. It might also be time for one of the other events to pick up the torch, but they have shown little inclination along those lines.

In the Judging Guide section of the new book, under Suggested Downgrades, the Stall Turn and Number of Loops or Axial Rolls language has been deleted, and new language added that makes it clear that these maneuvers are to be judged according to the One Point per 15 Degree Rule. This removes the conflict that existed through the last rules cycle between the old and new language in the book. A section defining the meaning of Major and Minor defects has been added.

The Mandatory Zero list has been changed in several places, the most significant change being that the flight no longer scores zero if an aircraft component falls off in flight. Instead, the maneuver in progress and all subsequent maneuvers earn a zero.

There are other minor changes, mostly clarifications, new maneuver descriptions, diagram changes, etc. For the most part, the rest of the book stays pretty much the same as before. You can order a copy from AMA HQ, 5151 Memorial Dr., Muncie, IN 47302,



"Mr. Futaba," Steve Helms with his immaculate Mystery. Ship is incredibly light at 8-3/4 pounds. Is equipped with a YS 1.20 AC and Futaba 92AP—natch!

the available sound level! This isn't Las Vegas; we can't continue to "double down." Cheating is a word with an unpleasant sound, and I don't like to use it. Rather, I'll say that we are starting to create a climate that encourages competitors to find creative solutions to beat the rule instead of meeting the standard. The burden is now

for the princely sum of \$2.50.

You would find most of the foregoing information to be old news if you were a member of the NSRCA (National Society of Radio Controlled Aerobatics). The NSRCA monthly newsletter, *K Factor*, printed these changes months ago. The *K Factor* prints all of the pattern news from around the coun-

AMA NOVICE CLASS

1. Takeoff	(U)	K=1
2. Straight Flight Out	(U)	K=1
3. 1/2 Reverse Cuban 8	(U)	K=1
(scored turnaround)		
4. Straight Flight Back	(D)	K=1
5. Stall Turn	(U)	K=2
6. Immelmann Turn	(U)	K=2
7. Split S	(D)	K=1
(scored turnaround)		
8. Three Inside Loops	(U)	K=3
9. One Horizontal Roll	(D)	K=1
10. Landing	(U)	K=1

Total K=14

AMA SPORTSMAN CLASS

1. Takeoff	(U)	K=1
2. Double Stall Turn	(U)	K=3
3. 1/2 Reverse Cuban 8	(U)	K=1
(scored turnaround)		
4. Cuban 8	(D)	K=2
5. Immelmann Turn	(U)	K=2
6. Split S	(D)	K=1
(scored turnaround)		
7. Three Inside Loops	(U)	K=3
8. Straight Inverted Flight	(D)	K=1
9. Stall Turn	(D)	K=2
(scored turnaround)		
10. One Reverse Outside Loop	(U)	K=3
11. Three Horizontal Rolls	(D)	K=3
12. 1/2 Cuban 8	(D)	K=1
(scored turnaround)		
13. Square Loop	(U)	K=2
14. Landing	(U)	K=1

Total K=26

AMA ADVANCED CLASS

(All turnarounds scored)		
1. Takeoff	(U)	K=1
2. Double Immelmann	(U)	K=2
3. 1/2 Reverse Cuban 8	(U)	K=1
4. Slow Roll	(D)	K=3
5. Stall Turn	(D)	K=2
6. Top Hat with 1/2 Rolls	(U)	K=3
7. Humpty Bump with Options	(U)	K=2
8. 4 Point Roll	(D)	K=4
9. Stall Turn with 1/2 Rolls	(D)	K=2
10. Cobra Roll with 1/2 Rolls	(U)	K=2
11. Immelmann Turn	(U)	K=2
12. 6 Sided Outside Loop	(D)	K=4
13. Split S	(D)	K=1
14. Avalanche	(U)	K=3
15. Top Hat with 1/4 Rolls	(U)	K=2
16. Triangle Rolling Loop	(D)	K=4
17. 1/2 Square Loop with 1/2 Roll	(D)	K=2
18. Three Turn Spin	(U)	K=3
19. Landing	(U)	K=1

Total K=44

try, along with contest reports, member opinion, pattern related advertising, and lots and lots of articles on... pattern, of course!

If you fly pattern and don't belong to NSRCA, you are missing about half the fun and around three-fourths of the available information. This is the answer to the question a lot of you have asked about "where to find more stuff about pattern." You can get in on all this good stuff by sending your money, name, address, phone number, and AMA or other national aero club number to Suzi Frohreich, NSRCA Treasurer, P.O. Box 41310, Phoenix, AZ 85080. The cost is \$20 per year U.S. funds for Americans and



The man behind Advanced Aero Products, Kelly Jacobsen, and his YS-powered Jekyll 1.20 on the Mats Advanced flight line.

Canadians, and \$30 for other foreign nationals. Am I a member? You bet I am!

FLYING SMARTS

Intelligence is a valuable asset to almost anyone, and pattern pilots are no exception. One of the best definitions of intelligence I've ever heard held it to be that capacity which allows an organism to identify and learn from mistakes, both its own and those that it witnesses. As pattern pilots, most of us make an adequate number

of mistakes of our own, and the opportunity to witness many more is there at every contest and practice session. How good are we at learning from them?

My experience has been that too many of us are painfully slow. Sure, we do all right in our private and professional lives, or we wouldn't have the time and assets to devote to any type of RC modeling, let alone pattern flying. We're fine, smart, sharp folks at our workplace or school. Great! Put a transmitter in our hands and stand us on a

flight line, and far too often, our brains begin to act as if we had marinated them in molasses. I'm not sure why this is so, but the process from zippy neuron to syrup cell is easy to catalog.

The majority of us, if asked, would certainly agree that we want to know what mistakes we are making. While we say this, the too-common reality is that instead of paying attention and attempting to learn from a critique by a friend, judge, or coach, we hear only what we want to hear, or worse, we get defensive. We become experts at the art of denial (who, me?). We do this to protect our confidence and self-esteem. For some of us, this defense mechanism works too well. The only really bad mistakes many of us come to see are the ones our closest competitors make. Our own progress begins to drop off, because we have lost the ability to identify our own mistakes.

Some of us blame the equipment (I need a four-stroke to get the scores! I need a new radio/servos/design/color scheme!). Our ears have already closed up shop, and now our eyes start to lie to us. We stare at the bits and pieces of our own flying so intently that we fail to see the whole of it properly. We get tunnelvision. The miscues keep coming, the frustration builds, fatigue sets in, and concentration becomes impossible. The net result is that we don't learn from our mistakes; we practice them. We don't gain confidence in our ability; we lose it. And with it, we lose the capacity to learn. Our brains quit transmitting because we are no longer set to receive. We have achieved the mental equivalent of a PCM "hold."

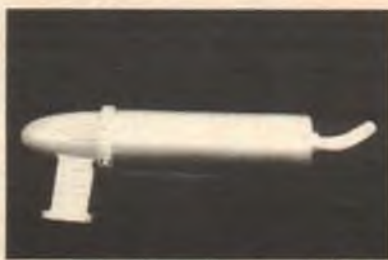
If any of this sounds uncomfortably familiar, the first step on the way out of the maze is to do a reality check and swap part of your ego for a little humility. I can't help with that; each of us must wrestle his own alligator. The second step is to trade your

continued on page 51



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JR
feel the difference!

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a time to see how different transmitter-to-model orientation affects the range. Your helper should always stand in the same place, as he or she will have some effect on the test.

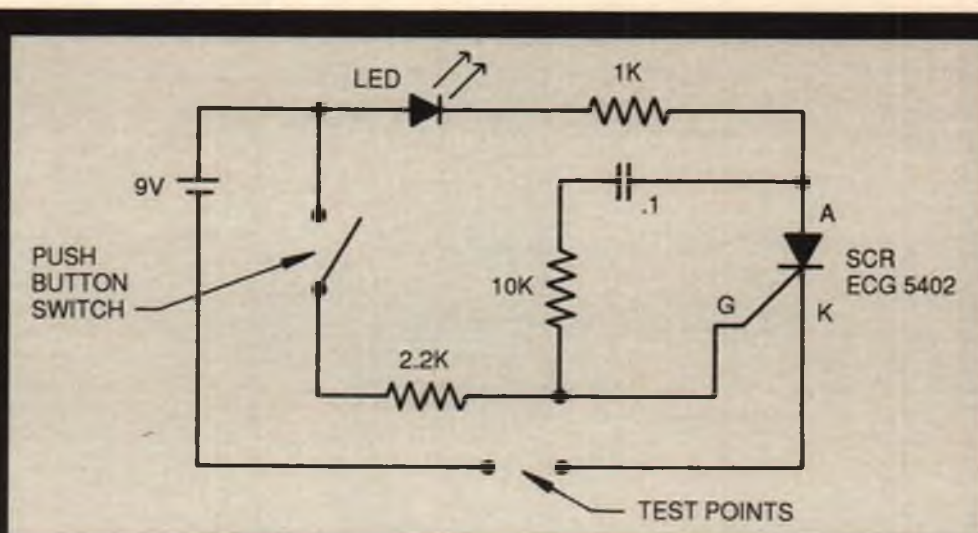
Now we have a standard; let's change the scenario. With the plane properly secured, start the engine and repeat the antenna-down range check. Completely rotate the airplane again. You can expect some loss of range with the engine running, but as long as the radio is steady and loses no more than about 10 percent of its range, you should be able to fly safely.

Assuming things are working acceptably well up to now, the next step is to install the spark ignition cutoff device and repeat the antenna-down range test. Again, be sure to keep the cutoff unit as far from the rest of the RC system as possible—think of it as part of the ignition system and not part of the radio. Repeat the previous tests, first without the engine running (but now also turning the ignition system on and off), then again with the en-

gine running. What you are attempting to do is establish exactly how and when the system malfunctions so that you'll know

definitely when a cure has been effected. Just for the sake of discussion, we'll as-

continued on page 50



A very useful test instrument. This intermittent detector will provide an LED indication of an open condition in any wiring, switch or plug. It can make fast work of the otherwise frustrating job of trying to pinpoint a troublesome—and even dangerous—connection.

Must be gremlins at work! In the November '93 issue, the same schematic illustration inadvertently appeared in two places, with different captions; the one on page 29 is correct, and as for the discrepancy between the 511 MOSFET shown on the drawing and the 510 called out in the text, Eloy reports that either

one will work equally well. The drawing that was supposed to be on page 28 is reproduced here. Our apologies to those who thought they were building an intermittent detector and wound up with a circuit turner-offer, and our thanks to Ed Carter of Westlake Village, California for bringing it to our attention.

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NIEUPORT TYPE 24/27

While not considered one of the better WWI fighters, the Nieuport 24/27 does make a challenging project for more experienced Peanutteers.

BY JOHN G. LOW

Several years ago a Nieuport 24 was hangared at the airport at Niagara Falls, New York. It was described to airshow visitors by a hangar guide as probably never having seen combat, and as it was unarmed, was thought to have been used by the Corps of Engineers in the way Piper L-4 Cubs were used in WWII. That may have put it to good use, for as fighters go, this particular Nieuport was not a roaring success.

In the early days of WWI, the Germans put the first aircraft specifically designed as a fighter into the air. It was known as the Fokker Eindecker. To counter this scourge the French came up with a neat little biplane, the

will certainly wish to research this subject on his own and come up with colors, details and documentation necessary to impress the judges today.

There are two choices for finishing, both of which are historically correct. The most interesting, but requiring considerable skill and model building experience, is the three-tone French camouflage scheme and related heraldry. Such a finish would require the use of model railroad or similar paints applied with an airbrush—but it would certainly look great. A less ambitious alternate simply requires white tissue to simulate fabric and aluminum dope with colored tissue roundels



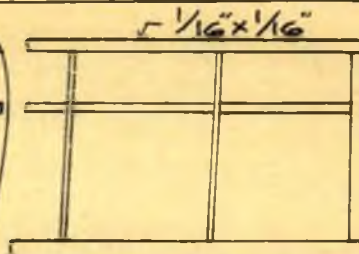
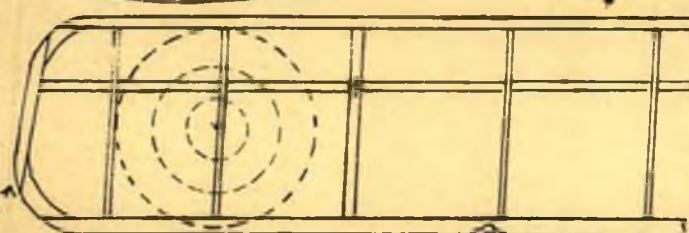
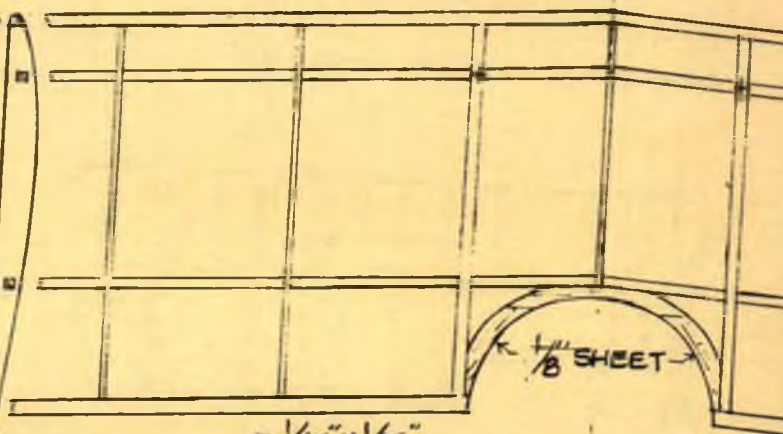
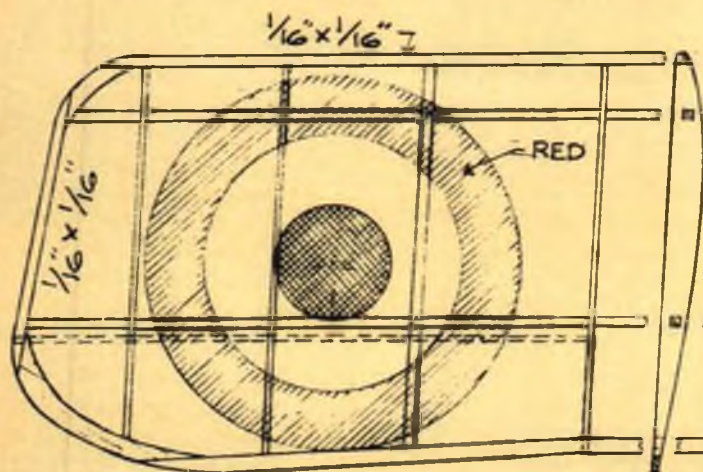
Nieuport 17. It was decidedly superior to the Eindecker, but suddenly Fokker DVIIIs and the Albatross D5 appeared in the skies over the eastern front, easily outclassing the Nieuport 17. The Nieuport 24/27 was an attempt to catch up, but the days of the Spad, SE-5 and Sopwith Camel had arrived and in turn outclassed the upgraded Nieuports.

