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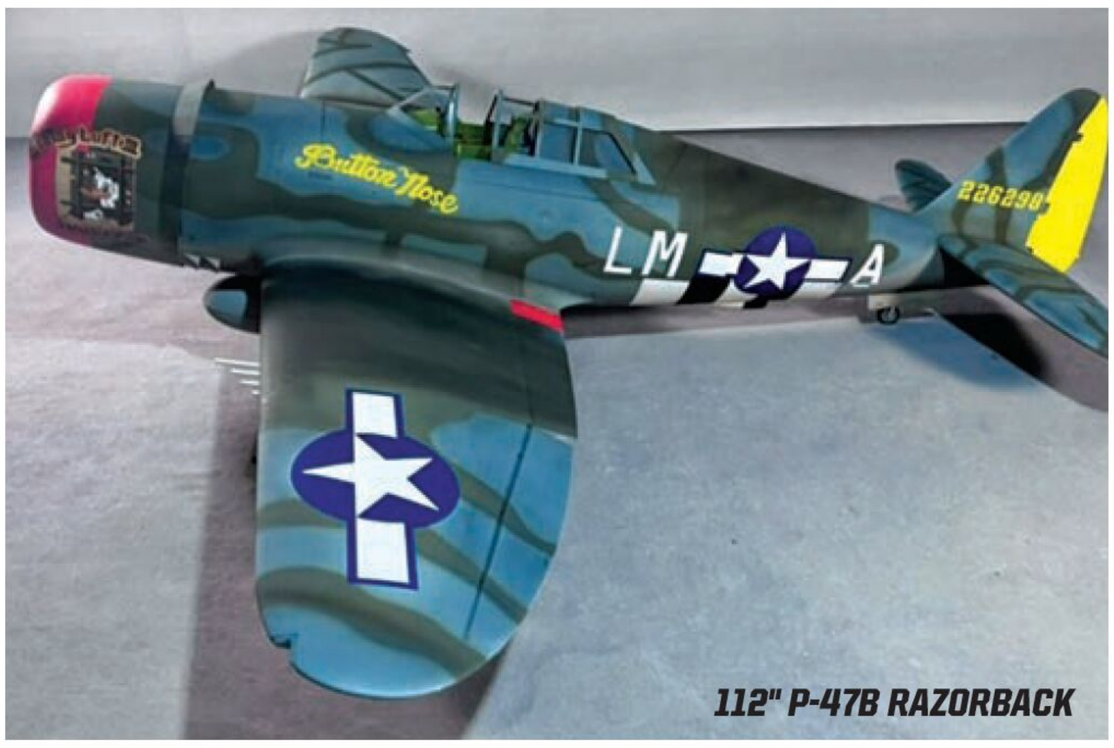

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ON THE COVER
Frank Sarantidis' 1/4-scale P-47, built from the Meister Scale kit, was awarded Best of Show at the Dino DiGiorgio Sr. Memorial Warbird Rally. (Photo by David Hart/CapturedFromTheHart.com)

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FLIGHT PLAN

BY DEBRA CLEGHORN

Doug Smith's 140-inch-span B-17, built from Bob Holman plans, was awarded Best Multi Engine at the Dino DiGiorgio Sr. Memorial Warbird Rally. (Photo by David Hart/ capturedfromthehart.com)

EVENT COVERAGE: CLASSIC AND THE NEW

If you're reading this issue of *Model Airplane News*, chances are you love an RC event as much as we do. Whether you're competing or watching from the sidelines, you know that getting together with other hobby enthusiasts on a nice day at a beautiful field is one of life's pure joys. In this issue we cover two events: one that's well-established and one that's brand new. In this issue, David Hart brings us coverage of the 18th annual Dino DiGiorgio Sr. Memorial Warbird Rally in memory of Dino DiGiorgio Sr., the man who started the World Miniature Warbird Association. Dino Sr. wanted to preserve military aviation history with fun-fly style events that included all sizes of RC models. Dino Sr. passed away in 2003, and his son, Dino Jr., has been the motivational driver for this special memorial event. This Georgia-based fly-in has become a premier show that attracts folks from all over the country (and a few from other countries as well!). Be sure to visit the ModelAirplaneNews.com website for more of David Hart's stunning photos.

As for the new kid on the block, the Ace of Aces International R/C Scale Invitational will have its inaugural event in April of 2026 in Good Hope, Georgia. The event will be run by Marvin Alvarez and Curtis Switzer, both experienced RC scale pilots. About the event, Curtis says "Top Gun was an amazing contest and will always be remembered for its great pilots, planes and Frank Tiano's great vision. This event will be a new start to what will hopefully be a great scale contest. We'll never be able to replace Top Gun. Hopefully we can give scale competitors a new place to show their skills to the world." For details, check out "Hangar Talk," and stay tuned for more info!

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F-18 SUPER HORNET

Patrick Skahill, Yulee, Florida

PILOT PROJECT OF THE MONTH

Patrick took a stock 90mm EDF F/A-18 from Motion RC and gave it a complete makeover that started with a custom VFA-204 adversary scheme. He airbrushed Tamiya paints and color matched Behr paint to areas that required a brush. Callie Graphics complete the aggressor livery, and 3D printed parts such as the missiles and other details were added to the work still in progress. A JR 12A radio system with a stabilized receiver flies the Hornet nicely and the stock power system sounds great in flight.

TWIN BEECH

Donivan Godsil, Oneida, Illinois

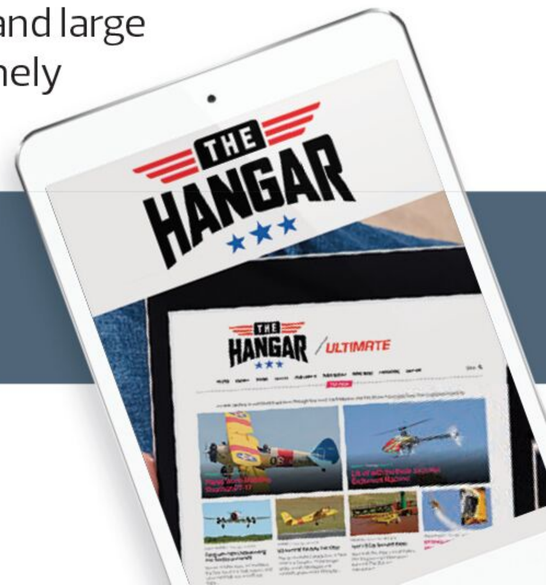
This Golden Era classic started life as a stock E-flite that took on the beautiful color scheme of a full-scale owned by Donivan's friends Brian and Rachel Aukes. The paint job required two coats of Rustoleum flat white primer, followed by a turquoise and gloss white coat. Callie Graphics decals match those on the full-scale Beech. Donivan's 7-year-old daughter Evelyn, who loves both full-scale and RC flying, holds the model.

BELL 206B3 JET RANGER

Donnie Roberts, Troy, Alabama

Donnie built his 1/4-scale Jet Ranger from a Vario Helicopters kit and also built the motorized, RC landing pad. The custom paint scheme used PPG automotive two-part paint and gloss clearcoat, and the cabin, seats, instrument panels, and other scale details are a combination of scratch-built and 3D-printed parts. The Jet Ranger is powered by a 12S, 10,000mAh electric power system and large 1050mm rotor blades that sound extremely realistic in flight.

SEND IN YOUR PICTURES! *Model Airplane News* is your magazine, and we encourage reader participation. Email your high-resolution images to MAN@airage.com, with your contact information and details on your project. The sender of each featured project will receive a free one-year membership to the *Model Airplane News* Hangar website.



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DON'T BREAK THE WIRE

When you use a vise instead of a wire bending tool to make landing gear, wire that's larger than 1/8 inch diameter is susceptible to breaking. I have learned that filing or grinding a radius into the vise jaws will prevent the wire from breaking on the sharp edges.
Orin Humphries, Lynwood, Washington

EXTRA REACH!

When working on larger models, I have tried various tricks for getting screws and bolts where I need them. I take a small piece of heat-shrink covering and partially shrink it over the tool and bolt head. This allows me to get the screw or bolt started and be easily removed when it's tight.
Bob Pollokoff, Baltimore, Maryland

TINY DRILLS

Sometimes you need to drill a hole that's smaller than the 1/16 bit included in most drill sets, or you need to drill something that a regular powered drill might not fit. Enter the pin vise or micro drill sets from a number of popular retail sources. They work particularly well on servo screw mounting holes! Simply rock the drill back and forth when drilling plywood or balsa you don't even need room to spin the drill bit completely.
Bill Barbee, Savannah, Georgia

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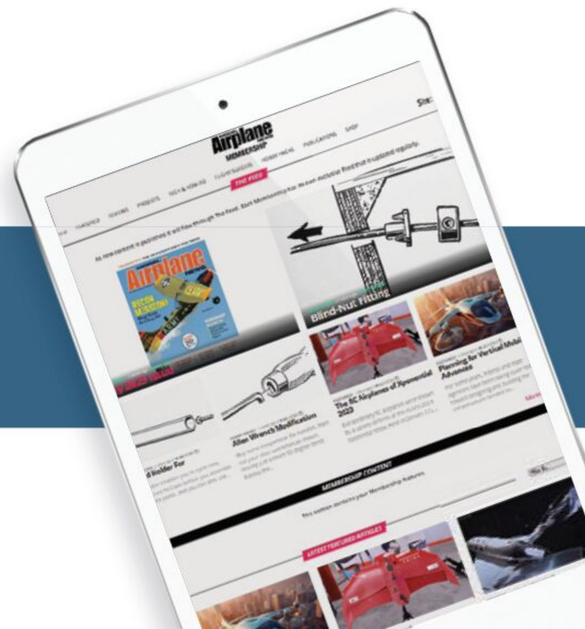

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B-29 SUPER FORTRESS
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NEW PLANES & GEAR

Seagull Models 90" L-4 Grasshopper

This 1/5-scale, built-up ARF is the perfect match for a 15-20cc gas engine or equivalent glow or electric power. With its wide flight envelope, it's suitable for pilots from beginners to pros. Plus, the scale details include operational flaps with linkages for performance and appearance and a realistic gradated camouflage trim scheme with Oracover film covering. For $550, it's a deal!
LegendHobby.com

Seagull Models Magic Bird EF1 40E Racer PNP

Experience high-speed electric excitement with the new 46-inch-span Magic Bird EF1 Racer. Designed for EF1-class pylon racing competitions, this versatile aircraft also excels at sport aerobatics. For $595, it comes equipped with a high-power Dualsky 40-size ECO 3520C-V2 motor. This is your ticket to high-speed thrills and impressive aerobatics—get ready to take to the skies with this exceptional aircraft!
LegendHobby.com

Hitec DB950SW Wide-Voltage Steel-Gear 25T Digital Brushless Servo

The all new DB950SW servo has a 32-bit MCU and 12-bit ADC for unprecedented programmability and flexibility, along with an ultra-efficient and powerful brushless motor that delivers super smooth movement. This powerful servo operates on a wide 4.8 to 8.4 voltage range, so it can be used with any common battery chemistry without the need for adapters or regulators. Featuring an industry standard 25-tooth output spline with 3mm hex screw and steel gears for maximum durability, for $140 you get a lot of servo tech!
HitecRCD.com

Old School Model Works Raider

Based on Phil Kraft's proven 1965 design, the 60-inch-span Raider has the same dimensions, airfoil, and great flying characteristics. The OSMW kit has been upgraded with laser-cut and self-aligning parts, including a wing jig, and is an uncomplicated, lightweight, and easy-to-build aerobat. A legal design for Senior Pattern Association and Vintage R/C Society competitions, it requires a .45-.61 glow engine or 900+ watt electric motor system and costs $289.95. Another winner from Old School Model Works!

Innov8tiveDesigns.com

Brodak Royal Aircraft Factory S.E.5a Scout

This large but lightweight park flyer is a 1/6.4-scale stunner featuring a 50-inch wingspan and an overall length of 40 1/8 inches. This kit includes laser-cut parts from contest balsa and ply, full size plans, complete assembly instructions, pre-bent wire components, pre-cut metal tubes for the removable wings for easy transport, vac-formed wheel covers, and best of all, a photo disc with assembly photos of the prototype. With a wing loading of just 5 ounces per square foot, it's a very stable flier. The kit costs $200 and requires a 450 brushless outrunner power system and radio gear.

Brodak.com

Spektrum NX10+ 20-Channel DXMX

Spektrum's latest transmitter has the versatility you need to operate your giant-scale, EDF, and other complex aircraft to their fullest potential. Out of the box, the NX10+ is compatible with "Smart Technology" and can receive telemetry data at your fingertips in real time, while the Wi-Fi connectivity adds even more convenience. In addition to completing product registration straight from the transmitter, you can instantly download firmware updates. For $550, this is a must have for the modern pilot!

ChiefAircraft.com

RC Plane Stands Epic Floor Stand (the BIG ONE!)

Have a giant-scale RC plane? Then you need the top-quality Epic Floor Stand, from mostly 3/4-inch Baltic birch plywood and using high-quality hardware parts. Built for very large aircraft that weigh up to 200 pounds, it includes small arms to support twin turbines and delta wings. This $995 unit comes sanded and unfinished, so you can decide how you want to finish your stand—or not. This investment in your hobby will pay dividends in avoided backaches!

RCPlaneStands.com

Zap Z-Poxy 5-Minute Epoxy

Need a fast repair at the field? The 5-minute cure time means fast building and fast fixes. Vibration-resistant and fuel-proof, this epoxy is perfect for all types of hobbies and crafts, not just RC. Plus, it does not get brittle with age and it's easy to mix: combine equal parts by volume. At four ounces for $15, we suggest modelers keep this handy!

ZapGlue.com

E-flite Sportix 1.1m PNP

Designed from the ground up to be a great looking and handling sport airplane, the E-flite Sportix 1.1m is the perfect aerobat for the more experienced pilot. It's capable of smooth and predictable sport flying, along with performing basic to aggressive and even precision aerobatics. Plus, the convenient size makes it easy to store, transport, and fly at a variety of large parks and sports fields to RC flying fields. This flier is $250 and requires a 14.8V 2200mAh 4S 30C Smart LiPo Battery. Have fun!

ChiefAircraft.com

E-flite Viper 64mm EDF Jet PNP

Like the full-scale ViperJet, the E-flite Viper 64mm EDF delivers fighter-jet looks and performance with low-wing, prop-driven airplane handling so more pilots can enjoy flying a jet! It's a scale EDF that flies smoothly and handles like a sport airplane, yet is also capable of incredible top speeds and aerobatics. But what truly sets it apart is how easy it is to hand launch or take off, fly, and land, which makes it the class-leading choice for a wide variety of pilots. This is a deal at $250 plus the cost of the required 4S 2200mAh 30C Smart LiPo. And with the easy setup, you can have it ready to fly in less time than it takes to charge the battery!

ChiefAircraft.com

Hitec D950TW Wide Voltage Titanium Gear 25T Digital Coreless Servo

Now with a new lower price of $130, the titanium D950TW comes with a 32-bit MCU and 12-bit ADC—exactly what you want to use in a large, high-power RC airplane. This servo is speedy and powerful operates on a wide 4.8 ~ 8.4 voltage range, allowing use with any common battery chemistry without the need for adapters or regulators. Featuring Hitec's industry standard 25-tooth output spline with 3mm hex screw, each D-Series servo brings monster performance never known before in the market.

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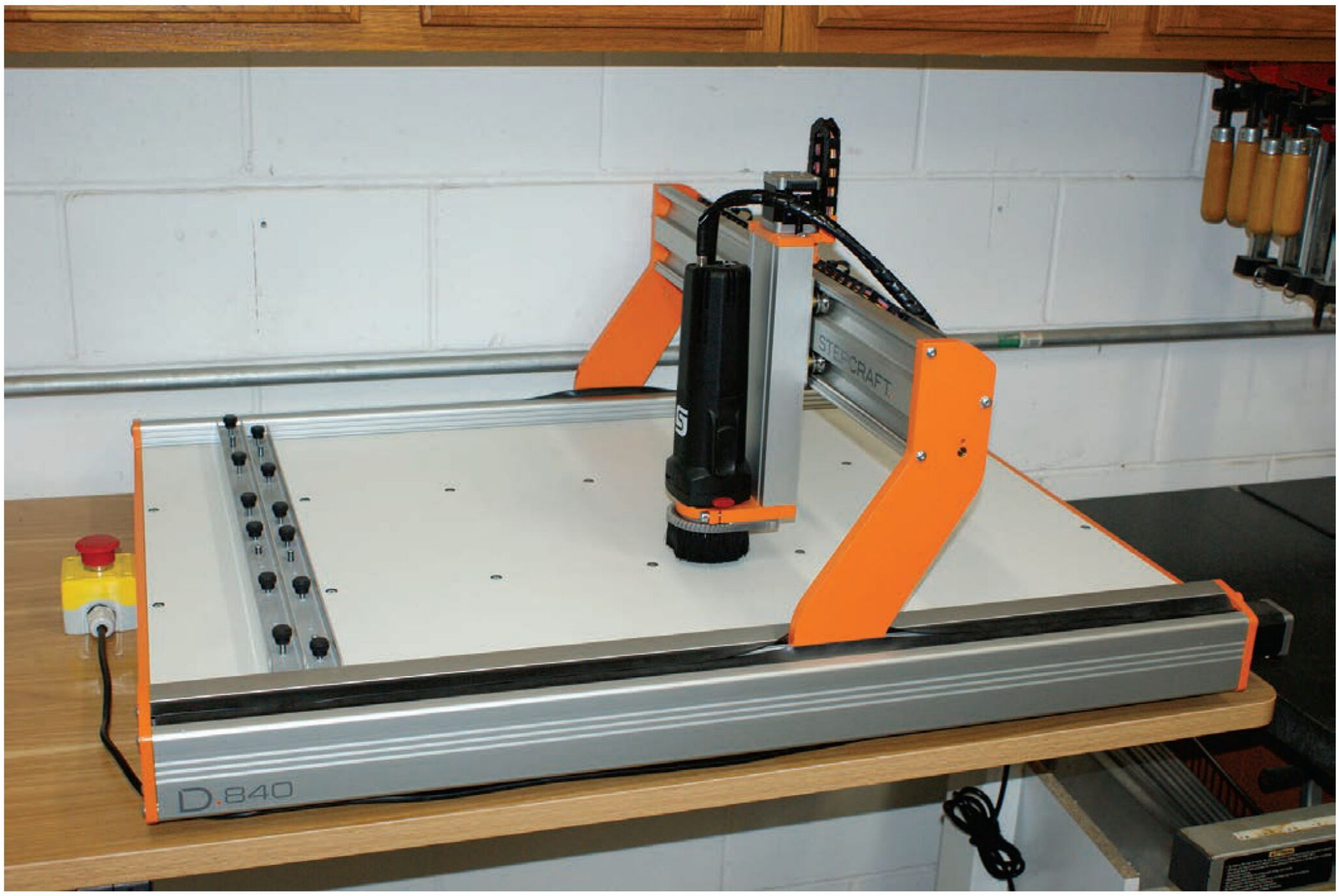
PRODUCT REVIEW

STEPCRAFT 3/D.840 CNC

Text & Photos by Adam Strong

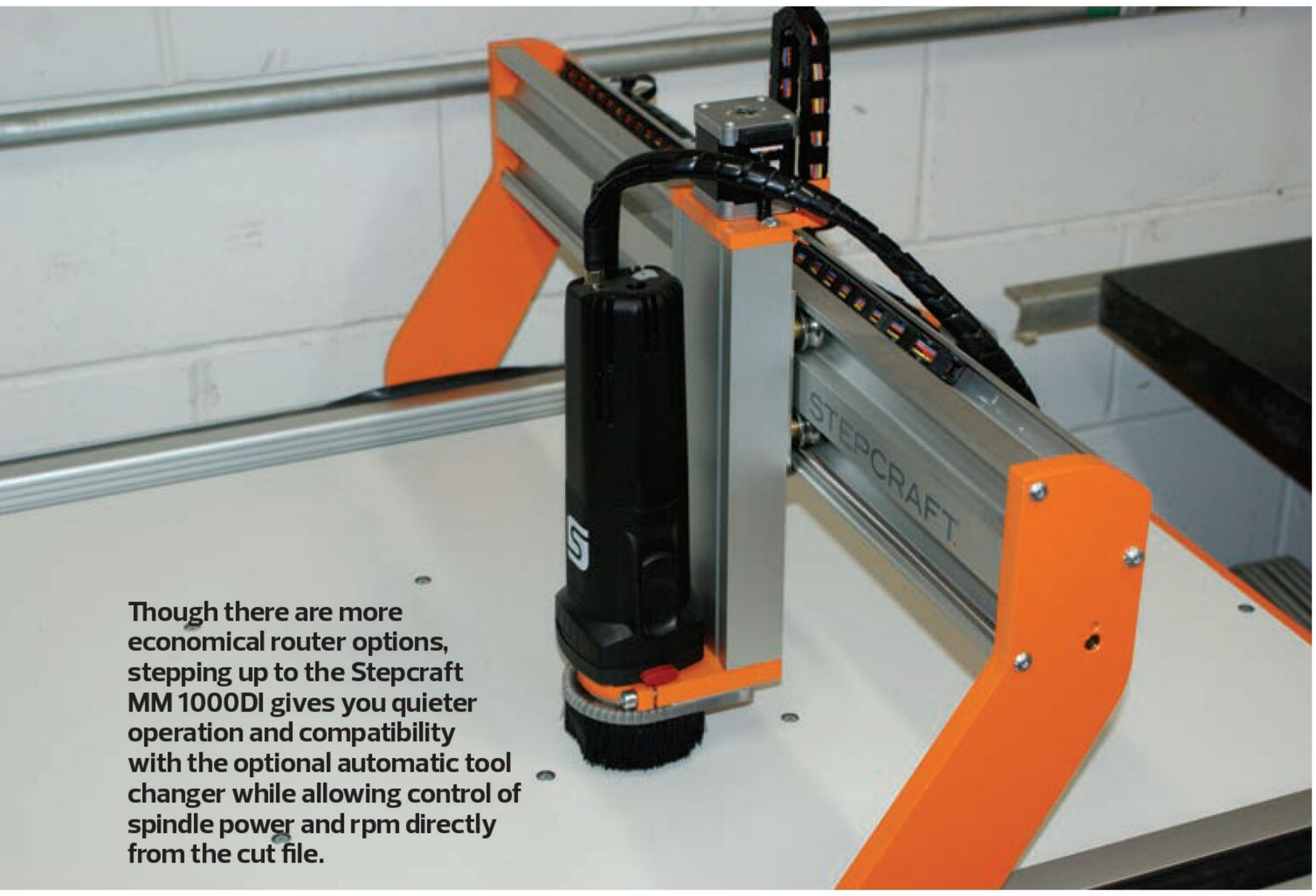


As a hobbyist and builder for the better part of three decades, I have wanted a CNC router or laser-cutter since I saw the first DIY kits offered years ago. Several years ago, I came across the Stepcraft brand and was instantly impressed by the quality consisting of German engineered components in a DIY hobby-grade CNC machine.

