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JUNE 2005

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RCM r/c modeler magazine

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JUNE 2005
VOLUME 42 NUMBER 6
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This Month's Cover — Features a beautiful giant scale Fokker D-VII ARF from Arizona Model Aircrafters' kit. Built by Stan Kulesa, it has an 88" span and uses a Zenoah G-45 for power. The photo was taken by Subhra Bose at the ARAM Club Field, in Patterson, NJ. A full product review of this model begins on page 16 of this issue.

FEATURES

CONSTRUCTION

FIESELER Fi-156C STORCH

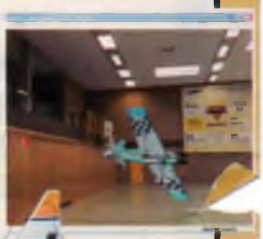
Sport Scale WWII S.T.O.L. Liaison Plane For .15 Glow Or Speed 480 Electric

By Robert Caso

PG 80

COLUMNS

REVIEWS



DEPARTMENTS

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From The Shop

By Jim Pearson

This month I have some photos and information to share with you as well as some of the new items seen at the 2005 AMA/IMS Convention and Trade Show. Held in Ontario, CA, in early January, this show is traditionally the first trade show of the season and gives modelers a firsthand look at many of the new items. This is the second year that this show was held in the new Ontario Convention Center, and in my opinion, it is a much better facility for both the participants and the spectators. The Convention Center is located just off of I.S.10, and is right across from Ontario International Airport, so it's easy to access by land or air, and there are a number of good hotel facilities very close by. And for all the people who need to unload and set up their displays, there are nice large loading docks with easy access and good parking in the adjoining parking lot.

At every show I have attended, Don Dombrowski of House of Balsa, has introduced something new and really neat for the modelers. This time, he had a 1/10 scale Electric P-51 with a set of modular retracts installed (Kit #K-80). These retract units (2) are mounted in each wing as a module, complete with a micro servo on each retract. A very clean and simple set-up! Check HOB's website for more information.
www.houseofbalsa.com
(760) 246-6462

Alberto from Hobby Club in San Clemente, CA, was there with many of the sailplane kits, electric models and motors that he stocks. Lot's of good stuff! You can check out his website at: www.hobbyclub.com
(949) 425-1362

The crew from Robart Manufacturing, was there in force with all their landing gear and accessories, including the new Fun Sonic FS 52 Turbine Engine. Be sure to check out their website for the full line of their products. www.robart.com
(630) 584-7616

Du-Bro products were again well represented by Ed Bojan, seen here manning the booth. The Du-Bro booth is always a popular place and was kept busy throughout the show. Something for everyone!
www.dubro.com
(800) 848-9411

Helmut, the owner of Dymond Model Sports was at the show again this year, and had a very large selection of models and accessories available. Lot's of neat stuff for electrics and sailplanes.
www.rc-dymond.com
(858) 495-0092

Two of the really big models seen at the show belonged to well-known modeler and TOC pilot, Billy Hempel, representing Hobby Barn in Tucson, AZ. They had a video going throughout the show of Billy flying these airplanes ... a real show stopper!
www.hobbybarn.com
(520) 747-3792

Cleve Lee of Experimental Aircraft Models was showing his full line of scale ARF home-built models, including the very neat Velocity canard. If you're in the market for a scale model of a home-built aircraft, you'll want to check out their website.
www.rchomebuilts.com
(800) 297-1707

Jeff Green from MRC was kept very busy all three days demonstrating the new Reflex XTR Flight Simulator and answering questions on all their products. You can contact MRC at:
www.modelrectifier.com
(732) 225-6360

Contrary to what many people believe, occasionally it really does rain here in Southern California, and as anyone who attended this show can testify, the three days of the show were some of the heaviest rains ever experienced in this part of the country! However, even with the very heavy rains, the attendance at the show was very good all three days. (What the heck, if you can't be out flying, why not go to a great model show?) All kidding aside, there were modelers who drove over 100 miles in very heavy rain to attend the show.

Okay, so what were some of the neat new items that were on display? Well, first off, there were a number of distributors/dealers showing the latest designs in electric models, motors, speed controllers, batteries, and accessories. I really don't think there is any question that this is the fastest growing segment of the R/C hobby. During the three days of the show, I had a chance to visit with several of the importers/distributors, and from what I saw and heard, it looks like a lot of modelers who normally fly glow or gas, will also be flying some type of electric powered models in the very near future! There were many people selling new brushless motors and LiPo battery packs in just about all sizes, from very small to very large. In fact, it seemed that just about everywhere you looked there was someone selling electric powered models or power plants. No doubt, this will be good for the modelers as this should help get the products in the hands of many modelers new to e-power.

Okay ... yes, there was also plenty of glow and gas powered models as well as a number of helicopters, and some really neat sailplanes and boats. In short, there appeared to be something for just about everyone! Throughout the three days, there were many flight demonstrations of both fixed wing and helicopters taking place inside an adjoining section of the convention center. In addition, there was a swap shop, a boat pond and of course the AMA Delta Dart assembly program for the kids. All in all, this was a very good show and a great way to kick off the new year for RC'ers. Don't forget to check the Advertisers Index and the Contest/Events Calendar in the back of every *RCM* for a listing of the contests and shows scheduled in the near future. My suggestion is that if there is a show to be held in your area, you really should plan to attend. Not only will you get a chance to see all the neat new R/C

Cyndy and Larry Wolf of Jet Hangar Hobbies had their line of D.F. and Turbine powered models on display, along with one of the new WREN 54 Turbine engines. Also, brand new from J.H.H. is their 1/14th Scale EDF powered F4D-1 Skyray, designed for a Minifan 480/DS-30 power unit. Span: 28.5"; Length: 37". For additional information:
www.jethangar.com
(562) 467-0260

goodies, you will no doubt run into a bunch of your old friends, and have a really great time. If the event is a ways off, maybe you can get together with a few club members and carpool to the event. Since it's simply not possible for us to attend all the shows, the next big show for us to attend will be the Toledo Expo on April 1, 2 and 3, and I hope I'll see you there!

••

The following are a few press releases that we have recently received:

Charlie's R/C has recently moved and are now located at: 6233 Blue Ridge Blvd., Raytown, MO 64133, ph. (816) 356-0961 or e-mail:

charliesrcaircraft@hotmail.com

Bob's Aircraft Documentation (formerly Scale Model Research), the world's largest commercial collection of Full-Color Aircraft Documentation Foto-Paaks and 3-view drawings has expanded their inventory *again*.

The 272 page, 21st Edition of their Catalog lists over 8,000 different Foto-Paaks (**200 new this issue** representing 400,000 photos in stock at all times), 39,000 3-view drawings (**1,000 pages of new additions**), and includes 9 scale related articles written by some of the top competitors and authorities in the scale movement.

The Foto-Paak (studies) are full-color 3-1/2" x 5" pictures taken with the modeler in mind, to show details like paint scheme, markings, instruments, landing gear, etc. These Paaks are sold on a satisfaction guaranteed basis, and because of the large inventory, orders are usually mailed within 24 hours.

Modelers and enthusiasts can get their 21st Edition of Bob's Aircraft Documentation (Catalog) by sending $10.00 ppd (AK, HI, PR, Canada/Mexico $12.00, all other countries $20.00 — includes air post) to:

Bob's Aircraft Documentation
3114 Yukon Ave.
Costa Mesa, CA 92626
(714) 979-8058

••

Before I close this month, I'd like to share a photo sent in by one of our readers, Kenny Heller of Post Falls, ID, who along with the help of friend and mentor, Matt Jacobson, started building this great flying model from RCM plans in May, 2004 and it was completed in December, 2004. The model is the Miss Grandin, a construction article by Ed Happich that was published back in the July 1978 issue. This is a large model and has an 81-3/4" span and is powered with an O.S. .91 4-stroke swinging a 13 x 8 Master Airscrew 3-blade prop. For control, Ken uses a Futaba Skysport 6 ch. radio with 5 servos. The all-up weight of the plane is about 9 lbs., and according to Ken, "It's a joy to fly off the local lakes here in beautiful north Idaho." Like most scratch-builders, Ken and Matt made a number of minor changes to his model during construction that really made "His" model special! If you're interested in this plan, it's #732 and can be located in our Plans Catalog on-line on our website, or you can order a plans catalog for just $5.00. There are well over 1,000 plans listed in our Plans Catalog, so if you are tired of seeing the same old thing at the field or lake, check it out, I'm sure you will find something that will turn you on!

Till next month, be sure to keep building and flying, because that's what keeps us young, no matter how old we are! ✈

Twenty two year old Mellisa Heller holding the Miss Grandin, built by her father, Kenny Heller and Matt Jacobson.

Miss Grandin
Plan #732
(See above for details.)

OVER CAROLINA WARBIRDS

October 28–31, 2004

American Eagle P51D built by Lenny Smith, modified by Ronnie Weaver and flown and owned by Jesse Phoenix. 3W 75 rear intake, 34 lbs., 102" wingspan, Robart retracts mains and tail wheel, finished with PPG base coat/clear coat with graphics by Bill Fulmer. Minimal detail, a great weekend flier.

Warbird fly-in's have become very popular in the last few years.

The forward thinking Chris Joiner saw the need to promote the construction and flying of 1911-1950 era giant scale warbird R/C model aircraft and in 1996 organized the Southern Scale Warbirds Association (the name has since been changed to Giant Scale Warbirds Assoc.). Since then this segment of the Association has grown to include 15 states holding nine co-hosted events a year. It is the only association promoting giant scale warbirds exclusively through participation of non-competitive fly-ins and public demonstrations, while encouraging sportsmanship and fellowship. Chris is secretary/treasurer/publisher and group website manager. He is also editor of the Warbirds Journal (online), which covers all aspects of happenings within the Association plus many historical facts of interest.

The flying site for this event was Triple Tree Airdrome located near Woodruff, SC. It is the first Warbird event to be held there among other annual events occurring throughout the year. Triple Tree was purchased over five years ago by Pat Hartness, a modeler himself, who developed the area into one of the best flying sites on the east coast. A wonderful place to fly with a 100 x 3000 ft. Bermuda grass runway, a 50-acre lake for float flying and, best of all, Pat's gracious hospitality. We appreciate **immensely** all you have done for us, Pat.

Because of the hurricane season last year, the Warbird event was shoved back to the

Tommy McClellan, Birmingham, AL, built and flew this one-of-a-kind 1/5 scale Curtiss SB2C Helldiver built from Jerry Bates plans. Powered with a 60cc 3W, it has a lighting system, dive brakes, retractable leading edge slats, and Robart retracts. Tommy spent 1-1/2 years putting this beauty together.

GIANT SCALE WARBIRDS AT TRIPLE TREE

By Jerry Smith

ABOVE: Paul Byron does a low inverted fly-by with his ARF Tiger Moth. The only ARF seen at the event, most all warbirds there were hand-built.

RIGHT: Pat McLaughlin, Woodstock, GA, lands and takes off on one wheel with his 1/3 scale Cub. The Cub was stationary in the sky at half throttle with the high winds experienced on Saturday.

ABOVE: Bob Underwood, High Point, NC, built this Boeing P-26 and flew it after solving his engine problem, thanks to Kirby McKinney. Powered with a Walker 3.2 Sachs and built from Dan Santich plans, you don't see many of these nowadays.

BELOW: Trent Wilhelm does a low pass with his Rich Uravitch Fokker D-VII. Trent has many Warbirds and flew them all ... one at a time of course!

ABOVE: John Mueller, Roswell, GA, proudly displays his Balsa USA Fokker D-VII. A Hansen G-26 up front pulls it around, all-up flying weight around 20 lbs. (See the upcoming Aug. 2005 issue of RCM for a review on this airplane.)

ABOVE RIGHT: Ty Brown, Kannapolis, NC, does a fly-by with his Italian Savoia-Marchetti SM-79 three-engine bomber. Ty scratch-built this 110" almost 1/7 scale beauty with two Magnum .52 4-strokes in the outer nacelles and an O.S. .91 4-stroke in the nose. The ever-popular Latex paint was used to produce this colorful scheme, which can be easily lost in the grass. 22 lbs. ready to fly. Bad weather, yep, but PhotoShop came to the rescue with the blue sky and clouds!

RIGHT: Chris Joiner, founder and driving force behind the Giant Scale Warbird Assoc. Also editor and publisher of the Warbird Journal. Chris is very happy with his Trillium Models J-3 kit modified to an L-4, powered with a Quadra 52, covering is Solartex.

It has been a few years since we have seen one of these. Yes, a real live Byron P-51 with belt drive, remember? There are still some around.

ABOVE: 87-year old Slick Larsen scans the skies before taking off. Good friend Gene holds while Bob Johnson looks on. Slick's airplane of the day (he has over 50 in the hangar) is a Ziroli Corsair F4U powered by a G-62 with Robart retracts.

LEFT: Early morning flight line, too foggy to fly. Note the author's SR Eindecker right up in front ... naturally!

Ronnie Weaver, Garner, NC, flew this super looking C-45. Powered with two G-38's, it was anything but slow. Excellent workmanship, Ronnie.

RIGHT: Jeff Whitford, Alpharetta, GA, adjusts the carb on his Dornier 335 while son Mark looks on. The Dornier has two engines: a YS 1.20 up front and a .60 in the rear. A very unusual airplane.

BELOW: Beautiful FW-190 built from an Air Wolf kit and powered with a 3W 120. Sierra Precision retracts, beautiful weathered finish with panel lines and rivets, weight 47 lbs. Owned by Jesse Phoenix and flown by Ronnie Weaver.

Trent Wilhelm and Ty Brown wait their turn for the pin to fly. Trent's P-40 waits for its turn in the sky to hunt down the Zeros.

Curt Jack's (Winston Salem, NC) Yellow Aircraft P-47 heads in for a landing after a flight. Curt had six airplanes at the event and flew them all.

Dick Konkle, Smyrna, GA, built and flew this wonderful looking Great Lakes built from RCM plans (Plan No. 1303 Nov. '01 issue RCM). The Great Lakes sports a Saito .120 on ignition and gas, covered with Coverite and painted with Latex house paint. All-up flying weight 14 lbs. Check out those fake Saito cylinder heads. Aren't they great?

Bobby Poston, one of the principals in the Giant Scale Warbirds Assoc., is very proud of his Glen Torrance Fokker D-VIII Razor. A Laser 200 twin 4-stroke hauls it around in fine style. Full cockpit detail can be seen in one of the small inserts.

Mike Bost also brought his 1/4 scale Balsa USA Sopwith Pup. Solartex covering, 15 lbs., and powered with a Saito 170 R.

***ABOVE:** Mike Bost, Rockwell, NC, stands behind his dad's 1/3 scale Balsa USA Sopwith Pup. The Pup is covered with Solartex, weighs approx. 29 lbs. and is powered with a Saito 325 five-cylinder radial. Mike flew the big Pup very realistically.*

***RIGHT:** Doug Imes, Greenville, SC, flew this great looking 1/4 Grumman Widgeon. Robart retracts and two powerful Brison 45 engines make it a fast airplane. Doesn't it look magnificent in the air?*

end of October and the Fall seasonal weather took over. Thursday and Friday were horrible with fog, mist, and dark overcast. However, there was considerable flying at times, that is, when you could see the airplane. Then came Saturday and 20-30 mph wind gusts which kept many on the ground except for the few who wouldn't give up. I managed to fly my slow flying SR Eindecker at least six times during the three-day period and was able to shoot these pictures to share with you, thanks to PhotoShop and a good digital camera. Not all bad, there were some good breaks in the weather allowing us to fly.

In spite of the weather 50 pilots registered for the event during the three days. Most fly-in's are nothing more than a big reunion. It's all about friends meeting friends and flying together. No competition except "my plane flies/looks better than yours," of course all friendly. Some bring their airplanes, set them out and never fly. Others fly all they can while there are some who just come to watch. Warbirds Over Carolina was no different in this respect.