So much for history—the serious Peanut scale competitor

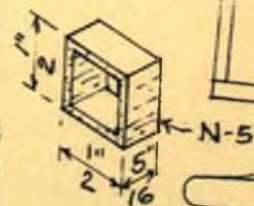
and black tissue lettering.

Construction is a bit more complex than Peanut versions of lightplanes and homebuilts, but the results are well worth the extra effort. Very light 1/16-inch balsa can be substituted for the 1/20-inch material indicated on the plan, however, it must be kept in mind that weight is the greatest enemy of Peanuts and the builder should continually strive for lightness.

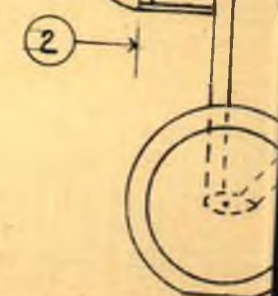
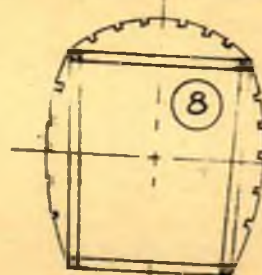
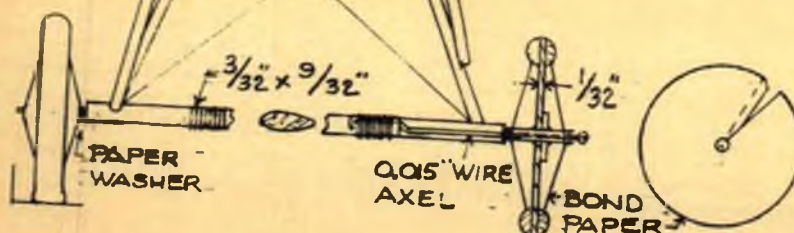
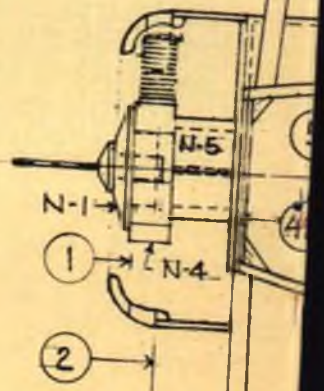
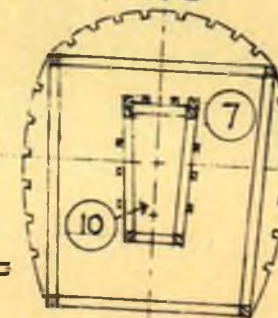
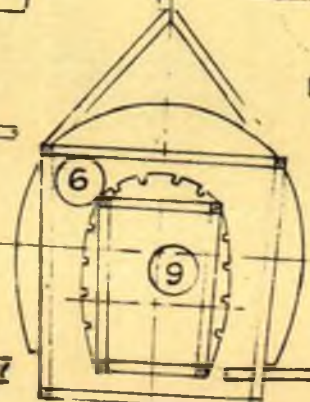
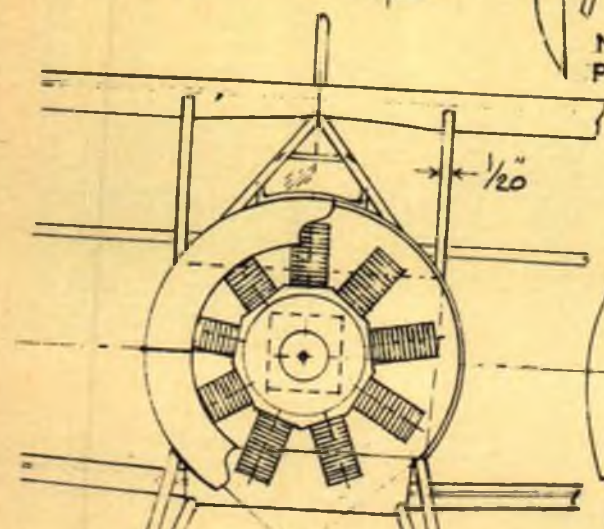
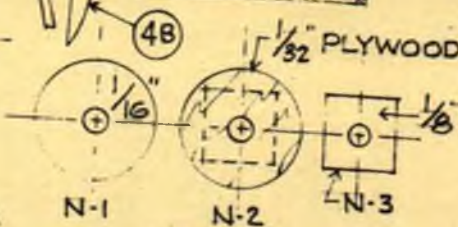
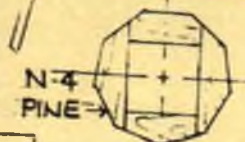
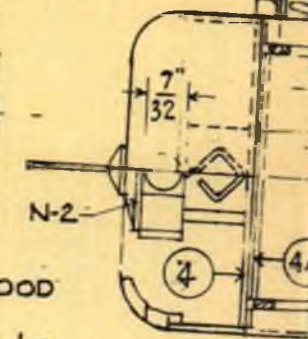
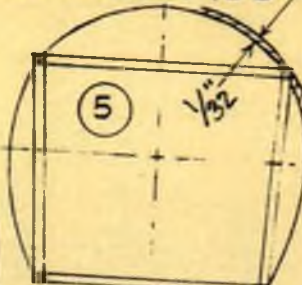
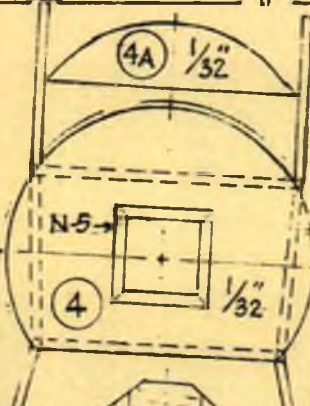
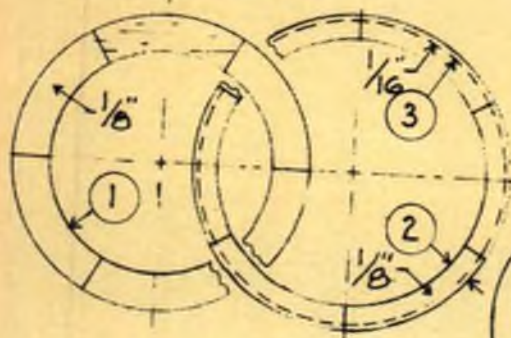
Except for a trapezoidal cross-

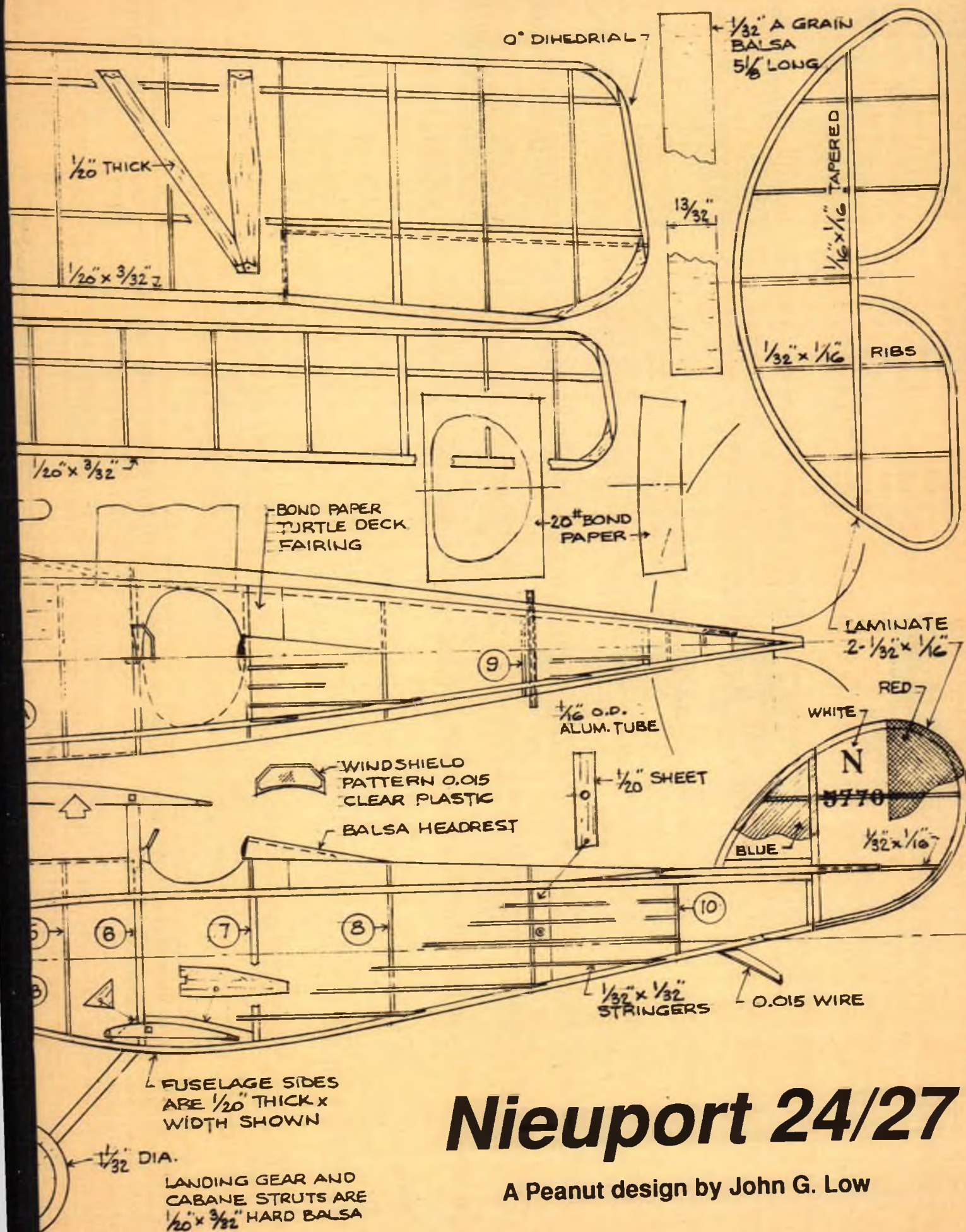


ALL SPARS ARE
1/20 x 1/20



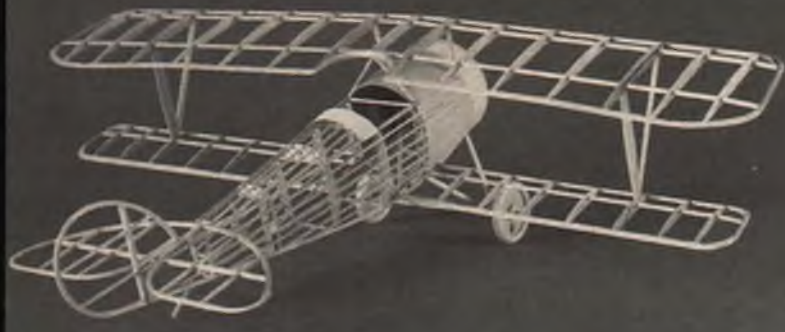
SHEET TOP & SIDES
OF FUSELAGE FROM
BULKHEAD 4 TO 6





Nieuport 24/27

A Peanut design by John G. Low



The author has obviously built a great many Peanuts to be able to turn out a beautiful structure like this. Just be sure to keep it as light as you possibly can for best flight performance.

section, the fuselage is conventional. Cut the crosspieces as shown on the sections, join the side panels and add wedge-shaped pieces just ahead of the stabilizer cradle. When adding formers, double the sides and top at the firewall (section 4) to provide a shoulder upon which to add the 1/32-inch sheeting. Stringers are parallel to the thrustline and are blended into the longerons.

It is hoped the word "blended" will be understood. It appeared on a plan prepared by an established and reputable service, so it must count for something. The fuselage is extended forward with a small open-ended balsa box to which the combination nine-sided crankcase and nose plug receptacle is attached. The cowling becomes superficial, but is nevertheless an important part of the model from an appearance standpoint. The wing and tail assembly are straight-

forward and hardly warrant discussion. A person good at this sort of thing should build the wings using straight sticks for ribs and sand them to an airfoil shape. Otherwise, prefabricate the ribs to the indicated profile by any comfortable method. Struts are hard balsa sanded to an oval shape. The landing gear is not reinforced with wire, as hard balsa, well cemented, is considerably lighter and has proven adequate.

Standard covering techniques can be a disaster on a lightly framed Peanut; steps must be taken to minimize warps and scalloped longerons. Frame-stretched tissue (sprayed with rubbing alcohol) applied to the model, lightly sprayed a second time and finally coated with thinned, low-shrink dope, seems to be effective.

Budget adequate time and effort for details. This is important on a model of any

size. Cylinders, not at all difficult, are 3/16-inch diameter balsa wrapped with thread. The cowling, somewhat more complex, is formed by sanding the assembled parts to the required shape and subsequently sanding the inside to form a shell a bit less than 1/16 inch thick. At this point the cowling should more or less snap onto the firewall and butt against the forward fuselage sheeting. Before cementing it in place on final assembly, the prudent builder will conceal a bit of lead inside the cowling to overcome the very short nose moment. A piece of solder works nicely.

Balsa disks with bond paper cones and rolled tissue bushings make suitable wheels. Guns, inspection panels and rigging make a marvelous contribution to the character of this model and go a long way in impressing judges, but these features are not shown on the plans.

Trimming for flight has been relatively easy. Perhaps it is because the lower wings are less than half the area of the upper wings, resulting in a modified monoplane as opposed to a full-fledged biplane. Scale dihedral virtually precludes outdoor flying except perhaps in totally calm air. Satisfactory indoor flights have been achieved with a 12-inch loop of 3/32-inch rubber and a 5-inch plastic propeller. Turn is to the left, but it is highly possible that this particular model (with no dihedral) could do better turning to the right. Experimentation along these lines is recommended. **MB**

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6.5 X 5.5	3.35	9.25 X 5.75	4.35	11 X 12	7.75	13 X 13N	9.75	16 X 10	12.95	22 X 16	31.00	24 X 14	55.00
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PILOT VS. MACHINE

**The man/machine interface as it applies to various types of models.
Also discussed: silver solders and their use in modeling.**

Human Factors" is a relatively modern science, dealing with the design of hardware to make the "man/machine interface" as clear, comfortable, convenient and safe as possible, consistent with cost considerations. We have some interesting man/machine interfaces in connection with our models. Handling microweight indoor models without damage, dizziness in learning to fly control line, and getting our fingers into the prop while making needle valve adjustments are all examples.

Everyone I know pulls back on the elevator stick for up, back on the throttle for idle, left on the rudder stick for left yaw, and left on the aileron stick for left roll; but it is your option.

Let's chat about "natural" phasing of controls. I put "natural" in quotes, because what is natural is not always clear-cut or consistent from person to person, and therein lies our discussion.