The D-Series is comprised of three models to fit different size and budget constraints. The finished machine is comprised of precision-fit CNC machined parts and custom extrusions to create a rigid structure that is remarkably light for its size. All the electronics, wiring, and hardware are included, along with high-quality stepper motors and drive screws. The assembly is guided by a thorough manual, making the build process comfortable and easy to follow.

You'll need a few tools and Zap CA and Z42 Loctite for the build, and you will need a sturdy table on which to assemble it and for the finished machine to reside. The 840D as reviewed has a footprint of around 30 x 40 inches and it's a good idea to have a little workspace around the machine for tools or a laptop.

In addition to milling, Stepcraft offers multiple attachment options, greatly improving your workshop efficiency because one machine can take the place of several. Stepcraft offers attachments for 3D printing, laser engraving/cutting, hot-wire cutting and more. They even



Though there are more economical router options, stepping up to the Stepcraft MM 1000DI gives you quieter operation and compatibility with the optional automatic tool changer while allowing control of spindle power and rpm directly from the cut file.

AT A GLANCE

Manufacturer: Stepcraft (Stepcraft.com)

Model: 3/D.840 CNC System

Time to assemble: 10 hours

Computer Requirements:

- PC with 1.6 GHZ processor or greater
- USB interface (Ethernet optional)
- Windows XP, 7, 8, 10 (32/64 bit)
- Mac OS X 10.3.9 or higher with Windows emulation

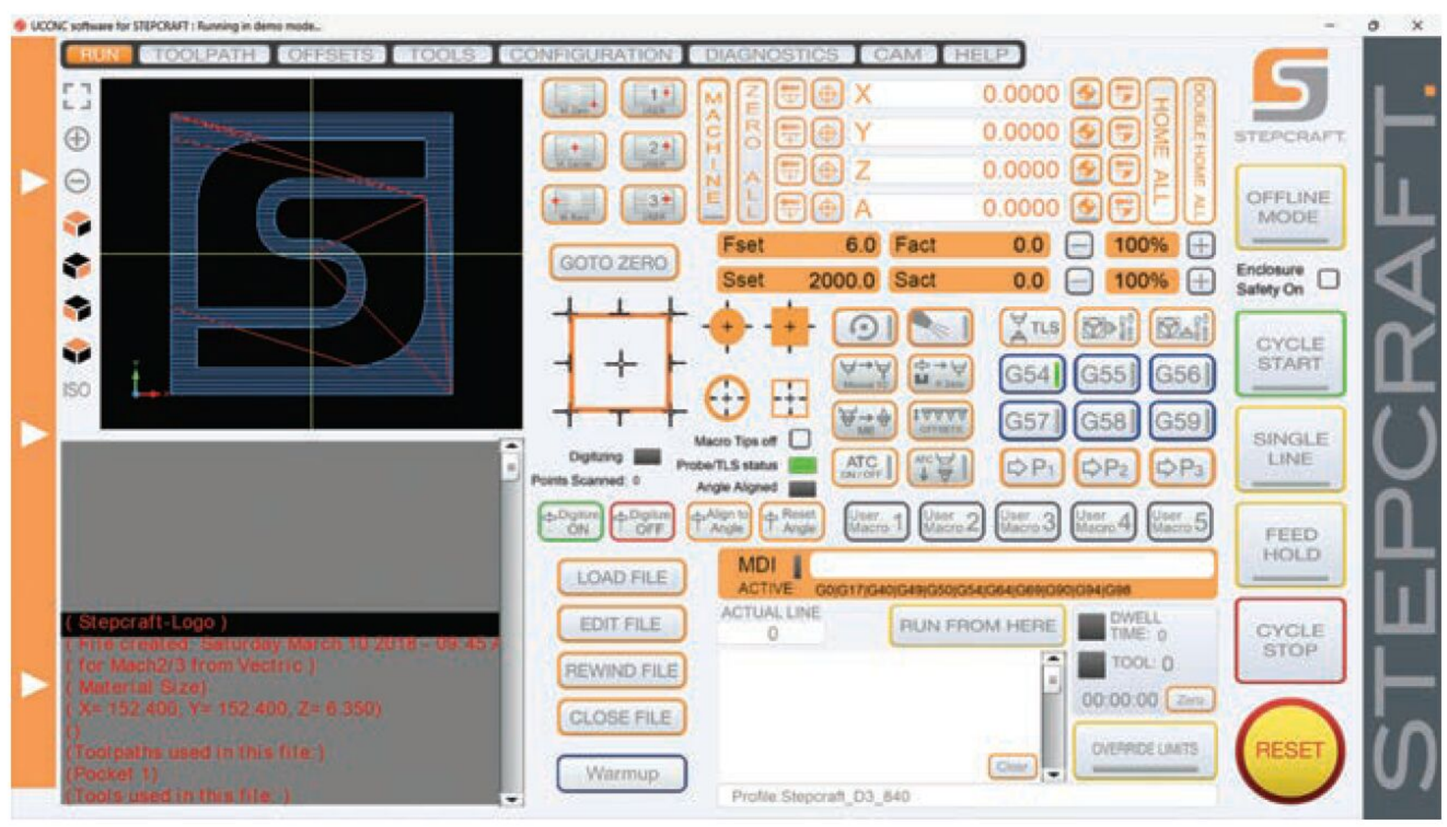
Price: $2,998

have an optional cutting bath for safely milling carbon fiber and other composites. When used as a router, you have the option to start out using the machine with a relatively inexpensive rotary tool such as a Dremel. Stepping up to a CNC spindle such as the MM-1000DI as used in the review gives a higher level of control and precision if you intend to do projects such as kit cutting that require tight-fitting parts and perfect alignment. For those wanting to dive even deeper, Stepcraft also offers both an automatic tool changer and a 4th axis for the D-series.

UNIQUE FEATURES

Stepcraft offers a DIY kit or a Ready-to-Run system for an extra $499. As a builder and tinkerer, it was a no-brainer to opt for the DIY kit which then allowed me to spring for the optional, higher-end computer-controlled 1000W spindle. When you purchase the DIY kit, you'll get a well-packed and organized box with all the hardware and electronic components in tight-fitting, molded Styrofoam. There is no pre-assembly, so organizing the small parts and hardware is key before beginning assembly. The first task of taking inventory is guided by pictures and part descriptions for every single screw in the first dozen pages of the manual. Nothing was missing from my kit, but Stepcraft has an email and phone number for U.S. customers and they are ready to help with parts or support. The next step is to go through the build guide cover to get familiar with the steps and defining symbols, such as using Loctite or CA on

Of the many compatible CAD programs available, I chose the V-Carve Pro software which allows you to design and process a cut file directly from a single program. One of the great features is the ability to virtually run the cut file to ensure there are no hiccups before risking any material.



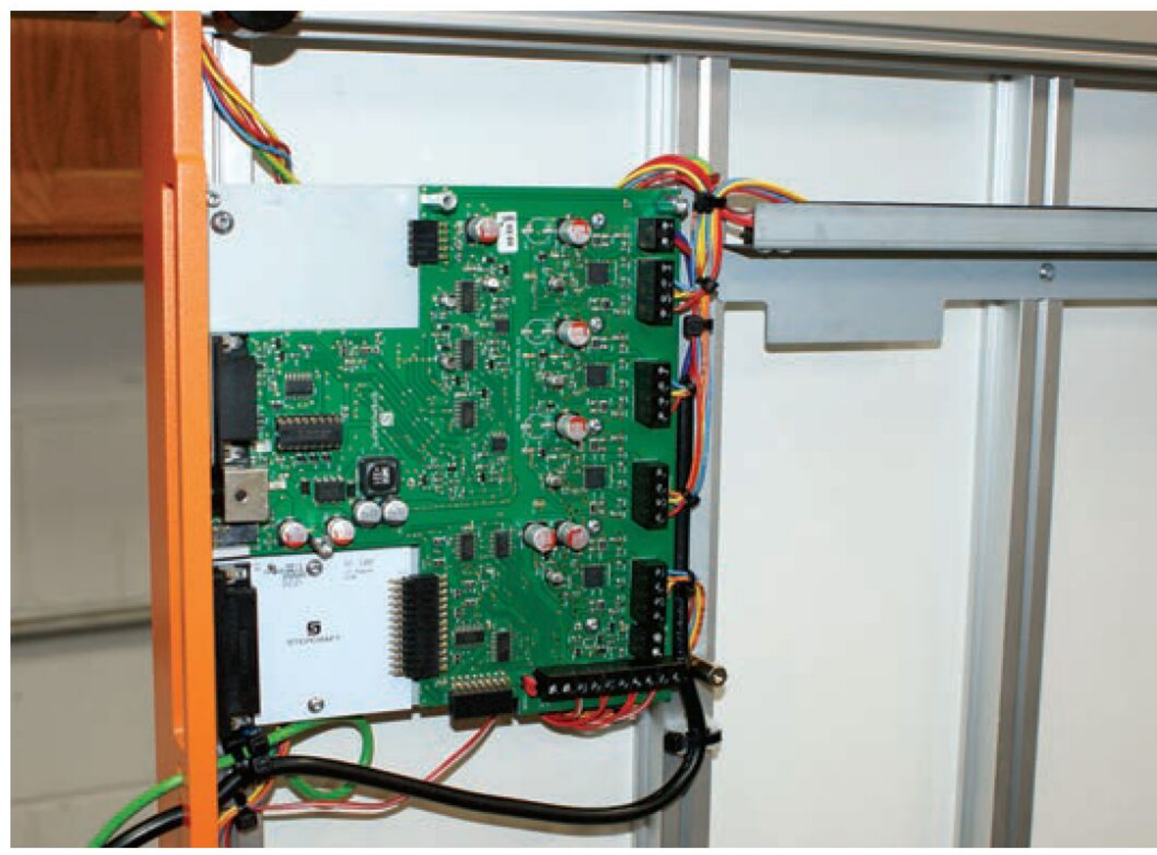
The UCCNC software interface is where the cut file will be loaded and executed. It also provides full manual control for setup and maintenance. Stepcraft uses a proprietary interface for the program that makes it easy to navigate and control peripherals such as the Automatic Tool Changer directly from your computer.

ON THE BENCH

If this is your first CNC build, powering on the machine for the first time is both intimidating and exciting so careful preparation is important. Make sure all connections have been made according to the manual and take your time, as a mistake here can cause major damage to the electronic components. Pay attention to the gantry alignment and ensure there is no binding of the stepper motors and the screws should turn freely. The final preparation is to familiarize yourself with the UCCNC software and how to manually move the stepper motors through the full range of each axis using the software. This will allow you to test the motion of the machine and adjust the alignment. Stepcraft has recently launched an educational series for the UCCNC software, which takes you beyond the basics and into the full capabilities of the system. In addition, online resources provide everything from project design ideas to full ready-to-cut files that you simply load and can start cutting.

To start creating your own projects, you will need to choose a 2D or 3D CAD program to design and lay out your projects. There are many free programs available which work well, but I have found the learning curve to be much easier using pro-grade software, which tends to be more straightforward and better developed. In addition, you'll need a post-processing program (which is included in many of the paid software options), to convert your drawn project into a G-code file, essentially a map to guide the CNC through the milling process. There are too many options and variations to go into, but make sure the programs work well together and with the Stepcraft machine. I used V-Carve Pro software, which includes a post-processor and can directly output the G-code cut file all from a single program. V-Carve has a gentle learning curve and you can find multitudes of tutorials to help you get started.

Shown is the Z-axis assembly, which uses an extremely rigid custom aluminum extrusion with steel rails guiding the bearings. This creates a consistent preload on the bearings for accurate, smooth, and stable movement of the cutting tool while providing hard bearing surfaces for long service life.



Throughout the assembly process, wires are carefully routed to eventually terminate at the Main Board. There are a few dozen wires that can look intimidating, but the instructions are clear and easy to understand, so no electronics expertise is required. Properly routing the wires is essential for both cable management around the board and to keep them safe from moving parts.

certain parts of the assembly and the torque specs. It is important to only use adhesives where specified, as the nature of a CNC machine with moving parts and a rigid structure requires following specifications.

All the hardware is metric, and everything fit well right out of the box. The guide breaks the build down into "Assembly Units," which are alpha-numeric and act as waypoints where you can easily walk away and resume the build later without fear of a missed step. The only thing I felt was lacking guidance is the cable routing of the spindle itself; if not routed properly it can cause binding or have loose cables that are vulnerable to the moving components.

BOTTOM LINE

I was able to assemble the full machine in around 10 hours, from opening the box to test running the system. On a difficulty scale of 1 to 10, the build was about a 6. The satisfaction of completing the assembly and performing the first test runs is certainly worth the time and effort to build from a kit. The finished 840D machine has more than enough capacity for the typical RC project and can handle all the typical materials used in modelling, from simple balsa and plywood sheets up to composites and even aluminum. There are several online guides and tutorials to help you choose the proper end mills, cutting bits, feed rates, and tool speeds for different materials. With a bit of learning and experience using the software, the possibilities are limited only by your imagination!

PRODUCT REVIEW

RCJetWerx 3S LiFe Turbine Battery

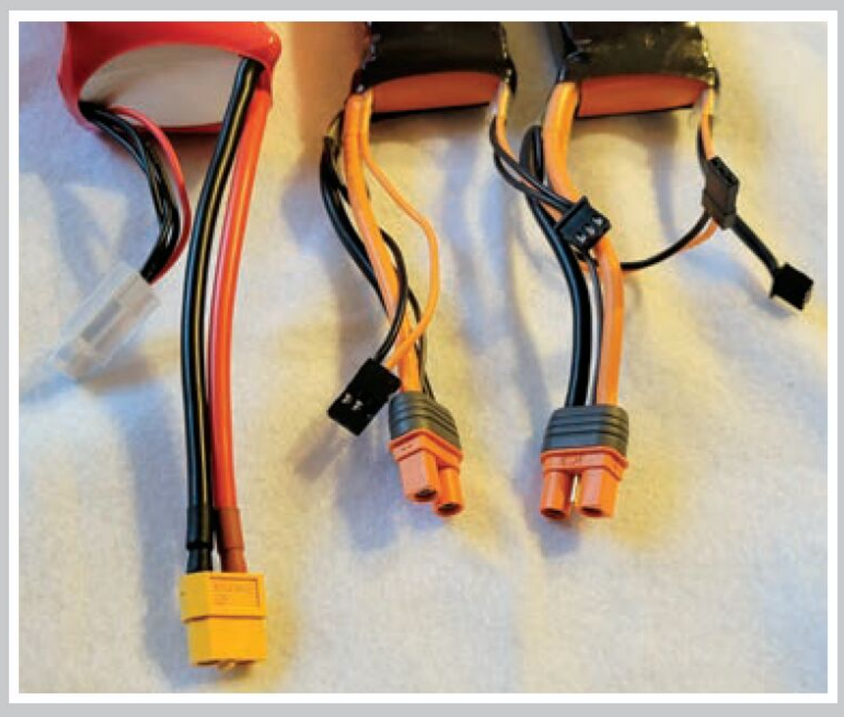
I've been using RCJetWerx Graphene LiPo batteries for several years in my EDF jets, so when owner Andy Davis asked me to try one of his LiFe turbine ECU batteries, I had no second thoughts using it in one of my large turbine jets. The Electronic Control Unit of most turbines requires a 3S battery to power the starter motor and fuel pump, and many, like my Kingtech K180, are set up to use LiFe chemistry and voltage. Previously, RCJetWerx had only offered their 3S LiFe batteries for commercial UAV applications.

When balancing a large jet, weight is often required in the nose, and when faced with the choice of carrying useless lead or useful battery capacity, I'll take battery capacity any day. RCJetWerx's 3S LiFe packs are available in 2100, 3000, 3800, and 6000mAh capacities, so by using a 3S 6000mAh LiFe pack in my BVM 1/7-scale F-18, I all but eliminated nose weight by placing the LiFe pack up front, just forward of the nose landing gear. The packs start at $39, and the 6000mAh pack I tested is $89.

When matched up with a pair of 5000mAh 2S receiver batteries, I can go to an event and not worry about charging batteries until the end of the day. This is a big advantage at large events when an outlet for my charging station can be hard to come by. I pull the batteries at the end of the day and charge at my leisure in the evening.

Another advantage of the RCJetWerx LiFe batteries is the short battery lead. Many packs made for turbines come with cable that always seems to be about a foot too long and requires either re-soldering connectors or stashing a bunch of wire somewhere.—*Andrew Griffith*

RCJetWerx.com



Tech Tip

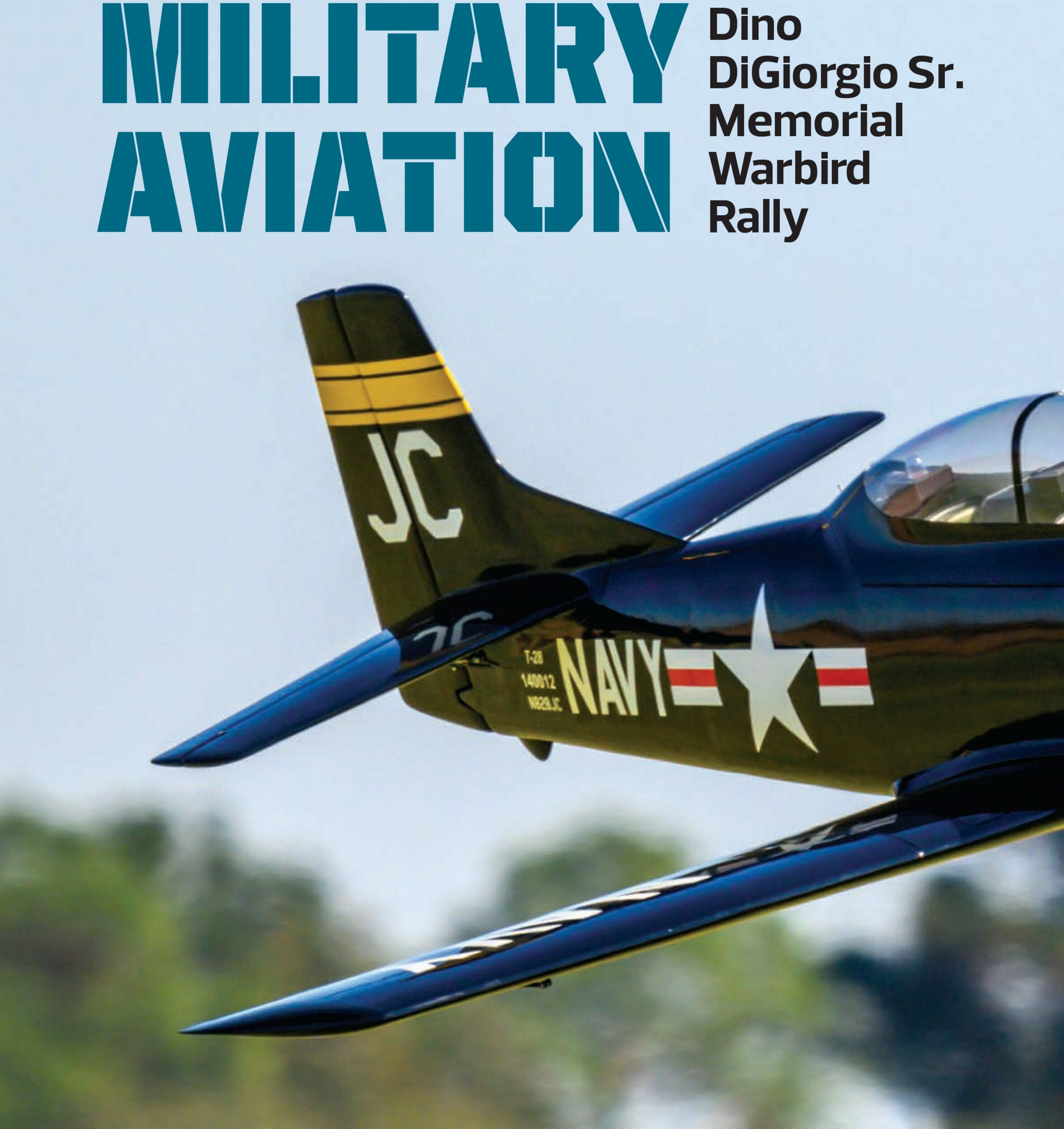
Turbine jets require mixing battery types because the radio systems use some sort of 2S battery while the turbine ECU requires a 3S. I always use different connectors, in my case EC3 on the receiver batteries and XT60 on the 3S turbine battery. This virtually eliminates the possibility of accidentally plugging the turbine battery into the receiver and sending 11 volts to the receiver which could destroy servos, landing gear motors or controllers, or brake actuators and controllers.

FEATURE

TEXT & PHOTOS BY DAVID HART/CAPTUREDFROMTHEHART.COM

CELEBRATING MILITARY AVIATION

Dino DiGiorgio Sr. Memorial Warbird Rally



WW I dogfighters, modern jets, electric, gas, and glow flyers, giants and park flyers, scratch-builts and and ARFs … scale RC planes in military livery are all welcome at the annual Dino DiGiorgio Sr. Memorial Warbird Fly-In. In 1997, Dino Sr. founded the World Miniature Warbird Association to include all sizes of military RC models in fun fly style events, preserving our military aviation history through RC model aircraft. Dino Sr. passed away in 2003, and his son Dino Jr. has been the motivational driver for this special memorial event.

Jason Korst does a nice photo pass with his award-winning T-28. He took home the Best ARF award.

John Rosier's Sea Fury, painted in the racing scheme "Sawbones," looked great in the late afternoon light.

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The flightline was busy all day long as seen here with Mike Barbee preparing to take up his Stearman.

Pilot PJ Ash (left) and builder Frank Sarantidis after a successful flight.

A display of past and present with a P-40 knife-edge pass and A-10 flyby.

Pilots prepare for a T-28 gaggle.

This was my third time attending the event and it did not disappoint. It was again held at Mac Hodges Field in Andersonville, Georgia. The grass runway is like a golf course fairway, and there's even a pond for float flying. Not only does Mac have a beautiful airfield, but the rest of the facility is also topnotch, including a huge covered staging area, restrooms with showers, and a lot of RV parking. The Chuck Wagon on site served food all day, and flying was nonstop. What more could you ask for?

This year, 78 registered pilots and approximately 200 aircraft were at this year's event. Open flying started on Sunday, October 20 with the event officially starting on Thursday and running through Saturday. I arrived on Monday afternoon and there were already a lot of people there enjoying the field. Over 200 people attended this year's event, flying all kinds of warbirds, from WW I to modern day fighter jets. It didn't matter if it was a small electric foam airplane or a helicopter; as long as it was a military aircraft, you could fly it. Registration was handled by Dino Jr.'s wife Kim. The flying started before the sun rose and didn't end until about 15

Roderick Vargas holds back Scott Prossen's Wildcat during a run up.

Curtis Switzer tosses Chad Cotsamire's P-51 into the air.

One of a few Stearmans that were in attendance was Curtis Switzer's.