I noted a couple of unusual airplanes I would like to tell you about. Jeff Whitford, Alpharetta, GA, brought his Dornier Do 335, a very unusual German airplane you don't see or hear about too often. I didn't get the scale size but it looked to be 1/5 or 1/4 size powered with a YS 1.20 in front and a .60 engine in the rear. It flew great and was fast. The full-size Dornier Do 335 was a bold attempt to embody the centerline thrust concept in a practical and efficient airframe. Its unique layout featured a conventional nose-mounted engine and tractor propeller, together with a second engine located in the rear fuselage, driving a pusher propeller situated aft of the tail unit. Aside from its unusual engine layout, it incorporated several other unusual features. These included a reversible-pitch tractor propeller, to shorten the rather long landing run; a wing leading edge de-icing system; hydraulically operated flaps; a tunnel radiator for the rear engine and a compressed air-powered ejection seat. The latter being essential for a safe bale-out clear of the rear propeller, although the vertical tail and propeller could be jettisoned by explosive bolts when required.

The other unusual airplane I noted was a Focke-Wulf 190 owned by Jesse Phoenix, Wilmington, NC. The FW, built from an Air Wolf kit, was beautifully weathered with panels and rivets. It was almost 1/4 scale and

powered with a 3W 120. The full scale FW 190 prototype first flew on June 1, 1939 and production deliveries began in late 1940. Within a year, FW 190's were making low-level sweeps over southern England in daylight, against which the Spitfires then in service achieved little success. The situation did not improve until the Royal Air Force received more powerful Spitfires in partnership with the four-cannon Typhoons. Jesse's FW also had a machine gun sounding off as it flew over.

Doug Imes flew his beautiful Grumman Widgeon. The Widgeon is a kit from G&P Sales. It is 1/4 scale, putting the wingspan at 10'. With a weight of 53 lbs., the Widgeon flies well on a pair of Zenoah 45's, Doug's JR 10SX radio is set up to provide differential thrust while taxiing, which is really a benefit for taildragging twins. Differential thrust meaning — when turning the rudder left the right engine turns up more than the left and vice-versa. Once in the air, the thrust mix to the rudder is turned off. Doug chose the markings on his bird because it was supposedly the only Widgeon to sink a sub in WWII. Unfortunatly, according to the History Channel, that claim was denied, and the kill was credited to a destroyer that sank the (probably wounded) sub 165 miles from where the Widgeon attacked it.

There were many other nice warbirds flown with their proud pilots performing low pass strafing missions. That's what it's all about. Fly around the pattern, do low passes with maybe a roll or two and land, that's it!

Doug Imes was CD of the event and did a great job of informing the pilots during pilot meetings of what was expected. Here is what he had to say.

We were very pleased with the participation; we had folks who made the trip from the mid Atlantic states, TN, NC, AL, FL, VA and probably some others. There were 50 registered pilots with around 100 planes.

The rain stayed away and the weather gave us what we needed, once we got the morning mist burned away. Pilots were treated to what they have come to expect at Triple Tree Aerodrome, the best grass runway in the country, plenty of good food and fellowship.

We had a "cook what you bring" dinner on Friday night, with fixings provided courtesy of Confederate Air Farce and Giant Scale Warbirds, and a famous Triple Tree BBQ on Saturday. Safety is always a key component, and I'd like to throw a salute to the pilots and spotters; we had a safe event.

Watch the JoeNall.com website for info about next year's event. Remember to watch it closely for the noise policy that we are going to campaign in 2005. It will include some things that will make a real difference in this far-sighted aspect of our hobby (noise reduction).

The $35 entry fee did seem a bit high but included three days of flying, a lunch on Friday and a BBQ dinner on Saturday afternoon. A reduced $20 entry fee did not include the lunch and dinner. Bobby Poston, GSWA Commander, and Charlie Kiel, Vice Commander, did the paperwork to keep things moving. The event was co-sponsored by the Charlotte Aeromodelers and the Giant Scale Warbirds Assoc. If you plan to attend next year, it is scheduled for September 15-18, 2005. I'll see you at Triple Tree ... a great place to fly and meet your friends!

1/4 Scale

FOKKER D-VII

Biplane ARF

By Stan Kulesa

Arizona Model Aircrafters

SPECIFICATIONS

1/4 SCALE FOKKER D-VII BI-PLANE ARF

Aircraft Type
Giant Scale
Mfg. By
Arizona Model Aircrafters
13814 N. 56th Place
Scottsdale, Arizona 85254
Ph. (602) 971-5646, Fax: (602) 971-5644
www.arizonamodels.com
Expected Street Price
$749.00
Available From
Both Mfg. & Retail Outlets
Wingspan
88 Inches
Wing Chord
15 Inches (Avg.)
Total Wing Area
2,660 Sq. In.
Fuselage Length
67 Inches
Stabilizer Span
28 Inches
Total Stab Area
364 Sq. In.
Mfg. Rec. Engine
ST 2500 2-stroke; US 41 Gas
Rec. Fuel Tank Size
24 Oz.
Rec. No. of Channels
4
Rec. Control Functions
Rud., Elev., Throt., Ail., Kill Switch
Basic Materials Used In Construction
Fuselage
Balsa, Spruce, Ply
Wing
Balsa, Spruce
Tail Surfaces
Balsa
Building Instructions on Plan Sheets
Yes
Instruction Manual
Yes (4 pages)
Const. Photos/Illustrations
No

RCM PROTOTYPE

Radio Used
Airtronics RD6000 Super, 7 Servos
Engine Used
Zenoah G-45
Fuel Tank Used
24 Oz.
Weight, Ready to Fly
332 Oz. (20 Lbs. 12 Oz.)
Wing Loading
17.97 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Quality of construction and materials, lots of scale details included in this deluxe kit.
WE DIDN'T LIKE THE:
Absence of a useful construction manual.

Photos by Subrha Bose

The full-scale Fokker D-VII had a remarkably strong airframe, was easy to fly, could quickly climb to a superior service ceiling, was capable of diving at high speed without flutter, possessed outstanding maneuverability, and had exceptional visibility for the pilot. It was arguably the best fighter aircraft of WWI. Among its array of capabilities, the D-VII could "hang on its prop" and shoot into Allied aircraft from below. (I watched this technique demonstrated by a replica aircraft at the Old Rhinebeck Aerodrome in New York; it was truly impressive.)

The Fokker D-VII wasn't introduced into battle until May 1918. However, its reputation was so pronounced that the Armistice ending the war included a clause demanding the surrender of all Fokker D-VIIs — no other aircraft were specifically mentioned by name. The aircraft modeled for this RCM product review was one flown by the leader of Jasta 10, Oblt. Erich Lowenhardt, Germany's third-ranked ace.

The Kit:

The cardboard box containing this model was very large, measuring 85" long, 17" wide, and 12" tall. In addition to the cardboard box, it was surrounded by wooden crating around its corners to minimize damage during transit; the test model had no damage. Each major component is individually wrapped in a clear plastic bag. Both the top and bottom wings are one-piece structures and secured in place in the carton with cardboard tabbing. The ARF version is covered with white iron-on fabric (an ARC version and a kit version are also available from Arizona Models). Landing gear, cabane and interplane struts, and assorted other items were taped in place.

This is a "deluxe" kit containing an array of extras such as two (one scale and one functional) sets of laser-cut acrylic control horns, cockpit coaming, fiberglass fuselage cheeks, Spandau machine guns kit, pre-assembled aluminum spoked wheels, fiberglass cowl, a Mercedes engine kit, instruments kit, scale interior

kit, etc. All wooden and acrylic parts are laser cut. For an additional cost, Arizona Models also offers lozenge-patterned fabric and full-bodied pilots.

There were no warps, waves, twists or any other significant problems noted on the test model. The materials used throughout construction were well above average in quality. Despite this being an ARF model, four folded sheets of full-sized blueprints are included. There are several instruction manuals (e.g., general assembly, guns, engine, instruments) and they are all difficult to follow. For example, the general assembly manual is a copy of a scratch-built construction article from a magazine; it does not specifically address the assembly process of this ARF. You will need to have above average technical skills to assemble this model, periodically referring to the blueprints and using your judgment. The shortcomings of the construction manuals are the most significant complaint I have about this product.

Construction:

Total assembly time was approximately 150 hours (from the point at which I opened the kit box to being ready for flight-testing).

The nose section of the fuselage is not covered with any fabric in anticipation of engine installation and placement of the two-piece fiberglass fuselage cheeks. Construction begins with the installation of the engine (described later in the article). Following engine installation, the outline of the cheeks needs to be traced onto the fuselage sides to mark their placement. Once the desired position is established, the builder must apply covering (supplied in the kit) to the uncovered section. I overlapped the traced line with covering by about 1/2". Once satisfied with the fit of the cabane struts and landing gear, the fuselage cheeks were glued in place with a thin coat of 5-minute epoxy.

The cabane struts and landing gear have balsa fairings (which are already shaped and covered). The strut wire is passed through predrilled holes in the fuselage nose section and attached to hardwood blocks with metal straps and screws. Once the cabane struts are installed, it's a good time to trial-fit the top wing in place and check for proper alignment. This is accomplished through loosening the brackets and adjusting the strut wires.

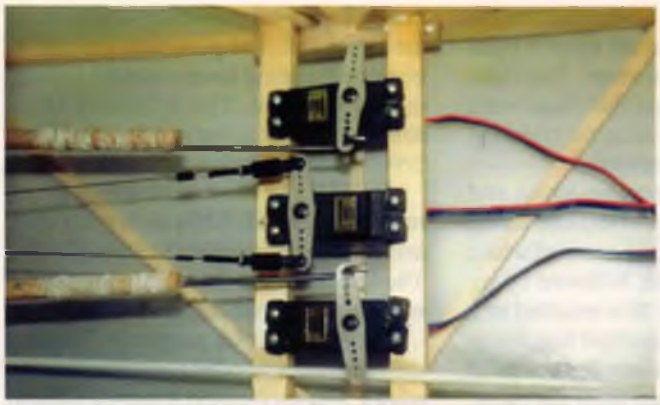
Assembling the landing gear requires the soldering of two spreader bars and a wire loop to the lower legs of the gear. The 1/4" axle is shock-mounted to the spreader bars (using five #64 rubber bands on each side) allowing the axle to move within the wire loop. The landing gear wing has front and rear halves and they are attached to the spreader bars with metal straps. These removable straps allow for disassembly if needed to replace the rubber bands. Metal straps and screws hold the landing gear in place on hardwood blocks.

The stabilizer is attached to the fuselage using three screws. The bottom of the fin has two "L"-shaped tabs that fit into slots on the stabilizer; neither the fin nor the stabilizer is glued into place. Instead, they are held in place by screws and rigging. Two light aluminum tubes firmly affix the bottom of the stabilizer to the fuselage. This installation process allows the entire empennage to be removed for easier transit/repair. Prior to hinging the rudder or the elevator halves, the acrylic control horns must be epoxied in place. A 1/8" wide notch must be cut into the hardwood leading edge section using a razor saw. At this point, the rudder and elevator pushrods should be installed.

The fuselage utilizes an open frame construction with the top and bottom longerons made of 1/4" x 1/4" spruce and vertical braces of 1/4" x 1/4" balsa. The nose section is balsa sheeting reinforced with 1/16" plywood doublers. The firewall is 1/4" plywood and all of the formers are 1/4" balsa. As a precautionary step, I doubled the firewall to better withstand the rigors of the gas engine selected to power the model. Hardwoods are also used for the wing hold-down plate, elevator hold-down plate, tailskid, and in a few other high stress areas.

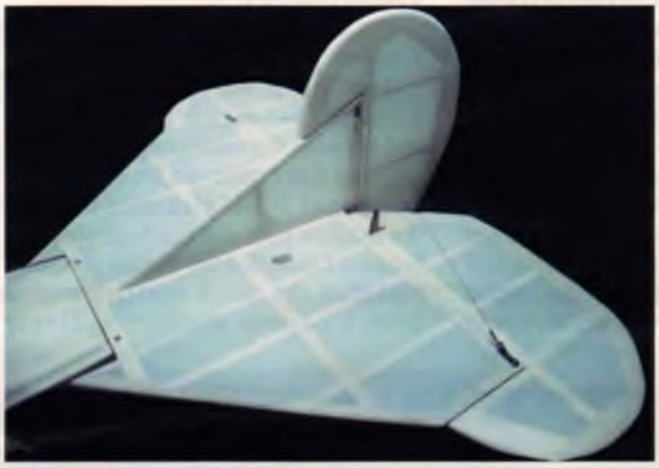
The empennage also uses an open frame construction method consisting of a 1/2" x 3/8" balsa perimeter, 3/8" x 3/8" balsa ribs and 1/2" x 3/8" spars. Hardwood inserts are added to the extreme ends of the stabilizer and fin; these are later drilled to attach the rigging and aluminum bracing.

True to scale, the wings are cantilevered, the ribs are undercambered. The trailing edge sheeting has the "scallop"



Du-Bro 4-40 pull-pull cabling (not provided in the kit) was used for the rudder. Mounted on either side of the rudder servo are the two elevator servos. The receiver antenna runs through the white tube at the bottom of the photo.

The two-piece fiberglass fuselage cheeks must be lightly sanded with 220 grit sandpaper (in preparation of paint) and holes need to be drilled for the cabane struts and landing gear.



The stabilizer is attached to the fuselage using three screws. The bottom of the fin has two tabs that fit into slots on the stab; the fin is held in place by the rigging. And the whole tail section is removable for transportation.

The landing gear wing has front and rear halves and they are attached over the spreader bars with metal straps. These removable straps allow for easy disassembly if needed to replace the rubber band shock absorbers.

pattern and the leading edge sheeting has the "dental" pattern. The wings have front and rear spars and diagonal bracing throughout. The structure is solid with very little movement on twisting. Wingtips are built-up balsa. The lower wing is attached to the fuselage by two metal screws that pass through a hardwood block in the interior of the fuselage. Two removable hatches on the top of the fuselage make this accessible. The top wing is fitted onto the wire end of the cabane struts and secured in place with metal straps; the interplane struts also use metal straps.

The accessories that are included with the Arizona Models Fokker D-VII are truly noteworthy. Check these out ...

Spandau Machine Guns — This is a laser-cut kit assembled from various thicknesses of plywood and cardboard trimmed with some metal parts. Solid brass bullets and leather feed belts are included.

Cockpit Seat — This is a laser-cut kit assembled from three pieces of lite ply.

Mercedes Engine — This is a laser-cut kit assembled from various thicknesses of plywood, balsa, plastic piping, springs, and nails. It requires quite a bit of shaping. The builder has two choices — the entire engine can be built for museum quality static display or just the top half can be built for flying models.

Spoked Wheels — These require minimal assembly (fitting the rubber hose over the wheel hub). The spokes have already been installed on the hub.

Control Horns, Cockpit Floor, Rudder Pedal Skids — These are all laser-cut items.

Instrument Panel, Throttle Control, Compass — These are cut from various thicknesses of plywood, balsa, and acrylic material. Instrument faces are printed on paper while the needles are laser-cut from cardboard. Some of the brass housings are supplied and the rest requires your imagination. Scrap plywood is needed for the instrument panel.

Covering/Finishing:

For the purposes of the Arizona Models Fokker D-VII, the term "ARF" means "almost-ready-to-finish." Once you have completed assembly, you must apply a painted finish. Considering the benefits of a uniquely finished product, though, it's well worth the investment in time and effort. There is no shortage of interesting color-schemes for the D-VII and the builder gets to avoid look-alike "cookie cutter" ARFs.

As with all scale projects, research is needed. For WWI projects, Windsock Datafiles are an excellent source. Wise Owl Publications at (562) 461-7574 provided me with a Fokker D-VII data file which is complete with three-views, colorized drawings, and a plethora of other information to "fill in the gaps."