Example number 1: In a manned airplane, pushing the left rudder pedal produces left yaw. Is that natural? It was the natural way to rig the airplane, since the rudder cables don't have to cross on their way back to the rudder horns. It also may be considered natural to push on the side you wish to turn to if you don't have previous countertraining.

The problem arises from the fact that foot-steered sleds and foot-steered homemade wheeled coasters go right when the left foot is pushed. For kids who have never owned such toys, there's no problem, but learning to push the left rudder pedal to go left required retraining the reflexes for me and my generation of pilots.

Example number 2: In the Seattle Guideliners control line club, which I belonged to in the 1940s, we all flew clockwise to keep the wings more level and increase the line tension. The rest of the world, for reasons I never understood, flew



The same thumbs that learned to control model aircraft in flight also learned to control a crane and a robot from the same transmitter—see text.

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counterclockwise. I was an expert stunt pilot, but on two separate occasions I flew airplanes belonging to counterclockwise fliers, and promptly crashed them.

These embarrassing episodes baffled me for a time. Then I realized that when the plane is inverted, control line stunt pilots don't get their cue to push down on the handle to pull the nose up by seeing the plane upside down; we get it from the direction of rotation of our bodies as we fly. In flying what to me was a reverse-direction airplane, when it was upright my reflexes told me it was inverted, and vice versa. After that I only flew other people's airplanes if they flew in the direction that was "normal" for me.

FEEDBACK

To have stability in any control system, we need "negative feedback." For instance, when we are flying a model airplane and we see the nose drop a bit, we feed in up elevator to bring the nose back up. This correction command is the opposite (or the negative) of what the airplane is starting to do. Observing what the airplane is doing is part of the "feedback loop."

POSITIVE FEEDBACK

With positive feedback, which is what we get when we pick up the control line handle upside down or have a servo reversed by mistake, the system is usually violently unstable. The reversed control must be reversed again, either in the reflexes (retraining) or mechanically, to make it right. Stability is restored only after the feedback is converted back to negative.

While unintentional positive feedback is not good, some devices, such as self-energizing brakes and resonant systems, depend on positive feedback. Without positive feedback to build up the volume by resonance, a violin and many other musical instruments wouldn't work.

Fortunately, we can phase our RC controls any way we want them, and in recent years all we have to do is throw servo-reversing switches. Everyone I know pulls back on the elevator stick for up, back on the throttle for idle, left on the rudder stick for left yaw, and left on the aileron stick for left roll; but it is your option.

MULTI-VEHICLE TRAINING

As some of you know, in addition to airplanes, I like to build other types of RC models—boats, cranes and robots in particular. I have found some interesting things about human adaptability in learning to operate all of them.

My 20-channel RC fireboat (international champion in 1960) has an operating console which is held in front of me by rigid shoulder straps. The controls on the face of the console were designed and arranged with human factors in mind. The miniature ship's wheel for steering is readily visible. Less visible are a "ship's telegraph" for throttle control, and miniature simulated

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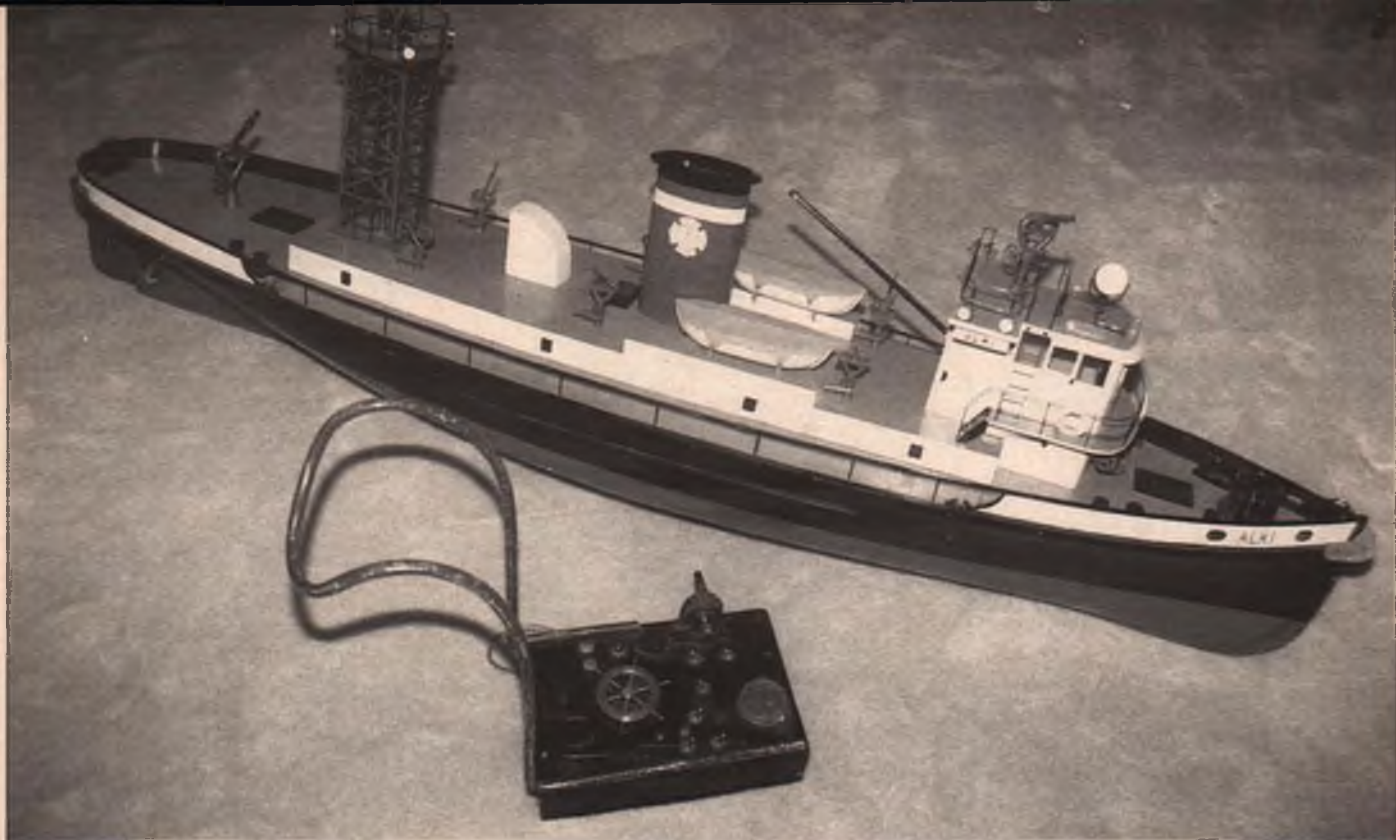
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The operating console for our columnist's 6-foot, 20-channel scale fireboat employed a transmitter tray in 1950.

fire-fighting nozzles on the console which correspond to the operating nozzles on the model. When a "nozzle" is elevated on the console, the corresponding nozzle on the

model elevates; when it is deflected to the left, the model nozzle turns to the left.

When I am flying a model airplane, the sticks are doing the things for which they

were designed. When I operate my crane, fore and aft on the left stick is forward and reverse, and lateral on the left stick pro-

continued on page 70

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DEAR JAKE

Advice For The Propworn

DEAR READERS:

I've been following the increasing number of letters in the Air Mail section in recent months expressing opinions on the merits or shortcomings of the Dear Jake column. Much of the debate centers on whether the column is funny or not. That doesn't bother me because humor is subjective and people will always disagree on what's funny. But some subscribers are saying the column is valueless, and that it takes up magazine space that could be put to better use with photographs or three-views.

That point of view cuts deep. I have always felt that my column provides a multi-purpose service not available in the other magazines. First, I work hard at trying to provide helpful advice to modelers with questions or problems. Granted, some of those problems are decidedly strange, but if one of our fellow hobbyists is crashing airplanes and is at a loss for an explanation, he needs somewhere to turn for help. My column fills that need.

Unfortunately, I don't always have the answers. In those cases, I try to refer the individual to a more knowledgeable authority—say, James Wang, for instance.

Listening to problems and handing out advice is a tough job. The heartwrenching stories of trial and tribulation that I receive in the mail leave me drained and depressed at the end of the day. How could anybody not feel for poor Tommy Smith, or the domestic animals that cross his path?

Second, I believe my column provides an educational service. How many of you knew about aerodynamic half-life, aerions, or kinematic ugliness before you read it here? Did you have trouble naming your models before I explained how to do it? And which of you fully understands modeling jargon without at least occasionally referring to my glossary?

There generally have been an equal number of pro and con letters on the Dear Jake column, but curiosity got the better of me and I had to know what the majority opinion was. I asked for and received permission to conduct my own reader survey. Armed with a list of subscribers, I sent the following question to a random sampling of *Model Builder's* readership: "What do you think of Dear Jake?" The results were as follows:

NATIONWIDE

Dislike—37%

Neutral—8%

Like—37%

Jake Who?—18%

CALIFORNIA

Tubular—7%

Gnarly—4%

Gross—19%

Let's Do Lunch—70%

ARKANSAS

X—57%

X!—16%

X?—5%

Come Agin?—22%

The two-part message is crystal clear: "Intellectual Californian" is an oxymoron, and Hillary's education programs didn't work.

As for the verdict on Dear Jake, it's a toss-up. I can live with that. Difference of opinion is what makes this country great. Some like it cold, some like it hot. Some say tomato, some say tomato. (If anyone read that with the same pronunciation both times, you're hopeless!)

So I'll keep answering the questions if you fine folks will keep sending them in. And if you don't like Dear Jake, don't read it. *Model Builder* is chock full of other entertaining and educational columns on virtually every aspect of our hobby. Or, if you don't like Dear Jake but read it anyhow, send your complaints directly to me. I'll respond to them in print. But be forewarned, there's a 37 percent chance my response might be considered funny.

Jake

DEAR JAKE:

You know how golf balls have dimples to give them better aerodynamics so they fly farther? Well, have you ever looked at the surface of a pickle? They're all dimpled and wrinkled, too. So it occurred to me that pickles might have excellent aerodynamic characteristics, and if they do, their circular cross-section and elongated shape would make them ideal for fuselages.

To test my theory, I bought a variety of pickles—gherkins, sour, bread-and-butter, and dill. I put balsa wings and tails on them and glided them from a stepladder.

They were a rousing flop! The gherkins were too small and suffered from low Reynold's Number. The sours were curved in shape and were subject to pitching moment problems. The bread-and-butters turned out to be pickle chips. I tried them as tail surfaces on a gherkin, but they were crinkle cut and didn't work out. The dills were too fat, their excessive weight negating any aero benefit from the dimples.

Guess I'll have to write off the pickle fuselage as a bad idea and look elsewhere in the vegetable world for inspiration.

Deli Dave in Danbury, CT

Dear Dave:

Sorry to hear about your setback, but I imagine airline passengers everywhere are breathing a sigh of relief. I doubt they would have "relished" the idea of riding in one of your Kosher Concordes.

Jake MB

NEW!

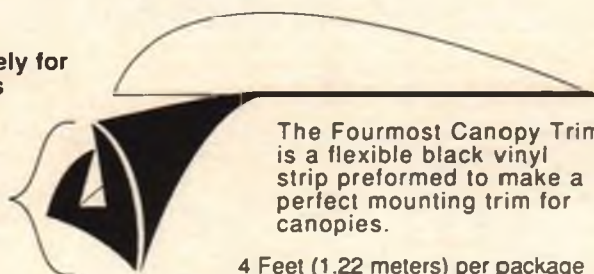
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BIG BIRDS continued from page 22

ERRATA

In the October 1993 Big Bird column, MACS muffler and exhaust parts were featured items, and deservedly so. However, I did fail to mention that the parts must be ordered through a retail outlet rather than directly from MACS. You can take the part numbers to any good hobby shop and special order them, if they are not already on the shelf. The muffler and the exhaust fittings are also available through some mail order houses.

SOAPBOX

I'd like to wrap up this month's column with some comments about a recent letter



Pretty Globe Swift by Dave Baxter has a mirror-finish acrylic paint job, weighs 19 pounds and packs a Super Tigre 3000 under the hood.

that appeared in MB's "Air Mail" column (September '93). The writer referred to Big Birds as "dangerous and expensive quarter-scales."

I guess size equals danger to some people. Big Bird enthusiasts have maintained from the beginning that it's not the size of the plane but how it is flown that counts. Most modelers realize that there are people in our hobby who shouldn't even be let loose with a paper plane, let alone something with an engine in it.

I have to wonder if the person who criticized big RC models carries his fear into the rest of his life, such as traveling by Piper Cub rather than a 747, or roller skates instead of an automobile.

Model Builder has a very unique character all its own, and does not stand in anyone's shadow. I know four of the magazine's writers personally and can assure you that they are not deskbound word processor hacks, but are excellent modelers who are out in the field flying and using what they write about.

I find that most of the people I visit and fly with during the year and who are regular readers of *Model Builder* enjoy the personal touch of our columns. Many have told me they feel that we really care about our readers. We do, and we strive diligently to bring you the best columns that we are able to.

I didn't receive much mail last month—everyone must be out flying. Why not write that letter you've been meaning to? I'd like to hear from you! **MB**

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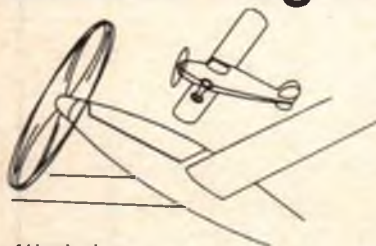
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ELECTRONICS continued from page 40

sume that all the recommended tests were made and everything worked normally until the cutoff was introduced into the picture. Sure looks like we found the problem, doesn't it? Well, not so fast; the cutoff device might still be in the clear—the problem may be the receiver!

It may be the receiver, that is, if you are flying a PCM system. The problem is that in some such receivers, the servo control signal, the same signal that is now used to control the electronic switch, is quite marginal in amplitude—in strength, that is. When asked to drive something that loads it differently than does a servo, its level drops below a useable point. I have not tested all PCM receivers for this, but the problem is common enough that some makers of add-on devices plainly state that they are not recommended for use with PCM systems.

For those of you who like values, most receivers produce a servo signal just slightly lower in amplitude than that of the supply voltage of 4.8 volts. Some of the Futaba PCM receivers produce a signal just slightly over 3 volts, and at least one aftermarket accessory manufacturer, McDaniel R/C, furnishes a buffer amplifier specifically designed for those receivers to build up the signal so that they will reliably operate some of his devices. The McDaniel amplifier might save the day in our case, if a PCM receiver is in use. The only test possible in this case is to fly the model with a non-PCM system.

Another similar device which might help here is the Ibis Designs "Active Y Cord," which, though intended primarily for driving two servos from an otherwise marginal signal, does an excellent job of boosting said signal to a single device as in this case. It is available from Bob Holman, of scale plans fame, at P.O. Box 741, San Bernardino, CA 92402; (909) 885-3959.