O-1 BIRD DOG

An Army fixed wing pilot with the 173 Airborne Division, Jim McDevitt decided to model his 1/4-scale O-1 after the full-size he flew in Vietnam. He says, "I flew the O-1 Bird Dog with the 219th AVNCO Head Hunters from October 1970 to October 1971, flying over 270 combat assault missions in country. My job was to locate enemy positions, escort airborne troop insertions, call in and adjust gunships, air force and navy fighters, adjust artillery and assist in the rescue of downed pilots when needed. I would mark targets with 2.75-inch aerial rockets or would fly low over the target and throw smoke grenades out the window. I was 19 years old at the time and usually flew alone. The aircraft I flew for many of those missions was Army tail number 015-057, which treated me well. I took many slides of her, so when I decided to build her I had plenty of reference material to work with."

Jim built his highly modified and detailed aircraft from Vaillancourt plans and a short kit from Kit Cutters. A Saito FG-61TS provides plenty of power.

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B-17 FLYING FORTRESS

Thirty years ago, Dino DiGiorgio Sr. started this B-17 build from Don Smith plans. Dino Sr. had known someone who was on the crew of the B-17 "Outhouse Mouse" and got drawings from him, but he never finished the model. Dino Sr.'s friend Doug Smith decided to pick up the project and finished building, assembling, and plumbing the bomber. He says that the 140-inch-span model is powered by four DLE 20cc gas engines and uses eight 3000mAh A123 batteries. It has Robart air retracts, Paul Rice resin-cast dummy engines, pilot figures, crew and guns by Mark Murdock, and is outfitted with all Futaba servos and radio gear. Doug created the scale scheme with PPG paint. Bravo to Doug for completing this project, which is a fitting tribute to Dino Sr. and the crew of B-17 "Outhouse Mouse."

Doug Smith (left) with event CD Dino DiGiorgio Jr.

One of a few A-10s in attendance.

Darrell Sprayberry cruised the flight line with his dog Molly in his 50% scale Willy's Jeep.

AWARDS

Special Recognition		Curtis Switzer
Best ARF	T-28	Jason Korst
Best WW I	Eindecker	George Hunter
Best WW II	Sturmovik	Jeff Quesenberry
Best Post WW II	L-19	Jim McDevitt
Best Scale Flight	TA 152	Chad Cotsamire
Best Multi	B-17	Doug Smith
Pilots' Choice	Peashooter	Jeff Quesenberry
Best of Show	P-47	Frank Sarantidis

minutes before sunset. This gave me the opportunity to get some nice sunset photos on the runway. The flying didn't stop after sunset, though. There was night flying going on every night with at least three or four night fliers up at one time. The weather was nearly perfect the whole week, with highs in the low to mid 70s and cool temps at night. This is probably the most fun, laid back event I have been to, and I plan to make this an annual trip.

Mark your calendars for October 21–25, 2025—this is one event you don't want to miss!

Frank Sarantidis's Best of Show award-winning P-47.

From radials to turbines, all sorts of warbirds were represented.

A nicely detailed SBD Dauntless flown by Cal Branton.

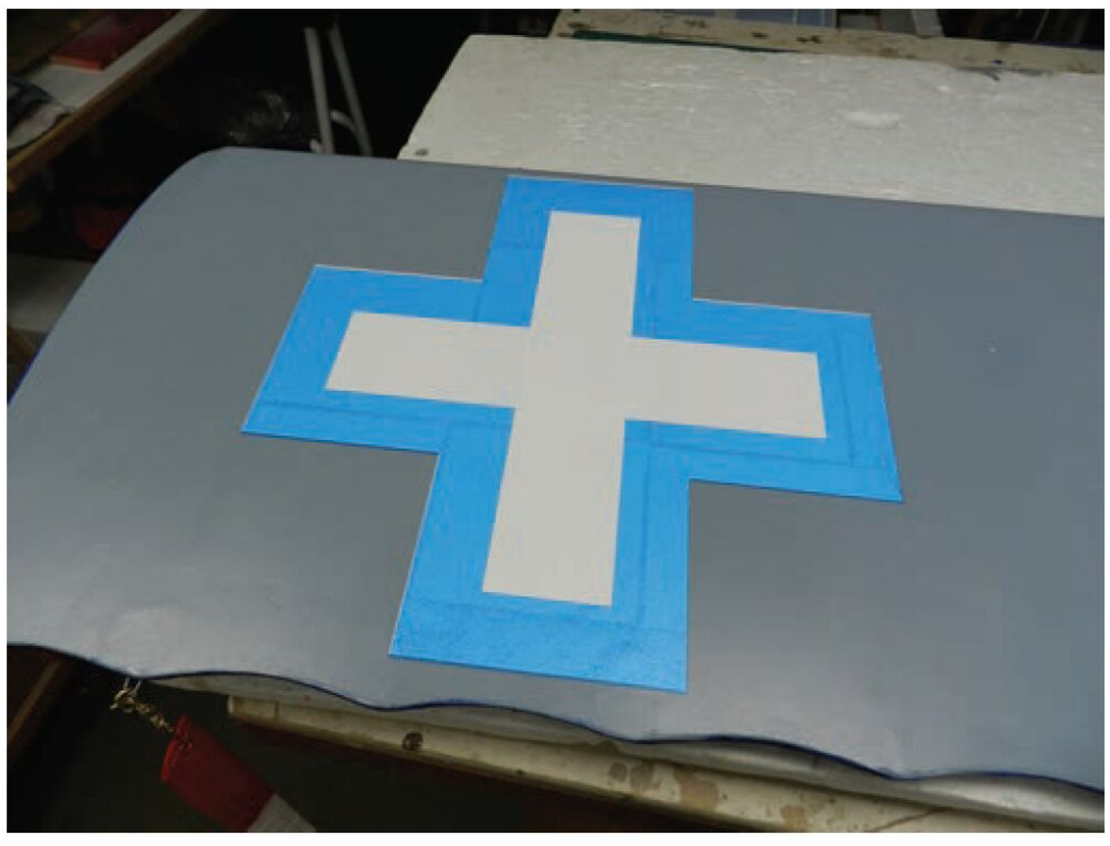
TEXT & PHOTOS BY ED ROGALA

PAINT SCALE MARKINGS

Neat, precise results using Callie Graphics masks

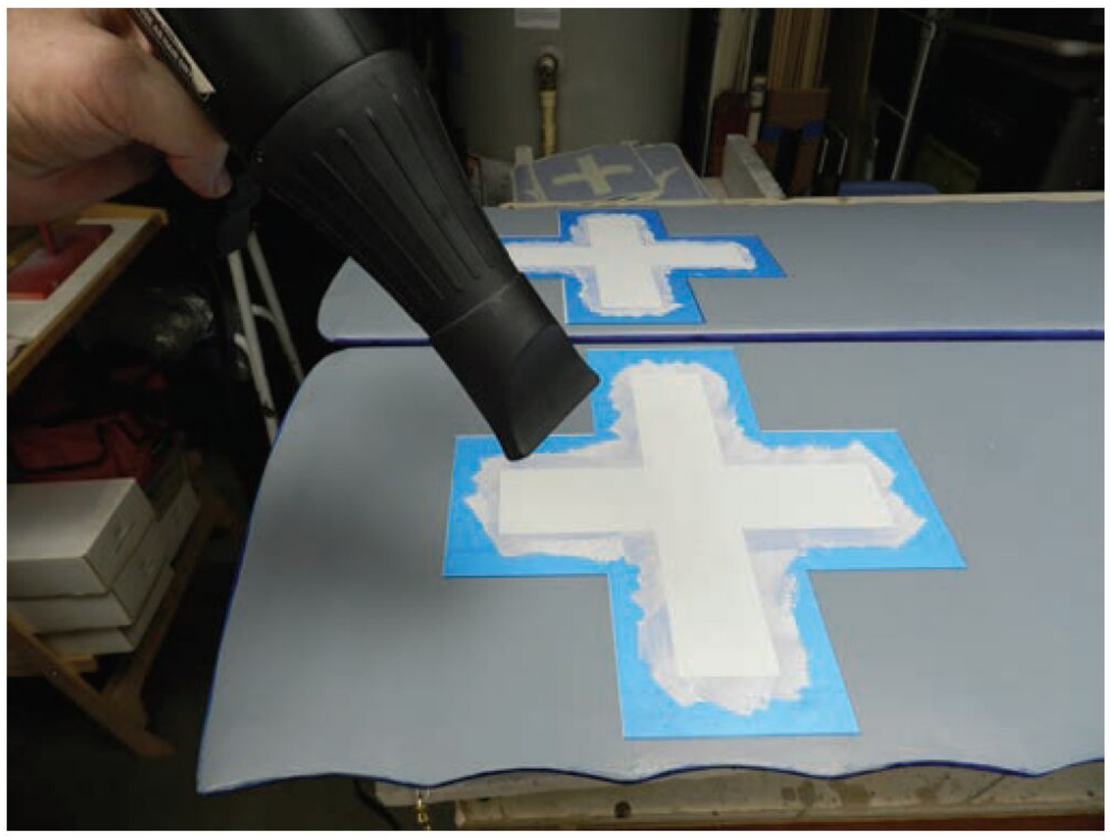
When it's time to add markings to your scale plane, paint masks ensure that you'll get precision results. I use Callie Graphics paint masks and have found them to easy to apply and use. Here's how I used a paint mask to apply an Iron Cross to the underside wing of my Fokker D-VII.

Paint masks are best applied dry. Use a rubber or plastic squeegee and make sure they are lying flat on the surface of your model. Remove the backing paper and carefully position them on your model.



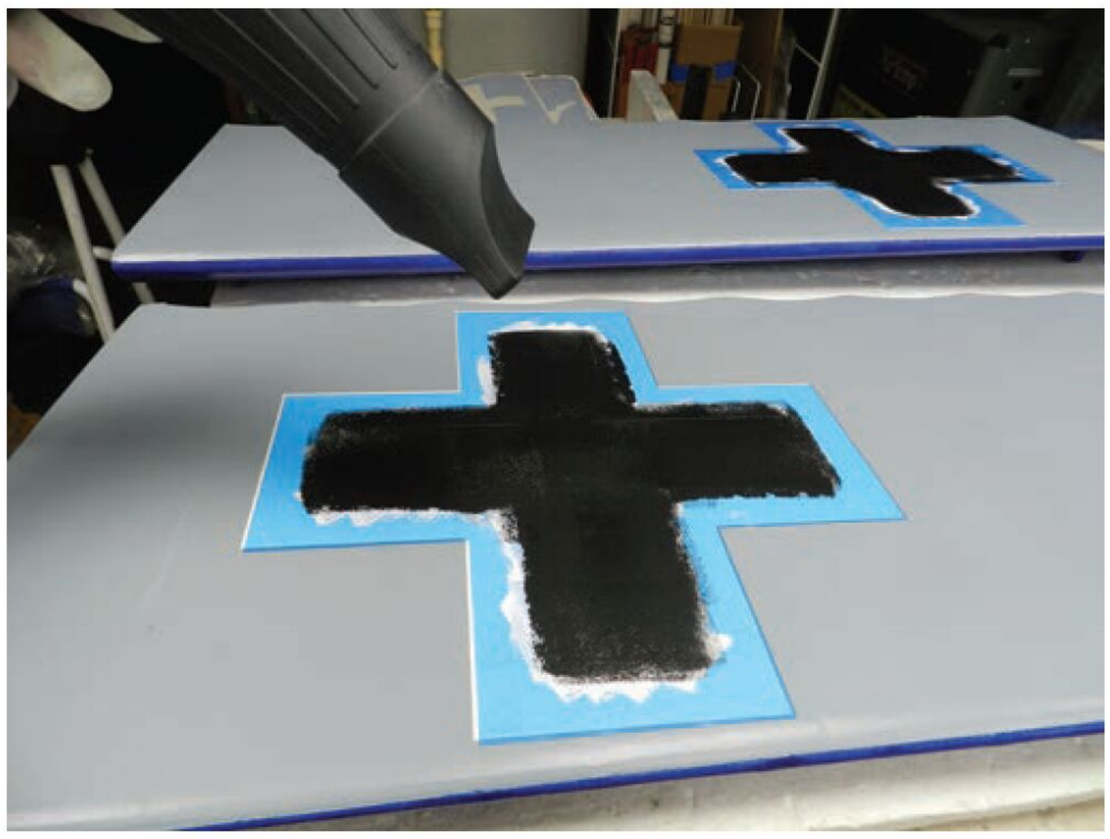
Now carefully remove the top carrier paper from the mask.

Apply a light coat of paint along the inside perimeter edges of the mask. This light coat should be the SAME color as the color you will be painting. This will prevent any "bleeding" of the color onto the surface of the model.

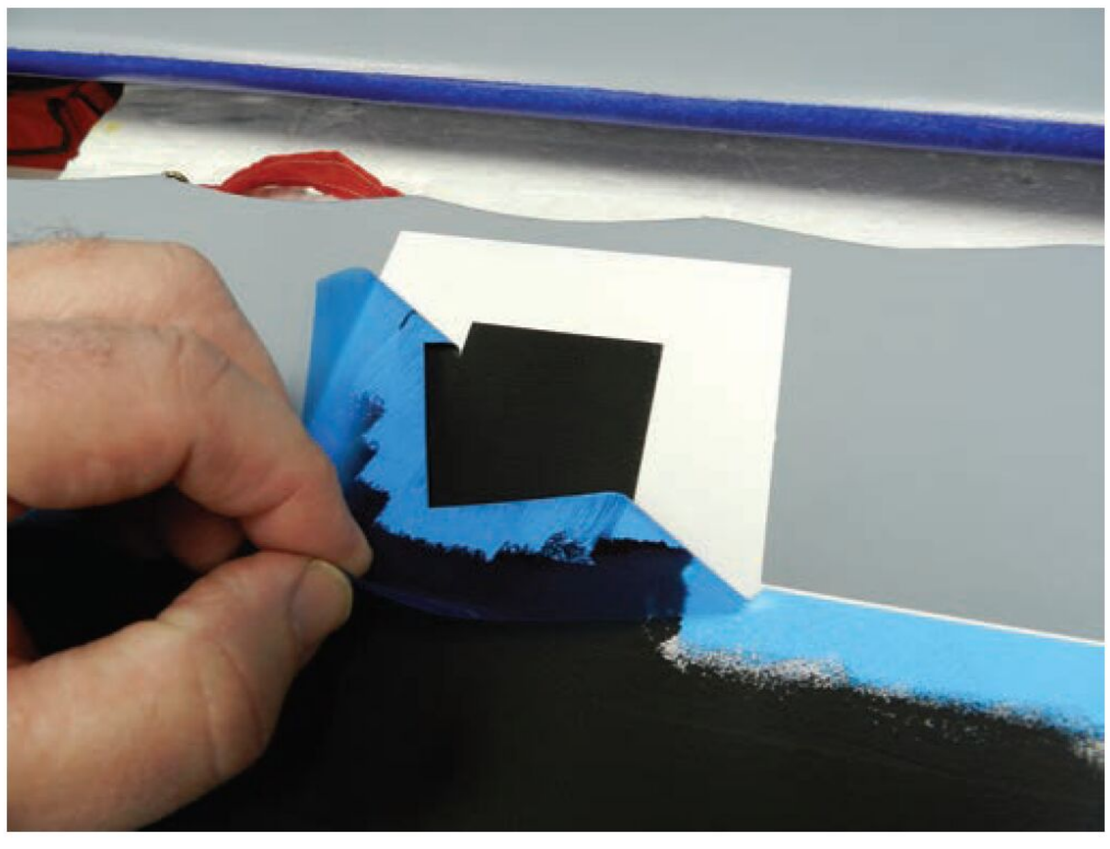


Allow it to dry thoroughly, you can use a heat gun set on LOW to dry this light coat of paint. Be careful not to apply too much heat so the mask remains in place.

Paint the color of the area that has the mask using the color you want the marking to be. Here, I'm using a 4-inch foam roller and applying latex house paint.



After the first coat dries, apply a second coat. The number of topcoats you apply will vary depending on what color you are painting over. In most cases two or three coats will be adequate.



After the paint has dried, carefully use a hobby knife to lift up a corner and remove the masks.

Sit back and admire your completed work! The next step will be to apply the clearcoat of your choice to your model.

HOW TO

BY DENNY DEWEESE

FIBERGLASS A WING

Tips for producing a smooth surface

There are many ways to apply fiberglass cloth to a structure. The most common methods use either polyester or epoxy resin and catalysts. Some of the resins require unequal mix ratios, like one part epoxy to two parts hardener, which is difficult to measure accurately. I also dislike polyester resin because it really smells foul. For all these reasons, I now use Pacer Technology's Z-Poxy Finishing Resin (#PT40). It is an equal-mix product that has little to no smell and is easy to work with. Cure time to a tacky consistency is about 30 to 45 minutes. After about two hours you can handle it, and after four to five hours, you can sand it or apply another coat. Even if you have never done this before, it is really easy to do.

LET'S GET STARTED

Some items you will need are paper towels, 1-inch hardware-store chip brushes, something stiff to use as a "squeegee" (a credit card works great, as do plastic-coated playing cards), a hobby knife with no. 11 blades, Z-Poxy Finishing Resin, and some denatured alcohol. A flat surface, like an old table or workbench, covered with newsprint or some other disposable covering is excellent for setting parts on. You will also need some 100- and 220-grit sandpaper to smooth out your prep work. A rubber sanding block, available at most hardware stores, will help enormously. Oh yes, and some 5-oz. disposable drinking cups will be useful for mixing the resin.

Keep in mind that different-weight fiberglass cloths (from 3/4 to 3 oz.) work differently. The heavier the cloth, the more stubborn it may be to lay down properly—be patient.

Whether it is a one-piece or a two-piece wing, pretend that it's divided into four quadrants: top left, top right, bottom left, and bottom right. It doesn't make a difference which section you start with. If you have detachable ailerons and flaps, remove them and do them separately. Now, let's get down to business.

PREPARATION

Before you start the first panel, make sure that the whole wing has been finish-sanded with 220-grit sandpaper and then vacuumed clean. Do the other three panels in the same way. If your balsa wing has any dents in it, spray the dented area with a little water and gently rub it into the dent. Let the area dry out; the wood grain will lift slightly, causing the dent to vanish like magic! The general idea here is to have smooth, flat, ding-free surfaces over which to lay your fiberglass cloth.

As far as fiberglass cloth goes, my basic guide to what weight to use is directly related to airplane size. For models with wingspans in the 80-inch range, you can use anything from 3/4- to 1 1/2-oz. cloth. Anything 100 inches and over, I use 2- to 3-oz. cloth. You get the idea. To find where to buy your glass cloth, check hobby shops or large distributors. You can also shop around your local boat/marine hardware stores for the cloth you need.

Now, measure your wing panels and allow at least an inch of waste material all the way around. After cutting your first piece of cloth, lay it on top of the wing panel and rub your hand over it to make sure that there is nothing under

As you can see, the wing of this Hellcat has been finished nicely with fiberglass cloth and resin and is ready to prime.

it, as any speck of sanding dust will ruin the finish.

THE GLASS ACT

For the first coat of resin, I add about 5 to 10 percent alcohol to the resin. This is not really recommended by the manufacturer because of the variances of alcohol used, but it helps the cloth lie down easier without pulling it out of shape while applying the resin. When you apply the second coat of resin, however, use it full strength. Mix the resin parts together completely, add the alcohol, and mix again until the alcohol is fully integrated.

Lay the cloth down over the bare balsa, being sure that it lies down completely smooth. Pour a small line of the mixed resin down the center of the wing panel spanwise, and spread it out from the center to the leading or trailing edge—it doesn't matter which—then do the rest. Keep a disposable drinking cup handy to squeegee off excess resin from your credit or playing card. Paper towels are nice to have around, too, as well as a 1-inch chip brush to brush down the edges and areas that you missed.

Now, spend some time going over those areas; fixing it now makes life a lot easier later on. By this time, your hands will feel as if you just handled a large ball of cotton candy—nice and sticky. Wipe yourself and any tools you wish to keep clean using a paper towel and some alcohol. Trust me—once you have completed the first panel, you will find the other three will go much faster.

I usually do the top-left panel followed by the top-right panel and then let cure. I trim the edges with a no. 11 hobby blade and then lightly sand the edges all the way around. I flip the wing panels over and apply cloth to the other side. Don't build up too much resin near any edges because, when it cures, you will just have more resin to sand off.

After you've done all four panels and they're all fully cured, revisit the first panel and very lightly sand and fix any little imperfections or dings that you might have picked up. If you have any wrinkles, bubbles, or brush hairs, now is the time to sand them away. If you must sand down so far through the cloth and resin that it leaves a bare spot, don't worry. You can cut a small piece of cloth and put it down with the second coat of resin, or if it's small enough (like the size of a quarter), just ignore it and put down the second coat of resin directly over the bare wood. Go over the other three panels and do the same thing.

As for the wingtips, I simply trim close

to the wing, apply resin, let cure, and then sand. If needed, I'll add scrap cloth to cover any bare spots. When you have all four panels done with two coats of resin and they are fully cured, use the sanding block to sand the wing smooth. You will notice that the second coat of resin has cured fairly shiny. This is because it just lies on top and does not absorb at all into the wood or the glass cloth. Use 100-grit sandpaper over the shiny surfaces to "break" the shine, then switch over to a finer-grit sandpaper, like 220, to finish-sand the whole panel. Remember that when you sand the cloth, be careful not to go through to bare wood. The difference now between a good wing surface and an outstanding one is how much time you spend sanding the wing.

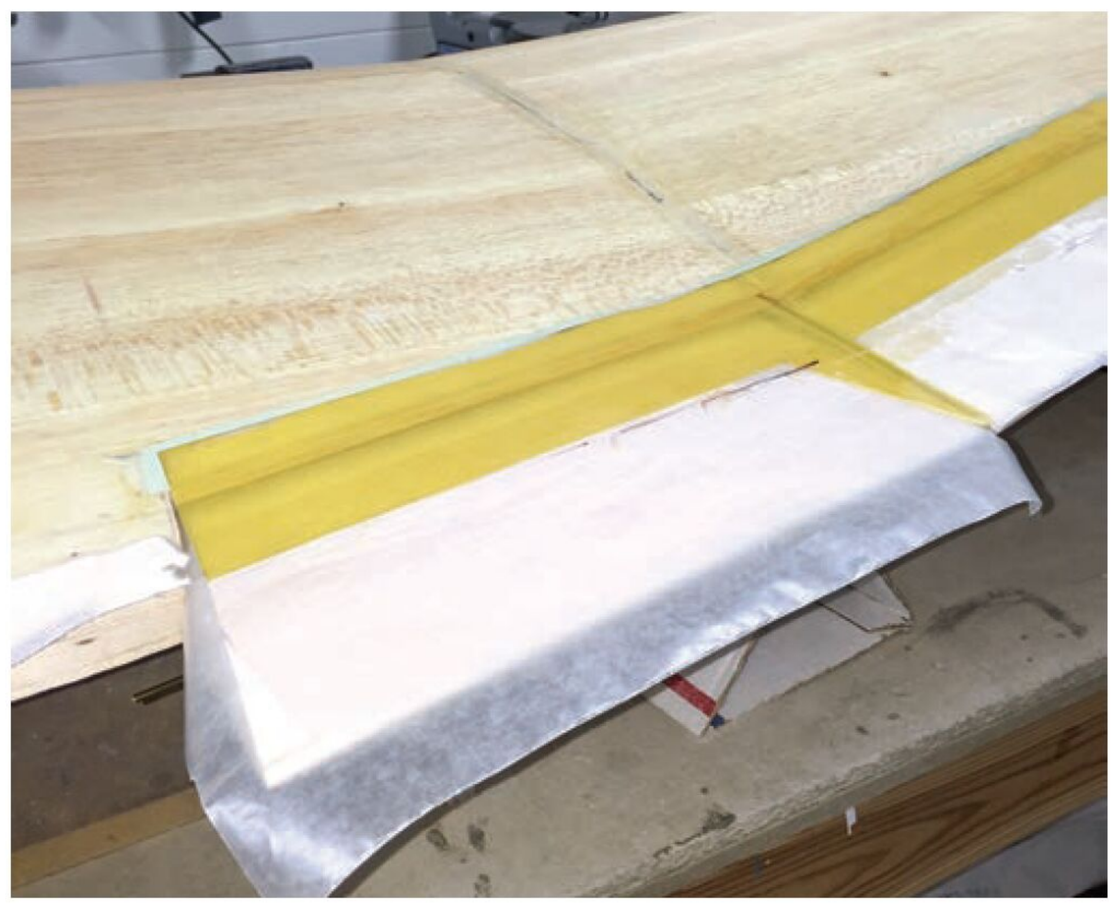
When you have the entire wing finished as mentioned above, you are just about done. For me, the next part is the final step. Find a well-ventilated area, and get some Rust-Oleum Automotive gray primer (an average rattle can will cover about 4 square feet) and lightly spray the wing panels. The primer will expose any flaws left in your fiberglass surfaces. Fill any pinholes or dings using a lacquer spot putty or Bondo, let dry, and sand and primer again.