The ARF model is factory covered with all-white iron-on fabric. Because I opted for a lozenge-pattern design for the wings, the existing fabric on the wings was stripped off. Using the pre-printed lozenge fabric from Arizona Models was markedly easier than the work that would have been required to paint each of the hexagon shapes. Before covering the bottom, I applied thin CA along the bottom of each rib to

The G-45 with custom Bisson muffler was a tight fit. Cooling air exits through gaps in the top hatches.

reinforce the adhesion of the fabric to the undercambered airfoil. This fabric is partially translucent, so to minimize this effect two steps were taken. First, a coat of white primer was applied to the structure of the wings. Second, primer was applied to the adhesive side of the covering of the bottom wing after it was ironed on but before the top of the wing was covered. 3/8" strips of the lozenge-pattern fabric were cut for each of the ribs and the perimeter of the wing to simulate the rib tape. Dots of glue from the tip of a T-pin gave the stitch some texture. Two light coats of Nelson Paints flat clear were applied to both wings once the covering and detailing were completed.

The fuselage, empennage, struts, and landing gear were also finished using Nelson paints. Two light coats of white paint served as the base, followed by six light coats of yellow; this resulted in a very nice finish. The cockpit hatch was painted olive drab. Two very light coats of flat clear took the sheen from the paint. (Please see the sidebar).

Provided in the kit are scale leather patches through which the control rigging passes. A scale interior is also provided in the kit and consists of a seat, instruments, throttle control, cockpit floor, rudder pedal skids, seat, and coaming. You'll need some scrap 1/16" plywood for the instrument panel and some dowel for the joy stick. A coat of natural wood stain was applied to all wooden parts, followed by three coats of polyurethane. An optional full-body Arizona Models WWI German pilot was used. And the machine guns and Mercedes engine (included in the kit) were added. Wire mesh material was purchased from a craft store for the engine grill. And music wire was used to simulate the lifting handles and the footstep on the fuselage. The red/white/black streamers on the wingtips signified Oblt. Lowenhardt's leadership status.

I used Kirby Kustom Graphics for all markings. (Dennis Kirby does great work and can be contacted at (513) 932-2422.) The flat clear over the markings gave it a streaked (paintbrushed) effect.

For static display purposes, I sanded the finish off a wooden prop, rounded the edges, and refinished it with a natural wood stain and three coats of polyurethane. The final step was to add the "Axia" prop logo (provided by Kirby Kustom Graphics).

Engine:

I chose to power the test model with a Zenoah G-45 engine; it was a snug fit and between the muffler and carburetor required that I remove a lot of material. Because of 1-1/4" clearance between the exhaust port and fuselage side and because I mounted the engine upright, I replaced the stock muffler with a Bisson custom muffler. A Zinger

NELSON HOBBY PAINT SYSTEM

There's nothing quite like a painted finish and there are still a number of paint products available. The Nelson Hobby Paint System is unique in that it is a water reducible polyurethane paint, it has no obnoxious odor, can be safely used indoors, it is not flammable, and it is easy to clean-up (with just water). A wide array of colors is offered and custom tinting is available. There are three parts to the system: the paint, a cross-linker (for fuelproofing), and water.

Nelson Paints come in half-pint or one-pint plastic bottles. The mixing directions are easy to follow. The "primary" formula is 4 oz. of paint, 8 drops of cross-linker per ounce of paint, and a capful of water. Once stirred, it is ready to be brushed on. Nelson Paints can also be sprayed on. To do so, the paint must be strained through a fine paint strainer, and the spray gun should not stand for more than 30 minutes without being cleaned.

The paint is applied in several thin coats and should be "stretched" over a wide area (a technique comparable to multiple mist coats). Applying too heavy a coat of paint will result in runs on vertical surfaces. A 2" foam brush from the hardware store can

The Nelson Hobby Paint System consists of a base color (only if the selected finish color needs it), the finish colors, and a cross-linker. It can be brushed on or sprayed. Best of all, it can be done indoors as there are no obnoxious/dangerous smells/fumes.

be used for a brushed-on effect. Since brush streaks can be seen, it's important that all coats be brushed in the same direction. Certain colors (i.e., yellow, red, orange) require a white base coat; I used two light coats of Nelson white paint for this purpose. The finish has a medium gloss but Nelson's flat clear can be applied over the painted surface if a flat finish is desired. I experienced no running of colors when brushing over them with the flat clear.

This paint dries quickly, allowing the modeler to apply the next coat in less than ten minutes. After the preliminary coats have dried for about an hour, the painted finish should be lightly sanded with 320 sandpaper to prepare it for the final coats.

Adding trim colors requires that the base color be totally cured. I waited 24 hours despite the paint's fast drying time. After carefully taping off the area for trim colors, a thin coat of the base color paint should be applied to seal the edge of the tape and prevent the trim color from bleeding. Once this is dry, the trim color paint can be added.

An important comment in using the Nelson Paint System is to follow the instructions — even if you're an experienced hobbyist who's gifted with painted finishes. The instructions are easy to follow but they are different than other painting techniques, so relying on your expertise and ignoring the directions is not advised.

I was so pleased with the results of the Nelson Paint System that I have switched to using the product on all of my scale projects. Nelson Hobby Specialties can be contacted at (877) 263-5766.

20 x 10 wooden propeller was used. There was plenty of room for the Du-Bro 24-oz. tank. A Great Planes ignition switch assembly was installed.

Radio:

The radio installation process is fairly easy. My choice was the Airtronics RD6000 Super system. Seven servos were used (one for each aileron, one for each elevator half, the rudder, the kill switch, and the throttle). Gary Allen (the model's designer) states that standard servos can be used throughout. I used Airtronics 743 double ball-bearing servos (with 60/72 in./oz. of torque) for the rudder and each elevator, but opted for Airtronics 358 high torque aluminum gear double ball bearing servos (with 167/200 in./oz. of torque) for the ailerons. The throttle and kill switch servos were basic Airtronics 322s.

The rudder and elevator servos must be installed before the cockpit can be finished. These servos are located under the pilot on hardwood rails (not provided). I mounted the cockpit floor to balsa rails with Velcro and attached the seat to a supporting structure with screws. All of this can be easily removed for unobstructed access to the servos. Du-Bro 4-40 pull-pull cabling (not provided in the kit) was used for the rudder. Mounted on either side of the rudder servo are the two elevator servos. Each elevator servo has a dedicated hardwood dowel with a threaded pushrod. I replaced the ones provided in the kit with Du-Bro 4-40. To coordinate the movement of the elevator servos in the same direction, I used a Maxx Products "Miracle Y" connector. The battery is located as far forward as possible and the receiver is located under the cockpit floor. The antenna passes through a tube in the fuselage. The switch was attached inside the cockpit area but hidden from view.

Flying:

No weight needed to be added in order to achieve balance at the Center of Gravity. The control travel used on the review model was as follows — Ailerons: 1-1/4" up, 1" down; Elevator: 1-1/4" up, 1-1/4" down; Rudder: 2" left and right. The take-off roll is short and very little rudder is needed. With full throttle, the tail rapidly comes off the ground and the model is airborne within 25 feet.

In-flight performance is a pleasure as the model exhibits no "surprises." It handles more like a Cub than a fighter plane; you will understand why this aircraft was a favorite among the German pilots. Turns can be achieved with ailerons only but are much nicer when coordinated with rudder. Spins were wide and not snappy, loops had about a 25-foot diameter, the roll rate was about 1-1/2 second per roll. Inverted flight required a generous amount of down elevator. Obviously, one needs to be mindful of backing off on the throttle for down-line maneuvers.

Landings are non-eventful as the model settles nicely as the throttle is dropped. Control surfaces remained quite reactive attesting to the Fokker D-VII's slow-flight performance.

Conclusion:

If you love WWI scale aircraft, this one's a "keeper." Its strikingly good looks, full array of scale detail amenities, and exceptional flying characteristics make the Arizona Models Fokker D-VII a "best-in-class" choice. The finished model exceeded my expectations — even considering the poor quality assembly instructions.

And by the way, I should also mention that this manufacturer also produces kits to build full-scale replica aircraft (frequently displayed at airports and museums), so if you are interested in this aspect of aeromodeling ... ✈

ENGINE CLINIC

Clarence Lee

As our side bar review of the Evolution 100 NX ran a little longer than normal this month using up more space than normally allotted for these reviews, we'll have to compensate by keeping the column shorter with just three or four letters.

Our first letter is a two-parter, i.e. — the sender's (Henry Hain) first letter, my answer, and then a follow-up letter from Henry.

Dear Mr. Lee,

I have an MVVS twin 1.20 engine that has given me fits. The engine starts with an onboard glow-plug igniter and runs up to max rpm. However, when the throttle is closed so the rpm is reduced to where the onboard igniter is turned on, the engine will not return to higher rpm. The exhaust temperature of the gasses leaving the individual exhaust stacks indicates only one cylinder seems to be firing.

Recently I had the engine on a test set-up and left the current on the glow plugs and the engine performed beautifully. Discussion with my friends suggests hotter glow plugs. My onboard igniter is an Electro Dynamics unit with two NiCds in series connected to the glow plugs operating in series. The glow plugs are Fox Miracle Plugs, which I understand are hot plugs.

I plan to install the engine in the airplane and operate the system with the current on at all times and then recharge the batteries between flights.

If you have any suggestions for a solution, please help.

Very truly yours,
Henry Hain
Green Valley, AZ

Henry,

Your cylinder drop out problem could be caused by nothing more than trying to idle the engine too slow. Keep the idle speed in the 2,400 to 2,500 rpm range. Also, be sure your fuel is fresh and hasn't been sitting around for a while with the cap off. If the fuel is fresh and the idle speed is set properly

EVOLUTION 100 NX
ENGINE REVIEW

Specifications
Type: 2-stroke cycle, ABC, Schnuerle scavenged
Bore: 29mm (1.14")
Stroke: 25mm (.985")
Displacement: 16.48cc (1.005 cu. in.)
Compression ratio: 7.16:1
RPM range: 1,400-13,000
Weight: Bare 23.2 oz., w/muffler 28.5 oz.
Manufacturer: Evolution Engines — China
U.S. Importer: Horizon Hobby, Champaign, IL
www.horizonhobby.com
Street price: $169.99

The Evolution 100 NX will be the fifth Evolution engine we have reviewed; as such, parts of this review may seem a bit repetitious to those who have read the previous reviews, but there are only so many ways to describe the various parts and features when they are essentially the same, i.e., the new 100 NX being basically an enlarged version of the previous engines.

Horizon Hobby first introduced the Evolution engines in the summer of 2002 with a "ready to fly" package that consisted of a trainer type aircraft, radio, and a .40 displacement size engine referred to as the "Alpha" that was later increased in displacement size to .45 cu. in. The major feature here being that the engine had been bench run and broken in by the factory with the high speed and idle mixtures set so that the aircraft was ready to fly "out of the box." However, don't let this broken in and ready to fly feature fool you into believing that the engine is fully broken in. Our inspection of the engines we have reviewed showed a minimum of running time with only a few minutes at the most — just enough time to set the mixture adjustments. Actually, the Evolution engines get away with the short bench time due to being of ABC piston/sleeve construction — a characteristic of all ABC type engines is that they require a minimum of break-in time. Rather novel is the use of limiting stops on both the high speed and idle mixture needle valves that limit the high speed adjustment range to a little over a 3/4 turn and the idle mixture to 1/3 turn, preventing any chances of getting the mixture adjustments out of the proper operating range. In actual operation we found the idle mixture to be "right on" and the high speed adjustment, when in full lean position, to be about 200-300 down from peak rpm which we have to assume was intentionally done to prevent inexperienced fliers from setting the mixture too lean. During our testing we disabled the limiting stop so we could check for maximum rpm.

Following the introduction of the Alpha trainer aircraft/engine combination, Evolution marketed the engine alone without the flywheel and 3-blade propeller used on the Alpha aircraft/engine combo. This, in turn, was followed by a .46 displacement size engine. We took a look at both of these engines in

the February '04 issue. Then Evolution did something strange. Although now having a .46 size engine with a bore of .864" and stroke of .797" displacing .467 cu. in., they increased the bore of the Alpha .40 from .805" to .867" while retaining the same .771" stroke, resulting in a .445 cu. in. engine that now replaced the .40 engine in the Alpha trainer. Why the new engine and not just a detuned version of the existing .46 is the puzzle.

Evolution next added the Evolution 61 NX to their engine line-up that we reviewed in the March '04 issue, followed by the Evolution 36 NX that we took a look at in the January '05 issue. This now brings us to the latest addition to the Evolution line — the Evolution 100 NX that we are taking a look at this month.

The 100 NX, like its smaller brothers, features the "egg shaped" cylinder with up-swept cooling fins. Whether the engine's designers were just going for a different look or felt that the up-sweeping of the cooling fins would provide better heat dissipation due to the cooling air from the prop being directed upward to the rear and hottest part of the cylinder is hard to say. My guess is that it is just a matter of cosmetics, i.e., a different look.

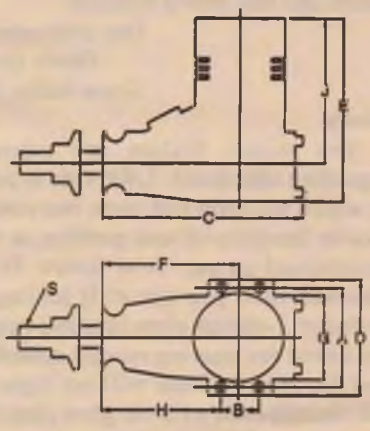
Also like its smaller brothers, the 100 NX utilizes true ABC piston/sleeve metallurgy, i.e., a chrome plated rather than nickel plated sleeve, a double ball bearing supported crankshaft, con-rod bronze bushed at both the crankpin and wristpin ends, modified Schnuerle scavenging consisting of a single mixture transfer port on either side of the divided exhaust with a single boost port directly opposite the exhaust, and a 2-needle, rotating barrel design carburetor with remotely mounted needle valve. A particularly nice feature is the ability to also mount the needle valve directly on the carburetor if desired — a feature that many of us who have been running engines for a while will prefer and appreciate. Timing numbers include an exhaust open duration of 150°, transfer port duration of 120°, and boost port duration of 110°, numbers identical with those recorded for the other Evolution engines tested.

The crankshaft induction port opened 40° after BDC (bottom dead center) and closed 50° after TDC (top dead center) for an induction period of 190°. Induction timing numbers within a few degrees of those recorded for the other Evolution engines, but the 50° closing time being two degrees later than any of the previous engines.

A check of the compression ratio showed it to be 7.16:1, slightly lower than any of the other Evolution engines tested, but more than likely done due to the larger size of the engine and wanting to tame any kick-back tendencies during starting.

Although the engine is advertised as broken in, we ran two 8 oz. tanks of fuel through it prior to proceeding with the testing. Fuel used was Morgan's 10% Omega and all props were Zingers. A glow plug accompanied the engine which always wins points with us. We have noticed that many of the engine manufacturers that have not included glow plugs in past years are now doing so. Maybe our needling in these reviews has played a part in changing their minds. As we have said quite a few times in past reviews — your car doesn't come without spark plugs so why should a model engine come without a glow plug?

EVOLUTION 100 NX



DIMENSIONS (MM)	
A	52
B	25
C	104
D	61
E	109
F	72
G	44
H	60
J	88
S	5/16-24 NF

13 x 6 — 12,200
13 x 8 — 10,600
13 x 10 — 9,600
14 x 6 — 10,900
14 x 8 — 9,800
14 x 10 — 8,500
15 x 6 — 10,350
15 x 8 — 7,950
16 x 6 — 8,450

The only other 2-stroke engine in this size range we have tested that can be used for a power comparison is the K&B 100. The Evolution 100 NX out-turned the K&B 100 by 300-500 rpm depending on the prop size. However, in defense of the K&B 100, we must point out that the K&B 100 utilizes a very restrictive muffler that lowers the sound level measured at three meters to 93dB with the 14 x 8 and 94dB with the 15 x 6 which are the prop sizes that would most likely be used by most fliers. The Evolution 100 NX, on the other hand, with a less restrictive muffler, registered 100 and 101dB respectively which is a bit loud.