Suppose the receiver in use is not a PCM unit; what now? We can safely assume that some electrical noise is being generated by something; we will just have to find it

and suppress it. Since few of us own or have access to the sophisticated equipment necessary to pinpoint such noise, we'll have to take a rather non-technical approach to the problem and apply band-aids until it disappears. The first step is to add bypass capacitors at various points, in the hopes that such disturbances, if being generated there, will be bypassed to ground and not to the receiver.

Refer to the block diagram of a common radio-operated control device; they will all be similar regardless of the type. They all have a receiver input, and a battery input and output. The bypasses mentioned (simple capacitors) need to be added from the ground leads to all others, and are shown on the diagram. Use .01 or .1 Mfd ceramic capacitors; good quality 50 volt units are called for. Radio Shack has suitable ones: No. 272-109, 1Mfd/50V monolithic caps (5/\$1.79). They should be soldered right at the PC board, with the leads as short as possible. If only a partial improvement is made, try adding similar caps on the same leads right at the battery and at the ignition module. Similarly, should the electronic switch be of the relay type, such caps should be added to the active relay contacts.

Now for the worst case example—the electrical noise being generated is too strong for these simple bypasses to be effective and is getting back into the receiver and upsetting its decoder. More isolation is required, in the form of another device called an "optoisolator." It is another modern solid state device, which uses the light output from a common LED to pass a desired signal, with no electrical or mechanical connections necessary. (See EC April '87.) Any unwanted noise floating around within the ignition system stays there and cannot possibly feed back into the receiver. I have included a circuit for a simple optoisolator using an easily available device. As mentioned earlier, there are no guarantees, but one or more of these common methods for eliminating undesirable noises should be effective in this particular case.

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AEROBATICS continued from page 38

flying cap for a thinking cap.

When you become aware that a problem is steadily getting worse, not better, the cure is almost never more repetition. Pack it in for the day, and use the ride home to analyze the source of your pain. By the time you get to the door, you'll often have the answer and the adjustment you need to make. Invariably, the next session will be far more productive, because instead of just doing your flying, you took time to *think* about your flying. The cure for slow brain syndrome is mental exercise.


When you practice, learn to analyze what's happening out there. Most of the common, repetitive pattern mistakes can be traced to an improper visual perspective; the pilot is simply not "seeing" the airplane correctly. The eyes are not at fault; the visual clues just aren't being processed properly or quickly enough. Deductive reasoning can help. If all of your verticals lean outward, the correct (and seldom made!) deduction is that you are "seeing" the straight and level flight picture wrong, and are habitually carrying the inboard wing too high. The maneuvers then start from a bank, and the verticals lean outward.

This is where watching others can help. When you see a mistake made, try to figure out why. Very often, what you see and learn can be applied to your own flying, and the practice will help you gain speed and confidence in picking up the visual clues during your own flights. There are many clues to be uncovered by watching, and something to be learned from nearly every other pilot, regardless of skill level. By ignoring how others are succeeding or failing, we are failing ourselves. "Ignore" and "Ignorance" share the same root word. There's nothing in the rulebook about brains on the flight line being illegal. Using yours could be an advantage. Think about it. It couldn't hurt, right?

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I received a neat little one-page catalog and some product samples from a company called Aero Design and Development, or ADD. These are specialty items pretty much aimed at the pattern market. One I especially like is the Pro Bar, a 21-inch long, 2-inch wide sanding bar with a nice wooden handle and beveled ends. It makes short and precise work of wing skins, and at \$9.00, it's a bargain. ADD also offers a Viton exhaust coupler in 2-inch lengths, natural silicon rubber exhaust couplers for two-stroke systems in 6 and 12-inch lengths, 1/16-inch thick red silicone rubber sheet stock for high-temperature insulation chores, and a few other little goodies you can probably learn to not live without. Aero Design and Development does business at Box 426, RD #1, Monroeville, NJ 08343. The phone number is (609) 881-6394. Ask for owner Marlin Groninger. **MB**

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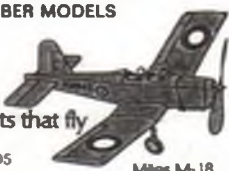


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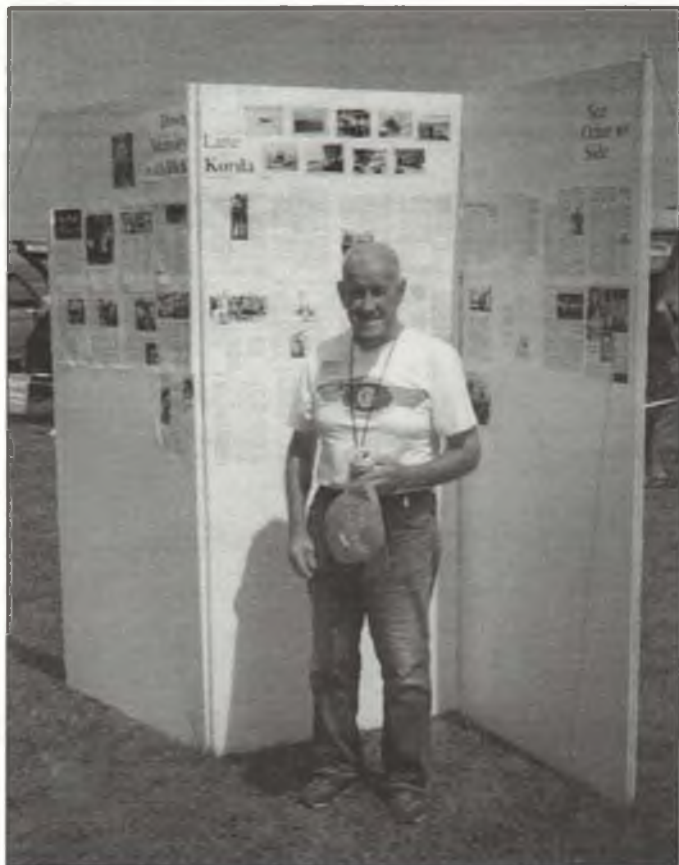
The Dick Korda Commemorative

With old-time modelers getting older and in some cases leaving us, it was inevitable that special memorial meets honoring those particular modelers would be instigated. The earliest of those was the John Pond Memorial, started in 1973 by the "No Name" club and the Tri-Club of Santa Maria (later

the "Howard Osegueda Remembrance," in memory of the many fine things done by Howard.

However, in the midwest, after the success of the Joe Elgin and Chet Lanzo Commemoratives, it remained for SAM 39, under the leadership of Robert "Bucky" Walter, to put on the

Not enough credit can be given to Korda's old friend, Howard Robinson, who made this contest possible by bringing Dick and putting him up at his home during the week. It is only fitting that Howard should be seen with Korda in Photo No. 2, after Dick was awarded the AMA Achievement Award



■ LEFT: Photo No. 1. At the Dick Korda Commemorative meet in August, the SAM 39 group put together a field display consisting of press clippings recording Dick's history-making 43-minute flight at the 1939 Wakefield competition, held at Bendix Airport in New Jersey. ■ RIGHT: Photo No. 2. Long-time friends Howard Robinson (left) and Dick Korda. Dick is holding the AMA Achievement Award presented to him by AMA curator Mike Fulmer.

SAM 26). Of course, being called a "memorial," many people wrote to ask when Pond had died. This called for changing the meet name to Commemorative, which has lasted all these years.

This set off a series of annuals honoring those who have passed away or have been outstanding contributors to the SAM movement. Those who readily come to mind were the Harry Moyer (by SAM 100) and the Chet Lanzo and Joe Elgin Commemoratives (by SAM 39). Also, SAM 21 changed the name of its contest from the "West Coast SAM Champs" to



best darn rubber meet, known as the Dick Korda Commemorative and featuring the Korda Wakefield winner. This one-design event fired the imagination of everyone, to the point where Dick Korda produced one himself, being encouraged by Joe Elgin, who helped bring the meet to fruition.

With such publicity being generated, Bucky Walter hit on the idea of a field display featuring press clippings of Korda's sensational Wakefield win, provided by Dick's daughter, Susan Stevens. Photo No. 1 shows the display with Dick Korda standing alongside.

as presented by Mike Fulmer, curator of AMA.

While handing out the kudos, we almost overlooked Joe Elgin, seen in Photo No. 3. Joe, in addition to 23 other modelers, built a Korda Wakefield for the meet. Joe is such a retiring guy, he was perfectly willing to stay out of the spotlight. Joe has taken a particular interest in Dick, taking him out to previous meets and encouraging his enthusiasm in building and flying. This was no small task, as Dick suffers from Parkinson's Disease.

Interest in this special meet was aroused to the point where

John Delagrange, of Lancaster, Pennsylvania and a member of SAM 100, made up 50 special decals, seen in the illustration, which were given to every Wakefield entrant. These decals will indeed become a collector's item.

Credit should also be given to Jim Deats, of Tiffin, Ohio, as

rotated. This triangular cornfield proved to be a real problem in recovering models. Those models that missed the corn were not always lucky, as the edge was lined with tall trees.

If that didn't do it, on the northwest corner, there was a lovely pond. However, it wasn't

gotten how to wind a rubber motor. He was the first to fly (a la his 1939 Wakefield win) and promptly maxed out! The best part was that the model landed in the center of the grass airstrip.

Korda was impressed when told there were 23 other entrants out to beat him. Dick

Wakefield rubber event, there was a full slate of O.T. gas events flown as well. Most notable was the spectacular performance of Fred Mulholland of the Tampa Bay, Florida area, who took seven 1st places and four 2nds. Truly a dedicated performance by Fred!

As usual, the Brown Jr. event



■ LEFT: Photo No. 3. Joe Elgin, best known as being the designer of the Cleveland Playboy series, built a Korda Wakefield specifically for this meet. A total of 24 models were entered. ■ ABOVE: Photo No. 4. The old master hasn't lost his touch; Korda cranks in the winds while Howard Robinson holds. ■ BELOW: A nice touch at the Korda meet was that all contestants and contest workers received one of these commemorative decals, produced by John Delagrange of SAM 100.

he made up the 1st place Korda Wakefield wooden plaques for each day of flying. These were hand-rubbed and featured a photo of Dick Korda sitting on the running board of his 1932 Plymouth Coupe, holding his "Dethermalizer" model (a follow-on to his famous Wakefield design).

The site of the meet was Shelby Airport, which is rectangular in layout with the longest sides running north and south. A very long triangular field separates the field. Normally, one can count on the contest being free of corn every other year, as bean crops are

so lovely when young Curtiss Grimes swam out to retrieve SAM President Jim Adams' model and the airport owner told the boy the pond was loaded with 24-inch catfish. No more of that!

In describing the Korda Commemorative, note should be made this two-day meet was flown in the middle of the week. Each day was flown as a separate event with a flyoff at the end of the day.

How did Dick Korda fly? Take a look at Photo No. 4 showing the old boy in rare form on the winding end of things. One thing for sure, Dick hasn't for-

could only say, "What a fine tribute for an old man." No question about it, Korda was the most popular guy on the field. He couldn't move more than 10 feet without someone wanting to congratulate him for his long career of flying.

As Bucky Walter put it, after the unfortunate wind switch that put most of the models in the cornfield or in the very high row of trees, the meet should be called "launch and search."

Although the meet attracted mostly midwest modelers, it was interesting to note that SAM president Jim Adams and Bud Romak made the long trip from the West Coast.

In addition to the Korda

was staged by John Delagrange of SAM 100. This RC event was the second largest with 23 entries and 16 registering official flights. Fred Mulholland won another 1st with the good time of 13:49 using a Mickey DeAngelis design, the Miss For-





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Photo No. 5. Champion free flighter Bud Romak (center) traveled from California to attend the Korda meet and edged Dick out of 1st place by a mere 4 seconds! Here Dick presents Bud with the winning plaque and an altimeter clock; contest director Tom McCoy at right.

tune X. Who says flat-bottom airfoils don't soar?

Returning to the Korda Wakefield event, on the first day (Wednesday), eight out of the 17 fliers maxed out. A flyoff was scheduled for that evening. Well, lightning didn't strike twice, as Bud Romak nosed out Dick Korda by a mere 4 seconds. Photo No. 5 shows what a great time was had by all as Korda is seen congratulating and awarding the 1st place plaque and altimeter clock to Bud Romak. Hard-working C.D. Tom McCoy is seen on the right.

Korda, who hasn't lost his sense of humor, during the awards suggested that everyone over 70 years of age receive a 5-second handicap. This caused quite a few grins as Korda is known to be 78 years old, and he only missed winning by 4 seconds. You can't blame a guy for trying! Double haw!

Many well-known modelers came solely to honor Korda and turned out to be excellent assistants and model retrievers. Seen on the field were George Reich, John

Wullschalager, and others we have mentioned. How many times have you had a champion like George Reich hunt in the cornfields for you?!

We would be remiss if we didn't feature a shot of Warren Weisenbach, seen in Photo No. 6. Warren not only competed on both days, he also found time to retrieve some of the lost models. Warren volunteered to climb the tree containing Joe Macay's model, and when later approached by Dick Thompson to retrieve his ship, Warren wearily replied, "I only have enough energy to climb one tree per contest." And



Photo No. 6. Warren Weisenbach wisely uses a winding tube on his model. Warren placed 7th on Wednesday, 4th on Thursday.



Photo No. 8. Photo taken at the end of the second day shows an elite group of famous free fliers. From left: Howard Robinson, Dick Korda, George Reich, and John Wullschalager.

Warren was not fooling as he looked done in. Photo No. 6 shows our happy warrior, Warren, testing his winding rig.

I guess we should title Photo No. 7 "Champions All" for modelers Dick Korda, first day runner-up; Tom McCoy, winner of the International Korda event in Italy; and Dick Thompson, co-winner of the second day's flying. Let's take a look at the results:

WEDNESDAY WAKEFIELD

1. Bud Romak	407
2. Dick Korda	403
3. Tom McCoy	388
4. Bob Espelding	371
5. Dick Thompson	366
6. Joe Williams	361
7. Warren Weisenbach	354
8. John Delagrange	344

THURSDAY WAKEFIELD

1. Howard Robinson	407
2. Dick Thompson	388
3. Bud Romak	224
4. Warren Weisenbach	222
5. Tom McCoy	222

6. Randy Ryan	219
7. Dick Korda	209
8. Joe Elgin	208

We did not list any of the radio event winners as they would take up too much room in the column. Suffice to say that with 32 sponsoring agencies, there were enough prizes for all.

At the end of the contest, Dick Korda, completely overwhelmed by the attention he received, said to Warren Weisenbach, "I will never forget this day." It goes without saying that the SAM 39 gang and all the other competitors and spectators will agree wholeheartedly.