Now you are ready to paint your wing! No matter how you choose to finish it, the smooth fiberglass will enhance your model's overall appearance.

I cut the cloth a little oversize, lay it over the surface, and dry-brush any wrinkles out. I pour the mixed Z-Poxy down the center, from root to tip (as shown), and prepare to "squeegee" the resin through the cloth.

Using a clean credit card or plastic spreader, I spread the resin toward the leading and trailing edges, to a point where there are no ridges of resin visible.

WHAT YOU'LL NEED
Here's what you'll need for this project. The components shown here are needed to start the project. The method I use will work with any resin, whether it is polyester or epoxy based; I chose this Z-Poxy product because I enjoy its working characteristics. Your scissors must be sharp. I use denatured alcohol for thinning or cleaning up the tools, but rubbing alcohol will also work.



After completely spreading the resin, this is what the surface will look like. When the resin has cured, the excess fiberglass cloth can be easily trimmed using a single-edge razor blade or lightly sanded using a sanding block. Here, the wax paper protects the flaps from the resin, but the flaps are in only to make sure that the trailing edge cured straight; normally, I would take the flaps out.

Notice how neat and clean the surfaces appear after sanding the second coat of resin. All surfaces are now ready for primer. Because the second coat of resin does not seep into the wood grain, it forms a crisp topcoat layer, which is very shiny. Sanding it until dull is appropriate.

A small vibrating sander can be helpful in breaking down the glossy topcoat of resin. The more pressure you apply, the faster it works. But be careful not to apply too much pressure on the corners—you may go through your cloth!

The fiberglassed and sanded wing panels for the big Hellcat I'm working on are just about ready for primer, as soon as I finish-sand the inboard edges of the panels.

The same basic technique is done for all control surfaces, as shown here. The parts are set aside until the resin cures, then the excess cloth is trimmed away and sanded smooth using sandpaper.

For strength, I always glass the wheel-well interiors.

FLIGHT REPORT

BY FITZ WALKER
PHOTOS BY RAYVIATION

SEAGULL MODELS/LEGEND HOBBY

MAGIC BIRD

This pylon racer is your ticket for speed!

AT A GLANCE

Model Name: Magic Bird

Manufacturer: Seagull Models

Distributor: Legend Hobby (LegendHobby.com)

Wingspan: 45.6 in

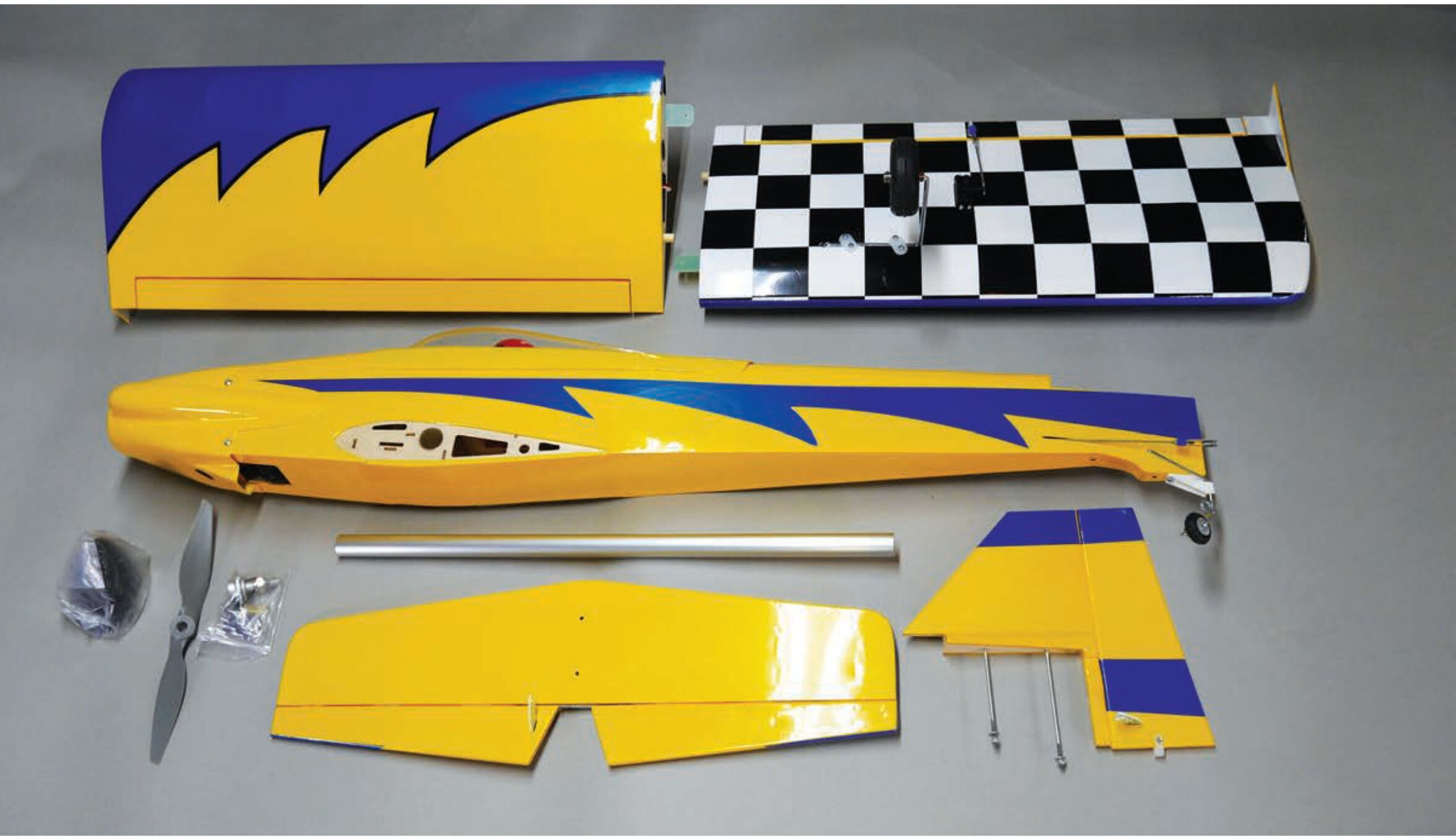
Pilot Skill Level: Intermediate

Time to Assemble: 30 min.

Power Req'd: 6S 2200mAh LiPo

Radio Req'd: 4- to 5-channel

Price: $595



Parts count is low, which means assembly time is extremely fast. Everything is expertly covered in a lively paint scheme.

Simple speed. That is the logic behind the long lasting Quickie 500 class of pylon racers. With their straight "Hershey bar" wing design, slab-sided fuselage, easily available engines, and easy construction (ARFs weren't as available back in the stone age of RC modeling), you could get into adrenaline-inducing racing with minimal cost and time, relatively speaking.

Despite their racing heritage, it was quickly discovered that these models made for very nice sport planes when not over-powered and duking it out with other modelers around the pylons. The "500" comes from the wing area, which is regulated to 500 square inches and turns out to provide ample lift and moments for both modestly powered and over-powered power systems alike.

So it's no surprise that U.S. pylon racing rules have a similar class for electrics known as "EF-1." The class has equally stringent rules not only for aircraft design, but also for electric motors, props, and batteries. This makes for an even easier entry into the sport as you no longer have to deal with cantankerous glow-powered engines. Just plug and play, so to speak.

Speaking of plug and play, the Magic Bird ARF is traditionally constructed balsa/ply design with iron-on covering. What's more, all servos and the power system are preinstalled by the factory. Just add a receiver of your choice and stir. The Magic Bird offers a quick and easy way to get into electric pylon racing (though not EF-1, as we'll discuss later).

UNIQUE FEATURES

There are not a lot of parts to assemble. In fact, calling it a ARF is almost an understatement. It's more of a "basically ready to fly." But BRF sounds too much like something that happens after having too much to drink. Needless to say if you spend more than an hour putting it together, then maybe you were having too much to drink.

All parts of the model are expertly covered with yellow low-temperature iron-on film with blue trim. Quite a bit of effort went into the color scheme. Of particular note is a black and white checkerboard pattern underneath the right wing only—a nice touch to aid in visibility during hectic racing.

Digital Dualsky DS9401 servos are installed throughout, and you only need to connect up the clevises to the tail. The wing servos are already connected to the aileron control surfaces. The manual also mentions the option to set up the ailerons as flaperons. I should also note that the fixed landing gear is already installed into the wings.

The wing halves are held in place

Author prepares the Magic Bird for flight. The quick-release top hatch makes for easy access to flight battery.

with bolt-through fiberglass tabs internal to the fuselage. They also have small ventral winglets at each wingtip. This aerodynamic feature should help improve speed and stall performance.

The power system consists of a 680kv Dualsky ECO 3520 brushless motor and a Dualsky electronic speed control (with XT60 connector) rated at 85 amps and good for up to a 6S LiPo. An APC 9 x 6 prop is supplied as well. I particularly noted the snazzy streamlined fiberglass cowl and large but sleek canopy hatch, which provided plenty of opening for to access the juicy innards.

If the previous block of text seems like I've been filibustering a bit, then give yourself a cookie. I have. Simply because assembly only requires bolting on the tail assembly with two nuts, and bolting on the wings with two screws. Pop the included prop on and add a receiver and you're done.

IN THE AIR

For some reason the instructions in the kit didn't say what size battery to use, so going by U.S. pylon racing rules I first tried a 4S battery. However, to my calibrated ears it didn't sound very powerful when running. This was confirmed when I hooked up a watt meter and found it was only pulling a couple hundred watts.

I eventually found an alternate electronic version of the manual that said to use a 6S battery. With a 2200mAh, 6S battery installed, it finally sounded like a fire-breathing racer. However, a 6S battery is not EF-1 race legal, and further investigation showed that the installed 680 kv motor is also not legal, so if you want to race this model in EF-1, you will need to swap in a 1200-1250kv motor.

IN THE AIR

Not surprisingly, takeoff roll is short and she's up in the air pretty quick. The recommended aileron control throws were a little on the sensitive side. I guess full length strip ailerons will do that. Fortunately, I had configured selectable low rates. Elevator felt fine as did rudder.

Speed seemed good, though not blistering fast. I've never raced an EF-1, so I don't have a baseline to go from. But it was plenty fast enough for speedy sport flying and that I did with wild abandon. It does reasonably well with basic aerobatics: the usual loops, rolls, snap-rolls, etc. Equally stable inverted as upright. I did notice the small-ish rudder meant stall turns were mushy, and forget about holding altitude while doing knife-edge passes. I couldn't help but try some racing moves. Bank to wings vertical and yank hard on the elevator. With enough finesse you could make it turn on a dime.

The model is more or less neutrally stable, with unlimited vertical and

GEAR USED

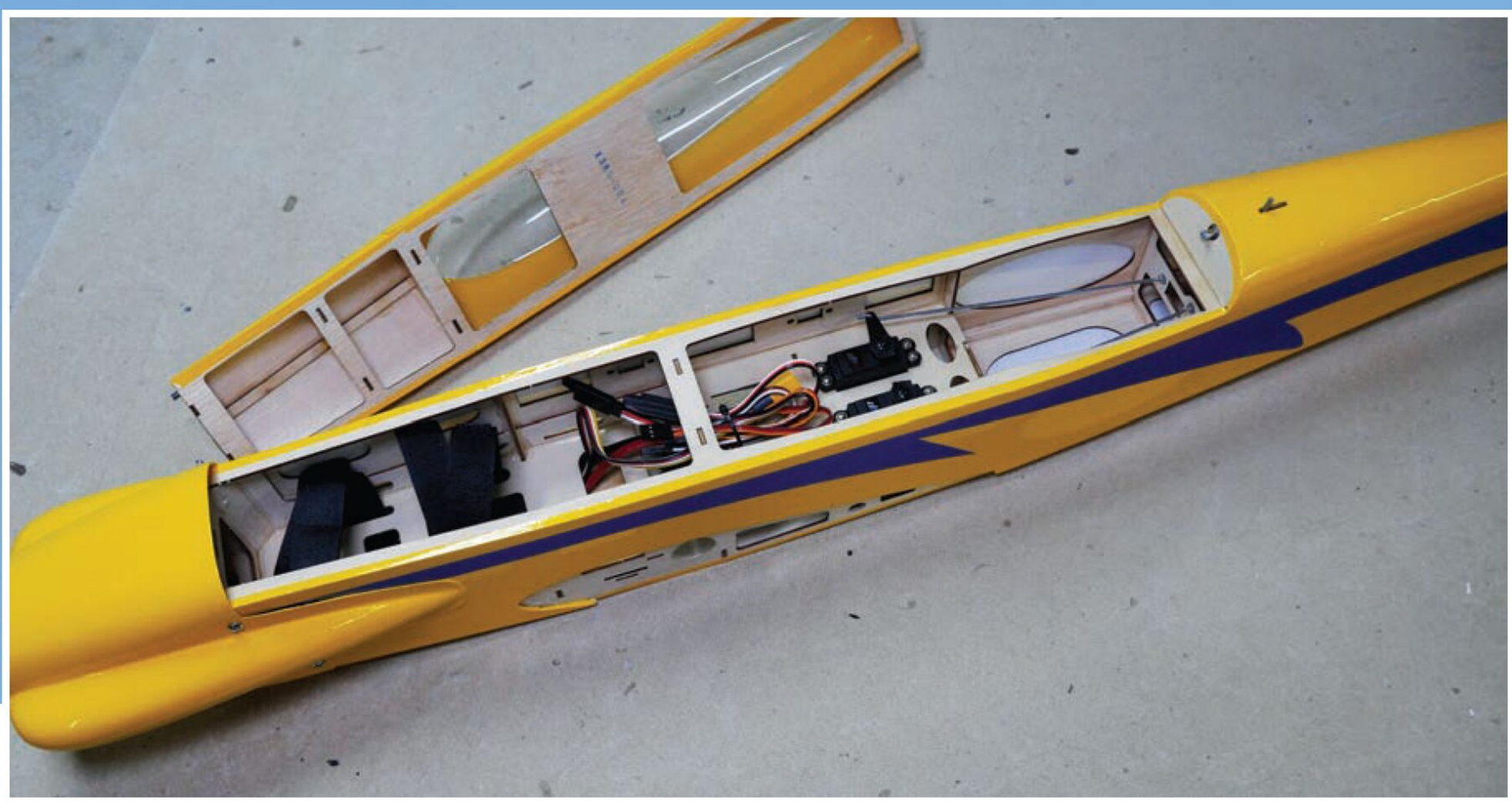
Radio: Dualsky DS9401 digital servos (installed); Spektrum NX10SE w/ AR620 receiver (SpektrumRC.com)

Motor: Dualsky Eco 3520 w/ XC-85 Lite speed control (installed)

Battery: 6S 2200mAh

Propeller: APC 9 x 6 (included)

The colorful and distinctive covering scheme makes it easy to maintain orientation as you are blasting around the race course.



The large top hatch allows plenty of space to reach internal electronics that are pre-installed at the factory.

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1 "Medicare & You," Centers for Medicare & Medicaid Services, 2024. 2 "Aging changes in teeth and gums", medlineplus.gov, 4/17/2022. 3 American Dental Association, Health Policy Institute, 2020 Survey of Dental Fees, Copyright 2020, American Dental Association.

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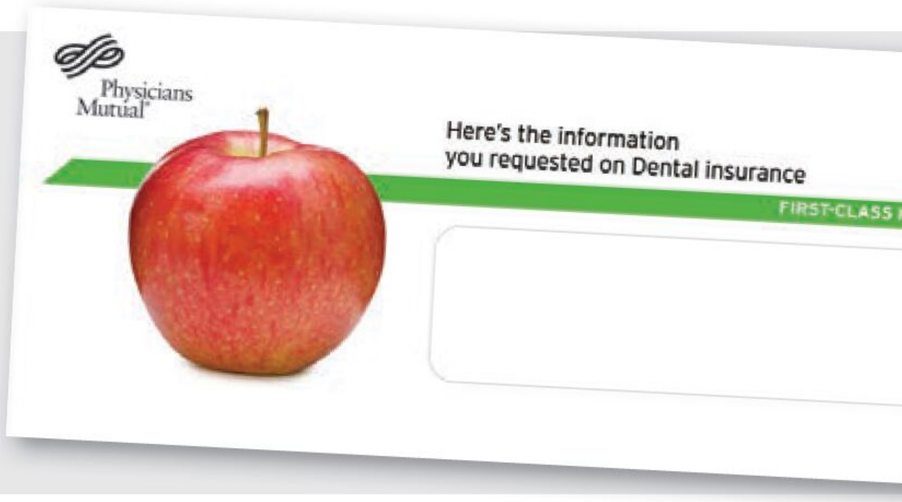

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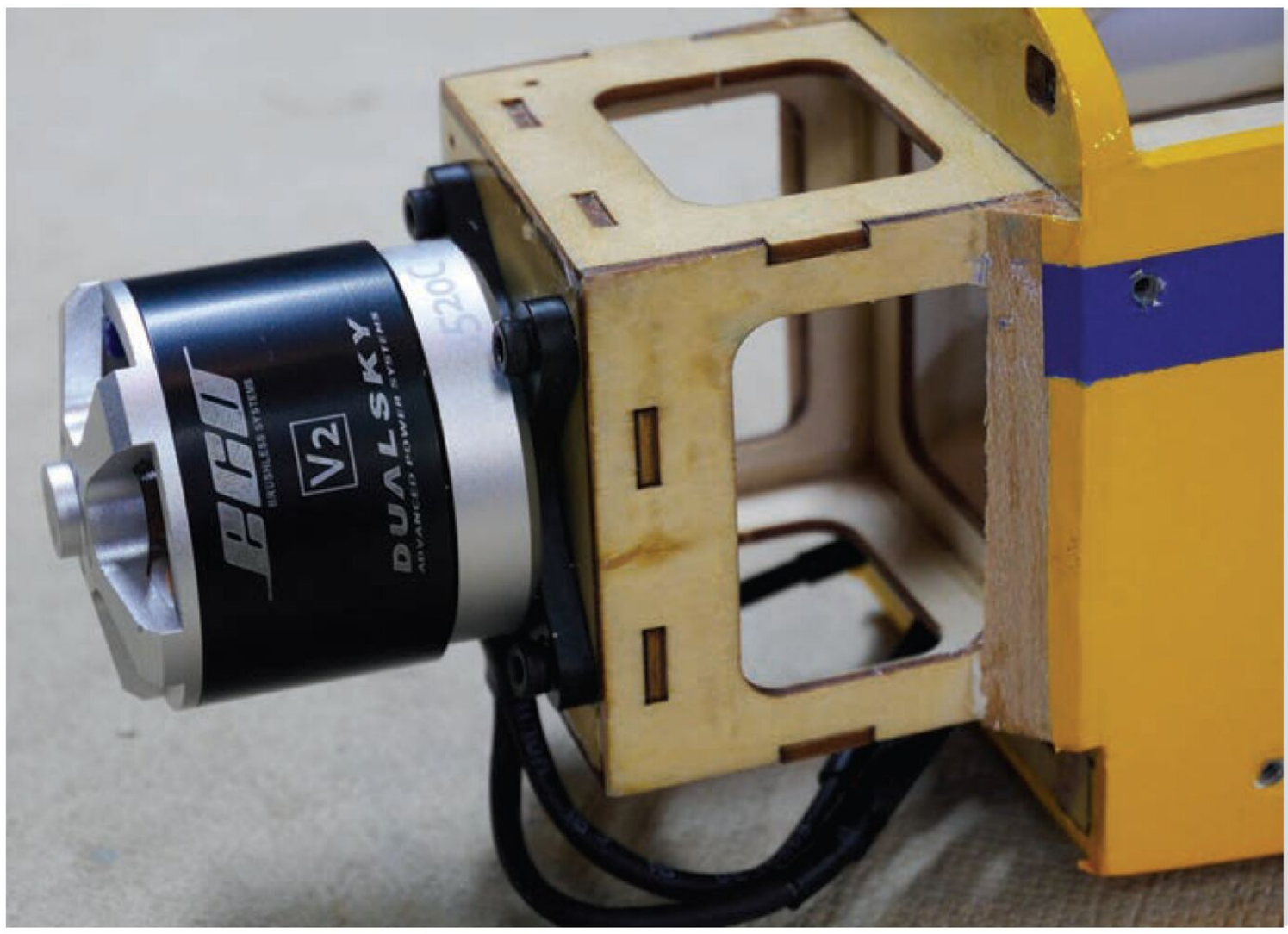


The installed powerful Dualsky outrunner motor provides motivation for the Magic Bird.

HITS

- Easy assembly
- Distinctive look / easy to see in air
- Easy flying quality
- Speedy on modest power

MISS

- Motor and recommended battery not EF-1 legal

very benign stall characteristics. Only with really aggressive elevator pulling would it show some mild signs of wanting to snap out of the turns.

Being a racer, it holds quite a bit of speed on landing approaches. The 'Bird is surprisingly floaty, especially in ground effect. This is where the flaperons should come in handy simply to help slow it down a touch.

GENERAL FLIGHT PERFORMANCE

Stability: The stability of the model belies its racing heritage. While not a trainer, it has very benign flight characteristics.

Tracking: Straight as an arrow. The model basically goes where you point it with no objections.