Like all of the Evolution engines we have reviewed, the 100 NX was an enjoyable engine to run with no problems encountered during the testing. Hand starts when cold were one or two flips of the prop following choking and connecting the starting battery. Hot restarts usually took five or six flips, although occasionally, the engine would take off running in one or two. The engine had an impressive idle speed of 2,200 rpm with the smaller prop sizes and we had it ticking over at 1,600 rpm with the 16 x 6 with immediate acceleration and deceleration.

The quality and machine work is some of the finest we have seen coming from a Chinese manufacturer. The Chinese have come a long way in the past few years when it comes to machining quality and tolerance control. The engine develops above average power for its size and weight and is also very reasonably priced at only $169.99 which is a great bargain. If you have, or are considering, a .91 size aircraft that could use a little more steam for those vertical and 3D maneuvers and also be flown "out of the box," you might want to take a look at the Evolution 100 NX. We were very impressed with the engine's overall quality and performance as well as ease of handling.

Profi 40 like the one mentioned in our 3rd letter. Crankcase, cylinder, backcover and head all machined from bar stock aluminum, i.e. — not castings. Engine featured a single ring piston, Schnuerle scavenging, double ball bearing supported crankshaft, and "slide valve" carburetor, i.e. — the carburetor barrel moved from side to side rather than rotate.

and you still experience the problem, then install K&B idle bar glow plugs. Although most Schnuerle scavenged engines do not require idle bar plugs, they can often help flame out and acceleration problems even in a Schnuerle scavenged engine. Let us know the outcome.

Dear Mr. Lee,

Some time ago I wrote you about the problems with my MVVS 1.2 Twin. You suggested using K&B idle bar glow plugs.

The engine is mounted on a piece of 3/4 plywood which is clamped to a sturdy post. The engine starts and at open throttle turns a 15 x 8 APC prop at 9,600 rpm. The idle is 2,000 rpm and the transition between idle and full throttle is smooth. The glow plugs are ignited in series with 3.0 volts.

Install the engine on an airplane using idle-bar glow plugs. Result, maximum rpm 6,000, temperature of right cylinder 180°F, left cylinder 105°F, exhaust from right cylinder hot, left cylinder warm. The results were the same using idle-bar plugs or regular hot plugs.

Right now the engine is a little better than expensive junk. If you have the address of the MVVS company in the Czech Republic please send it to me so I can pack the engine up and send it to them. Perhaps this problem has occurred before and they have a solution.

Very truly yours,
Henry Hain
Green Valley, AZ

Henry,

You didn't follow my advice regarding idle speed. 2,000 rpm is nice to watch the prop tick over, but could also be the cause of your problem as we mentioned in our first letter. It is obvious that you are still losing a cylinder. 2-stroke glow ignition twins are noted for starting on one cylinder and the dead cylinder will not light at full throttle even with the glow plug lit. The flood of fuel passing through the cylinder more or less puts out the fire. It should light at idle, but not always. Oftentimes it is necessary to stop and restart the engine.

I do not know what you are using to check the cylinder temperature, or where you are taking the reading, but 180° for the hot cylinder is still far too low. I'm guessing you are using one of the infrared heat type sensors which can give a false indication due to actually measuring the temperature of the air flow over the head or cylinder. Actual cylinder head temperature should be in the 360° range. I believe the low temperature cylinder is not running and the 105° reading is just heat being conducted from the other cylinder. However, the puzzle here is why the engine performs fine on your test mount and not in the aircraft. This would indicate a fuel system problem in the aircraft. Be sure you are using large diameter fuel line, there are no leaks in the system, a plugged filter, etc.

It is not a good idea to use 3 volts in series to light the two plugs. One plug can pull more current than the other so that the other does not come up to full heat. Possibly this could be the cause of your problem. Try using separate batteries for each plug. Also, if the hot lead to one plug should touch ground the opposite plug will suffer instant burnout.

Finally, have you ever checked for equal compression on each cylinder? One cylinder might be low due to a ring not sealing, valve not sealing, etc.

Sorry, but I do not have an address for the MVVS factory. All of my dealings have been through Bob Kozak who imports the engine. If you can't solve the problem, the engine should be sent to him. Let us know the outcome.

Dear Clarence,

Back in the 1960's I was stationed in Germany with the U.S. Air Force. While there I purchased an engine called a Profi 40 at the base exchange. I do not know if you have heard of this engine or not. I'm not sure if it was ever sold in the U.S. but seem to remember seeing small ads for the engine some years

back. The engine resembles a Cox 1/2A engine in that it has a screw-in cylinder and back cover and what appears to be a plastic front housing for the carburetor. After many years of faithful service the engine developed rough bearings and was stored away. I recently had a project in mind that called for a 40 size engine and thought I would like to put the Profi back in operation. However, here's the problem — I cannot remove the screw-in cylinder or prop drive washer. I have a large strap wrench that I have used to remove screw-in cylinders on old Brown Jr. and Bunch Ignition engines in years past with no problem but the Profi cylinder will not loosen. I'm afraid to apply too much pressure for fear of breaking something. I have also used a battery terminal puller trying to remove the prop driver with no success. Any help you can offer would certainly be appreciated. If and when I get the engine apart do you know of any source for parts that might be needed? Keep up the good work. I have enjoyed your column for years.

With best regards,
Mike Jackson
Lt. Col. USAF Ret.
Denver, CO

Yes Mike, I am familiar with the Profi engine line which also included a 61. There was also a third engine which I believe was an 80 but am not sure about the size of this one. The engines were imported into the U.S. by my old friend Jerry Nelson who is still involved in the hobby industry (Nelson Hobby Specialties). However, that was many years ago and it is doubtful that Jerry would still have any parts left.

To disassemble the engine you have to first remove the head. You will see the six screw holes that secure the head as well as two other slightly larger holes. The hole closest to the exhaust side of the engine has a socket head setscrew at the bottom that utilizes a metric size thread. Loosening the setscrew will, in turn, allow the cylinder to be unscrewed. When doing so be sure to move the piston to top center, as otherwise, the ring can catch in one of the ports and break. I discovered this the hard way myself years ago when disassembling one of the engines. The prop driver is retained by the threaded prop stud which actually has a shoulder and steps down with a smaller diameter thread where it meets with the prop driver. With the piston/cylinder assembly out of the engine, place a wood dowel inside the case between the crankpin and side of the case to keep the crankshaft from turning. Then screw two prop nuts on the threaded prop shaft and lock them together. Turning the nuts will unscrew the stud and the prop driver can be removed. It is driven by a small hex-shaped boss on the end of the crankshaft that matches a hex shaped recess in the back of the prop driver.

New bearings can be had from Boca Bearing, 1500 SW 30th Ave., Suite #3, Boyton Beach, FL 33426, ph. (800) 332-3256 or

www.bocabearings.com

If the engine should require a new ring, Frank "Ringman" Bowman can make

one (1211 N. Allen Ave., Farmington, NM 87401, ph. 505-327-0696). If Frank has a ring in stock the cost is only $8.50 which I believe includes the mailing, but best to check with Frank on this. If he does not have a particular ring in stock, he will make it, but requires a two ring order.

If installing a new ring the sleeve should be roughed up with some #360 grit wet-or-dry emery paper and oil. Better still is to use an automotive brake cylinder hone. However, if using the hone be careful to only make a couple of passes to break the cylinder wall glaze and not remove any significant amount of metal.

Clarence,

You have, no doubt, addressed and re-addressed this question many times over the years, but I ask that you do so once more for those of us either starting or re-entering the hobby. For some time now I've been seeing different formulas for after-run oil using "Marvel Mystery Oil." A recent tip from one hobby retailer, in fact they recommended a mix of half 5w30 motor oil and half Marvel. I mentioned that during a meeting of our club and one of the members said he'd been using the product alone as an after-run for several years, with no ill effect.

A couple of bucks for the ounce or so of hobby-specific after-runs that are available at hobby shops seems objectionable if a self-mix substitute would serve as well.

Thank you,
Don Rhamy

Don,

I have been using and recommending Marvel Mystery Oil since 1946 when a rebuilt engine I installed in my 1936 Ford wouldn't turn over with the starter when hot. An automotive parts store recommended I try adding Marvel Mystery Oil to the engine's oil, which I did, and solved the problem. The only thing I have found better for our model engines is Marvel Air Tool Oil which contains additional rust preventatives. However, being of low viscosity, it will eventually evaporate as will most machine oils, sewing machine oils, gun oils, etc. A 50/50 mix of one of the Marvel oils and automotive automatic transmission oil makes an excellent after-run oil. Automatic transmission oil is an excellent assembly oil as well as being good for long term storage. Ordinary motor oil will eventually dry out leaving a shellac-like residue.

That about uses up our allotted space for this month, guys. See'ya next month.

The completed Nova is quite a looker. The flat wing appears intimidating, but the overall platform is quite stable.

Tech Tip Time

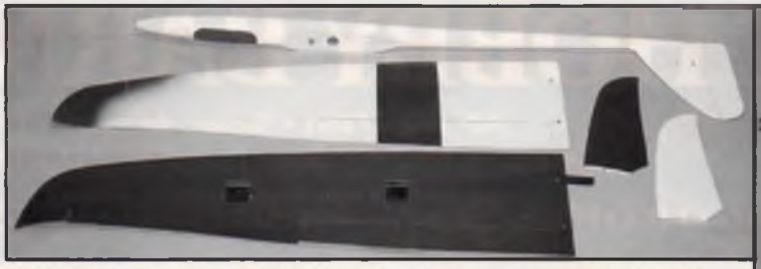
I have mentioned this subject previously, but it seems worth repeating as an important part of your flight habits. I preach the habit of doing a complete control surface check on your model prior to launching the plane, and for good reason. In no other segment of the hobby does this incident occur more than in non-powered flight. The incident being either launching without the aircraft receiver turned ON, or being launched with the wrong model program on tap with the transmitter. The problem with non-powered flight is that it is all too easy to walk up to the launch line, and without thinking about it, heave the plane into the wild blue yonder. Power planes have to have the engine or motor running, making it easy to confirm the radio system is turned on. Not so with sailplanes! Many times, our models are well trimmed and go straight up the launch line with uncanny stability, and as the pilot amazes himself with a very nice launch, he soon realizes there is no control. Hmmmm, maybe the radio isn't on! Just as amazingly, the model departs the launch line and heads off on its own with people running frantically behind. I even have a piece of video where an on-board camera records a free-flighted crash. (No, I was NOT the pilot, only the video guy!)

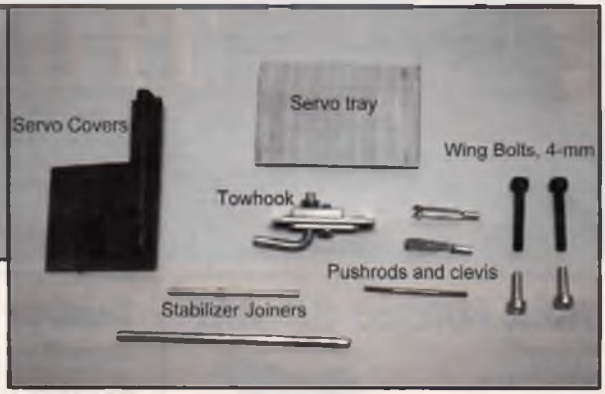
At my own flying field, an experienced pilot had been launching his RES bird all day, with the winch operator calling for a control check on each flight. Well, the owner of the winch decided to call it quits for the day and put away the equipment, while the pilot whipped out his own equipment, wanting to do some more flying. In his excitement to get into the air once again, he did not conduct his own flight check and about an hour later, recovered his model about a mile away. The good thing about this incident was that the model landed perfectly in an open field without so much as the ants crawling on it. Lucky? More than anyone should deserve, but I assure you this pilot will never do that again. Don't let excitement and complacency get the best of you at the field. Always check the equipment to ensure it not only works, but that it also works correctly. And make it a point in your club to check each other. One saved bird is the saving of a lot of blood, sweat and many tears!

Do you want more Tech Tip Stuff? How about putting your model on a diet to cut the weight down? There are many ways to do this, but one of the best ways to drop the weight is to substitute the heavy stuff with light stuff. Many of the planes coming from Europe and Asia use solid steel rods for the pushrods going to the tail. In a recent model I built, the elevator had a hefty arrowshaft type pushrod and the rudder used a steel wire. The wire was run inside a hollow plastic tube adhered to the side of the fuselage. I wanted to make this model lighter in the tail to prevent adding nose weight for balance. The first thing I did was to immediately replace the steel wire with a carbon fiber rod of similar diameter. The fit within the plastic guide tube was identical, and in 5 minutes, I dropped 1/4 oz. from the back. Doesn't sound like much, until you consider this means 3/4 oz. less weight in the nose, and that's an ounce total weight lopped off.

The Nova on approach looks good and could be mistaken for an Open Class model with its flaps down. A very nice 2-meter model!

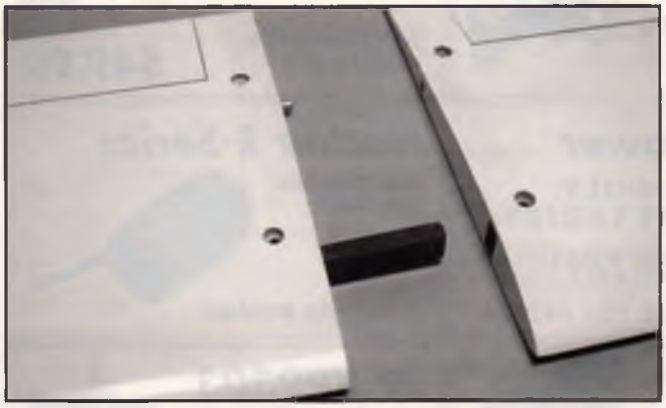
Replacing the elevator pushrod required a bit more thought, and I replaced the arrowshaft with a pushrod arrangement similar to the rudder, making sure the outer cover was well adhered to the side of the fuselage. This was a loss of 1/2 oz. at the tail, meaning I also dropped over an ounce in the nose. Between the rudder pushrod and the elevator pushrod, we lost about 2.5 oz. from the model's total weight. When you are looking at a model that started out at 34 oz., this represents a weight loss of 7%. In terms of wing loading, we went from a wing loading of 8.92 oz. per square foot to 8.40 oz. per square foot, and that is pretty meaningful to a guy like me! You can do the same for any type of metal pushrod and cut some significant weight without a compromise in strength or reliability. Try this out and see what a diet can do for you ... well at least for your model.





ABOVE: Overall view of the Nova-II as it comes out of the box. Not much to see, as everything is already done for you.

RIGHT: This is the hardware packages, providing you with everything you need to prepare the Nova. Good quality stuff.



The wing center joint is simple and strong. Note the large carbon joiner. Pretty hefty, isn't it?

A Hitec HS-125 Wing servo fits easily in the wing bays of the Nova. This is the flap installation and the ailerons used HS-56HB servos.

Nova-II

I just finished putting together the Nova-II, a competition 2-meter design available from Hobby Club:

www.hobbyclub.com

This ARF model is a full house thermal bird with ailerons, flaps, elevator and rudder. It is constructed of fully molded composite materials everywhere, making this a strong airframe. The wing is a dual tapered wing planform that is fairly flat but has turned-up tips for added stability. The horizontal stabs are also dual tapered and both wing tips and stab tips have a raked aerodynamic trailing tip design. What I like a lot about this model is that the fuselage is fairly spacious for a 2-meter bird. The older open class Thermal Eagle is what I consider the standard of cramped quarters, and the Nova-II is easily larger than that, allowing side-by-side servo placement in the nose.