Bucky reports the meet was a happy time, but also a sad time watching Korda leave with long-time friends. Photo No. 8 shows Howard Robinson, Dick Korda, George Reich and John Wullschalager, all well-known modelers and winners. As they turned to walk back to their respective cars, Korda waved a sincere goodbye to everyone. That's what this SAM is all about. **MB**

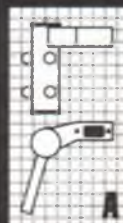


Photo No. 7. Winning smiles all around! From left, Dick Korda (first day runner-up), Tom McCoy (winner of the International Korda event in Italy), and Dick Thompson (second day co-winner).

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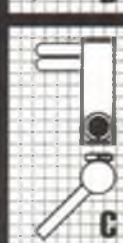


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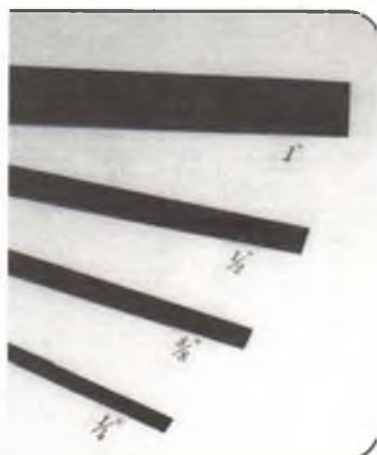
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BY BEN CLERX

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base-loaded antenna will make the transmitter even more compact, will prevent hand-launchers from tripping over their antenna, and will prevent the antenna from becoming caught in the winch retriever line and going aloft with the sailplane, much to the pilot's horror and embarrassment!

Three different transmitter configurations are available: airplane, glider



and helicopter. Each one has the switches and knobs positioned so as to best suit that particular type of flying, while still containing the internal programming for all three. The glider version I tested, for example, has the flight mode switch on the left side of the transmit-



■ **ABOVE:** The author poses with the radio and the ship he tested it in, a Falcon 880. The X-388S has been out only a relatively short time now but is rapidly gaining favor among many serious glider fliers. ■ **LEFT:** The X-388S transmitter is a very professional looking piece of equipment. This particular one is configured with glider pilots in mind; other slightly different versions are offered for fixed-wing power and helicopters, but each one contains the programming for all three. Programming is done via the six edit keys along the lower front face. The LCD screen shows we're in the glider mode and that the on-board battery is putting out 10.1 volts.

ter (deemed the best location for glider flying), but can be programmed for acro (airplanes) and helicopters as well by selecting the appropriate programming template.

The X-388S radio system, therefore, is quite versatile, storing not only settings for eight models, but eight different types of models (any combination of airplanes, gliders and helicopters). Also, the type of modulation—FM, S-PCM or Z-PCM—is selectable to make use of most any receiver you may have on hand. The only thing you can't program is the transmitter "stick" mode; this must be specified when ordering the radio system. If you already have the radio and want the mode changed, the JR Service Center can do it for you.

RECEIVER

The X-388S system comes with your choice of an NER-529 FM or NER-649S

PCM receiver. The 649S offers 1024 resolution, the highest available. It weighs a mere 1 ounce and measures a compact 1.42x2x.63 inches. Although this is a full-size nine-channel receiver, it easily fits in my small hand-launch glider. For those who need something smaller yet, there are the new six-channel JR "credit card" receivers, also available in FM or PCM versions. Measuring a minuscule 1.43x2x.55 inches, they will probably fit into that paper airplane your kid just folded.

Surface mount technology (SMT) improves vibration resistance and reliability, while the recently updated ABC&W circuitry (a type of computer logic used in sophisticated communications equipment) makes the 649S one of the best receivers ever tested and virtually immune to 2IM and 3IM interference, ac-

SERVOS

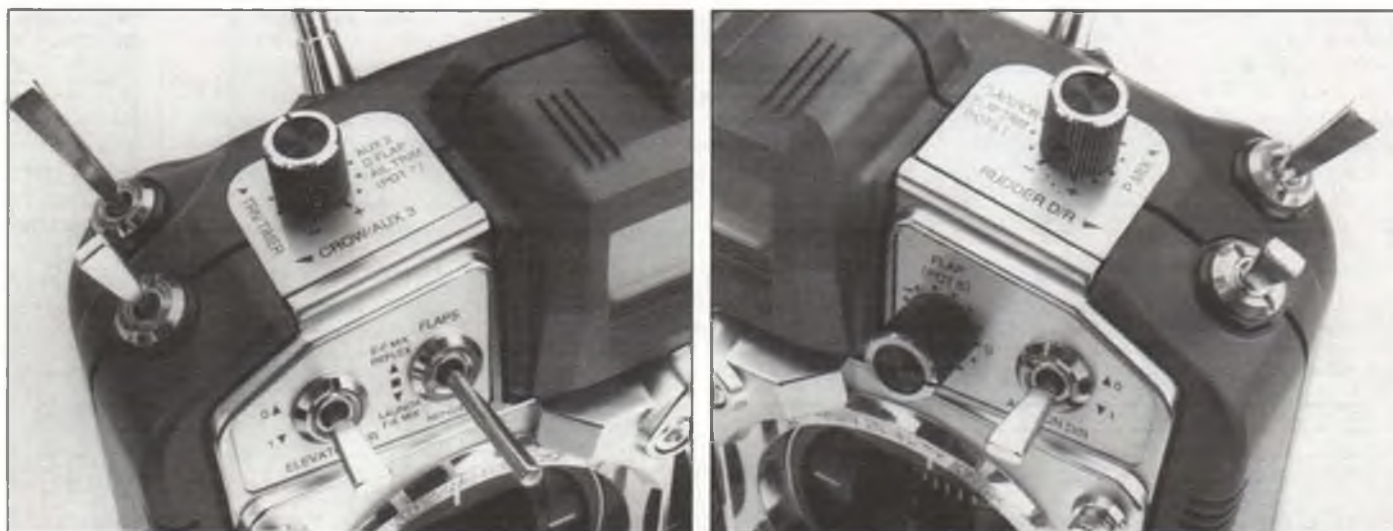
JR has a wide variety of servos available to satisfy your every need, all featuring surface mount technology. The two most popular ones used in competition sailplanes are the NES-341 and NES-3321. The 341 is a micro servo that measures .50x1.12x1.17 inches—small enough to mount in the thinnest sailplane wings. They are particularly popular for driving ailerons. Their 31.9 ounce-inches of torque is quite adequate, even for F3B flying.

The 341's barely noticeable .63 ounce is achieved through the use of nylon gears that are not your ordinary easy-to-strip variety; these gears are extremely tall and, according to JR's engineers, are virtually unstrippable. My primary competition sailplane, an Airtronics/Flite Lite Falcon 880, uses six 341s, one for every control surface

used for trailing edge control, usually preset for three flight conditions: reflex for high speed flight, normal for cruising, and a launch position that lowers the ailerons and flaps a predetermined amount for maximum launch altitude. (The launch position could also be used to slightly camber the trailing edge for thermalling a high-speed airfoil, although this would normally be done with a separate toggle switch. There are several ways to set up the X-388S transmitter with regard to the function of the various switches and knobs.)

Because there are too many features to mention without sounding like an operating manual, I'll describe a typical competition sailplane flight using the most important features.

Turning on the transmitter starts the integral timer that can be used to monitor elapsed battery time. Stepping up to the



Knobs and switches, bells and whistles aplenty! All of the toggle switches and rotating knobs are located on the upper left and right corners of the transmitter, within easy reach.

cording to an independent laboratory report. I guess the report is accurate, because I haven't experienced a single glitch yet in RF-contaminated Southern California.

ABOUT THE AUTHOR

When we needed an experienced competition flier to evaluate the new JR X-388S radio system, we found exactly what we wanted in Ben Clerx, of Newport Beach, California. Ben has established himself as one of the country's top RC sailplane fliers, having won top honors over 224 other pilots at the prestigious CVRC Fall Soaring Festival last year.

Ben is 34 and has been flying RC sailplanes for the last 22 years (with a bit of pattern and pylon racing thrown in for fun). He has a B.S. in meteorology, served eight years in the Air Force flying and instructing in T-37s, T-38s and KC-135s, and is currently flying 767s for American Airlines. Ben flies with the Harbor Soaring Society in Costa Mesa, California. **MB**

including the flaps, and I've experienced no problems with them.

The other popular sailplane servo, the NES-3321, is designed with mounting tabs that allow it to be mounted conventionally or flat, as in a wing. Other brands of wing servos have dual tabs located at the edges of the case and require one set to be cut off, so that you end up with left or right-handed servos. The 3321 solves the problem of "handed" servos by having the flat mounting tabs in the center of the case. The conventional mounting tabs allow them to be used for elevator and rudder servos as well.

The 3321 measures 1.30x1.30x.58 inches, weighs .95 ounce and provides 59.8 ounce-inches of torque—plenty for any sailplane control surface needs.

OPERATION

To describe the system operation, I'll assume the sailplane is equipped with six servos (one for each control surface), the most common and versatile setup for competition.

A three-position flight mode switch is

winch, the flight mode switch is placed in the launch position; this lowers both the flaps and ailerons and also couples the rudder to the ailerons at maximum rate (the rudder is a more effective directional control than the ailerons at high angles of attack). Of course, the rudder can be decoupled at any time with the flick of a toggle switch, and rudder control by itself is always available on the rudder stick. At the top of the launch, the flaps are retracted and you manually start the transmitter flight timer at towline release to back up the official timer.

Because of the coupled ailerons and rudder, coordinated turns are made by using only one transmitter stick. (If you wish, the flaps can also be coupled to the ailerons for maximum roll rate). You've already preprogrammed the amount of aileron differential as well as the amount of rudder coupling. Let's say our particular sailplane doesn't require any rudder for a coordinated turn until the aileron stick is moved about a third of its available travel; no problem. Using mixing offsets, we can program the exact point at which the rudder



■ LEFT: This cutaway view of a JR 341 micro servo shows the beefy nylon gear train; note that the final two output gears are exceptionally tall and actually extend down into the middle of the case. Miniscule size and strong, tight gearing makes the JR 341 one of the most popular servos for model sailplanes. ■ RIGHT: The coreless motor, dual ball bearing JR 3321 servo is about the same as a standard servo in length and height but is only .58 inch thick, so as to fit into thin glider wings—note the special mounting tabs that allow it to be mounted on its side. Like the 341, the 3321 also has huge nylon gears and would be a good choice for a flap servo, which can really take a beating on a competition spot landing.



starts to move.

We finally stumble upon a thermal and begin to circle. A toggle switch is activated which not only slightly cambers our high-speed airfoil (both flaps and ailerons), allowing the plane to circle at a lower speed, but also automatically adjusts the horizontal stab incidence so that the plane is trimmed for this lower airspeed.

After circling for five minutes, we are far downwind and begin to worry about getting the plane back. A flick of the flight

mode switch reflexes the entire trailing edge (both ailerons and flaps) and adjusts the stab for a high-speed run back to the field.

Entering the landing pattern, the flight timer beeps to give us a 30-second warning. The spoiler stick (with ratchet) is pulled to lower the flaps and raise both ailerons simultaneously in the familiar "crow" configuration for glidepath control. We roll out on final approach as the transmitter's flight timer counts down (beeps) the last 10 sec-

onds to mark the approach of our target time.

After landing, we notice that we've moved our trim levers to maintain level flight. Trim offset memory allows us to store these new trim settings and return the trim levers to their neutral (centered) positions. Should we fly our helicopter now? Sure, why not? It's in one of the eight model memories.

CONCLUSION

From our simulated flight, you can see that complex control surface mixing is what this radio system is all about. It's packed with features such as low voltage alarm, programmable endpoint adjustment and exponential servo travel, and PCM failsafe/hold settings. For those who fly all three—gliders, airplanes and helicopters—you can now do it all with one transmitter. If you haven't used a computer radio before, you'll be amazed at the capabilities, but that's no reason to be intimidated. A few evenings with the operating manual is all it takes to unlock the magic.

All in all, I think the JR X-388S gives you the most programming power for the dollar. I'm sure you'll be seeing a lot of these radios at the flying field. If you have any questions about JR products, call your local JR dealer or the Horizon Service Center (JR radios are distributed by Horizon Hobby Distributors) at (217) 355-9511. This number is manned by trained, experienced staff ready to answer your questions. **MB**

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Type - AWSUMM Wingspan - 64", (752 sq. in.) Length - 43". Training Wt. RTF - 5.75 lbs. Mission Wt. - varies with payload up to 9 lbs. Radio Required - 4-channel minimum (rudder, elevator, throttle, ailerons). TO-Pod features require additional dedicated radio channel. ARM and BBDM each require dedicated servo. Flaps require additional dedicated radio channel and 2 additional servos. Engines - 40-50 ball-bearing 2-stroke or 50 4-stroke. Engine, Radio, Camera, 12 oz. aux. tanks for LRTS and wheels are not supplied and must be purchased separately.

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BY ART STEINBERG

The U.S. AirCore 'KnightHawk'

In keeping with its do-it-all advertising claims, our author felt this rugged aircraft might be a good choice for his airborne video camera experiments—and wasn't disappointed.

Judging from the mail I've received, a lot of readers were highly interested in the airborne TV camera experiments I reported on in the June '93 *Model Builder*. The equipment we used at that time was loaned to us by a company called Plane Talk, of Costa Mesa, California, and the airplanes we tried it on included a glider, an electric sailplane, a helicopter, a 1/4-scale Laser, and a Miss Philadelphia old timer. Since then, the experiments have continued in an effort to achieve what must surely be every RC modeler's dream: to fly from the cockpit of his very own RC airplane.

A commercially available airborne ATV (amateur TV) setup costs \$600 or more, so we decided to see if it would be possible to assemble our own equipment at a significantly lower cost. As electronics is not my major field of expertise, I decided to enlist the aid of someone who is greatly accomplished in amateur radio communications. I really struck the jackpot when I ran into Jerry Hauser, who is not only an electronics whiz, but is also a certified flight instructor. Jerry just happens to be Chairman of the Aviation Department at Palomar College in San Marcos, California. He was enthusiastic about the project, and all that remained was for me to teach him how to fly RC, which took just a few days, as he turned out to be a natural on the sticks.

While Jerry was developing his low-cost

■ **TOP LEFT:** Like all U.S. AirCore models, the KnightHawk is made of "AirCore," a tough corrugated polypropylene material that comes pre-decorated and requires no further painting or fuelproofing. For rough-field operation, Art built his model with taildragger landing gear, but didn't feel the need to hook up the optional flaps. ■ **TOP RIGHT:** Art found the KnightHawk to be a rock-steady, stable flier, which makes it an excellent candidate for a basic trainer as well as a perfect flying platform for an airborne camera. ■ **RIGHT:** Jerry Hauser, who heads up the Aviation Department at Palomar College in San Marcos, California, is well versed in electronic design and eagerly took on the challenge of building a low-cost airborne video camera system to try out on the KnightHawk.



camera system, I took on the responsibility of obtaining a suitable airplane to carry it. Our experiments had already indicated that while high-performance RC aircraft could provide spectacular pilot's-eye views of aerobatic maneuvers, for our purposes it would be preferable to use a stable, slow-flying platform with good load carrying characteristics. An ARF model that looked like it might meet our requirements is a new offering from U.S. AirCore—their all-weather, sport/utility, multi-mission (AWSUMM) "KnightHawk." The specifications for this airplane seemed to indicate that it would serve as an excellent airborne platform for our ATV equipment. The dry wing loading was calculated to be approximately 17.6 ounces per square foot—quite low as compared to most other sport RC models. U.S. AirCore gives the maximum loaded flying weight as 9 pounds, which translates into a load carrying capability of up to 3.25 pounds. At this weight the wing

necessitated a bit of custom fitting so as to produce a good, tight fit of the wing in the wing saddle.