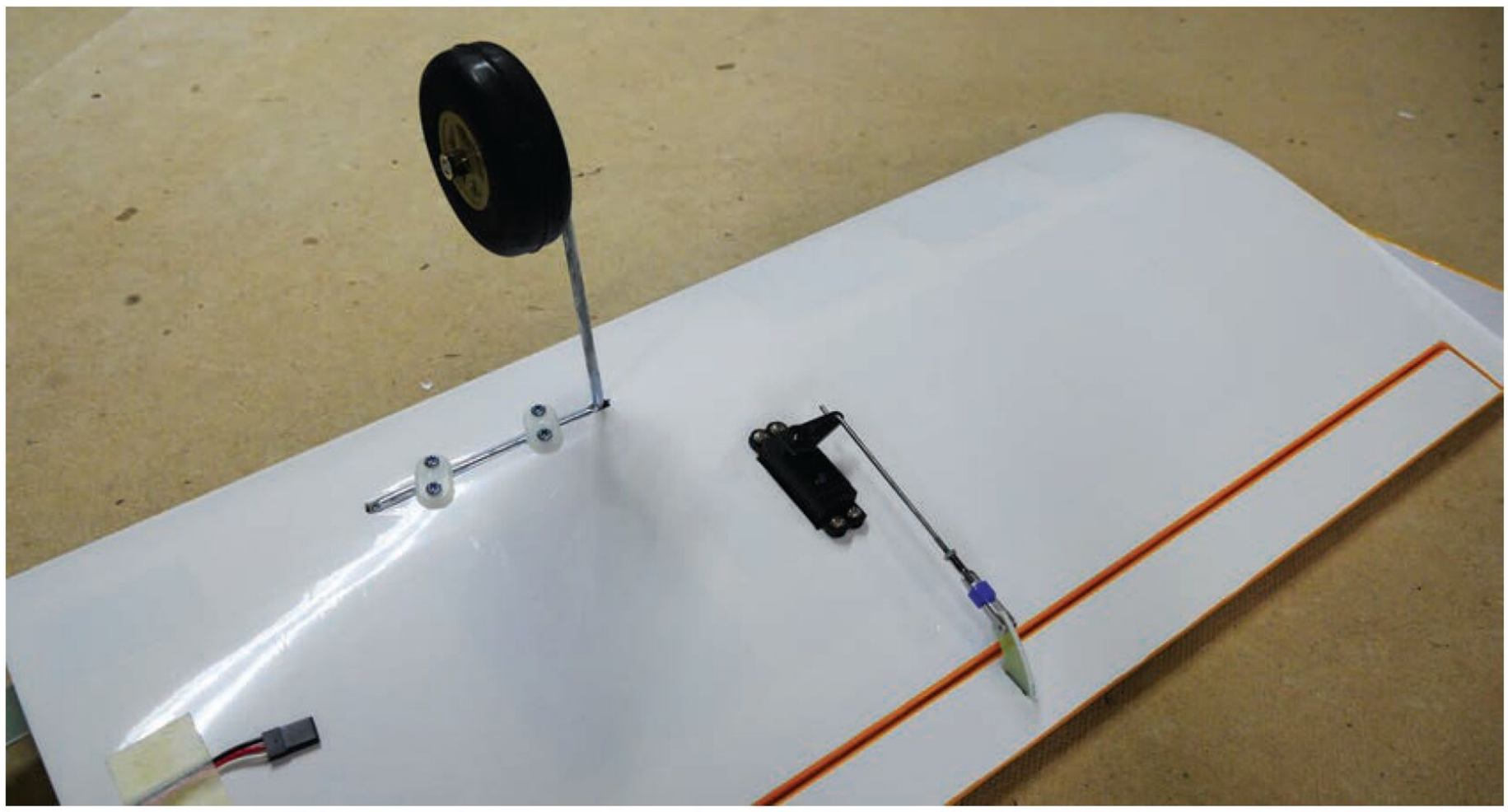
Aerobatics: It does most traditional style aerobatics just fine, but its small rudder limits its aggressiveness.

Glide and Stall Performance: Stalls are non-events as a benefit of the model's light wing loading. Glides are longer and flatter than expected, so back off the power early in the pattern.

PILOT DEBRIEFING

Just as expected, the Magic Bird makes a fine sport plane when not in racing mode. It's great for tearing up the skies—in a relaxing way.

This model is well built and looks great in the air. It harkens back to a time of simple, yet easy flying classic model designs. The nice thing about the 6S power setup is pretty decent run times as long as you back off full throttle. But who wants to do that with a racer?



Both the wheels and aileron servos are installed at the factory. No work at all needs to be done to the wing by the builder.

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UP, DOWN & All Around

Four advanced aerobatic moves

From vertical and horizontal moves to turnaround maneuvers, it can be challenging to combine various elements and fly them both precisely and consistently. Let's take the loop, for example. While a single loop may be fairly straightforward, try flying a vertical 8, which is an inside loop followed by an outside loop. Place these maneuvers on top of each other, make sure they are the same size, and fly them in different wind conditions. Now, it isn't so simple!

HORIZON

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The maneuvers we'll discuss here—the reverse Cuban-8 with half rolls, the snap-rolling half circle, the vertical S, and the Figure 6 with half rolls—are all built on segments of more basic moves. With time, you can even combine these complex maneuvers to create your own sequences. After all, that is the beauty of aerobatics.

FIRST THINGS FIRST

In the aerobatic world, a perfectly set up aircraft helps the pilot focus on one thing: executing the maneuver. Once the airplane is well trimmed and performs to your liking, you can concentrate on flying different aerobatic figures rather than correcting undesired airplane tendencies. I love using "flight modes" on all my planes. This basically means that all dual and/or triple rates can be found on one switch. While other features exist (like the fact that separate mixes can be applied on each flight mode, separate trims can be applied to each mode, and so on), I use the term "flight mode" in its most basic form.

To perform maneuvers like the ones featured here, I only use low-rate modes. I like to use low rates for all precise maneuvers, but you can always tweak certain modes to cater to new maneuvers. As you progress in your flying ability, you will perform more complex maneuvers and will have to adjust your rates and/or exponential values. As a starting point, I recommend 15 degrees of aileron deflection with 20 percent exponential, 12 degrees of elevator deflection with 25 percent exponential, and 35 degrees of rudder deflection with 50 percent exponential for the low-rate setting. Because these are not 3D maneuvers, a minimum of 30 degrees of control-surface deflection is required on all control surfaces with a fair amount of exponential. Typically, a great starting point is about 40 percent. Exponential will soften how the airplane will respond to certain control inputs around neutral, but maximum travel can be obtained by moving the control stick to the maximum amount. Too much expotential will make the aircraft feel mushy; not enough will make the controls too sensitive around neutral.

IN THE AIR

When your plane is in the air, let's check control throws. The plane should feel smooth and not overly sensitive while flying on low rates. At altitude, apply full aileron deflection. If the roll rate is too slow with the aileron stick at maximum deflection, increase the aileron dual-rate value. If it's too quick and you can't keep up, decrease the dual-rate value. Then try different exponential values so that you can make small corrections around neutral stick so that the airplane is not overly sensitive. Perform similar tests on the other control surfaces. On low rates, you should be able to sustain knife-edge, which will determine the amount of rudder deflection that's needed. You should also be able to pull full on the elevator stick and not have the airplane tip-stall.

Pilots sometimes feel that their throttle response is too sensitive at certain throttle percentages. For example, do you feel like your throttle response is fairly linear from 0 to 60 percent, but there is little throttle change from 60 to 100 percent? If so, you may want to apply a throttle curve so that you can change the throttle percentage at various points. Done correctly, the throttle will respond in a linear fashion, which is my personal preference.

The entry altitude should be at your typical flying height as a fair amount of altitude will be gained. For a 60-inch-span airplane, an entry altitude of 150 feet is more than sufficient. When ready, orient your model parallel to the runway and increase throttle to about 90 percent. While this will vary depending on the power-to-weight ratio of your aircraft, it is applicable to most setups. As the airplane is directly in front of you, initiate the first half inside loop. Then, when the airplane has completed the half inside loop and is in front of you but now inverted and traveling in the opposite direction, immediately perform a half outside loop. No line segment should exist between the two loop segments, and it is important to keep the two loop segments the same size.

When the maneuver is complete, the airplane will be traveling in the same direction that it entered the maneuver but at a much higher altitude for the exit.

While this might appear to be a fairly simple maneuver, it might take some time to fully master it. For example, the airplane should not drift with the wind throughout the maneuver, and because this is a fairly large stunt, it might. You must concentrate on heading. If you started this maneuver 50 feet away from yourself on the edge of the runway, it should be at that same distance but at a much higher altitude once complete. If a strong crosswind exists, you may have to lean the airplane into the wind so that the flight path remains constant and parallel to the runway. To do this, rudder corrections will need to be made as well as small aileron inputs to keep the airplane from drifting with the wind. Now, focus on doing all of this while maintaining a perfectly executed vertical S!

Now, let's examine the control inputs needed, and divide this maneuver into four easy steps.

Vertical S

1. Orient your aircraft in a manner so that it is traveling parallel to the runway in upright level flight. Make sure that you are on your low-rate setting (if using dual or triple rates), and increase the power to about 90 percent. Ensure that the wings of the aircraft are perfectly level, and if the airplane is not parallel to the runway, make any necessary rudder and/or aileron inputs to correct the heading. This will greatly decrease your workload; if the airplane is not parallel to the runway and only elevator input is applied for the loop, the loop will not track properly from the start and will need more complex inputs to correct for this error.

2. As the airplane is directly in front of you, pull back ever so slightly on the elevator control to initiate the half inside loop. The size of this loop will determine the size of the outside loop as both portions of the maneuver must be equal. Do not make an extremely large inside loop if your airplane is not overpowered as you may run out of speed on the second half of the maneuver. Use throttle, as needed, to maintain a constant flight speed.

3. As soon as the first loop is complete, the airplane should be directly in front of you but at a higher altitude. As soon as the airplane is inverted, the outside loop should be performed by applying down-elevator instead of up. Cater the elevator input to the shape of the figure. It is important that you perform all inputs in a smooth manner so that the aerobatic figure will be smooth and continuous. Again, no line segment must be visible between the half loops.

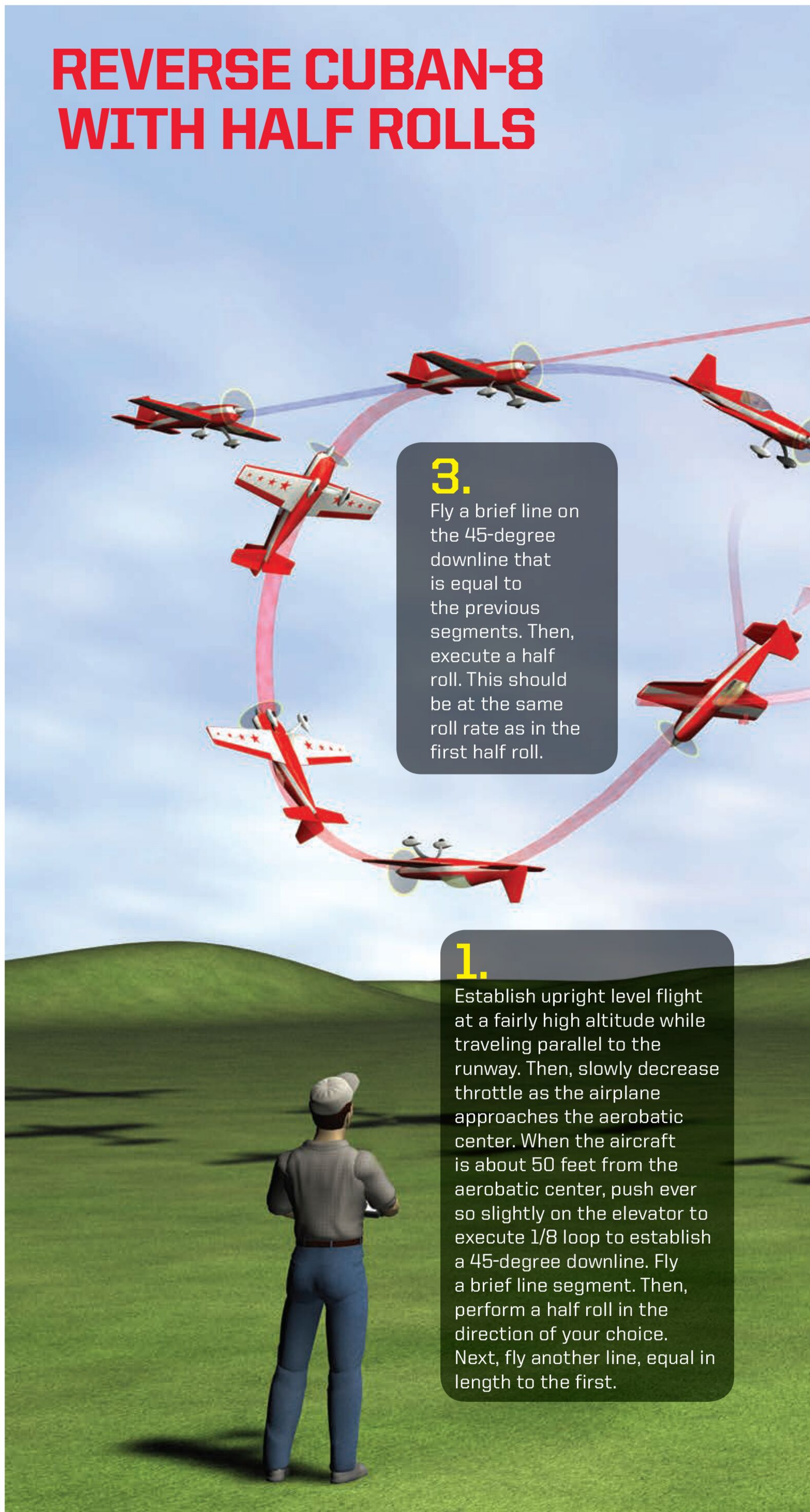
4. Once your aircraft establishes upright level flight, you have completed the vertical S. Now, decrease throttle to about 75 percent, and prepare to give this maneuver another try!

Begin by climbing to a safe altitude, which for a typical 60-inch-span model is about 300 feet. Align the aircraft so that it is upright and parallel to the runway at about 40 percent throttle. When the airplane is about 50 feet in front of you, decrease throttle, push down-elevator, and establish a 45-degree downline. Fly a short line and perform a half roll as the airplane passes directly in front of you. Fly another short line, equal to the first. Increase throttle to about 80 percent and push 3/4 of an outside loop to establish another 45-degree downline (decrease throttle after establishing the downline). Fly a short line (equal to the others) and perform another half roll. Fly another similar short line. Increase throttle to about 80 percent and push 5/8 of a loop to exit in upright level flight. As the airplane flies upright and level, decrease throttle to about 40 percent. Your plane should be at the same altitude in which it started the maneuver. It can help to count while flying the various line segments to keep them the same length. It's also important to fly at a constant speed.

Some situations might develop that need special attention and practice. For example, in a strong wind, the airplane might change heading. Make sure that the heading of the aircraft is exactly where you want it to be, and ensure that both loop segments are the same size and are round, as intended. Also, define the 45-degree lines, and center both half-rolls on the 45-degree lines. While these are the most common mistakes performed, they can separate a novice pilot from an advanced pilot.

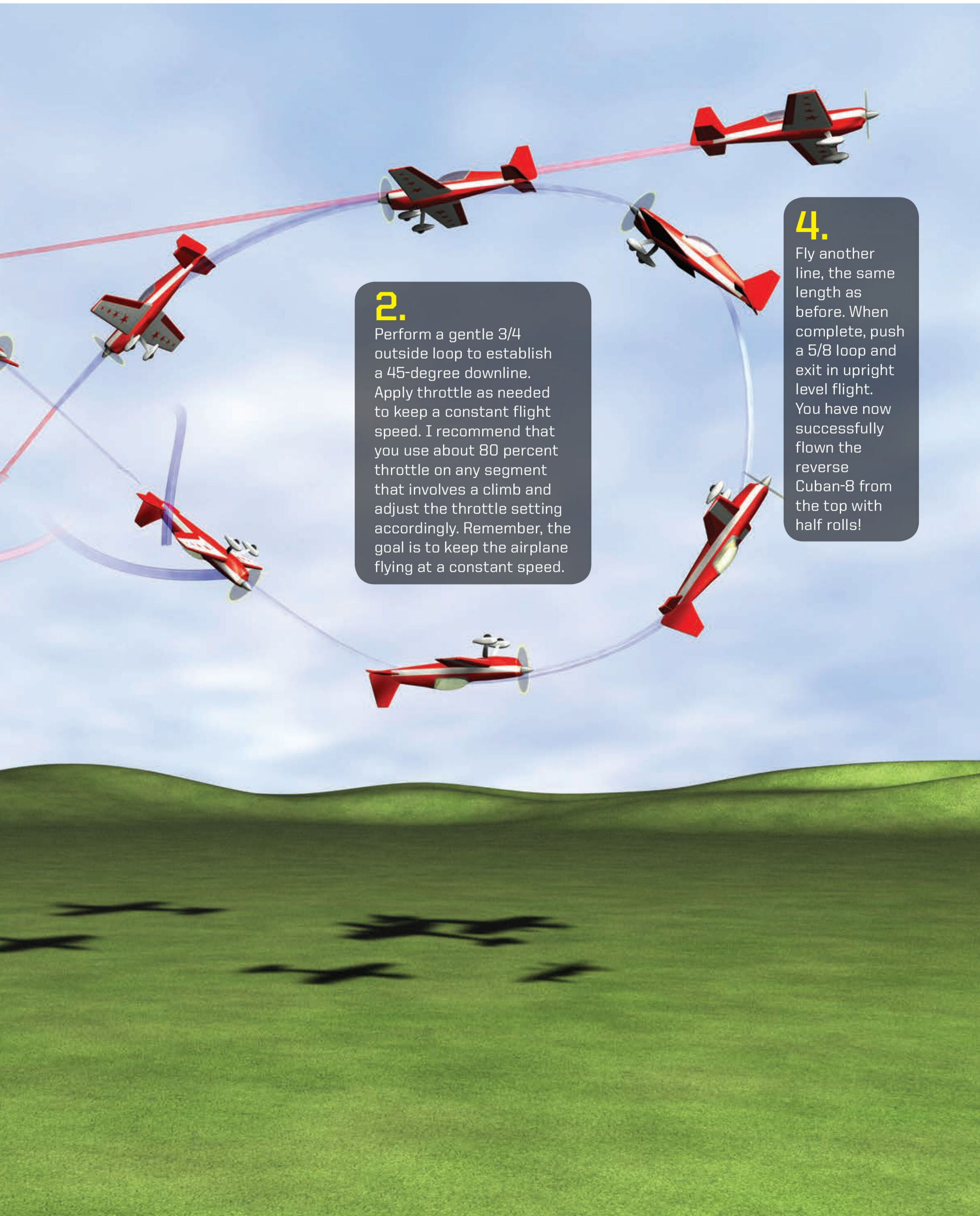
Now that you have a brief overview of the general control inputs that are required, let's explore this maneuver as well as a few key flight tips by breaking this stunt into four steps.

REVERSE CUBAN-8 WITH HALF ROLLS



3. Fly a brief line on the 45-degree downline that is equal to the previous segments. Then, execute a half roll. This should be at the same roll rate as in the first half roll.

1. Establish upright level flight at a fairly high altitude while traveling parallel to the runway. Then, slowly decrease throttle as the airplane approaches the aerobatic center. When the aircraft is about 50 feet from the aerobatic center, push ever so slightly on the elevator to execute 1/8 loop to establish a 45-degree downline. Fly a brief line segment. Then, perform a half roll in the direction of your choice. Next, fly another line, equal in length to the first.



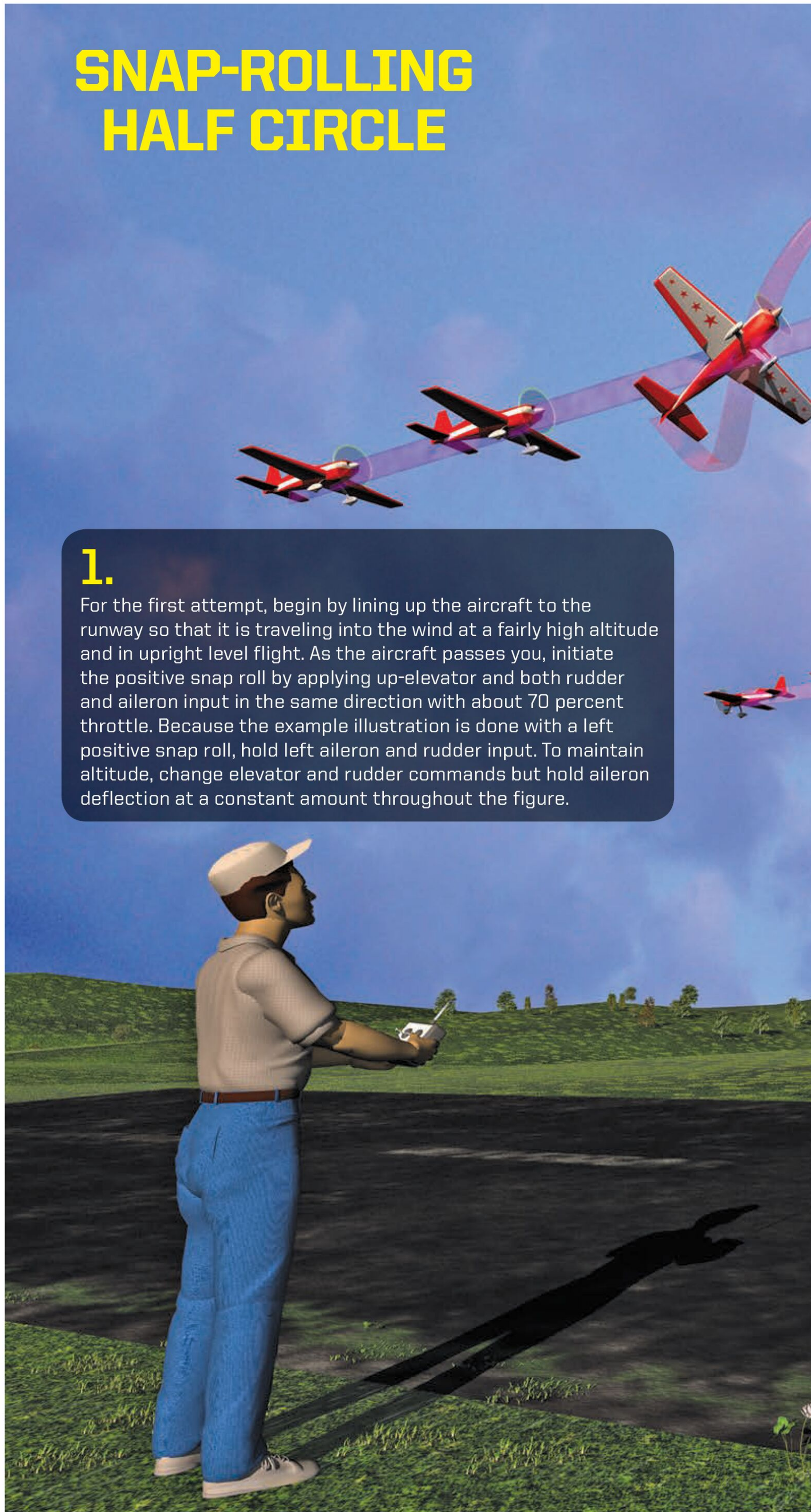
2.
Perform a gentle 3/4 outside loop to establish a 45-degree downline. Apply throttle as needed to keep a constant flight speed. I recommend that you use about 80 percent throttle on any segment that involves a climb and adjust the throttle setting accordingly. Remember, the goal is to keep the airplane flying at a constant speed.