The wing itself is a hollow molded section, using the MH-32 airfoil. It is well reinforced with a full span carbon spar with other composite reinforcements in critical areas, including the servo bays. For ease of transport, the Nova wing is a two-piece design using a large, square carbon joiner that is more than tough enough for this size model. The kit provides the builder with molded carbon servo bay covers that also have hoods for the pushrods. All control surfaces use a live skin hinge and wipers are built into the ailerons and flaps. The finish is simply gorgeous.

At the nose of the Nova is a slide-in-place canopy cover, leaving the major portion of the nose intact for those intentional spot landings. At the tail, we find a full flying stab and skin hinged rudder. Control pushrods are installed and ready for hook-up to the servos. The weight of this model from out of the box was measured at 22.79 oz. ... that's nice for an all molded model of this class.

Assembly of the model for flight is fast and easy, as all of the hard work is done for you. We started with the wing, installing Hitec HS-125 wing servos in the flap position and Hitec HS-56HB servos for the ailerons. Both servos allow for flat mounting into the wing servo bays as they have side mounting lugs for this purpose. The kit provides you with pushrods and clevises, so no hunting at the hobby shop for hardware. Servo wire extensions are required to get the power to the servos and I used some Dean's 4-pin connectors for the connection between fuselage and wing. You will have to make a wire access hole near the wing root on the bottom to allow for the wires to exit the wing, and this is placed to match the access hole in the fuselage.

Tail feathers simply slide into place on music wire joiners, with a larger one used as the main joiner and pivot rod. The smaller rod has a collar on it to allow the rod to be centered easily, which is good thinking. The rudder is already in place and ready to go. Going back to the nose, you need to fit the servo tray and then cut it out to fit the rudder and elevator servos. The tray is then installed using epoxy. Make sure you leave space for installing the battery to the front and receiver to the rear. Both the rudder and elevator use Hitec HS-85MG servos. These are plenty strong enough for the chores and you will need to use only the inner hole of the servo output arm for control.

The Nova uses a full flying stabilizer, joined with steel rods.

Adjustable towhook installed in the fuselage.

The wing mounts to the fuselage using four metric hex head bolts, and this was the only flaw that I found in my model. The rear bolt plate inside the fuselage was sagged at one side, and although it was solidly in place, the threaded portion of the plate was lower than required and the wing bolt did not reach the threads. I simply replaced the bolt with another longer bolt and solved that problem. The final all-up weight of my Nova-II was 34 oz. and set with a balance point of 87mm back from the leading edge. Recommended C.G. was to be 80mm back, but I do like a more sensitive model.

One of the highlights of this model is the inclusion of an adjustable tow hook, and this one is a goody! The design is such that only the shoulder portion of the mount pokes through the fuselage with the hook. You will have about 1" to play with on adjustment, so you will need to center up the mount at about the best guestimated place on the model. Normally, you won't need a lot of adjustment, so if you are close to the optimum position, you'll have plenty of adjustment to play with. My initial placement was 1/8" ahead of the balance point.

Calling the signals for the Nova-II is the JR 9303 Sailplane radio. This is a recent radio system for me to use, and I have to say that this is about the most custom sailplane radio that I know of. The capability of this system has continued to surprise me with the flexibility and versatility within the transmitter. On the receiving end is a Hitec Super Slim 8-channel receiver, which fits easily within the confines of the Nova fuselage.

My first flights of the Nova-II was faced with a little apprehension. After all, we are looking at a model with a fairly flat wing (might be a bit twitchy), the balance point is rearward (recipe for more twitchy stuff), and the wind at the field is the wrong direction: Downwind launch! (Big time recipe for excitement.) Well, you have to face the moment of truth sometime, and with that, we tossed her off into the wild blue. Boy, was that apprehension for nothing! The Nova went straight up the winch and departed the line without complaint. She needed no trimming to assume straight and level flight, and that's an accomplishment for me! Rearward C.G.? No problem at all, and I think I'll leave it there, as the Nova-II seemed to be right at home. And as far as the flat wing is concerned, this apprehension proved to be totally in error as the model is very stable and easy to fly.

On the wing, the Nova is almost anti-climatic, as it doesn't do anything nasty or twitchy. It is a stable flight platform that reacts well to camber and mildly to reflex modes. The MH-32 airfoil allows the model to penetrate well, with good thermal capability. I have not attempted any high speed runs at the time of this writing, but the planform is very slick and I believe that this model is capable of some very fast flying. The original Nova model was intended for slope flying, so this version should be right at home zinging along the cliffs of your favorite slope site.

Landing the Nova-II is just a delight. The larger flaps are very effective as airbrakes, making the approach slow and predictable. This is one place where I would like just a bit more negative elevator ability in order to nail a spot landing. The stock elevator travel is just a bit too conservative. Other than that, this 2-meter model is a potent competition model for TD work, as well as being a great model for sport flying. Check this one out at the Hobby Club website at:

www.hobbyclub.com

Next month, I hope to have some info from the January AMA Convention in Ontario, CA. This show is normally the place where new products are introduced and we get to drool over them for a few days. Oh, and if you ever tried to figure out just what kind of power you might need to motivate your control surfaces by a servo, try this website:

www.csd.net/~cgadd/eflight/calcs_servo.htm

This site, by Electric Flight in Colorado, will let you know how much servo torque you might need for moving a control surface, given just a few important measurements. The site also has other calculators, like wing loading calc, electric power conversions and others. Great info site to use! By the time you read this, the Spring weather will be warming up your field and you should have already tested out the planes you built during the winter. If not, it's time to get out and fly. It may still be a bit chilly outside, but you need to dare yourself to push the envelope. Only those who dare truly live. ✈

TIGER 50 ARF

Audacity Models

By John Benario

The Tiger 50 is a new entrant into the 50 size market. It is produced in Korea and imported in the U.S. by Audacity Models. A previous version was sold in Europe by Robbe, although the Tiger has undergone many changes from that version and is essentially a different model. The Tiger is available both as a kit and as an ARF. The model provided to RCM was an ARF, but as my regular readers know, the first thing I do with an ARF model is take the model apart and then put it back together to inspect the construction and fit of the parts.

The Tiger is similar to a Venture, but with Sceadu style sideframes. The goal was to incorporate the best ideas from both helicopters. The rotor head uses CCPM, and the cooling fan is very good for the 50 size engine, like the Venture. The sideframes have a rear fuel tank position and the tail rotor control is a pitch fork design similar to the Sceadu. The tail rotor is not driven during autos, making the Tiger 50 suitable for learning autos. A slipper unit is available for just the cost of postage for those pilots who want a driven tail. Simply register your Tiger with Audacity Models.

Since the Tiger is an Asian model I was expecting to use JIS screwdrivers on the crosspoint bolts. It turned out that the crosspoint bolts didn't really match JIS or Phillips. This was my first indication of the unusual fasteners. The socket head bolts that the Tiger uses are soft steel, which is not an issue for bolts that hold plastic parts together, but I rounded the socket on one of the engine mount bolts. I ended up replacing the bolts that hold the engine to the mount and hold the mount to the frame with normal 3mm socket heads from my hardware cabinet.

The Tiger 50's Kit and box .

Reviewer's Note: Some months ago, Audacity Models provided RCM with the Tiger 50 to review. At that time, we did not feel that the original model adequately lived up to the expectations of Audacity, so we provided our comments to Audacity Models and are pleased to report that Audacity not only addressed our concerns but made additional improvements. The above review is of the Tiger 50 as it is now being supplied by Audacity Models. The Tiger is now provided with an extra parts bag containing a longer radio tray, a dual ratio seesaw with button head bolts, improved servo inserts, instructions for the swashplate ball spacers, and a shoulder bolt for the head.

SPECIFICATIONS

Heli Type
Beginner-Intermediate
Mfg. By
Audacity Models
Box 952765
Lake Mary, Florida 32795
ph. (407) 302-3361, fax (407) 302-3363
www.audacitymodels.com
Expected Street Price
$280-$300
Available From
Both Mfg. & Retail
Main Blade Included
Yes, 600mm, Wood
Tail Blades Included
Yes, 85mm, Plastic
Rotor Span w/600mm Blades
52.5 Inches
Tail Rotor Span w/85mm Blades
9.5 Inches
Overall Length
47 Inches
Mfg. Rec. Engines
50-size

Frame Material
Plastic
Rotor Head Material
Plastic
Main Gear Ratio
8.9:1
Tail Gear Ratio
5.24:1
Tail Boom Material
Aluminum
Tail Gearbox Material
Plastic
Tail Fin Material
Plastic
Tail Drive Type
Belt
Instruction Book
61 pages
Set-up Inst. plus Assembly Inst.
Yes

RCM REVIEW MODEL

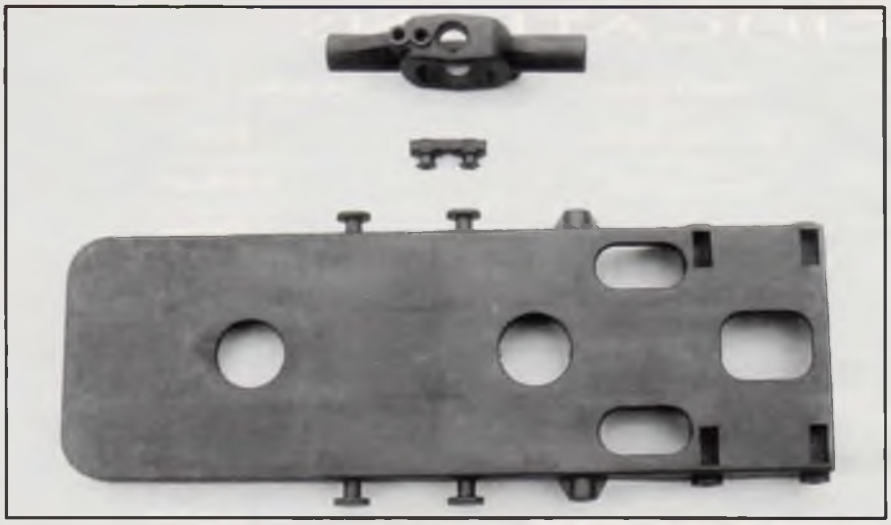
Weight
122 Oz. (7 Lbs. 10 Oz.)

Engine Make & Displacement
O.S. 50
Muffler
Hatori 666
Main Blades
V Blade 600 N
Tail Blades
Included
Radio Used
Futaba 7CHP
Gyro
Futaba 401
Servos
Futaba 9202 (for Pitch, Roll, Collective, Throttle, and Tail Rotor)

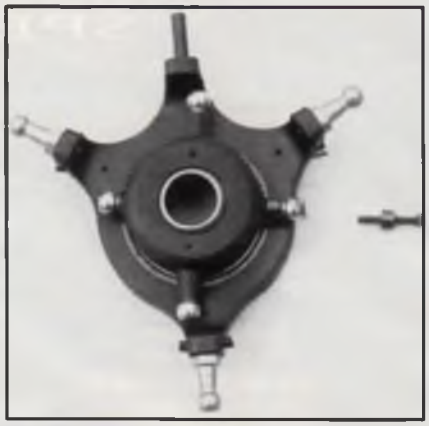
SUMMARY

WE LIKED THE:
Wide range of cyclic set-up, high power tail rotor.
WE DIDN'T LIKE THE:
Low main gear ratio, tight ball links, soft bolts.

The Tiger 50 with the Futaba 7C transmitter.



The new seesaw with adjustable flybar ratios, the new servo inserts and the longer radio tray.



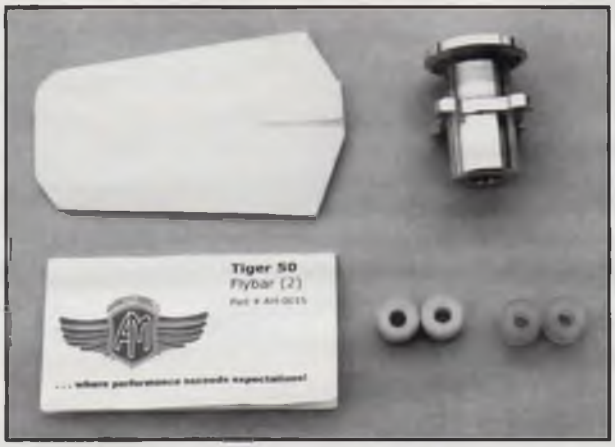
The swashplate ball spacers. One is installed on the right ball with the other spacer and long bolt next to it. Note the difference between the stock configuration on the left and the ball that has been spaced out on the right.

For the crosspoint bolts I used the best fitting crosspoint screwdriver I could find for each bolt.

Green Loctite , #290 (Permatex 29000), was used where necessary.

I'll follow the sequence of steps in the instruction manual and provide my comments.

Step 1.3: The elevator bellcrank has a neat clamp feature that allows one to compensate for wear and keep the bellcrank slop free. The Tiger bellcrank dimensions are not a 1:1 ratio, but rather is a throw reducer. The reduction in throw will be accounted for later during radio set-up.



Optional parts from Audacity: 3D paddles and flybar, a fan hub for the O.S. 50 Hyper, and hard and even harder dampers.

Step 2.1: The original servo inserts that are installed in the frames allow the servos to move in the adjustment slots. The movement is not an issue for the roll and collective servos, but for the elevator servo, the movement is in the same direction as the pushrod movement, which makes precision flying difficult. The new servo inserts are molded such that they do not allow the servos to move in the slots. The original inserts are simply pushed out of the slots and the new inserts are snapped in place.

Step 3.3, 3.4, 3.5: The included fan hub is designed for use with the standard O.S. 50 which includes a thrust washer. The O.S. 50 Hyper engine does not come with a thrust washer; however, a taller fan hub is available from Audacity for use with the Hyper. As mentioned above I replaced the soft engine mount bolts with normal hardened bolts. *(Editor's Note: Audacity Models is now including hardened engine mounting bolts in all models.)*

Step 4.1: There is a note stating that for 3D flight the short balls on the swashplate should be extended. The note, however, does not mention that the spacers are included along with long 2mm bolts in the servo hardware bag. The instruction supplement now details the installation of the spacers.

Step 4.2, 4.3, 4.4: The head on my ARF model was balanced very well; however, when I disassembled it I found that the 4mm nuts that hold the blade grips on the spindle were not fully tightened. Regardless, the blade grips should be removed from the spindle to grease the thrust bearings. The instructions state that the bolt that holds the head on is a 3 x 20mm shoulder bolt. The bolt in my kit was not a shoulder bolt, and that fact coupled with the soft steel used in the kit bolts concerned me. A non-shoulder bolt is probably satisfactory for a 50 size model, but I replaced the bolt with a shoulder bolt, and a shoulder bolt is now included with the kit.

While I had the head apart I changed the seesaw to the new piece with the adjustable flybar ratio. The new seesaw is made from a very strong plastic and requires care when pressing the bearings in. As per my norm I installed 1/8" wheel collars on the flybar for balancing.

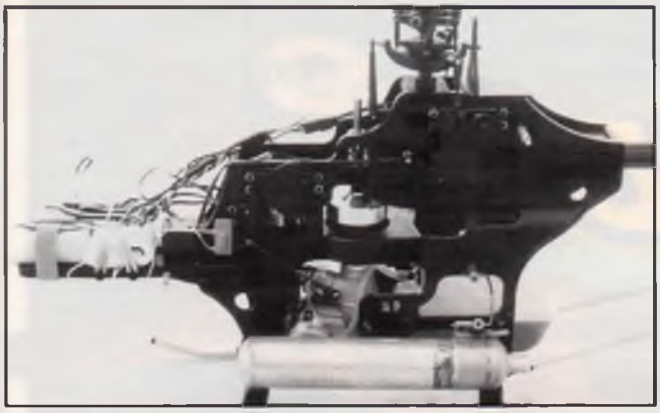
Step 4.5: There is a note stating that the "HD" on the ball links should be away from the ball when the links are snapped on. There is no "HD" molded on the links, but the links are unidirectional. The side of the link that faces the ball has an "indented" ring circling the hole.