The KnightHawk is supplied with parts to assemble a "Tactical Operations Pod" (T.O. Pod), which fits on the belly of the fuselage between the main landing gear. This removable pod can be used to carry various bomb drop loads, extra fuel tanks, ballast weight for high wind conditions, or it can be used to mount still, video and TV equipment.

Recommended engine sizes for the KnightHawk are a .40 to .50 two-stroke or a .50 four-stroke. We initially installed a Webra Speed .40, which provided plenty of power but turned out to be rather loud. This was later changed to a K&B .45 Sportster, which also rendered good performance, although it's not a ball bearing engine as recommended by U.S. AirCore. We chose the taildragger option over the tricycle gear configuration, as a nose gear

would have obstructed the view of the forward-facing camera. The completed plane was very impressive in appearance, with an outstanding high-contrast color scheme which promised to provide maximum in-flight visibility.

All initial flight testing was done with the T.O. Pod attached, both in an empty state and carrying payloads ranging up to 2 pounds in weight. Results? The KnightHawk flies great with or without a payload! Takeoffs are almost hands-off, and all responses are gentle, regardless of how much we increased control surface throws. Takeoff runs are quite short with little rudder correction needed, and landings are slow and gentle.

The KnightHawk has optional flaps, but we found no way to justify using them unless, perhaps, when making a takeoff run while carrying an exceptionally heavy payload, or making very short landings. The airplane loops and rolls nicely and landings

U.S. AIRCORE'S KNIGHTHAWK

WINGSPAN	64 in.
WING AREA	752 sq. in.
FLYING WEIGHT	5.75 lbs. empty; 9 lbs. loaded
WING LOADING	17.6-27.6 oz./sq. ft.
OVERALL LENGTH	43 in.
ENGINE	.40- .50 two-stroke; .50 four-stroke
RADIO	Four channels minimum
SUGGESTED RETAIL	\$169.95
Produced by U.S. AirCore, 4576 Claire Chennault, Hangar 7, Dallas, TX 75248; (214) 250-1914	

loading would be about 27.5 ounces per square foot—by no means a stratospheric figure. In any event, our requirements were that the airplane be able to lift only about a pound of equipment, so we had no reservations about the KnightHawk. However, it remained to be seen if the KnightHawk was the stable platform desired for our purposes.

As is customary with all U.S. AirCore airplanes, the KnightHawk is constructed entirely of AirCore sheet, a tough, light, corrugated polypropylene material which seems to be almost immune to destruction. Assembling the airplane proved to be no problem at all, as the "Fold and Fly" construction made assembly a snap. For someone who has previously put together a U.S. AirCore model, the entire assembly job will take no more than four or five evenings, but a builder who is new to this type of construction might take twice as long.

We found the instruction manual to be very well written as usual, with professional diagrams and numerous tips which help the builder avoid mistakes. One small discrepancy that cropped up was that the fuselage wing saddle is shaped to accept a flat-bottom airfoil wing, but the underside of the wing actually has a slight convex curvature toward the leading edge. This



■ TOP: Webra Speed .40 provided plenty of power for the KnightHawk, but with the stock muffler installed, was too loud to fly at the author's noise-sensitive home field and was later changed to a K&B .45 Sportster. ■ LEFT: Inside view of the Futaba Conquest radio installation; serves are S148 standards. Radio and engine are mounted on U.S. AirCore's unique "Power Cartridge" slide-out tray, allowing a single radio and engine to be interchanged between any number of U.S. AirCore airplanes. ■ ABOVE: Rudder and elevator pushrods and the radio antenna exit directly from the large opening in the aft end of the fuselage. Fuselage width is constant all the way back to the tail, providing a solid base for the stab to mount on.

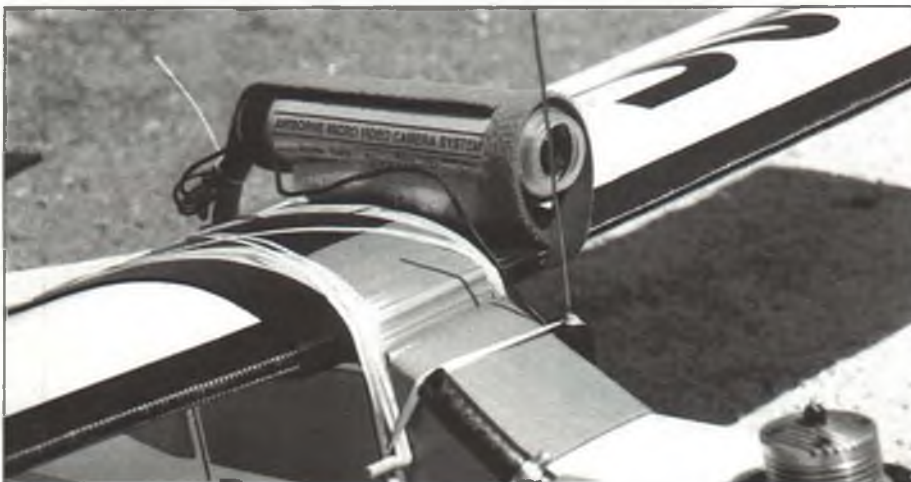


In order to clear the propeller arc and provide better reception, Jerry Hauser's homemade airborne video system was mounted outboard on the wing, with a counterweight on the other wing. The KnightHawk still performed very well.

are textbook perfect, but don't count on the KnightHawk doing snaps or vertical climbs, especially with engines of .40 to .50 displacement. It's exactly what the manufacturer claims it to be—a multi-mission airplane, capable of serving as a basic trainer

or as a steady, dependable, load-carrying workhorse.

During the flight testing we discovered a heretofore unheralded advantage of the AirCore material, which is its natural ability to absorb and dampen engine vibration. In



Plane Talk's new "S.O.S." airborne micro TV system can be strapped to a model's wing in just seconds and weighs only 9 ounces including batteries. This is a commercially produced unit, offered assembled and ready to go—contact Plane Talk at P.O. Box 11364, Costa Mesa, CA 92627, or call (714) 650-5004 for details.

aerial photography and videography, vibration can wreak havoc by blurring photo images and damaging delicate equipment, but the KnightHawk exhibits no such tendencies.

About this time Jerry Hauser had his homemade airborne TV unit ready, and he managed to put it together for only around \$350, which includes the cost of materials for assembling a ground antenna. That cost doesn't include a TV receiver, as these can be found in most households. A good receiver would be a 13-inch AC/DC model, but a larger size could be used if you have a source of AC current at the field.

Our homemade ATV was first mounted in the KnightHawk's pod, facing forward. One of the things we learned right away from our ATV experiments is that you can't get decent reception with the camera aimed through the propeller arc; the prop causes a severe breakup of the picture. We then turned the camera to face backwards, but since our eventual goal is to fly our model by observing a ground station video display, looking rearward doesn't help. Eventually we mounted the ATV outboard on the wing, using a counterweight on the other wing to maintain lateral balance; this took the camera out of the prop arc and gave our best reception. An ideal airplane for these purposes would be a pusher configuration with the ATV mounted in the nose. We also learned that the placement of the antenna on the airplane and on the ground was quite critical for good range and reception, and will require much additional experimentation.

Monte Salot, the guiding light of Plane Talk, recently announced another breakthrough in airborne ATV equipment for models: the "S.O.S." or strap-on system, which consists of a micro video camera unit which attaches to practically any airplane in seconds by means of a clever built-in Velcro strap arrangement. The S.O.S. requires no building or assembly, and has little or no interference or vibration problems.

We tested the S.O.S. on our trusty KnightHawk. Reception on this system was very good, noticeably better than our homemade equipment. This could be attributed to a more up-to-date camera, transmitter circuit and better shielding of the airborne unit. However, shooting through the prop arc is still a no-no.

U.S. AirCore products are available from most hobby dealers. Further information is available from U.S. AirCore, 4576 Claire Chennault, Hangar 7, Dallas, TX 75248; (214) 250-1914. Plane Talk offers a free brochure on their airborne micro video camera equipment and can be obtained by writing them at P.O. Box 11364, Costa Mesa, CA 92627, or by calling them at (714) 650-5004.

Meanwhile, I will be glad to answer your questions or deal with your comments if you write me at 2267 Alta Vista Dr., Vista, CA 92084, and please don't forget the stamped, self-addressed envelope! **MB**



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(Two Channel Radio & Cox .049 Black Widow Required)

SPYDER

.049 BLACK WIDOW POWERED SPORT AEROBATIC



NO. 7060
WINGSPAN: 42"
LENGTH: 35"



COX PRODUCTS, INC.
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BY JOHN LUPPERGER

The 1/2A 'Spyder' from Cox Products

The engineers at Cox mixed and matched some of their existing ARF model parts and came up with a hot little two-channel aerobat that really performs.



The Spyder is quite attractive in its red, orange and yellow colors. The foam wing and tail surfaces come molded in white and can be used as is, but John went a step further and covered them with Hobby Shack's Filt-Kote (a low-temperature film) to make them more ding resistant, easier to clean and also to add some color and visibility to the model—important when flying at speck altitudes.

The Cox Spyder is a lively little 1/2A sport aerobatic model with some hidden talents. It's an adaptation of parts from previously released Cox kits—the plastic fuselage was originally designed for the Silhouette glider, the cut-down wing is from the E-Z Bee, and the tail surfaces are from the Ridge Hawk/Thermal Hawk models. Yet the Spyder is unique and exhibits abilities and flying characteristics

True to Cox's word, the Spyder is a surprisingly fast and agile machine—definitely not for the first-time novice flier! It's also capable of staying up in medium lift, as the author proved on one 20-minute flight. Even better thermal performance can be had by strapping on the longer Thermal Hawk wing (available separately from Cox Products). Having both wings on hand makes the Spyder an extremely versatile model.



totally different from its predecessors.

The Spyder may look like it belongs somewhere between a toy and a true RC model, but its performance is all-out RC. Also, with just a small bit of effort, the Spyder's foam wing and tail surfaces can be covered with low-heat film to give it a custom or "built" look.

CONSTRUCTION

There is very little construction involved, and quite frankly, I would call the Spyder an "almost-ready-to-fly" model. It can be ready to go in just a few hours. The instruction booklet is six pages long and made up of isometric drawings and callout-style instructions. These are relatively easy to follow and should not cause any undue problems, even for a fairly new RC pilot (although the Spyder is intended for the more experienced flier).



As is often the case, the sound of an .049 engine attracted a local youngster to the schoolyard where the test flying took place. Brian's interest was piqued, and we're sure his dad was told what he wanted for his next birthday!



Because normal modeling glues won't stick to the polypropylene plastic fuselage, it's necessary to mount parts to it with screws or rubber bands. Most of the work on the fuselage consists of opening up holes for the various mountings. The area under the wing has to be removed for the installation of the radio gear. Be careful when cutting out this area, as the indented guidelines for cutting are a bit thinner than the rest of the fuselage; once you cut through the material, the resistance is very low and the knife can get away from you. This happened to me and I almost cut through the side of the fuselage.

The molded foam elevator and horizontal stab come in one piece and must be

separated with a straightedge and a hobby knife. The elevators are then cut apart and joined with a 1/8-inch dowel.

The molded foam fin and rudder each come in two halves. The halves are joined to either side of a piece of clear self-adhesive Mylar (sticky on both sides) that is the same shape as the entire vertical tail assembly; the Mylar also serves as the rudder hinge. A U-shaped plastic tail retaining loop also gets sandwiched between the halves and provides for stab mounting later. The two halves of the vertical stab and rudder did not match up as well as I would have liked, and it was necessary to sand the final assembly to achieve a nice match between the left and right sides.

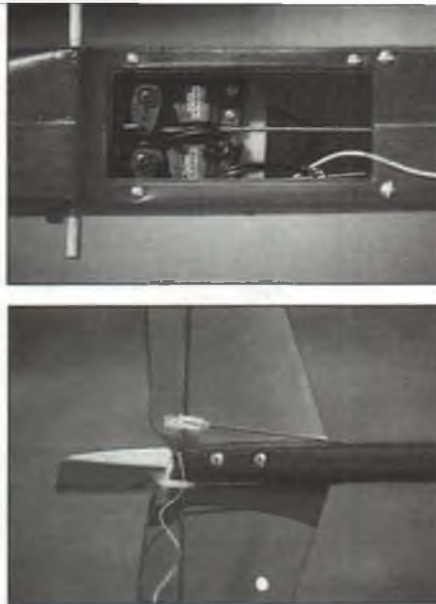
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WING LOADING	8.7-9.7 oz./sq. ft.
AIRFOIL	Undercambered
ENGINE	Cox reed-valve .049 (Black Widow preferred)
RADIO	Two channels required (elevator/rudder)
SUGGESTED RETAIL	\$71.00
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LEFT: Parts count for the Spyder is very low, which translates into quick assembly time. Fuselage is molded red polypropylene—no painting required.

The stab retaining loop in the fin passes through matching holes in the horizontal tail and into the fuselage. The loop is then captured by two 6-32 fasteners from the bottom of the fuselage. When you snug down the fasteners you will find that the front of the horizontal stab rises up out of the saddle on the fuselage. Don't worry about it! I called Cox to ask if I should shim the stab to keep it even with the saddle, but they assured me that this was the correct incidence angle. If you try to fix it, you will end up with too much negative incidence in the tail and the model will have a very strong tendency to pitch up.

The molded foam wings have two holes drilled in the root of each panel for the wing joining dowels. These are meant to just slide together (no glue) and the center of the wing is to be wrapped with the supplied clear tape. When I slid my two panels together, the leading and trailing edges were off by almost 3/16 of an inch. I used the dowels to ream out the holes until I could line up the leading and trailing edges, then epoxied the panels and joining dowels together. Pieces of stiff, sticky-backed clear plastic are then applied to the leading and trailing edges to protect the wing from the rubber bands.



■ FAR LEFT: The Spyder was designed to be a fast, very aerobatic ship, so John chose an engine to match—the Cox Black Widow, the hottest reed-valve .049 available. Engine mounts to a plastic firewall, which is screwed to the front of the fuselage. ■ LEFT TOP: The servos are all that is seen of the radio gear in the fuselage opening. The ball bearing, metal-gear Futaba S-3002s are overkill for a model like this but were the only ones the author had on hand that would fit without modifying the supplied servo tray, which is cut out to fit Cox mini servos. The screws seen in the saddle area secure spruce longerons inside the fuselage and stop an accidental cut from extending into the fuselage side. ■ LEFT BOTTOM: Two 6-32 fasteners on the bottom of the fuselage hold the entire tail assembly securely in place. Note the absence of Z-bends in the wire pushrods where they exit the fuselage—explained in text.