4.
Fly another line, the same length as before. When complete, push a 5/8 loop and exit in upright level flight. You have now successfully flown the reverse Cuban-8 from the top with half rolls!

While the power-to-weight ratio of each individual aircraft is different, most aerobatic airplanes are powered so that about 70 percent throttle is needed to execute this maneuver. For the first few attempts, you should perform this stunt parallel to the runway, into the wind, and at a generous altitude in case you become disoriented. After the aircraft passes you, which should be in the center of the flying field, activate the rates that you use to perform the snap roll. Initiate the snap roll by applying up-elevator and input rudder and aileron in the same direction. As the aircraft completes the first rotation, continue to hold maximum aileron deflection, but command different elevator and rudder amounts not only to maintain altitude but also to keep a constant turn radius while snapping. The goal is to perform a 180-degree circle with continuous positive snap rolls. When the figure is complete, release inputs and establish upright level flight so that the aircraft is now traveling parallel to the runway but in the opposite direction.

When you are new to a maneuver like this, it might help to decrease control deflection to allow more time in the maneuver. If the roll rate is too quick, for example, decrease the aileron rate. Similarly, if the aircraft becomes too deep in pitch and/or yaw, decrease the elevator and/or rudder deflection amount. As you become more proficient, you can gradually increase the aileron, rudder, and elevator deflection amounts that are needed to fly this stunning stunt.

Let's simplify matters and divide this exciting figure into four steps.



SNAP-ROLLING HALF CIRCLE

1.

For the first attempt, begin by lining up the aircraft to the runway so that it is traveling into the wind at a fairly high altitude and in upright level flight. As the aircraft passes you, initiate the positive snap roll by applying up-elevator and both rudder and aileron input in the same direction with about 70 percent throttle. Because the example illustration is done with a left positive snap roll, hold left aileron and rudder input. To maintain altitude, change elevator and rudder commands but hold aileron deflection at a constant amount throughout the figure.

2.
To begin the circle portion of the figure, apply more up-elevator deflection when the aircraft is banked in a way that will allow it to be "pulled" around the radius. Similarly, this will be done when the aircraft is inverted. As the airplane is inverted, apply small amounts of down-elevator, and release rudder input to some degree if the airplane becomes too "deep" in yaw throughout the snap roll.

3.
Change the throttle setting as needed to maintain a constant flight speed throughout the figure. Continue to hold full left aileron while changing the rudder and elevator deflection amounts to maintain a perfect 180-degree circle. Proper control-input timing is essential, and only small amounts of elevator deflection should be given.

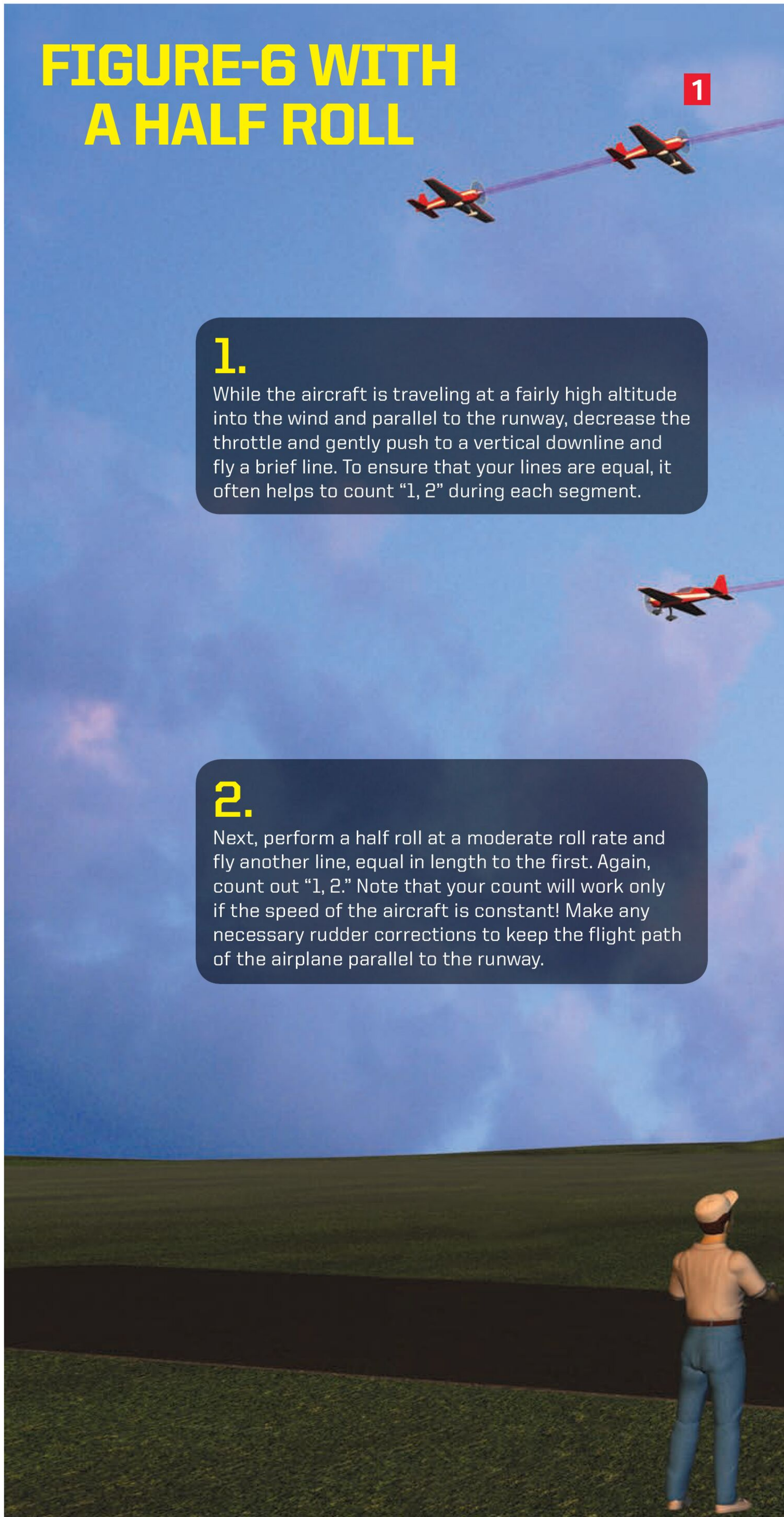
4.
As the aircraft approaches the completion point, hold larger rudder amounts with full left aileron input and focus only on both elevator and throttle amounts. When the aircraft has completed the 180-degree circle, neutralize all control inputs so that the airplane is in upright level flight. You may have difficulty in applying the proper aileron, elevator, rudder, and throttle commands needed to maintain a constant turn radius.

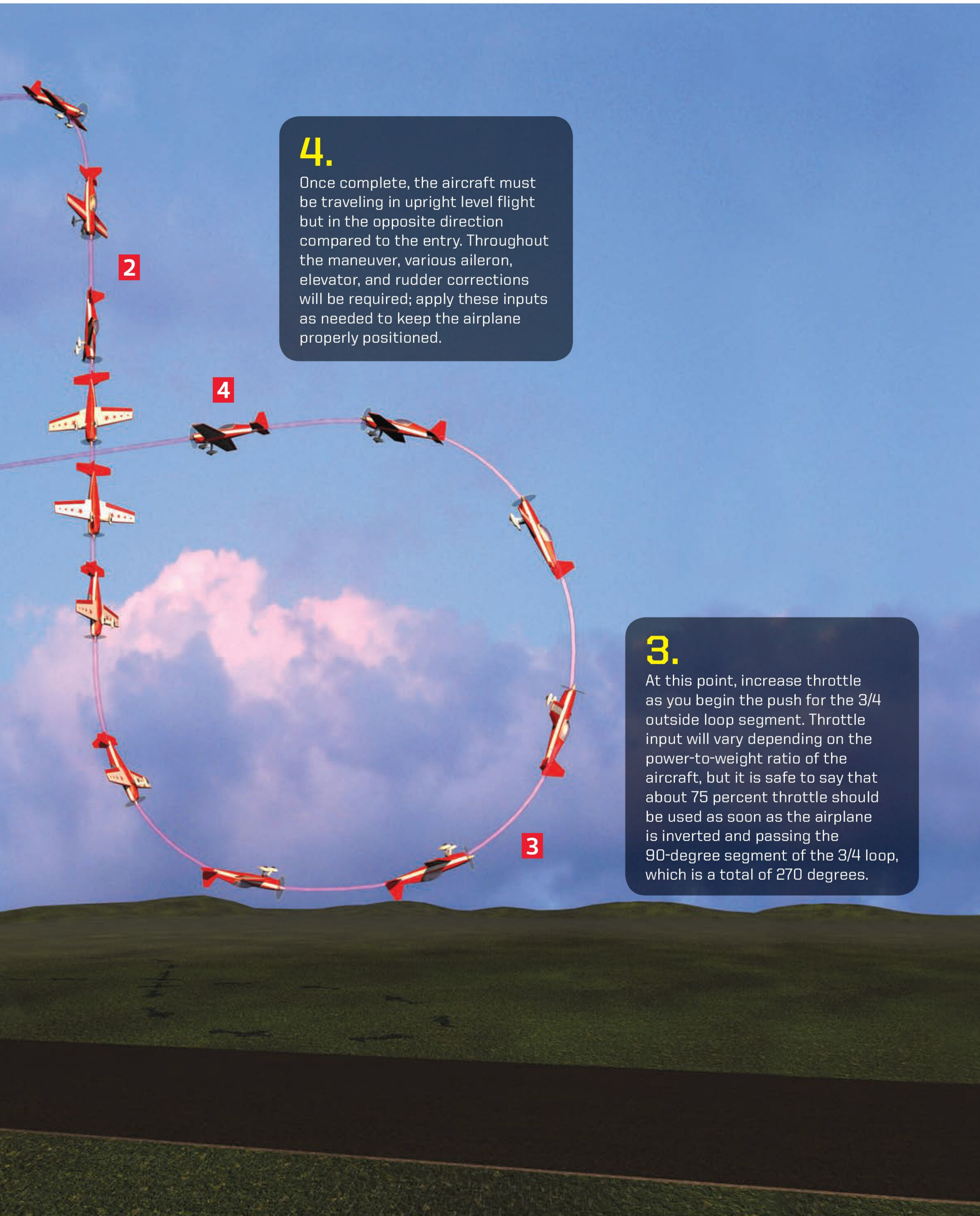
Known as a turnaround maneuver, this move is used to change the direction in which your airplane is traveling. During the maneuver, you should orient the aircraft parallel to the runway, flying upright at an altitude of about 400 feet. The altitude will differ depending on the size of the model being flown, but an altitude of 400 feet will suffice for a 60-inch-span aircraft. After you've established the heading, perform a 90-degree push to establish a vertical downline, where you'll fly a brief line segment. You'll fly a half roll during another line segment, equal in length to the first. The aircraft will then execute a 3/4 outside loop and exit the maneuver in upright level flight in the opposite direction in which it started.

To perform this maneuver well, you'll need practice, patience, and the proper aircraft setup. Pilots often have difficulty with line segments not being of the same length and might have loops that are not round or a half roll that isn't centered on the downward segment of the maneuver. Also, wind can often become a troubling factor. Regardless of the wind direction, the flight path of the model should always be either parallel to the runway during the entry and throughout the 3/4 loop or perpendicular to the runway during the downline segment with a half roll. If this isn't done correctly, the airplane can easily be pushed to an undesired heading. This maneuver can be divided up into four steps.

BOTTOM LINE

It is important that you don't become frustrated when trying new maneuvers as consistency comes with time and practice. Before taking to the skies, think about the new maneuver that you're going to perform in detail and know what control inputs will be required. When you're trying out a new move, it might not look pretty at first, but continue to practice until it looks perfect. And of course, always remember to have fun!





4.

Once complete, the aircraft must be traveling in upright level flight but in the opposite direction compared to the entry. Throughout the maneuver, various aileron, elevator, and rudder corrections will be required; apply these inputs as needed to keep the airplane properly positioned.

3.

At this point, increase throttle as you begin the push for the 3/4 outside loop segment. Throttle input will vary depending on the power-to-weight ratio of the aircraft, but it is safe to say that about 75 percent throttle should be used as soon as the airplane is inverted and passing the 90-degree segment of the 3/4 loop, which is a total of 270 degrees.

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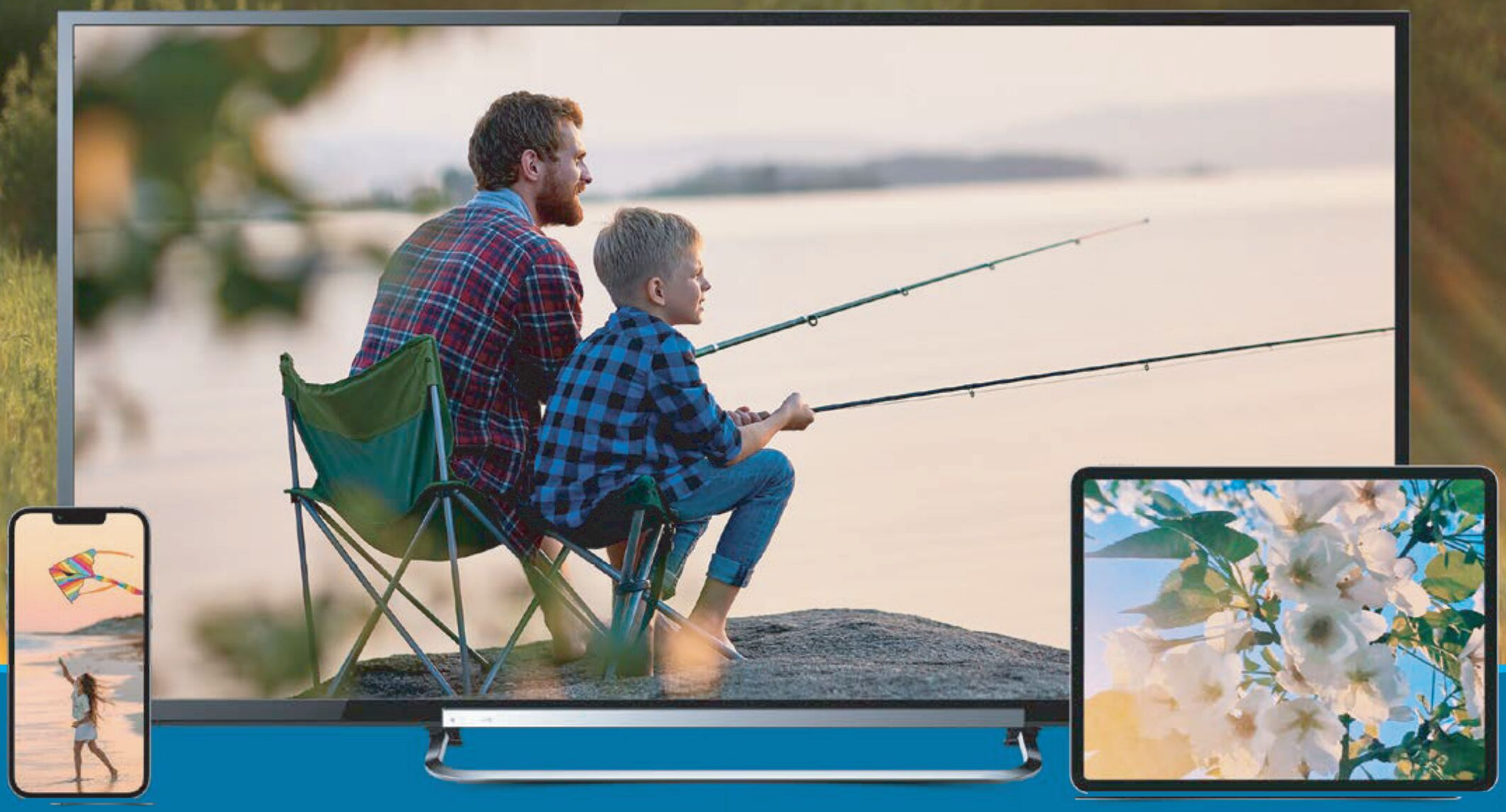

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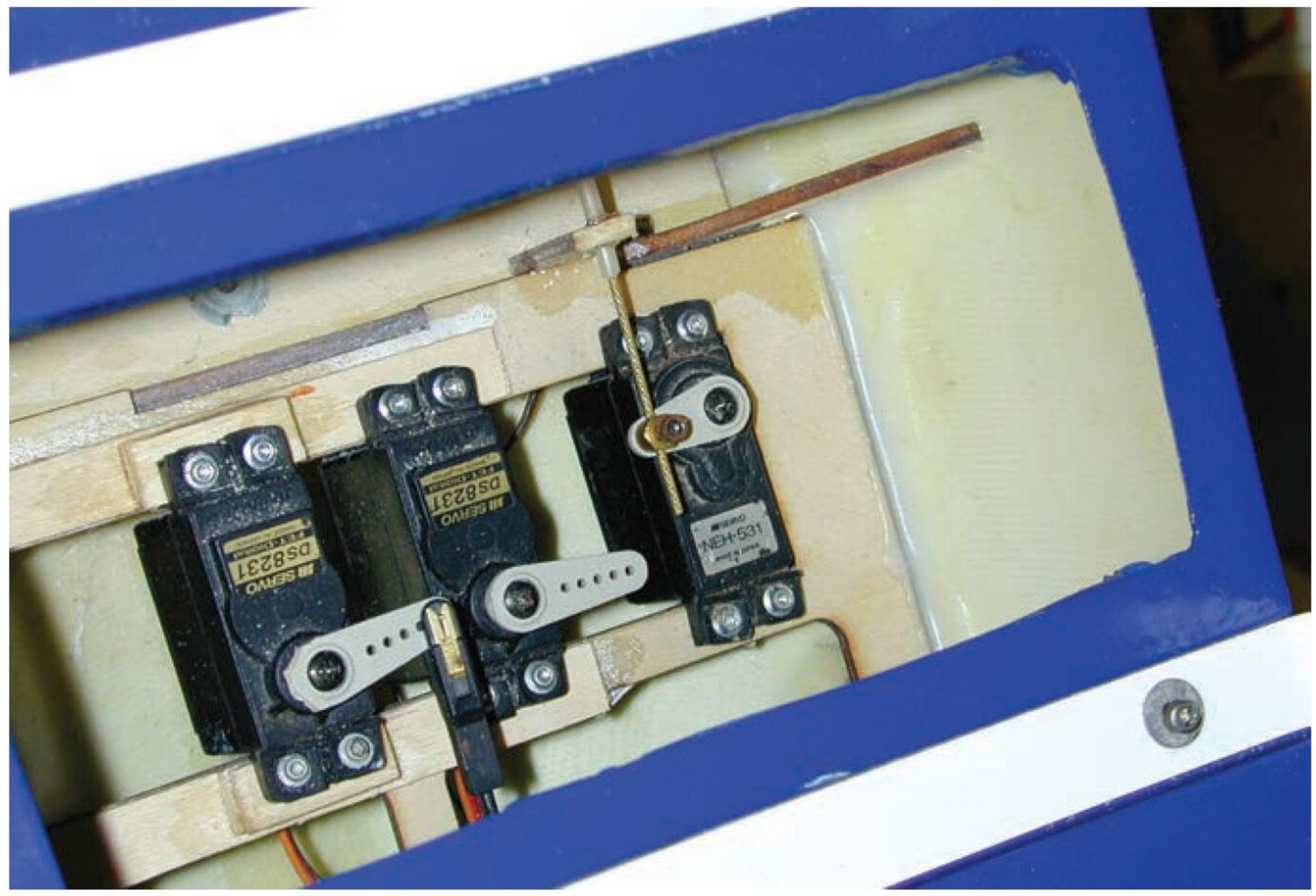
HOW TO

BY GERRY YARRISH

FLIGHT TEST JITTERS?

Expert advice to ensure success

There are risks involved in test-flying a new model. Regardless of its type, be it a giant-scale monoplane, a high-performance biplane, or a heavily loaded scale warbird, there are three things you have to get right every time for a successful first flight. Not figuring in random equipment failures, I figure that the three most common causes of new airplane crashes are center of gravity (CG) balance-point placement, engine reliability, and control throws and setup. Getting any one of these things wrong won't bode well for your model's survival.



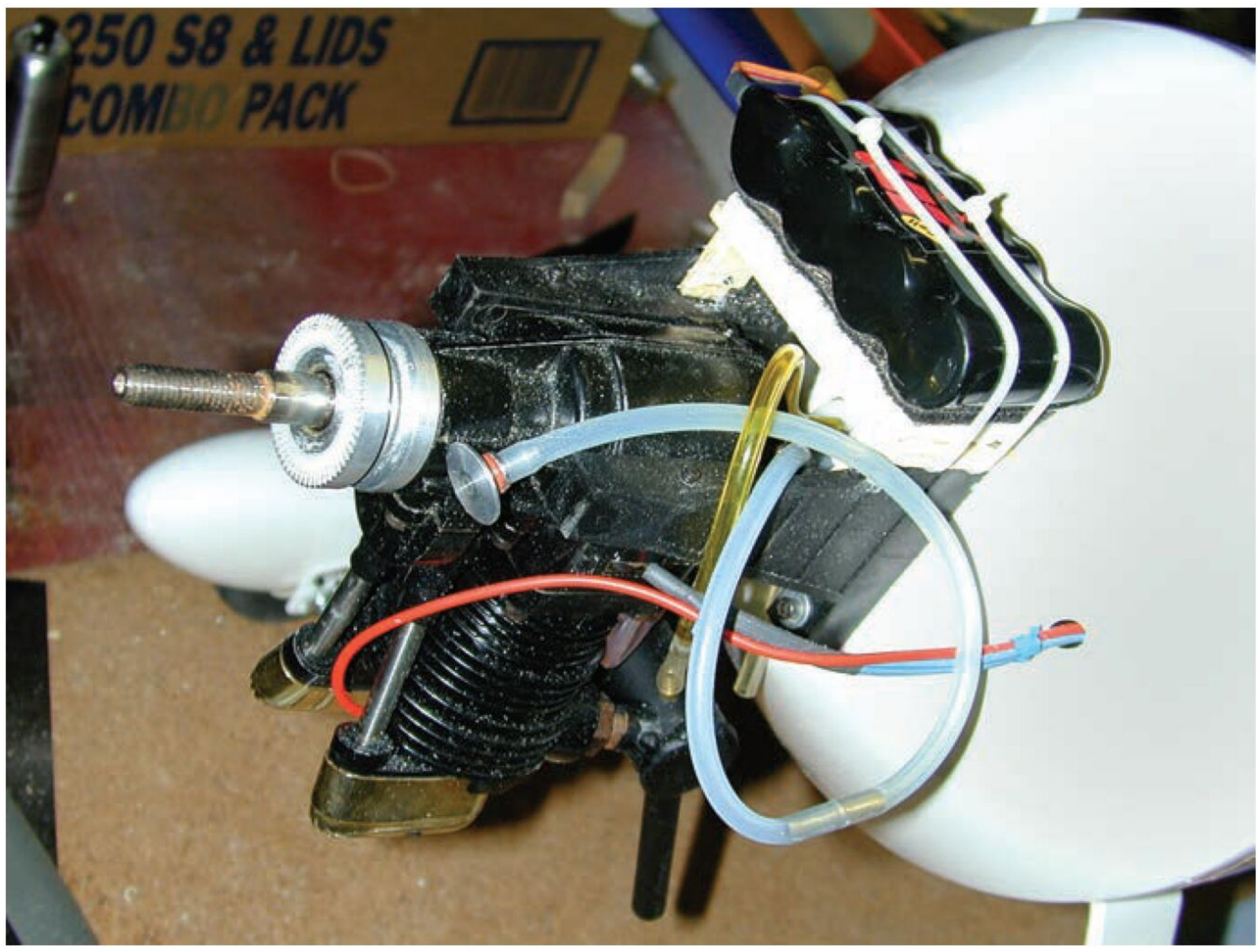
Proper control-surface setup starts with the servo installation. Make sure that they don't bind and that the clevises hold the pushrods securely to the servo arms and have safety keepers. Here, I use Du-Bro heavy-duty 4-40 clevises with built-in pin keepers. The throttle linkage uses a Sullivan flex cable and a Du-Bro EZ connector.