Step 5.4: One of the 3mm nuts holding the blade grips on the tail rotor hub was not tight on my model. The tail rotor hub has two setscrews 180 degrees apart. Only one setscrew should be used, otherwise a "seesaw" rocking can occur with the tail hub. The tail rotor balanced easily by drilling a few holes in the tip of one blade with a number 60 bit.

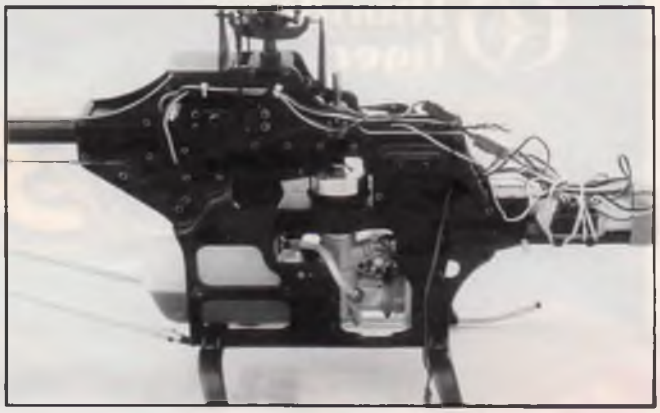
Step 5.7: The sideframes did not hold the tail boom securely even when the boom bolts were tightened fully. I wrapped electrical tape around the tail boom on the part that goes in the sideframes to make the fit tight.

Step 6.3: The tail rotor pushrod guides were a loose fit on the tail boom. I put small strips of electrical tape inside the guides so they would hold tightly. The tail pushrod guides on the Tiger are an ingenious design with a floating ball that supports the pushrod. It was very easy to get a perfectly free pushrod run. This one item saved me about an hour compared to some other designs.

I drilled two holes in the horizontal fin so that I could get an Allen wrench to the tail boom clamp bolts without removing the fin. With the belt drive it is good to be able to adjust the belt tension without having to remove parts.



The main frame left side.



The main frame right side.

The pitch fork tail rotor control.

The ball links were molded to be similar to the original Rocket City links. An unintended consequence of this goal was that the hole for the pushrod is sized for 2mm threads and the pushrods on the Tiger use the now standard 2.3mm thread. I discovered this fact when I tried to thread the links on the long tail pushrod and the fit was so tight I couldn't hold the wire securely enough to keep it from spinning. The links should be drilled out with a number 44 bit to fit the 2.3mm thread. The preassembled pushrods are hard to adjust because the fit of the links is so tight. It would be worthwhile to unscrew one link from each flybar and blade pushrod and drill out so that those pushrods can be adjusted easily.

Step 7.1: The servo pushrods come preassembled. The pitch and roll pushrods were close to their final length, but I had to lengthen the elevator pushrod for my Futaba servo. The pushrod used for the elevator servo is 50mm long, which only left about 4mm of thread in the links after I lengthened it. While 4mm of thread is probably sufficient, especially for beginner level flying, I wanted a higher comfort level so I replaced that pushrod with a 65mm one. While I had the two links off the pushrod, I drilled them out with a number 44 bit.

I mentioned above the elevator bellcrank is not a 1:1 ratio. I discovered this fact when I was setting up my Tiger. With 120 degree CCPM there is a bump in the swashplate when a large elevator command is given because of the different distances the elevator servo travels compared to the pitch and roll servos. In addition to the elevator bump, I noticed a bump in the swashplate when I gave a collective command, which I traced to the reduction in throw in the elevator linkage caused by the elevator bellcrank. I ended up with 114/113 on the elevator ATV with 100/100 on both the pitch and roll servos to account for the bellcrank. These values were determined experimentally using the standard procedure for eliminating interaction in CCPM, as I described in the February 2004 Hover.

To power my Tiger, I used an O.S. 50 (non-Hyper), in my opinion, the most perfect helicopter engine made (I haven't tried a Hyper yet), and a Hatori 666 60 muffler that I have fitted to the O.S. 50. A Futaba 7CHP radio handles the control, with 9202 servos and a 401/9253 gyro and tail rotor servo. Even with the longer radio tray the Tiger is still tail heavy. For those who

are interested in getting the C.G. on the main shaft, the quick fix is to replace the aluminum tail struts with carbon or aluminum arrow shafts.

The gear ratio for the Tiger is 8.9. Audacity has gone the way of Thunder Tiger and Hirobo by using a gear ratio that is a bit too low for the O.S. 50. The 8.9 ratio yields an ideal in-flight RPM of about 1950, which is a bit faster than I like. The tail rotor ratio, however, is very good at 5.24. Tail rotor control on the Tiger is not an issue.

I first flew the Tiger in the as-delivered condition with the included wood blades. The wood blades flew as well as can be expected from heat shrink covered blades, good enough for learning to hover, but they did not stay in track with large pitch changes. I then changed over to my trusty V-blade 600 N's.

The cyclic on the Tiger out of the box is set up for hovering and forward flight only. With the stock thick paddles the Tiger is extremely stable and smooth. A beginner would do well with this set-up. It was only possible to do very gentle aerobatics with the stock configuration.

I then added the spacers to the swashplate balls and changed to the 3D paddles and flybar that Audacity offers. The 3D paddles are very similar to the KSJ design. With this arrangement the Tiger was a completely different helicopter. Very quick response but still smooth and not pitchy in forward flight. It was at this point that I realized how much I have come to depend on the governors. I am not used to the RPM bogging as I fly through maneuvers!

For the next day I changed to the harder yellow polyurethane dampers and moved the mixing levers to the inner holes on the new seesaw. I discovered the 3mm seesaw bolts interfere with the mixing levers in the inner hole so I changed the seesaw bolts to 3 x 8 button head bolts which provided the necessary clearance. Two 3 x 8 button heads are now included with the new seesaw.

With the harder dampers and the lower flybar ratio the helicopter was very responsive. Engine bogging became a real issue since the control is so powerful. I have not determined if I can use the p-mixes in the 7C for swashplate-throttle mixing, but the obvious solution would be to install a governor.

The cyclic control available with this last configuration, coupled with the very capable tail rotor make the Tiger an excellent 3D practice helicopter.

With the included improvements provided by Audacity Models, the variation available in control set-up allows the Tiger to be set up anywhere from very docile to very responsive. This makes the Tiger a very good one-stop-shopping helicopter that a beginner can start with and then use all the way through beginning 3D flying. The plastic parts are made out of an extremely strong material and most should never break, which coupled with the low cost of the metal parts makes for a low stress 3D trainer model, as well as a low stress beginner model. Additional information is available at:

www.audacitymodels.com

SILENT POWER

Jim Zare
E-Mail: jimzare@cs.com

This month we'll discuss a large size model powered by electric and look at the latest offerings in micro flight packs from FMA. We'll also discuss lightweight coverings suitable for small indoor models.

E Bipe

Over the past couple of years there has been an exciting shift from gas power to electric power for large R/C models. This is the direct result of LiPo battery technology coupled with the latest in brushless motors. A prime example of this is the E Bipe built and flown by Joe David of Columbus, Ohio.

The E Bipe is a conventional balsa and plywood model exquisitely covered with silk and dope. It is has a top wingspan of 66", a bottom span of 57", with 1,200 sq. in. of wing area. The overall length is 56". This is no small model.

Joe installed an AXI4130/16 brushless motor with a Jeti Advance 77 Amp Opto., Ultimate BEC, speed controller. Power is provided by a Kokam, 15C, 2000 mAh 6s2p flight pack. An APC 17 x 8 propeller is used with this combination.

The E Bipe has a ready to fly weight of 7 lbs. 15 oz. The wing loading is approximately 14.7 oz./sq. ft. At the time of writing the E Bipe has had around 10 flights. Joe wrote: "I have a glow J-Bipe, same size with a YS 120. This model has a ready-to-fly weight of 13 lbs. I think the E Bipe out-flies the J-Bipe!"

Joe built the E Bipe for the Giant Fly-Ins. He commented that he hasn't flown in the Giant Fly-Ins since he got into electrics, but you can expect to see him at these events in the summer of 2005.

ABOVE: E Bipe built and flown by Joe David of Columbus, Ohio. The E Bipe is a conventional balsa and plywood model exquisitely covered with silk and dope.

RIGHT: E Bipe uses an AXI4130/16 brushless motor with a Jeti Advance 77 Amp Opto., Ultimate BEC speed controller. Power is provided by a Kokam, 15C, 2000 mAh 6s2p flight pack.

FMA M5LV low voltage system shown with a low voltage M20 gear motor. The motor is available from Bob Selman Designs.

The test bed for the FMA M5LV system is a Micro Phantom Flash scaled down from a larger version I have been flying for the last couple of years.

The Micro Flash in the foreground has the FMA M5 with 2 PS20 servos and an M20 low voltage motor. The model in the rear uses an RFFS 1000 receiver and two Selman magnetic actuators and a KP 00 gear motor. Both models fly with a single Kokam 145 mAh LiPo cell.

FMA Low Voltage Flight Packages

I have had the opportunity to test one of the new Low Voltage flight packs designed by FMA for a micro flyer or indoor aircraft flying. I have written several times about the problems of interference while flying in gyms. This is attributed to radio waves bouncing off of the steel structure found in most school buildings.

The FMA low voltage system is built around the M5LV Sub Micro Low Voltage dual conversion, narrow band, receiver that virtually eliminates interference. This receiver is a full range, full performance unit redesigned to operate from 2.7 to 8VDC.

It can be powered by a single Lithium Polymer (LiPo) cell or a 3 to 5-cell NiCd/NiMH pack. It uses tiny 1.25mm connectors for plug-in compatibility with FMA's LiPo single cell packs, the Super 9LV electronic speed control and the PS20LV low voltage sub-micro servos. It is available with either negative shift (for Futaba, Hitec transmitters) or positive shift (for JR, Airtronics transmitters).

Based on FMA's popular M5 receiver, the M5LV is specially designed for low voltage operation. Ideal for micro and indoor electric-powered aircraft, the M5LV can also be used with small glow-powered aircraft. The M5LV maintains full range operation and advanced interference rejection. The M5LV gets its reliability from S.M.A.R.T. (Selective, Microprocessor, Advanced Radio Transmission) decoding. This technology analyzes each frame, ignores noise spikes, and operates reliably in the presence of strong interference. The M5LV deals with overwhelming RF noise by sending the last good frame signal to each servo. As a result, the M5LV can fly through even deliberate interference with minimal effect on the flight path. This is very desirable for indoor flying!

The flight system comes with two PS20 servos with 1.25mm connector which is compatible with the M5LV Receiver. The servos measure 0.78" x 0.69" x 0.32" and weigh in at .2 ounces each. A SUPER 9LV Low Voltage Mini Auto Detect ESC 2 PS20LV is also included along with a 145 mAh LiPo cell.

I installed the system in a 22" Phantom Flash ROG model I designed and built for the DWE RFFS 1000 receiver with dual magnetic actuators. The ready-to-fly weight with this equipment, a KP 00 gear motor and a single 145 mA LiPo cell is 36 grams or 1.24 ounces.

I built a second model to test the FMA system. The real problem was finding a suitable low voltage motor. I selected an M20 LV motor with Kenway 4.2:1 gearing purchased from Bob Selman Designs. The weight is 5.33 grams or .18 ounces. It is designed for use with one LiPo cell with the blue propeller included in the package and sells for $19.50. Contact Bob at **info@BSDMicroRC.com** or BSD, 9054 Gum Rd., Carthage, MO 64836, USA or call (417) 358-9521.

With the FMA Low Voltage system and the M20 LV motor, my second Micro Phantom Flash weighs 55 grams or 1.9 ounces. It flies a bit faster than the lighter model but is easy to control in a small gym. In flights to date no interference problems have been detected! For more information contact: FMA Direct, 5716A Industry Lane, Frederick, MD 21704, phone (800) 343-2934, fax: (301) 668-7619, Tech/Service: (301) 668-4280, website **www.fmadirect.com**

Ultra-Lightweight Film Coverings

Jay Flagg wrote. "I've been searching and searching for articles on those ultra-lightweight film coverings that I see on those remarkable indoor flyers. The ones that look sort of like a captive soap-bubble? So far, I have only gotten one hit during my searches, and the article turned out to be written in Dutch, which I don't read. Can you help me find any info?"

One of the more popular coverings is RA Microlite. Microlite is a very lightweight, iron-on, heat-shrinkable plastic film covering material. It is available in two thicknesses of the Mylar plastic stock: 5-micron and the 3-micron. It has a glossy appearance, and is relatively opaque. Microlite is available in 16 colors in 5-micron thickness, and 10 colors in 3-micron thickness.

It is applied in a manner very similar to that of the common iron-on plastic coverings, such as MonoKote, although it is only a fraction of their weight.

Microlite 5-micron weighs 0.030 to .039 oz./sq. ft. (8.5 to 11.5 grams/sq. meter), depending on color. Microlite 3-micron averages about 0.023 oz./sq. ft. (7 grams/sq. meter).

Microlite 5-micron is available in 24" x 24" and 24" x 48" sheets. Microlite 3-micron is available only in 24" x 24" sheets.

It is suitable for indoor and outdoor rubber powered models, indoor R/C, and very light outdoor free-flight and electric R/C models.. The 5-micron material is a little lighter, and stronger, than the lightest undoped Japanese tissue, but is much quicker and easier to apply and remove than tissue. It can be used on very light structures without distorting them. It is manufactured by: Risteen Associates Ltd., 120 Smythe St., Fredericton, New Brunswick, Canada. E3B 3C4, phone: (506) 454-3675, fax: (506) 454-0276, e-mail:

risteen@nbnet.nb.ca

Until next time, Great Flying!

RADIO SPECTRUM Cal Orr

Photo #1: Great Planes DC-3 Electric ARF. 60" built-up wing with fiberglass fuselage, the model also includes two Speed 400 electric motors with a speed control, powered by a single 9.6v 1800 mAh NiMH battery pack.

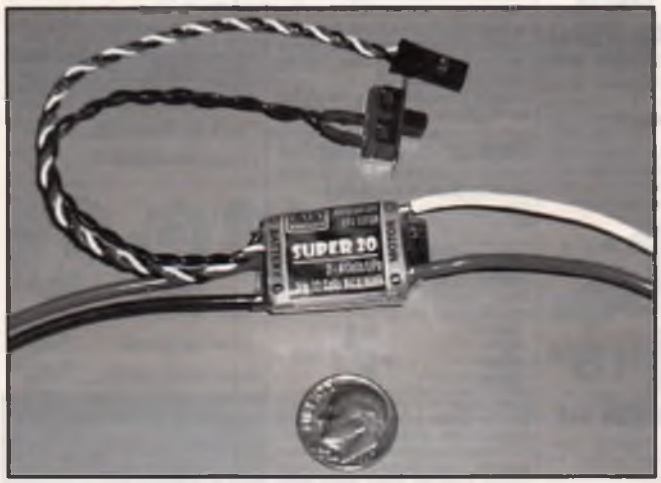
Photo #2: New Battery Speed Control system for my DC-3 ARF. Top right of photo are two FMA/Kokam KOK 2000 - 15C - 2S - DNS battery packs, each pack is 7.4 volts at 2000 mAh capacity. The two packs are taped together with a .75" step so they fit in the nose of the DC-3 as far forward as possible for the correct C.G. Left of batteries is FMA/Kokam "Battery Pack Connector Module" CMP-HC-5 a parallel module. Since I only used two battery packs the remaining three connectors may be snapped off. Bottom of photo is FMA Super 30 Speed Control, note the input wires are soldered to the parallel "Battery Pack Connector Module" for an input of 7.4 volts at 4000 mAh capacity. The output wires on the right side of the speed control then attach to the Speed 400 motors also wired in parallel.