A servo tray is provided that fits Cox's mini servos perfectly, however, I didn't have any Cox servos on hand. To fit other servos, the instructions recommend cutting the tray and repositioning it when you screw it into the fuselage. I didn't want to do this, so I went through my stock of servos to try and find something that would fit. I came up with Futaba S-3002s—a bit of overkill, but they fit and work. The batteries and receiver are first wrapped in foam and inserted through the opening in the fuselage, then the tray is mounted with screws through the side of the fuselage.

The wire pushrods are threaded at one end for a clevis and have a small Z-bend at the other. The instructions call for some moderately large Z-bends to be put in the pushrod wires to facilitate exiting the side of the fuselage. I found that by opening up the exit guides lengthwise by about 3/8 of an inch, I was able to make straight runs with the pushrods, eliminating the need for the Z-bends.

FINISH

No finish is recommended by Cox, however, my experience has shown that foam

models ding easily and don't clean up all that well, as oil from the fuel tends to discolor the foam. There are paints and low-heat films on the market that will work with foam. I chose to use Flite-Kote, a low-heat film covering from Hobby Shack. It is a thin film covering that almost gives the appearance of paint when applied. I used orange and yellow to highlight the red fuselage, which looks good on the ground and adds visibility in the air. I found it necessary to trim the supplied graphics, as they have a white background to match the white foam.

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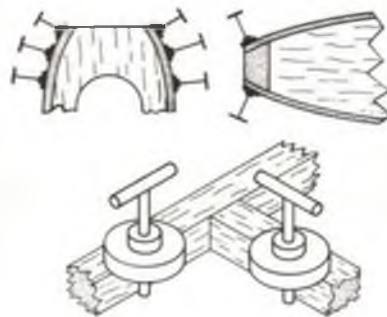


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FLYING

To make the Spyder really perform, I bolted a Cox .049 Black Widow to the nose. Break-in was done with Cox Super Power Fuel and a 6x3 Cox propeller. After running a few tanks of fuel through the engine at a fairly rich setting, it was ready to go.

The afternoon I decided to go test flying had winds in the range of 10 to 15 miles per hour—conditions that I would not normally consider ideal for a 1/2A model. But with an easy level push into the wind the Spyder was away and climbing skyward. It was surprising how much the Spyder wanted to climb with the huge amount of downthrust built into the fuselage firewall mounting; it was necessary to carry a fair amount of down trim for straight and level flight (this might have been partly due to the windy conditions). When flying straight and level the Spyder was moving out at good clip—well beyond the range of an inexperienced pilot—and penetrated well directly into the wind. From level flight the Spyder would do multiple loops, snap rolls, barrel rolls, split-Ss and Immelmans. All with just elevator and rudder controls!

After a few flights I put on a Cox gray 5x3 to increase the rpm and the airspeed. It's really surprising what a small difference in airspeed can mean to performance. All of the aerobatic maneuvers mentioned previously became crisper, and could even be strung together in a series. I was really surprised by the agility of this polyhedral-winged, elevator/rudder model. It beats the heck out of any other elevator/rudder .049-powered model I've flown before!

Next, I wanted to check the engine run time and average glide time. I removed the down trim and allowed the model to climb during the engine run. Run times were in the range of 2-1/2 minutes, with glide times about the same if no lift was encountered. Lift? That's right, one flight turned into a 20-minute thermal soaring spree that would make many glider pilots jealous. I could hardly believe that this highly aerobatic 1/2A model was soaring like a well-behaved thermal glider. I found that I could fly aerobatics or climb for altitude and thermal whenever I wanted. The Spyder was turning out to be a very versatile model with some hidden talents that one wouldn't expect to find in a model of its size and intended purpose.

CONCLUSION

If you want a 1/2A sport aerobatic model that can handle a little wind without getting grounded, the Spyder will fit the bill. But you won't be stuck with a model that requires you to be on the sticks all the time, or one that is only capable of two- or three-minute flights. When you want to relax and catch a thermal or two, the Spyder will perform these tasks admirably. For a relatively small investment you can have a model that lives up to the advertised claims and then some! **MB**

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A Look at the Airtronics Infinity 660 Heli Radio

The 660 is a relatively new computer RC system and offers many unique features that beginning and experienced heli fliers alike will find useful.

BY JAMES WANG

This month we will examine the six-channel Airtronics Infinity 660 radio, designed for helicopters as well as airplanes and gliders. The 660 is marketed as a medium-priced system that fills the gap between Airtronics' super-sophisticated radios and the basic no-frills ones. It has enough features to keep a beginner or an advanced hotdogging pilot happy. Other medium-priced computer radios on the

instructions once, you probably will not have to read them again, because the names and wordings used in the liquid crystal display are very logical and self-explanatory.

The Infinity 660 has memory for four different models. You can set it up for two helicopters, one airplane, and one glider; or all four model memories as helicopters. Unlike most computer radios on the market, which require a separate tiny battery inside



Our columnist's Infinity 660 test ship featured a Century Helicopter Products "Blackshark 60" fuselage, GMP Legend mechanics with Hirobo DDF main rotor head, Super Tigre .60H engine, Blackshark U-shaped pipe and Airtronics SG-X gyro. Overall weight is 11 pounds.

market are offered either in a helicopter or an airplane configuration, but the Infinity 660 has no distinction between heli and airplane versions. There's no need to do so, because this is the only medium-priced radio on the market that allows the user to define the function of each switch on the transmitter.

The Infinity 660 manual is a book—119 pages. It covers helicopters, airplanes and gliders. The helicopter section alone is 27 pages and is very well written. After you've read the

the transmitter to back up important memories, the Infinity 660 uses an EPROM to store all the data. The EPROM requires no separate battery to remember the program. The memory won't change until you change the programming.

The shape of the Infinity transmitter separates this radio from the rest. It has a high-tech curved look, and feels very comfortable. It has panache. The transmitter is taller than normal, and it is bottom heavy. At first it may feel strange when holding it in the

helicopter world

normal flying position, but when the antenna is fully extended, the unit balances nicely in the normal flying position. You quickly get use to the feel of this transmitter.

The stick and switch locations are comfortable for either thumbs alone or thumb-and-index finger flying. The switches are all easily accessible. The top four switches are rocker-style instead of the more common toggle variety and took me some time to get used to. The trims on the transmitter are bigger than on other transmitters, making them very easy to find without taking your eyes off the model.

The transmitter RF module is removable, so the frequency can be changed at the field. Behind the RF module is a collapsible wire stand that permits the transmitter to sit on the ground at 45 degrees. Stick tension is adjustable from the inside, but the factory setting seems to be just right. There is no slop or deadband at the center stick position. The throttle stick has a very fine ratchet action—you barely feel it.

One of the most impressive features of the Infinity 660 radio is the ability to assign whatever function you please to any transmitter switch. For example, you can assign idle-up 1 to the left front switch, throttle hold to the right front switch, elevator dual rate to the rear left switch, gyro sensitivity to the right rear switch, etc. Or change them around any way you like. The only switch that is not assignable is the trainer switch.

The liquid crystal display on the transmitter includes a built-in digital stopwatch/timer that can be set as a countdown timer with

FLASH!! U.S. F3C TEAM WINS WORLD CHAMPS!

The U.S. FAI Helicopter team copped top honors at the 1993 F3C Helicopter World Champs, held in Velden, Austria over the week of September 27 to October 1. U.S. fliers Curtis Youngblood, Wayne Mann and Wendall Adkins placed 1st, 6th and 13th respectively, all three flying various versions of the Miniature Aircraft X-Cell 60. Curtis flew a pod-and-boom X-Cell 60 Custom, Wayne used an XL-Pro with an Optima fuselage, and Wendall flew an X-Cell 60 Graphite Custom with a Triumph fuselage. James promises to have more on the World Champs next month—stay tuned!

transmitter battery voltage and shows whether you are in the helicopter, airplane or glider mode. It can display up to a 10-letter name for each model.

The six input edit keys on the front are extremely easy to use. There is one key to start program editing and another to end it. Two more keys move the display cursor left or right. The two last keys increase or decrease the program values. That's all! The program names are displayed in plain English and are logical—you don't need computer knowledge to use this radio. Also, every time you press a key, there's an audible beep so you know



■ LEFT: James' test model uses a combination of Airtronics 74735 ball bearing and 74102 standard servos. The Airtronics SG-X gyro is at the front of the servo tray. This photo shows the Super Tigre Tiger Paw muffled pipe next to the 20-ounce fuel tank. This pipe proved to be too noisy and was later replaced by a Blackshark U-shape pipe.

■ RIGHT: The Infinity 660 FM or PCM is a six-channel radio with memory space for four models—any combination of helicopter, airplane or glider. It comes with four 74102 standard servos, a six-channel dual-conversion narrow-band receiver, 660-mAH receiver NiCd battery, charger and a 119-page instruction manual.

a beeping alarm at the end, or can count forward to 59 minutes and 50 seconds. There is also a separate total elapsed time display which keeps track of how long the transmitter has been on. It keeps adding up the "on" time until you reset it. From my experience with the Infinity 660 over the past three months, I know I can get at least 150 minutes of safe flying time per battery charge. The digital display includes a continuous readout of the

you have entered a command. If you don't want the beep, it can be turned off.

There are four pitch curves: normal, idle-up 1 and idle-up 2, and throttle hold; and three throttle curves: normal, idle-up 1 and idle-up 2. Idle-up 2 can also be used for switched inverted flight, if desired. The instruction manual includes a detailed explanation

continued on page 80

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MODEL DESIGN cont. from page 47

duces turning (stopping one crawler tread or the other). Fore and aft on the right stick is throttle (mode 1, as I use on airplanes), and lateral on the right stick swings the body and boom of the crane on its turntable. The auxiliary channel levers control the winches—up for up, and down for down. The other 12 controls are all pushbuttons. So the crane controls are pretty natural, and phased normally.

On my robot, the right stick causes him to nod or turn his head right and left. Lateral on the left stick causes him to move his eyes to look right and left. Fore and aft on the left stick moves the robot's legs, making him walk. Again, it's as "natural" as I could design it, but quite different from the crane and quite different from our airplanes.

It was interesting to observe that I easily learned to operate all three different RC machines with the same style of RC transmitter without confusion. If I'm looking at a flying airplane, the optical feedback causes certain reflex actions in my thumbs on the sticks. If I'm looking at the crane, my thumbs do different things. And on the robot, the optical feedback, commands and actions are still different. Yet these multiple skills are simple compared to the skills we had to develop in learning to balance ourselves upright, walk, run, and jump. The human organism is an amazing piece of work.

SILVER SOLDERS

There are two distinctly different silver-containing solders that creative modelers need to know about. Everyone knows about common or "soft" solder, which is an alloy of lead and tin. It is often 50-50; the better grade sold for electrical work is 60 percent tin and 40 percent lead, and modern plumber's solder is 95 percent tin, 5 percent lead (to minimize lead in our water). These common solders melt at a low temperature and are easy to use, but they aren't noted for their strength.

The word "brazing" relates to brass, which is the alloy used for regular brazing. True brazing produces very strong joints, but has to be done at a bright red heat, which requires an oxyacetylene torch. This takes any heat treat out of the work, and oxidizes the surface to a black scaly mess that has to be sanded and polished when appearance counts.

Silver solder, with a high percentage of silver, melts around 1100 degrees F., which is where metals first begin to glow; very much cooler than regular brazing. This temperature can be achieved with a simple propane torch, and if one is careful not to overheat the joint, the oxidation isn't too bad. Depending on how the joint is cooled afterward, part of the heat treat may even be salvaged. A silver soldered, "silver brazed" joint is as strong as a brazed joint, and nearly all common metals except aluminum can be silver soldered. The silver

solder itself costs more, since about half of it is silver.

"Silver-tin" soldering is a middle ground between silver soldering and common soft soldering. The solder used has a few percent of silver in it, and the rest is tin. No lead or other bad stuff, so it can be used in contact with food, etc. Also the low silver content makes its price much lower than regular silver solder.

Where silver soldering takes a torch, silver-tin solder melts at 420 to 430 degrees F, the same range as ordinary solder, so a soldering iron or gun works fine. Ordinary soldering fluxes are used with it, and it is also available with a flux core.

It has considerably more strength than ordinary solder. How much strength? I knew you were going to ask that, so I'm ready for you. I got 6,875 psi ultimate tensile strength in one pull test and 6,000 psi tensile in a different type of test. It would have been easier to give you the strength claimed on the box, but I stopped trusting advertising about 60 years ago. For example, one brand of silver-tin solder I have claims "10,000 to 25,000 psi," and another claims "28,000 psi." The latter one also says "5 times as strong as regular solder." So I had to test regular solder to check that claim. I got 4,583 psi in tension on 50-50 tin-lead solder. Instead of being 5 times as strong as tin-lead solder, as they say, my tests showed it is only 1-1/2 times as strong.

At this point I am reminded of a quotation from Socrates: "The avoidance of strict accuracy is a general sign of good breeding." I refuse to accord such ad writers the seal of good breeding. Good con artists, maybe.

At any rate, a gain of 1-1/2 times in strength is still worth having. I use silver-tin solder in some semi-structural joints that I would have previously soft soldered; and I use it for some electrical connection soldering where there will be some mechanical strain on the electrical joint. Also, the silver in it gives it better electrical conductivity than tin-lead solder, so it is especially good for the wiring in electric-powered models.

I bought one spool of silver-tin solder from Brookstone and a different brand from Cascade Sales (206-592-5970). Hardware stores that sell hardware instead of dishes and flowers may also have it.

PARTING WORDS

Some of you who enjoy this column may be interested in a book of mine which has just been published. It is titled *CRACKPOT or GENIUS? A complete guide to the uncommon art of inventing*, published by Chicago Review Press, ISBN 1-55652-193-6. If your local bookstore doesn't have it, they can order it for you. The subject is inventing, another of my lifelong avocations, but I couldn't avoid talking about model airplanes in places.

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The Robbe Schluter 'Futura' RC Helicopter

'The Rolls Royce of model helicopters' is how James rates this state-of-the-art .60-size machine from the highly respected German manufacturer.

PART 1 OF 2 • BY JAMES WANG

The Futura RC helicopter from Robbe Schluter of Germany is the quintessence of modern contest machines. It encompasses the state-of-the-art in model helicopter technology and design. Construction is mostly aluminum, fitted with many molded glass-filled nylon parts. The Futura's suggested retail price is close to \$1,000, but from the moment you open the box you will be impressed by the overall quality of workmanship and attention to detail.