BALANCE POINT

I have written several times about the importance of getting a model's balance point correct. Proper balance is the most important because it greatly affects the model's response to your control inputs. Modelers are constantly showing up at the flying field with tail-heavy planes that predictably last only a few moments after takeoff. Remember, this very old saying and live by it: A nose-heavy plane may fly poorly, but a tail-heavy one only flies once!

Most conventional models can be flown safely when balanced at a point between 25 and 30 percent of the mean aerodynamic chord (MAC) measured back from the wing's leading edge. The final CG placement can be fine-tuned after the first few flights. This depends on how the model behaves after you've trimmed it for straight and level flight. If a lot of up-trim is required to maintain a straight flight path at about 1/2 throttle, the model is nose heavy, down trim indicates a tail-heavy condition. Make adjustments in the workshop and take the guesswork out of the equation.

Move the battery pack and servos forward, avoid placing your servos in the tail if possible, and if all else fails, add lead weight to the nose to bring the balance point into the proper CG range.

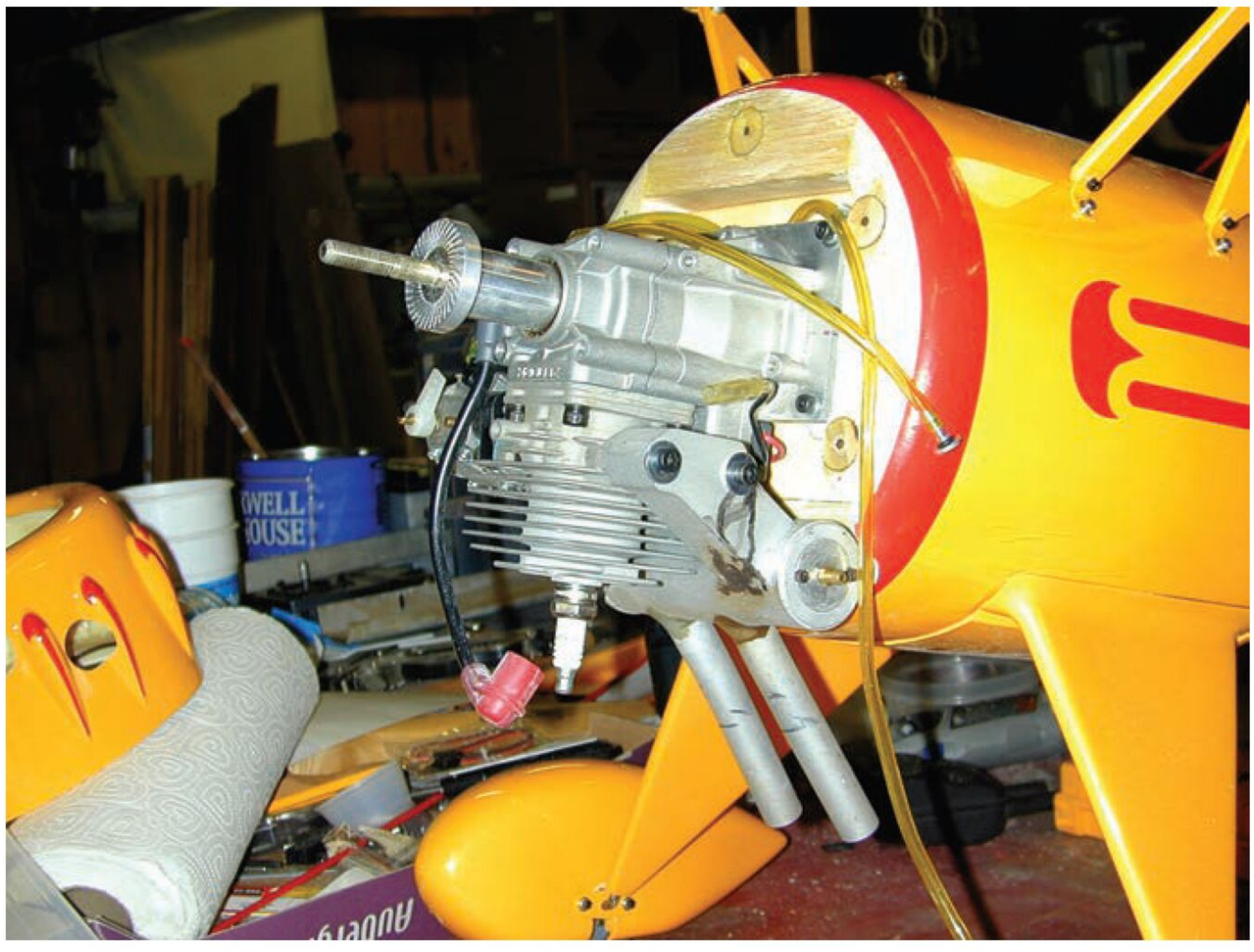


When I set up the Saito 180 in my Pitts Model-12, I also moved the battery pack forward to help balance the model. The battery sits on a plywood shelf I bolted to the top of the engine mount. Note that the engine has an on-board glow driver wired into place.

ENGINE RELIABILITY

When it comes to engine problems, RC'ers often have more than their fair share. Poor engine performance is often the product of your not understanding the basics of engine break-in and proper setup. Again, there are more than enough articles out there to teach you how to set up your engine. Typically, engine issues are caused by improperly setting up your engine's idle.

For that first butterflies-in-the-stomach takeoff, the most important thing is to keep that engine singing happily. Take the time to break in the engine, and don't run it too lean. If you do, shortly after the model's nose is pointing upward, the engine will begin to really scream, and then it will sag and eventually quit. Of course, this only happens after you've left the end of the runway behind and gotten just high enough to cause a very hard landing



Proper engine performance begins with installation. Make sure that your gasoline engine is attached securely to the firewall and that the muffler is properly bolted into place. Install the fuel lines so that they do not chafe on any sharp edges because this could cause a leak.

impact. A good engine setting gives you a reliable idle and a smooth transition through the midrange, and the high-end setting should be able to spin the prop without overheating the engine. Here again, there is no great secret for success. Do all your engine adjustments at home where you have the time to get them right.

Even if you are just taking a model out for the first time after a long winter break, check the fuel system, and make sure that there aren't any kinks or pinholes in the fuel line that will cause the engine to run lean. While you're at it, invest in a new gallon of fuel; don't use that stale leftover half-full jug from last year. Keep your engine happy, and it will treat you right!

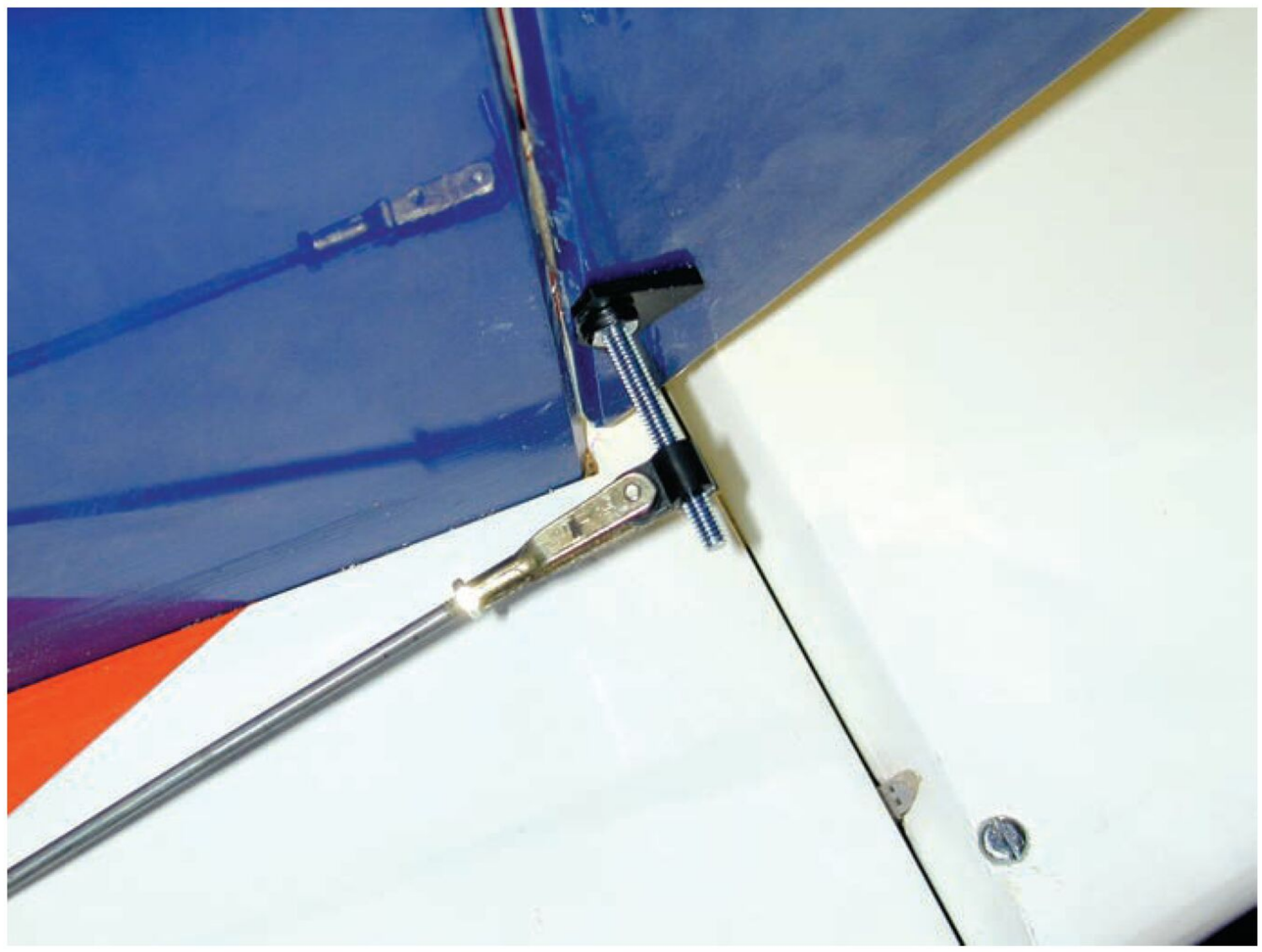
ELECTRIC SYSTEM CHECKS

Modern electric power systems are very reliable, but even they require checks. Before you fly an electric-powered plane for the first time, double-check all of the motor, speed control, and battery connections, and be sure that your battery is held snugly in place so it doesn't become loose in flight and affect your plane's CG. Speaking of the battery, it goes without saying that you should always use a watt meter to check your battery's voltage before you fly!

CONTROL-THROW SETUP

Last, but certainly not least, you should check and recheck your controls' direction of travel and their throws. Over-controlling a model with excessive throws is about as bad as flying too tail-heavy. Follow the model designer's recommended throw settings, and set them as your high-rate value. I set my low rates to about 75 to 80 percent of the high rates. With a properly balanced model that has a reliable engine, most takeoffs will require little up-elevator to break the model free of the ground. This is why I select low rates for the first departure. After takeoff, climb to a safe altitude of about 200 feet and switch to high rates. A good way to ensure that you don't have too much throw is to make a tight turn and then apply full throttle and full up-elevator. If your model turns smoothly, you are OK, but if it snaps out of the maneuver, you have too much control travel, and you are causing the model to go past its maximum angle of attack, after which the wing will stall. Switch back to low rate and bring the model in for a landing. Adjust the control throw mechanically, center your trims and try again! Roll rates depend on the type of model you are flying. Aerobatic planes can have roll rates of 360 degrees per second (or more) while a Piper Cub doesn't need that much. The best rate to set is one with which you are comfortable. Again, start with the designer's recommendations. As for rudder throw, I dial in as much as I can for the start and adjust it according to the model type.

It is also very important to ensure



The length of control horns help determine the amount of control throw. Be sure to set the elevator throws to the recommended amounts for your model.

Always have a caller whenever you fly; two sets of eyes are always better than one. In addition, good sunglasses help you to see your model when you test-fly it!

that the control directions are correct. Taking off with the elevator or the ailerons working backwards is very bad. Look at the model from the rear (facing in the same direction as it), and move the rudder left and right. It should follow your control movements. Move the ailerons left and right. When you give left aileron, the left aileron should rise; give right aileron, the right one should rise. Up-elevator (pulling back on the stick) should raise the elevator. I know this is very basic, but many get caught with reversed controls! Don't become a statistic.

BOTTOM LINE

Follow these three basic checks, and I promise that your bird's first flight will be successful. If you're still wary of test-flying your model yourself, seek the help of an experienced pilot to help you confirm that your model and engine setups are correct, and let him do the first flight for you. This will build your confidence for the second flight when you are at the controls for the first time! Good luck!

A good way to test for proper elevator throw is to fly a tight turn at full power. If your model snaps out of the turn, you have too much control throw.

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FLIGHT REPORT

TEXT & PHOTOS BY ANDREW GRIFFITH

FMS AVANTI 90MM EDF

18th anniversary beauty!

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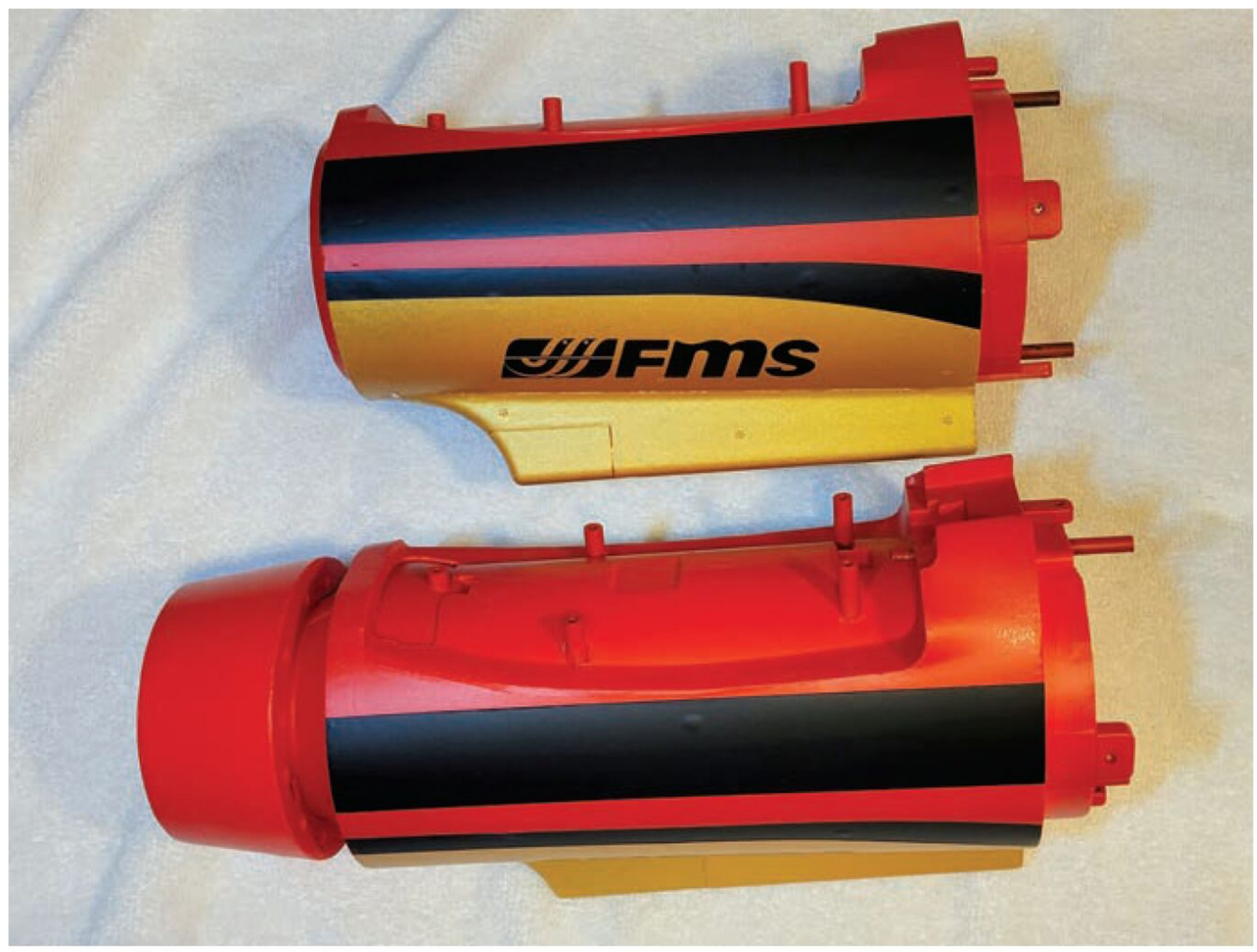
Originally designed by world renowned aerobatic pilot and designer Sebastiano Silvestri, the Avanti is to sport jets what the Extra 300 is to aerobatic aircraft. It's just a great flying design that is available in a wide range of sizes from small foam construction to big composite turbine versions. The Avanti is particularly popular with F3S (FAI jets precision aerobatics category) pilots because when it's configured with plenty of power and moderate control throws, it excels at the IMAC-style flying demanded by F3S competitors.

The latest and most exciting release from FMS is the 90mm Avanti in a striking red and gold paint scheme that celebrates the 18th anniversary of FMS. The new Avanti is constructed of injection-molded foam with hard plastic parts where extra strength is called for. The model arrives fully painted and with all the graphics in place from the factory. Everything that you need to get airborne is included with the Almost Ready to Fly Avanti except for a 6S LiPo flight battery and a minimum 6-channel receiver.

Many aspiring jet pilots have learned to transition from sport models to jets with an Avanti due to their gentle stall characteristics and stable flight habits. With that in mind, I'd rate the Avanti as a good choice for pilots comfortable flying intermediate sport aircraft or those with true trainer jets looking to move up in size and performance.



The standard tail on top and the optional vectored thrust tail on the bottom.

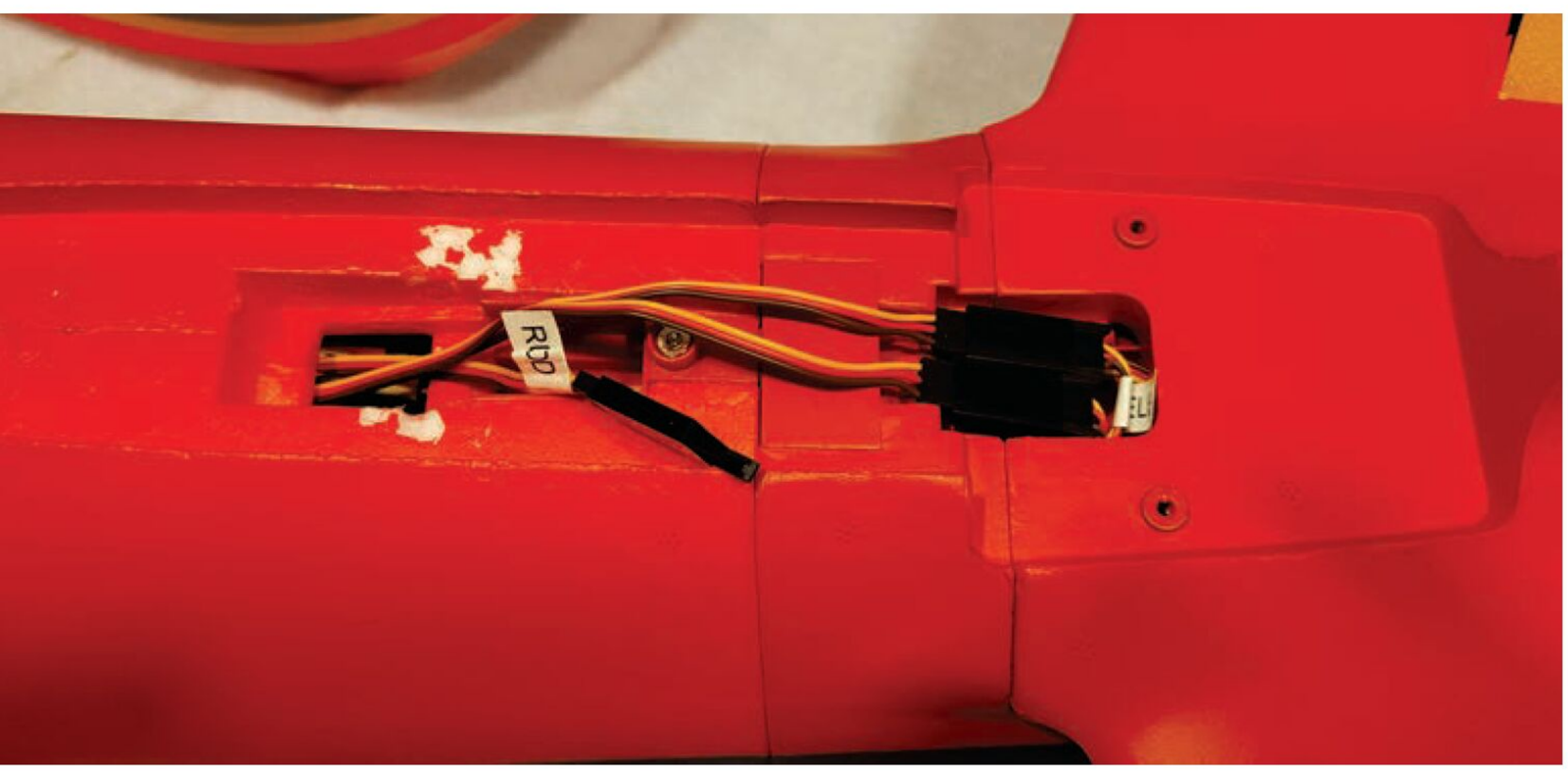
UNIQUE FEATURES

Like most FMS models, the Avanti ships in a large double boxed modular foam shipping container that protected all the components from the airplane bashers disguised as local delivery drivers. With the snap-on nose cone and bolt-on tail section, the resulting box is smaller and offers a more modest shipping price.