A lot has been said about Lithium Polymer (LiPo) battery packs and their technology that provides very high capacity in a small, lightweight package compared to that of NiCd or NiMH batteries. The LiPo batteries I have the most experience with are the Kokam cells available from FMA Direct, 5716A Industry Lane, Frederick, MD 21704, Sales: (800) 343-2934,

www.fmadirect.com

When LiPo batteries were first introduced, the limiting factor seemed to be the maximum discharge current of 3C or 5C (where C is the batteries' capacity). At that time the LiPo battery was a disadvantage compared to a NiCd battery in some applications. Then we saw second generation LiPo cells that had a maximum discharge rate of 6C or 10C. Now third generation LiPo cells are offered that have a maximum discharge rate of 15C or 20C. This means a 2000 mAh (or 2Ah) LiPo 15C battery cell can be discharged at a rate of up to 30 amps. Just around the corner are fourth generation HDR LiPo cells, some with the ability to deliver a burst of current up to 30C or 40C for one second and continuous maximum discharge current of 15C or 20C, depending on the cell. Remember all LiPo batteries need to be charged with an appropriate charger and cannot be allowed to completely discharge.

In my Radio Spectrum column of 11-04, I mentioned a Great Planes DC-3 Electric ARF. This DC-3 is a sports scale model with a 60" wingspan. The wings and tail are built-up construction and are pre-covered. The fuselage is fiberglass and is pre-painted. This DC-3 also includes two Speed 400 electric motors with a speed control and uses an NiMH battery pack, 9.6 volts at 1800 mAh capacity. The Great Planes DC-3 ARF is a good looking airplane and flies very well stock — wheel touch and goes (touch and go without touching the tail wheel) are fun to do along with more aerobatics than the full scale counterpart can perform. With an airplane this fun to fly, I wanted to increase flight time; I needed some stuff from FMA, like their Kokam LiPo batteries.



LEFT, Photo #3: Close-up of FMA Super 20 speed control, size only 1.15" x .75" x .40". Features include proportional throttle, throttle end point adjustment (EPA), motor brake (on/off), battery eliminator circuit (BEC), low voltage cutoff appropriate for NiCd, NiMH and LiPo battery packs, and motor restart. Note: the Super 30 speed control is slightly larger with the same features except for a higher 30 amp output. RIGHT, Photo #4: "Auto Cell Detect Low Voltage Cutoff," this handy device plugs in-between your receiver and speed control to give you auto low voltage cutoff when used with speed controllers that don't provide a low voltage cutoff or the low voltage cutoff is not appropriate for LiPo battery packs.

The Great Planes DC-3 has the two Speed 400 motors wired in parallel, this theoretically means at full throttle each motor sees the full voltage of the 9.6 volt NiMH battery. The current draw of each motor is added together for a total discharge rate. As it turned out, each motor draws approximately 12.5 amps spinning its propeller at over 12,000 rpm, both motors therefore put a 25 amp load on the battery pack at full throttle, a load a little heavy for an 1800 mAh NiMH battery. As it turns out the measured NiMH battery pack voltage at full throttle was only 7.2 volts, a significant voltage drop from the 9.6 volt pack.

The 9.6 volt 1800 mAh NiMH battery pack measures approximately 5.25" x 1.81" x .66" and weighs just over 10 oz. Since this battery is installed in the nose of the DC-3 the replacement LiPo batteries had to be close to the same weight to keep the model's C.G. the same. After looking at all the FMA/Kokam LiPo choices — voltage, capacity, size and weight, I settled on two KOK 2000 - 15C - 2S - DNS battery packs. Each battery pack is 2000 mAh in capacity with a maximum discharge rate of 15C (30 amps). Each pack consists of two LiPo cells pre-wired in series (7.4 volts) with a high current Deans connector. Two of these Kokam battery packs wired in parallel would give me 7.4 volts at 4000 mAh capacity with a maximum discharge rate of up to 60 amps. Each battery pack measures 3.14" x 1.77" x .67" and weighs about 4.3 oz. This meant I saved almost 2 oz. in weight but had to stack the two battery packs with about a .75" step and stuff them into the nose to keep the DC-3's C.G. where it needed to be.

The Kokam LiPo battery packs come pre-wired with Deans connectors; not wanting to re-wire them I used FMA/Kokam "Battery Pack Connector Modules." Without altering or making custom battery packs I could also easily use these batteries in other models. The "Battery Pack Connector Modules" are available for either series or parallel connections and can handle up to five battery packs. For the DC-3 I used the high current parallel module CMP-HC-5 and since I was only using two battery packs in parallel, I was able to snap off the remaining three connectors. The "Battery Pack Connector Module" is then soldered to the input wires of the speed control.

While I could have used the stock Great Planes speed control I was a little concerned with the cutoff voltage and feared I might overdischarge the LiPo batteries further than desired. I therefore elected to use an FMA Speed Controller that has cutoff voltages appropriate for LiPo battery packs.

FMA offers four different speed controllers, two 9 amp versions, a 20 amp version (shown in Photo #3) and a 30 amp version. I elected to use the Super 30 which has a continuous output current of 30 amps with a peak output of 40 amps, size 1.35" x .75" x .40". A Battery Eliminator Circuit (BEC) is also included to power the receiver and servos.

The FMA Speed Controllers are to be programmed via three dip switches on the controller itself. First you can turn the brake on/off. Normally the brake is used with folding props and stops motor rotation when the throttle is OFF/CLOSED.

Second, you program End Point Adjustment (EPA) to give better tracking between the throttle stick position and actual motor speed. With the throttle stick all the way down, turn on the system, then advance the throttle to full — now return the throttle to low. The speed control has just learned the range of your throttle stick and which is high and low (no need for servo reversing). When you are happy with the results, push dip switch #3 so the speed control will keep these settings in memory even when the system is turned off.

The last item to set on the speed control is the low voltage cutoff, which turns off the electric motor(s) when the batteries are depleted to a certain level. This is to prevent overdischarging of the battery pack while leaving enough energy in the battery pack to operate the radio system while gliding in for a landing. If your landing approach is short you may reduce the throttle, then advance, and the motor(s) may operate for a couple seconds. Normally dip switch #2 is left on for Auto Low Voltage cutoff. When the speed control is powered up, it reads the batteries, and based on input voltage determines the appropriate cutoff voltage for that battery pack. Of course, you need to start with charged batteries so the speed control does not misread the battery pack. If so desired, the FMA speed controllers can also be programmed to a custom cutoff voltage to suit your particular needs. I have used several of the FMA Super 20 and Super 30 Speed Controllers and have found them to be good performers and very reliable.

If I had chosen to use the Great

Planes Speed Controller in the DC-3 I might have also used a neat FMA device that they call "Auto Cell Detect Low Voltage Cutoff" (shown in Photo #4). This little circuit basically plugs in-between the receiver and the speed control to give you an appropriate voltage cutoff. The extra red wire in the photo needs to be spliced into the positive battery wires which can be done at the battery pack connector module. This circuit then reads the battery packs' voltages and determines the appropriate low voltage cutoff for NiCd, NiMH and LiPo battery packs. So if you are using an electric speed control that turns off the motor on loss of signal and does not have a low voltage cutoff, or a low voltage cutoff that isn't appropriate for your type of batteries, then get a hold of the FMA "Auto Cell Detect Low Voltage Cutoff."

With the two Kokam KOK 2000 - 15C - 2S - DNS battery packs installed in the DC-3 and the FMA Super 30 speed control, it was time to check operation. At full throttle the voltage across the battery packs was 6.95 volts and current draw for both motors was under 25 amps while spinning their propellers at about 12,000 rpm. Note — one of these KOK 2000 - 15C - 2S - DNS could fly the DC-3; however, the full throttle voltage dropped to 6.4 volts and the rpm dropped to below 11,000, also you would have to add weight in the nose for the correct C.G. Using the two KOK 2000 - 15C - 2S - DNS batteries in the DC-3, the C.G. is correct and my flight time more than doubled. If you reduce the throttles in the air and/or perform a series of touch and goes, flight time can approach 30 minutes.

While LiPo batteries can be expensive, especially these Super High Discharge cells (the KOK 2000 - 15C - 2S - DNS battery packs are around $55 each and the charger is around $100), the amount of energy you can store in the small size and weight is impressive. You the modeler benefit from nice long flight times compared to that of NiCd or NiMH batteries and with less weight. A cost saving idea is to use the FMA/Kokam "Battery Pack Connector Modules" installed in each of your models, therefore you have not customized any battery packs and can easily move your LiPo packs from model to model even if another model has different voltage and/or current capacity requirements. Take a look at LiPo batteries, follow their warnings and enjoy long flight time.

REPAIRING
A SHEETED FOAM WING
A SIMPLE HOW-TO

By Brian Motta

While at the field recently a friend broke his plane, which had a sheeted foam wing. The body looked easy to repair but he had doubts with regard to the wing, so I said I would fix it for him.

The first thing to do is make sure you pick up all the bits and pieces as they have to be fitted together later to get back the right shape and fill in all the gaps. My friend's wing was fiberglass covered. If your wing is film covered, you are going to have to remove the film before your repair it, and fiberglass it after you are done. Because of the butt joints between the old sheeting and the new, simply recovering it will not give you the strength you need.

At home, cut away all the broken balsa with a sharp knife (#11 knife does a good job). Use a ruler to get all the cut lines straight, as it is much easier to resheet the wing at the end with straight lines. In this case I was lucky as the foam had broken and not shattered so it was fairly easy to fit the foam back together and line up the wing once the sheeting was cut away. This is where you have to be careful, try fitting it together and figure how you are going to hold it straight while the glue dries, you might have to enlist a helper.

I prefer to use Titebond Polyurethane glue instead of epoxy because the Polyurethane expands as it dries, therefore filling all the small spaces in the foam, and if you put masking tape over the joint it keeps the glue in the joint and stops it from bubbling out (see Photo #1). Photo #2 shows the top of the wing after the glue is dry and the masking tape has been removed. Note: The black lines in the photos are the thin carbon fiber strips that were in the wing originally so I just glued them down again.

As this is a fairly high performance plane I decided to put a short spar in the bottom of the wing just behind the landing gear for additional strength. Using a trigger soldering iron I made up a wire jig to fit the spar with a bend in it so that it could be guided straight by a metal ruler (Photo #3), again using the polyurethane glue and masking tape.

The leading edge balsa strip was also broken so I cut out some of the foam behind it and glued in a new piece of balsa (Photo #4). The bottom of the wing with the spar installed is now ready for sheeting (Photo #5). The next step is to sheet in the spaces on the top and bottom of the wing — here I use epoxy, spreading it on the foam and the edges of the old balsa. When this is thoroughly dry, sand and use a light filler to flair in any difference in height between the old sheeting and the new (Photo #6).

I use 3/4 oz. fiberglass cloth with thinned epoxy to cover all the new stuff and overlap it on to the old sheeting. Thin the epoxy with alcohol and use any old credit card or cut some cards from card stock, to spread out the epoxy and to work it into the glass (Photo #7). Sand, and prime with a sandable auto body primer, sand again, and now you are ready to paint (Photo #8). ✈

Photo #1: Foam joined with polyurethane glue and masking tape (bottom of wing). Also shows straight cuts in old sheeting.

Photo #2: Top of wing after glue has dried and masking tape is removed.

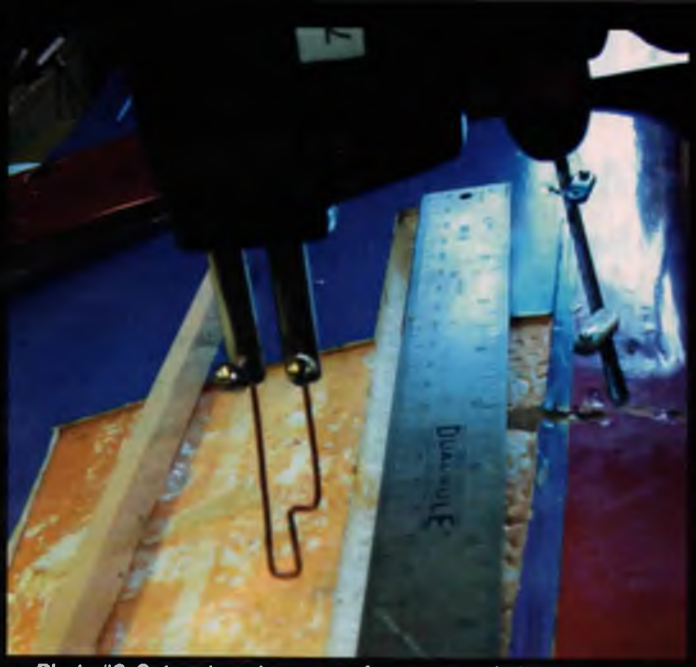


Photo #3: Set up to cut a groove for new spar in bottom of wing.

Photo #4: A doubler added to the back of the leading edge.

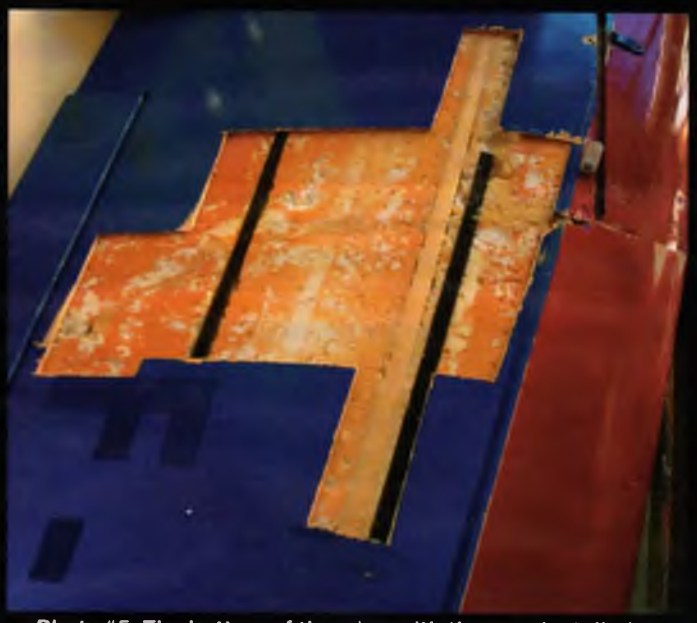


Photo #5: The bottom of the wing with the spar installed, now ready for sheeting.

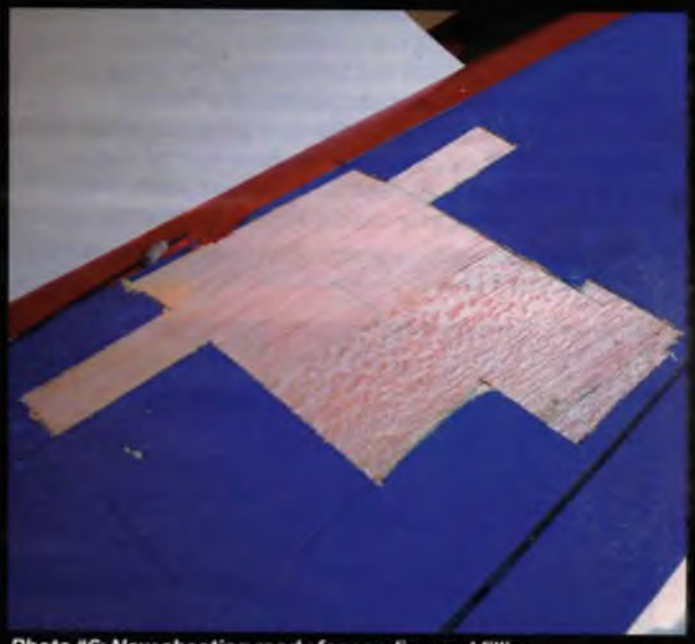


Photo #6: New sheeting ready for sanding and filling.

Photo #7: Applying 3/4 oz. glass with card.