Many of the Futura's design features are different from other

.60-size helicopters. For example, the tail rotor hub is a miniature copy of a floating-axle main rotor head. Inside the tail rotor hub are two O-rings supporting the teetering, feathering axle. The engine drives the main gear via a toothed belt to reduce vibration and eliminate the need for dial indicating the engine starting shaft. The kit includes a low-friction driven tail system which is great for doing 180-degree autos. It's up to the builder to decide whether or not to install it. The driven tail unit is usually treated as an expensive aftermarket item on other brands of helicopters.

Our columnist tries out David Ramsey's Futura to see how it compares to his own. The Futura is rock solid in hover, and moves as if on rails in forward flight. David uses a Rossi .60 ABC airplane engine in his model.



helicopter world

The Futura is also the only helicopter I know of that allows the builder to choose between a clockwise or counterclockwise rotating main rotor. The kit includes parts for both rotation directions.

The amazing thing is that the folks at Robbe Schluter had all these options in mind when the Futura was first designed. Rather than continuously introducing expensive upgrade items to improve their basic helicopter, the designers made a list of all the good ideas and lumped them all together into the Futura from the beginning. For example, there is an optional recoil starter system that fits under the starter cone, eliminating the need for an electric starter. The Futura also has provision for using a regular .60 two-stroke engine, a .90 four-stroke, or Robbe's 22cc Zenoah gas-line engine. The stock gear ratio is 9.6:1, but parts are available for 10.91, 10, 9.23, 8.89, 8, and 6.67:1 ratios. The ratios permit optimization with any kind of engine.

The swashplate on the Futura is an all-metal unit that is almost bulletproof. It is anodized black and is surrounded by a polished metal ring. The pitch and roll cyclic controls are push-pull. The pushrods are a heavier, stronger 2.5mm instead of 2mm as on other models. The tail rotor drive wire is also 2.5mm diameter. The landing gear struts are the strongest molded .60-size struts I've ever seen. Unlike others, the Futura struts have thick webs molded underneath. When the helicopter is sitting on the ground, the struts don't squat and spread out.

The overall impression you get from building this kit is that it's designed like a Rolls Royce—there is no cutting corners. When you fly it, you will think that you are *flying* a Rolls Royce. You can

a powerful engine like the Rossi .60 or the O.S. .61SX-H is recommended. The Futura is not the best choice for all-out hotdogging because the control responses are smooth and gentle and catered more to contest flying. If the thick Hiller control paddles were replaced with Schluter razor-thin long paddles and the main rotor speed spooled up to 1,800 rpm, then it would really groove. But that would be defeating the design objective of the Futura.

Robbe says: "In developing the Futura mechanics, we have taken on board the experience and wishes of many experts and top pilots. The Futura uses the most flexible mechanics in the world and can be used for virtually any helicopter application." The designers at Robbe recognize that the Futura is heavier than other .60-size helicopters, and here is what they have to say: "Naturally, the price of this robustness is weight, and there is no reason why we should ignore or wave aside this drawback. Nevertheless we believe that this extra weight does no harm, and that most skeptics have by now been convinced."

I agree with what Robbe says. In the past I have written that while a heavy helicopter may accelerate slower, with a powerful engine it can actually fly faster than a lighter machine in steady flight because the profile drag is reduced. Fuselage drag increases as the cubic power of velocity. A slightly heavier machine reduces the nose-down attitude of the fuselage, hence reducing the fuselage drag. This is a fact well known among full-size helicopter designers. Just look at the fastest flying FAI model helicopters, such as Dwight Schilling's, Robert Gorham's and Wayne Mann's; they weigh from 11 to 12-1/2 pounds, and they



■ LEFT: An underside view of Ray St. Onge's Futura reveals the Hatori U-pipe mounted underneath. This one is powered by an O.S. .61 SX-H. Note the extremely wide stance landing gear. ■ RIGHT: The Futura kit gets an A+ for packaging. Large parts are protected in compartmentalized foam trays. Smaller parts are packed in plastic bags. The very readable and concise instructions are printed in six languages, which gives an idea of the world-wide demand for Schluter products.



feel the solidness in hover and smoothness in forward flight. The Futura weighs in at 11 pounds—about 1 pound heavier than a typical .60-size model. The extra weight comes from being solidly built. Because of this structural integrity, there is no flexing in the frames or control system.

Even in gusty wind, the model hovers steadily. In forward flight, once it gets going, it cuts through the air like a truck on rails. It's almost like flying a .60-size RC pattern plane; it goes where you point it. The extremely long canopy makes it look slick in fast forward flight. The long canopy also makes the Futura easier to see than a pod-and-boom model. To achieve good acceleration,

move at 100 mph. Ray St. Onge's Futura was clocked at 96 mph.

The secret is that you must use a good, powerful motor in the Futura. Robbe believes the improvement in robustness, stability and speed outweighs the 10 percent weight gain, and that this weight gain is more than offset by the increased power from modern .60-size engines. Robbe sums up by saying, "We have taken into account the general trend towards higher-power motors." I guess I will be hearing a rebuttal from Ray Hosteller soon!

When you first open the Futura kit box, you will see that the big parts are carefully protected inside the molded Styrofoam trays.

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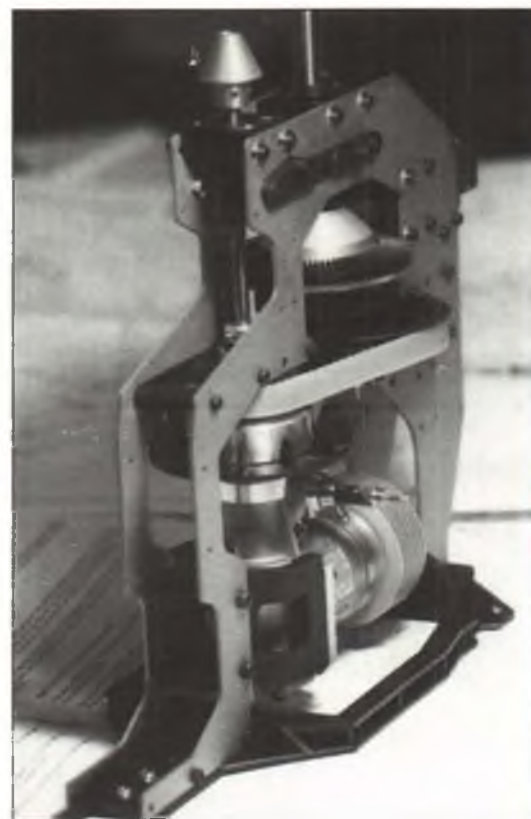
The smaller parts and nuts and bolts are contained in 13 plastic bags. The bags are individually labeled with a number that matches the assembly step called out in the instruction manual. The nuts and bolts required for each numbered step are placed inside that particular numbered bag. This way, you will not be confused as to what size nuts and bolts to use.

There are two large sheets of isometric drawings to aid assembly. Each section of the drawing is labeled with a number that matches the assembly step called out in the manual. With this attention to detail, there is little chance of making mistakes during assembly. If you ever need replacement parts, there is a complete list of parts by name and number. The drawings show the part number next to each part.

The main rotor head and tail rotor are pre-assembled at the factory. The engine mounting block is a fancy piece machined from extruded aluminum with a large lightening hole in each side. Be careful not to overtighten the 4mm bolts in this block; I managed to strip out the threads in one of the holes.

I used a Rossi .60H ABC engine along with a Rossi straight aircraft tuned pipe and Schluter No. S0915 steel header. I highly recommend the Rossi engine and pipe for the Futura because of the power, and also because the centrifugal clutch fits perfectly on the 8mm diameter crankshaft. The O.S. .61 SX-H also has an 8mm crankshaft, but the crankshaft is 2mm too short. For that engine, David suggests cutting away 1mm of the tapered brass collar so the nut can thread onto the crankshaft. (Lester Goldsmith of Action Hobbies in Memphis, Tennessee sells a special nut for the Futura—call him at 901-365-2620.)

My Rossi .60H puts out as least as much power as the O.S. .61 SX-H in my friend Ray St. Onge's Futura. With the Rossi tuned pipe and 10 percent nitro fuel, my Futura screams along at 70 mph plus. To get similar performance from the O.S., 30 percent nitro had to be used. I recommend using the Rossi pipe instead of a muffler because the Rossi motor



The assembled aluminum side frames with the Rossi .60H installed. The transmission is a two-stage system. A toothed belt drive from the engine to the first gear reduces vibration. The spring-loaded starter cone engages only when the starter is applied.



The Futura's centrifugal clutch is beautifully made. The clutch lining has metal wires inside the fiber material. The system works very well.

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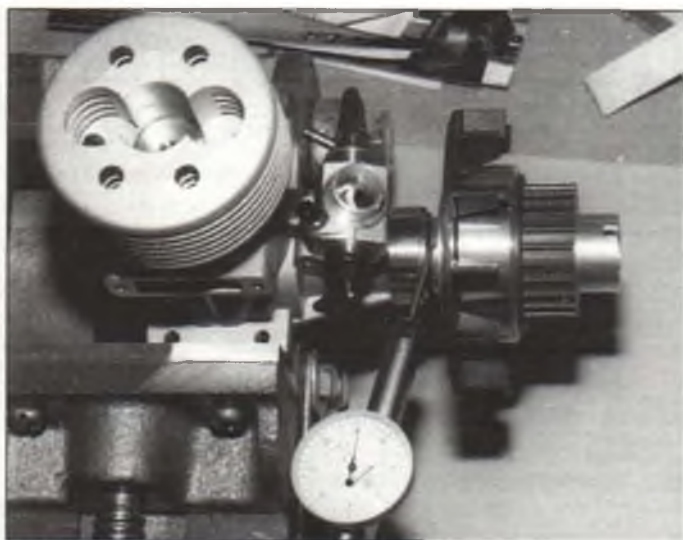
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■ LEFT: Using a dial indicator to check the clutch alignment showed less than .0015-inch runout. Cooling fan has more blades than normal, and along with the Rossi's huge heat-sink head, does a good job of keeping the engine cool. The Rossi is a real powerhouse, and James strongly recommends it for the Futura. ■ RIGHT: The Futura's tail rotor gearbox and tail rotor hub are excellent. This is David Ramsey's Futura; James mounted his tail rotor on the right side of the boom, which theoretically improves efficiency.

has an exhaust timing of over 160 degrees, and is designed to peak with a pipe. The Schluter S0915 header is just the right length for the pipe. The pipe is attached to the tail boom using Robbe's special tuned pipe holder, No. S0911, which fits the hexagonal tail boom.

My engine reaches its maximum horsepower when the main rotor speed reaches 1,700 to 1,800 rpm. I found it best to

have the throttle arm on the bottom of the carburetor barrel for easier hook-up to the throttle servo.

The Rossi heli motor has a huge heat sink, but engine cooling is improved even further with the Futura's cooling system. It has a greater number of fan blades than other .60-size models. There is a pulley just above the clutch for the drive belt. On top of the pulley is the

aluminum starting cup, which has a crossed-shape slot. The starting cone and starting shaft are spring loaded and engage this slot when the electric starter is pressed onto the starting cone. This unique design eliminates the need for the traditional and laborious dial indicating procedure, and reduces the engine vibration transferred to the frames.

To be continued. **MB**

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2nd -	Dan Chapman	XL-Pro/Optima
3rd -	Wendall Adkins	X-Cell 60 Custom Triumph

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1st -	James Griffith	X-Cell .60 Custom
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British FC-3 Team Trials

2nd -	Alistar Newman	XL-Pro
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Scotland - Carlisle FAI

2nd -	Dave Wilshire	XL-Pro
-------	---------------	--------

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INFINITY 660 continued from page 69

tion on how to set up the radio for switched and switchless inverted flight.

The hovering throttle and hovering pitch settings are adjustable by means of the two black knobs on the front of the transmitter. At the beginning of each day's flying, I always tweak these two knobs to fine-tune the main rotor rpm while hovering. Unique on the Infinity 660 radio is that the hovering

throttle and hovering pitch can also be changed on the liquid crystal display. This increases the versatility of the hovering throttle and hovering pitch even more.

Dual rate, exponential, and end point adjustments are available on roll cyclic, fore/aft cyclic, and tail rotor control. Tail rotor revolution mix is available for all four pitch curves. The four revolution mixes are each programmed in as an up-mix and a down-mix; the splitting point is when the throttle stick is physically at the halfway

position. There is a rudder offset feature, but no tail rotor acceleration feature. Rudder offset helps make the model fly hands-off straight in forward flight.

In the helicopter mode, the Infinity 660 has only one programmable mix. I use it for mixing collective pitch and fore/aft cyclic, so that increasing the collective pitch automatically gives up to 6 percent more forward cyclic, and at negative pitch some aft cyclic is automatically generated. This helps the model fly level in high-speed forward

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and switchless inverted flight.

I am using the less-expensive plain FM version of the Infinity 660 with the standard Airtronics FM narrow-band six-channel receiver, and haven't had a single glitch in the three months I've been using it. The PCM system costs \$50 more. The only difference

is in the receiver; the transmitter and servos are identical. In case you want to get a PCM receiver later, you won't have to buy another transmitter.

The Infinity 660 comes with four standard Airtronics 74102 servos. Extra servos can be purchased for around \$20 each. I

use the 74102 servos in all my .30-size helicopters. The ones in my Concept 30 have survived many brutal crashes and still work flawlessly. On my .60-size models I use a 74102 for the throttle and the precision 74735 double ball bearing servos for collective and cyclic controls.

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The "alternate model" function on the Infinity 660 makes this radio stand out from all others. This function allows the pilot to switch from one model setup to another during flight just by flicking a switch. We're talking about the entire model program here, including end points, exponential, four new pitch curves, different revolution mix, etc.—all changed at once! This is a powerful feature that allows you to set up one helicopter for different flying conditions or styles. You can use the baseline setups for tame normal flying, and the alternate setups for hotdogging or FAI competition. The alternate model setup uses up one of the four model memories.

The instruction manual includes a blank data sheet to jot down all of your program settings for safe keeping. Originally I intended to print a table of the Infinity 660 program settings I use on my models, but after I filled out the data sheet, I found that my settings were very similar to the default factory settings. I think the factory default program values are quite good for beginners and intermediates. I congratulate Airtronics for



James found the Infinity 660's factory pre-programmed default settings to be nearly perfect for beginner and intermediate fliers. Notice the smooth curves of the transmitter—makes for a very comfortable feel. There is a collapsible wire stand on the back.

doing their homework and including an excellent starting point for buyers.

The bottom line is, the Infinity 660 has many ingenious features and doesn't have to take a back seat to any other heli radio in its price range. Check it out at your local Airtronics hobby dealer. You won't be disappointed! **MB**



The transmitter's tinted clear plastic panel flips open to reveal the liquid crystal display. All of the programming is done by six edit keys. The Infinity series radios have a reputation for being exceptionally easy to program, to the point where you almost don't need an instruction manual.

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