Looking over the 90mm Avanti I noticed a lot of well-thought-out features, but I'll start with arguably the most interesting one first. A vectored thrust tail upgrade package is available to morph your cool sport jet into a 3D bobby dazzler. The thrust vector kit includes an elongated tail cone with two servos that operate a thrust nozzle in both the pitch and yaw axis. If 6S doesn't provide enough thrill for vectored thrust flight, a 1500kv fan and motor combination that runs on 8S is available. I'm excited!

The stock power system however leaves nothing to be desired. A 1900kv motor spins a 12-blade composite fan that is fed by a 120-amp Predator speed control and 6S battery. The battery compartment has enough room to accommodate a variety of pack sizes and mine flew comfortably with both 6S 6000mAh and 6S 5000mAh batteries. A 10-amp BEC is included with the ESC to power the radio system.

All of the control surfaces are equipped with 13-gram digital metal gear servos, and each control surface has with a ball-link style pushrod on the surface with a Z-bend that connects to the servo arm. The resulting control system is robust and free of any slop while being easy to adjust. (Pro tip: Helicopter ball link pliers are handy when making adjustments to the control rod length.)



Servo extensions with safety clips are provided to connect the elevator and rudder servos.

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Custom Radio Setup

Many models provide a control box that performs a number of combined functions while offering radio simplicity by mixing the ailerons, flaps, and rudder and nosewheel steering allowing the use of a 6-channel radio on what otherwise would be a more complicated radio setup requiring more channels.

In the case of the Avanti, I wanted to split the nose wheel steering and the rudder apart and assign them separate channels, so I removed the Y-harness and set up a radio channel for the nose-wheel steering. This allows nose-wheel steering trim independently from the rudder and allows me to use the servo cutoff functionality of my Core radio to center the nose wheel and disable the steering servo while the gear is retracted.

I also contemplated separating the aileron servos so that I could set up aileron differential in case flight testing revealed that the model would benefit from that but the roll turned out to be axial so there was no need on this particular aircraft.

GEAR USED

Radio: PowerBox Core with PBR-9D 2.4Ghz receiver (PowerBox-Americas.com); 13g digital metal gear servos installed

Motor: 1950kv inrunner motor w/ 120A speed control (installed)

Battery: 6S 5000mAh 100C Spektrum SMART battery (SpektrumRC.com)

Prop: 12-blade EDF fan (installed)

HITS

- Machined aluminum trailing-link landing gear
- LED lighting system
- Available thrust-vectoring upgrade

MISS

- Suggested CG in the manual was very nose heavy

The large flaps are highly effective and the Avanti slows down nicely for landing.

The Avanti features retractable tricycle landing gear that is constructed of machined aluminum and incorporates trailing link struts and rubber tires. A complete set of landing gear doors is included and contributes to the top speed by reducing drag when the gear is retracted. Overall, this appears to be a stout landing gear set.

The wings are equipped with an aileron and flap servo, the main gear retract unit, and a colored LED navigation light. All of the wiring goes through a multi-connector at the wing root so once the wing is mated to the fuselage everything is connected and there are no servo extensions to mess with. The wings plug in using a pair of wing rods that include a 13mm main spar and a 9mm anti-rotation rod at the back, which should result in a very strong structure.

The included control box takes care of all the mixing for the dual elevator, dual flap and dual aileron servos as well as the nose wheel steering servo. This results in the Avanti only requiring a 6-channel radio system to operate all the functions. The control box also manages the LED lighting system and electric landing gear. See the sidebar for modifications to take advantage of more powerful radio systems.

I used a PBR-9D receiver bound to my PowerBox Core radio to fly the Avanti. I set up the control throws as recommended in the manual and 25 percent expo on all the surfaces with 35 percent on the nose wheel steering. I also enabled flight modes tied to my flap switch which will allow me to trim the elevator for each of the flap positions.

BOTTOM LINE

The 90mm Avanti went together easily, taking me only about 30 minutes to assemble. The only modification that I made is documented in the sidebar regarding the radio system setup. I have the vectored thrust setup for a follow-up article and after flying it stock, I'm very excited to try the vectored thrust.

IN THE AIR

With only four wing screws to install and the quick-connect wings, the

AT A GLANCE

Model: Avanti 90mm EDF

Manufacturer: FMS (FMSHobby.com)

Wingspan: 51 in.

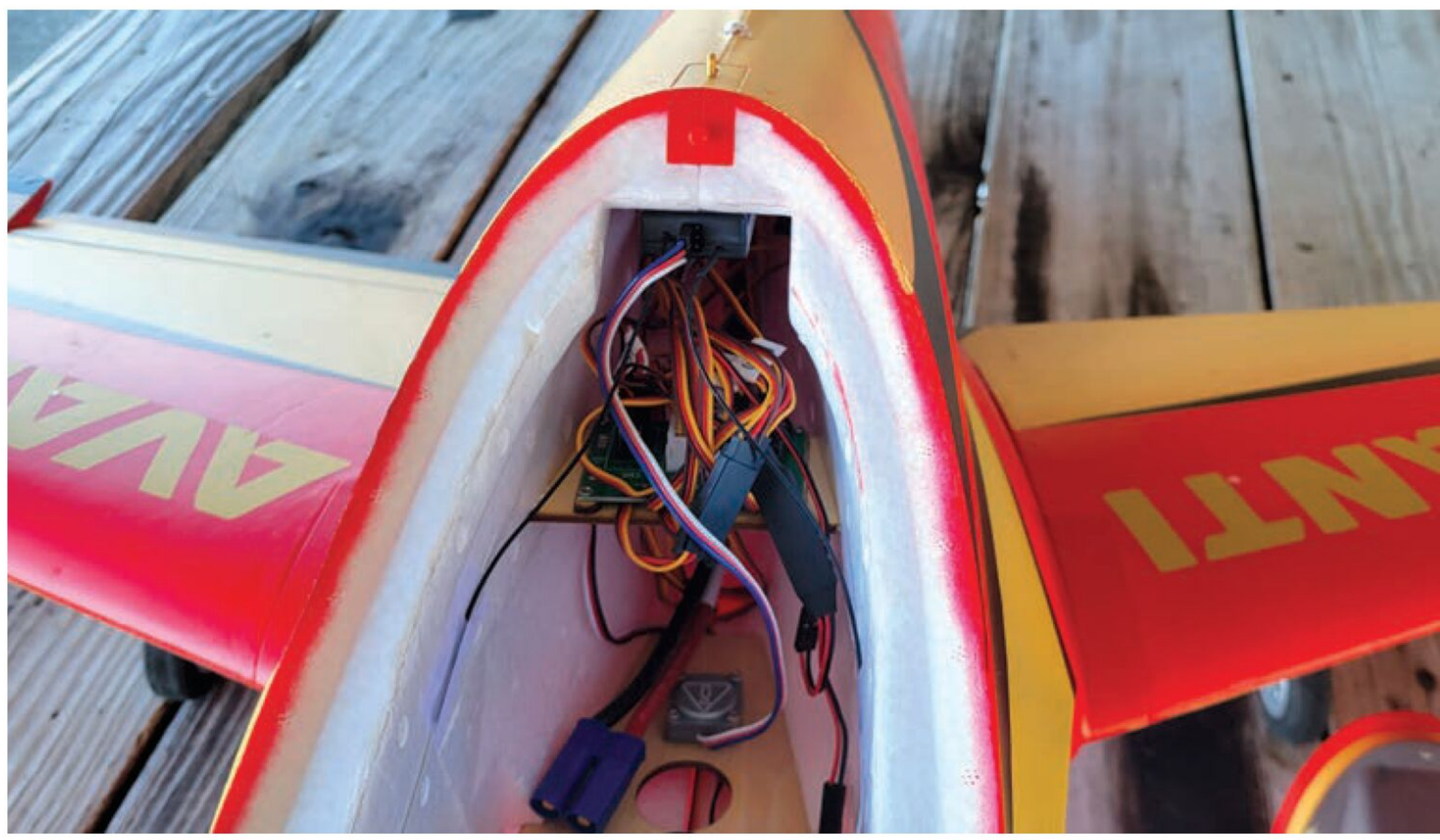
Pilot skill level: Intermediate

Time to assemble: 30 minutes

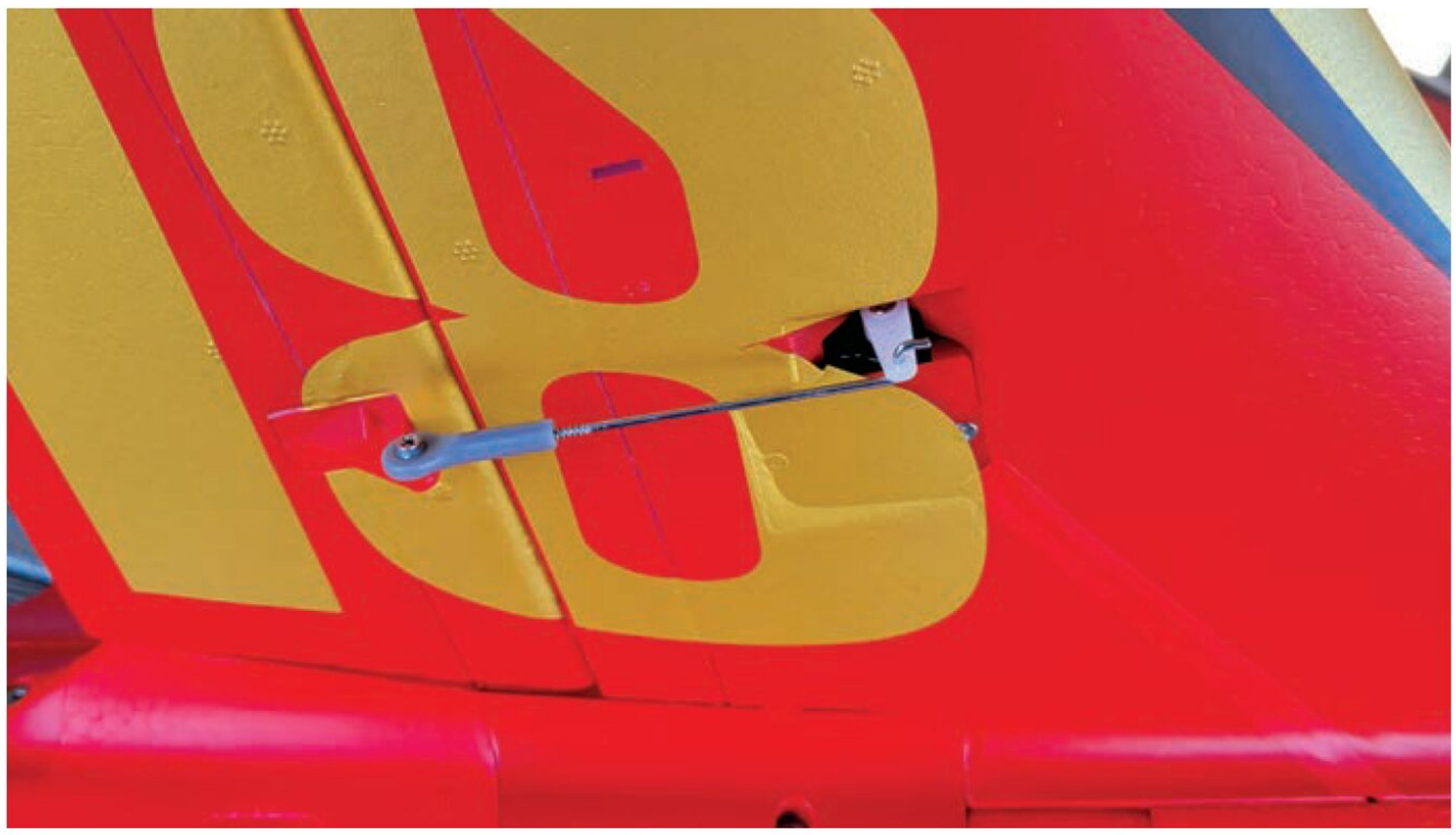
Power req'd: 6S 5000mAh LiPo

Radio req'd: 6-channel

Price: $569.99



I used a PowerBox 9D 9-channel receiver to allow me to connect the additional two servos for the vectored thrust unit when I install it.



Ball-link-equipped pushrods allow allow a slop-free control system, which is important for high-speed jets.

Avanti assembles for flight or breaks down for transport and storage very easily. Any new model usually gets some attention at the field, but this one got a lot of interest when I was preparing for the maiden and review flights. The wide stance of the main landing gear makes it very stable when taxiing.

Using takeoff flap, the Avanti accelerated quickly and took off in less than 100 feet and climbed with authority. The Avanti needed very little trim, and I quickly learned a couple of things. This jet is going to be fun was the first thought, followed quickly by "wow this is pretty fast" and "that 12-blade fan sounds amazing!"

The large flaps are highly effective, and the Avanti slowed down nicely for landing. The trailing link landing gear should absorb any bad landings but with the CG back where it belongs the Avanti touches down very lightly for a jet of its size.

FLIGHT PERFORMANCE

Stability: With no gyro, and flight testing done on a gusty day the Avanti felt stable and felt like a heavier composite plane in the wind. I installed a gyro and it was like I turned off the wind.

Tracking: A credit to its heritage! The Avanti locked in, augmented I'm sure by the wing fences and smooth lines, she tracked nicely through everything I tried, both smooth and during later flights, aggressive.

Aerobatics: Axial rolls, crisp stops during point rolls, excellent vertical, solid knife edge, and loops as big as you please with the 12-blade power system! I can't wait to try the vectored thrust!

Glide and Stall Performance: This is one of the few jets I've flown that will slow to the point where the control surfaces lose effectiveness before the jet stalls, and when it does it just comes straight down with the wings level. Any application of power has it flying again.

PILOT DEBRIEFING

I got comfortable with the Avanti in short order. It's a big jet and it flew like one. I found that I was constantly doing something with the controls rather than flying graceful passes but when I did let it straighten out it accelerated crisply and did nice full power passes, and the 12-blade fan has a very pleasing whoosh. Curious as to the speed claims, I mounted a GPS sensor and obtained ground speeds of 135mph straight and level, and 165 mph out of a powered dive, so it's fast.

The slotted flaps are hinged so that they extend slightly backward as well as down. When lowered a bit for takeoff, the result is a very short takeoff roll for a jet.

The trailing link-style landing gear absorbs any not so perfect landings, and the aluminum struts seem very robust.

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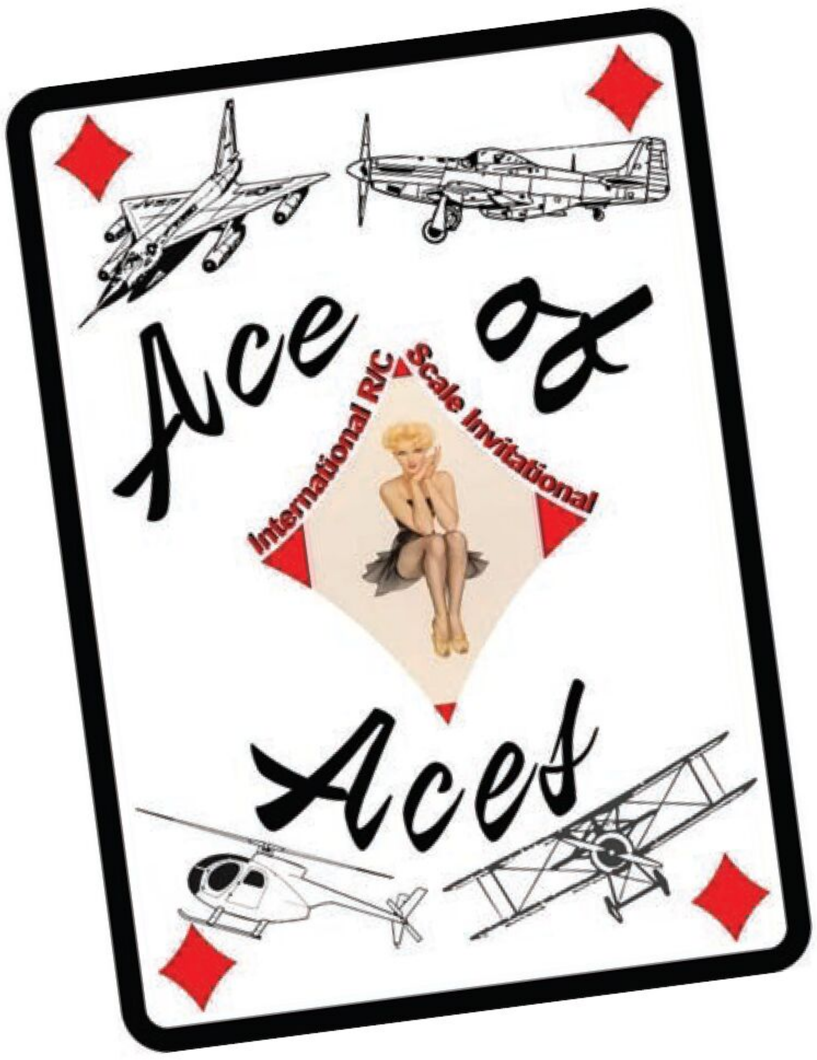

INTRODUCING ACE OF ACES

A New Scale Competition

After the world-renown Top Gun Scale Invitational ended after 30 years of competition, scale builders and pilots wondered if anyone would step up and recreate the magic of this event. Enter Curtis Switzer and Marvin Alvarez. These two experienced RC competitors look to fill the gap with the all-new Ace of Aces International R/C Scale Invitational (AceOfAces.org), to be held at the Saraf Farms RC field in Good Hope, Georgia and tentatively scheduled for April 23–26, 2026. Wednesday will be a practice day, Thursday through Saturday will be the competition, and Sunday will be a rain/make-up day.

Similar to Top Gun, the Aces of Aces competition will have five static- and flight-judged categories: Masters, Expert, Team, and Unlimited. A Pro/Pro judged flight competition will only require a photo of the full-size aircraft the model is based on (no static judging).

About an hour's drive east of Atlanta, the Saraf Farms RC field is no stranger to large events and hosted the Georgia Jets fly-in in 2025. With over 320 acres, the field boasts a 100 x 50-foot taxiway and a new (laid in 2023!) east-west 1,000 x 60-foot asphalt paved runway, so the sun is always at pilots' backs. Other amenities include a 150 x 50-foot covered shelter, a paved pit area and taxiway and paved and grass parking. RVs and dry campers are welcome (no hookups).

Ace of Aces organizers Marvin Alvarez (left) and Curtis Switzer (right) are longtime friends and RC scale competitors.

Curtis says, "We have put together a great team of judges and a number of sponsors. A lot of work needs to be done, but we are very excited about the future of scale competition." He adds, "Invitations were emailed in December to past Top Gun competitors. If you would like an invite, we will be accepting resumes in the near future."

Curtis goes on to say, "Top Gun was an amazing contest and will always be remembered for its great pilots, planes and Frank Tiano's great vision. This event will be a new start to what will hopefully be a great scale contest. We'll never be able to replace Top Gun. Hopefully we can give scale competitors a new place to show their skills to the world."

After sponsoring and covering Top Gun for 30 years, here at Model Airplane News we can't wait to cover this new and exciting scale event. On behalf of the RC scale modeling community, we thank Curtis and Marvin for continuing a great legacy of camaraderie and competition.

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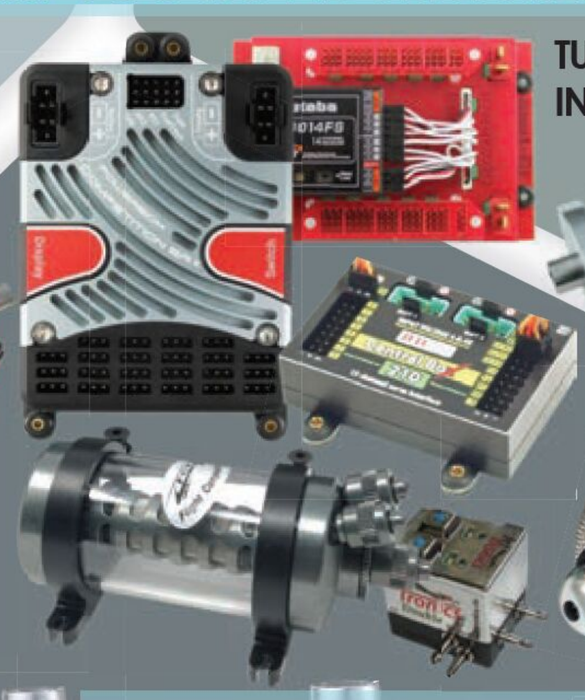

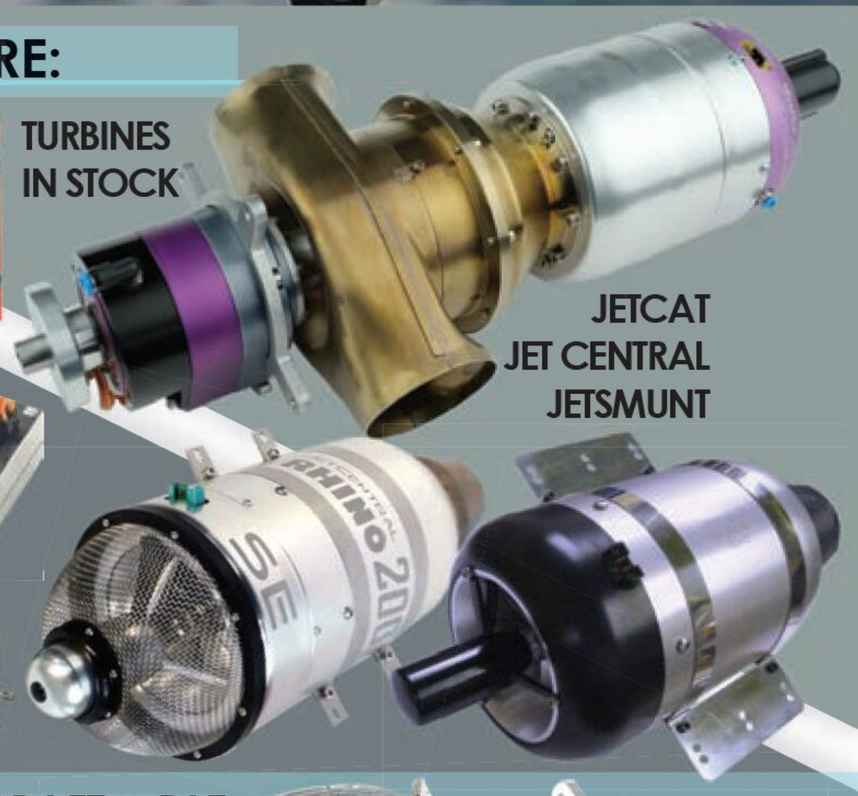

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