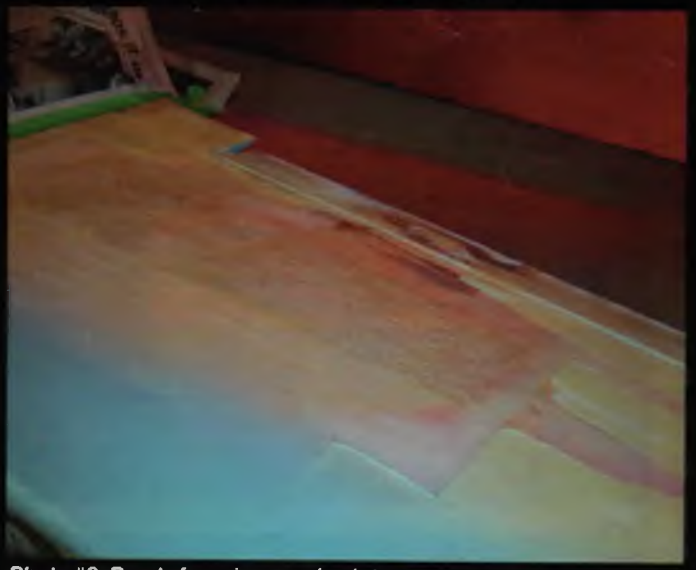


Photo #8: Ready for primer and paint.

REFLEX XTR SIMULATOR

MRC *(Model Rectifier Corp.)*

By Allan Poinsett and Dean Brinton

With additional testing and input by Jim Feldmann

The box is smaller than a 6 inch cube: shippable anywhere.

Photo realistic backgrounds are Reflex's most obvious advantage. The Heli is pretty realistic too!

"What do I learn first, to take off or to land?" said the R/C beginner to his instructor. Replied the wise old instructor, "Repair."

The time and effort required to repair one's beloved bird probably is one of the reasons that our Hobby is not embraced by the total populace. It is a complicated undertaking to learn to fly radio control aircraft and helicopters. The strain of losing a model to terminal impact can put one in a "bummer" mode for some time, and often puts the new pilot out of the Hobby altogether. Fortunately, today we have virtual reality ... the beginner can learn to fly (and the expert can practice those risky maneuvers) without ever risking a crash. Cost? If the simulator

A Shock Flyer makes a pylon turn inside an auditorium. This venue is part of the latest Reflex upgrade. The upgrade is a free-ware download from the factory website.

SPECIFICATIONS

REFLEX XTR

Distributor
Model Rectifier Corp. (MRC)
80 Newfield Ave.
Edison, New Jersey 08837
(732) 225-6360
www.modelrectifier.com
Hardware Requirements
Pentium P4 1200 MHz
or similar AMD with 256MB RAM.
AGP 2x hardware accelerated video card
with at least 32 MB video RAM.
1GB free hard drive disk space.
CD-ROM or DVD drive
USB Port 1.1 or 2.0.
Recommended Video Card
GeForce FX5900 Ultra 128 MB,
Radeon 9700 Pro 128MB,
or later models
This program requires DirectX 8.1 or later.
Reflex XTR Will Work With:
Windows 98, SE, ME, 2000 and XP.
It will NOT work with Windows 95, NT,
Linux, Mac and game consoles.

SUMMARY

WE LIKED THE:
Ease of loading, brilliant graphics,
availability of freeware upgrades,
use your own transmitter.
WE DIDN'T LIKE THE:
Difficulty adapting some transmitters.

The list of included venues and models keeps getting longer with each upgrade.

The airplanes include everything from foamies, to scale, to 40% aerobats. Clouds can be added to the sky at your command.

The models are extremely detailed, and light and shadow are handled very realistically in flight. You can't imagine how important light and shadow are in orienting on a model until you see it on the screen.

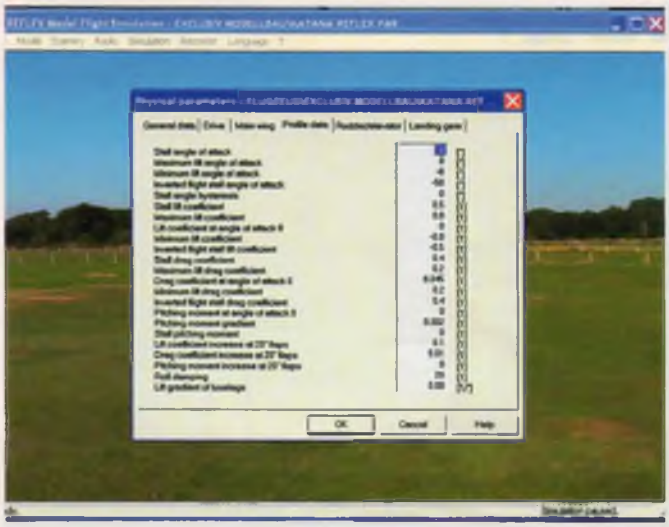
prevents one crash it has paid for itself. Two or three crashes could pay for your computer.

There are a number of excellent R/C simulators on the market today. Over the past few years, with the increase in PC power, simulator capabilities have leapfrogged forward. I can remember the first R/C simulator that I saw. It featured a monochrome sorta model, and no scenery. The latest sims offer very accurate flying characteristics and true to life graphics that make you forget it isn't real. You can select models of all types (or even design your own), and go and fly at various "actual" flying fields.

MRC's new Reflex XTR Simulator was introduced at the Toledo show last year and its break-through graphics amazed everyone who saw it. I intended to buy one, but I wanted to use my Hitec Eclipse Transmitter and MRC (the distributor in North America) did not have (and at this writing still does not have) a connection cord for Hitec equipment. Then the opportunity to review the Reflex XTR Simulator for RCM came along and I decided that a Futaba transmitter would probably work just as well.

What's in the Box:

The small 4" x 5-3/8" x 5-3/8" box contains two sheets of installation and startup instructions, a CD ROM containing the program and extensive help menus, plus a proprietary adapter to connect your transmitter to the USB port in the computer. This adapter provides the copy protection for the program. You will also need the correct



The flying characteristics of each model can be changed in almost unlimited ways and saved for future use. This ability is the most valuable learning tool we have seen to help you understand how and why an aircraft flies.

Very helpful training aids are included to help you improve your flying. Landing and take-off paths help you develop the ability to place the aircraft where you want it in the sky.

cable to connect the adapter to your transmitter's trainer cord socket. JR, Futaba round and Futaba square cables are currently available. I slipped the disk into the drive, and the program loaded itself onto my computer with no further delay. Once loaded, you click on the icon and you are in the program with a message saying "turn on your transmitter." I removed the crystal from the transmitter before connecting it to the cord. This cuts out the RF section, and allows you to operate the transmitter much longer without recharging.

I suppose we should detail the system requirements to smoothly run this program. If you don't have the necessary computer power, don't abuse yourself by trying to make the product work without the tools. R/C simulator programs are high-end, resource consuming programs that require lots of computer muscle to run well. I use a Microsoft XP Pro platform, my PC had a performance upgrade this year to a 2.8 MHz chip and a new high-end 128 meg video card. The program runs flawlessly on this set-up. Looking at the picture via a 19" flat screen monitor makes the experience totally enjoyable.

The first little problem I ran into came when I wanted to access the Helicopter programs. The older Futaba Skysport that I was using does not have the ability to mix the pitch and throttle controls. My flying buddy and heli tester, Dean Brinton obtained the JR interface cable, and used his JR transmitter for the heli portion of the review. I also immediately went to the German website:

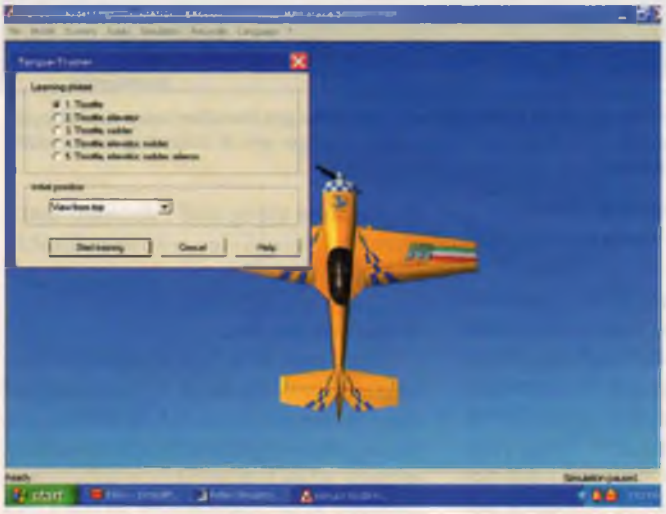
www.reflex-sim.de/

and ordered the latest upgrade which is a free-ware item, and was shipped to me on CD from Germany (see upgrade notes below).

Fixed Wing

By Allan Poinsett

The menu of the original program I received included a choice of 18 models and four actual RC flying fields in Germany. All four are grass runways, and the realism is awesome. Reflex has captured a great way to make your flying environment realistic. You get a wider span of the horizon, and the horizon stays in view for a higher portion of the flight time than with other sims I've seen. I would have liked to have a larger selection of models, so I could use the sim to get comfortable on a model before I take it to the field. I am working up to my Hangar 9 Giant P-51D, and couldn't find a model in the



The Torque Roll trainer allows you to learn one control at a time, rather than having to master all four at once. A few hours of practice on this, and you can actually torque-roll a trainer if the throws are high enough.

Many additional aircraft, developed by private users, are available free on independent Internet simulator sites. This P-38 doesn't have all the fine detail that the Reflex aircraft have, but it flies very realistically in the Reflex environment. (It even spins in if you lose an engine.)

original inventory that came close without lots of tweaking. There is a very nice 40-sized trainer model, which we tried first. It flies just like a trainer should, with good stability and moderate self-correction. Just flying this trainer for a few hours will give the beginner a huge headstart on learning to fly real models without crashing. At the other end of the airplane spectrum, the (4) Katana models are all 40% scale and I flew all of them. The program gives you a list of 13 Kyosho models; a ducted fan, a glider, a pattern ship, and various sport scale models, all of which are in the .40-size range. There is also a 3-channel Marutaka Bleriot, a contemporary of the later Wright Flyers, available.

Initially we felt that all four of the Katanas were a bit underpowered and their rudder response was way too sluggish. Was it somehow the result of my computer set-up? Never mind, we went into the "Model Parameters" and increased both power-to-weight ratio and rudder authority. Voila! Now they fly like TOC mounts. Reflex has the ability to adjust any and all of the models' variables to suit your desires. Start with a model of the type you are flying and then alter the variables to make it fly exactly like your own airplane. Or change things at random (one at a time, of course) and see what effect it has on the way the airplane flies. Try adding or removing a pound of weight from one of the 40-size warbirds and see what happens. This is fascinating and you can learn a lot.

In addition to the photo-realistic flying fields there is a 2D field that offers some very useful training aids. For those who are interested in 3D flying, the simulator has a "Torque Roll trainer" that lets you get into hovering one channel at a time. You can also turn on a "roadmap" that guides you around the pattern and back down to the runway. It really helps. There are many adjustments possible to the program; from dialing up thermals, to inserting engine failures, control throw parameters, *et al, et al*. Some software engineer went crazy here!

Helicopters

By Dean Brinton

The helicopter portion of the simulator features 17 helicopters from 8 different manufacturers, both gas and electric varieties. The simulator comes as an individual CD-ROM without a printed manual, but the on-line help is more than adequate. You will use your existing transmitter with this simulator. I used the JR interface cord that connected my JR transmitter to any available USB port on my computer. Initially, I had some difficulty getting the simulator to operate properly. It turns out that minor changes need to be made to the connecting cable so that it will work with some JR transmitters and my 8103 is one of them. Michael at MRC got me straightened out in short order. While I had Michael on the phone, I asked him about another odd quirk. Sometimes the sim will ask you to turn on your transmitter, and you find it's already "on." Michael says the

on/off function will be reversed on some radios, and there isn't a work-around. In order to make the sim work with a large variety of transmitters, a few quirks were inevitable. Once everything is working correctly, you will be able to assign existing switches on your transmitter to the same functions on the simulator, for example the throttle hold switch, for practicing auto-rotations. I had a few questions getting it set up initially, but the help section of the program offered the solutions I needed.

I've owned and flown a variety of helicopter simulators, including simple game versions that would not likely benefit an R/C pilot. The Reflex XTR is not a game. It's fully capable of providing a real time simulation of helicopter flight where the graphics will make you feel like you're at the field. For learning to hover, transitioning to forward flight, practicing auto-rotations, basic 3D, or trying different helicopters or set-ups, this simulator will be of benefit to beginners and experienced pilots alike.

I flew the Raptor 30V2 first to compare it to the heli I fly most often. Not only does it look precisely like the stock Thunder Tiger model, but it also feels like it, in all modes of flight. It wasn't necessary to tweak the settings to get it to fly that way, but there are literally dozens of parameters you can modify if you want to change flight characteristics. Then I tried the Caliber 30. Even without adjusting the pitch range, the Caliber 30 was no problem to hover, or fly inverted. The auto-rotation switch works great too, and does a nice simulation of an auto-rotation.

Reflex's programmers have provided excellent ground references throughout most parts of your flight. That makes the simulation far more realistic and useful, and is Reflex XTR's biggest single improvement over any simulator I've flown in the past.

Upgrade Notes

The upgraded program file I received on CD ROM from Germany was dated October 2004 and included indoor flying field scenarios, and one more outdoor flying field. The models have been expanded to include electric slo-fly models. I also like the fact that with the upgrade, when you fly into a "no-fly" area, such as over the pits, the red bars appear on the screen, but the model continues to fly through, rather than resetting to the starting position, as in the original version.

Sims on the Internet

There are a number of sites on the Internet dealing with R/C flight simulators. One of the most useful is:

www.rc-sim.de

which allows you (after registering for free) to download 241 additional planes and helicopters, 30 additional scenes specifically designed for the Reflex simulator, and to participate in a forum with modelers worldwide who own various sim programs. This is a real treasure, and allows you to benefit from the considerable effort it takes to create a model or a background. Be patient with the webmaster, as the site runs out of bandwidth late in the month, so you want to do your downloads early.

Conclusion:

The Reflex XTR certainly fills the bill for our needs with ease of operation, almost unlimited capabilities, and the most realistic graphics available today. It's easy to get lost in this sim. I found a model like one of mine, set it up to fly exactly like mine, plugged in my transmitter and started having fun. Then the phone rang and I almost jumped out of my chair. You can't get more real than that.

Beginners will find this program invaluable for taking the pain out of learning to fly. But I'd go so far as to say it is even more valuable for experienced R/C pilots who want to improve their knowledge and skills.

For ten years I told myself I would like to learn to fly rolling circles, but every time I tried it, I got crossed up and scared myself. Flying a plane like mine on Reflex, I flew rolling circles (and crashed) until I could actually complete one most of the time. Then I tried it with my real plane, and did it right the first time. That moment was worth the cost of the simulator.

BEGINNERS' BENCH

Jerry Festa

LEFT: Paul Ramirez of Rockwall, Texas, scratch-built this version of the LT-40. It's 20% larger and is powered by a Saito .91. Paul is returning to this great hobby after a 3-year lapse! Can you say LT-40 on Steroids?

BELOW: New pilot "Bob" likes to use his Alpha 60 to warm up his fingers, then switches to the Tiger 60 Sport ARF to expand his flying skills. Both planes are excellent fliers and are easily controlled by newcomers to the hobby.

"Starting Over — for the first time"

For the most part, this column has been focusing on the brand new model aviator who is in the process of beginning their journey into this fabulous hobby. Not to be forgotten are those of us who are beginning all over again — those who have stopped along their journey for whatever reason — but have been brought back into the flock, so to speak.

Take for example Paul Ramirez of Rockwall, Texas. After a three-year hiatus, Paul decided to return to our hobby by building (from scratch) an LT-40. Well it was supposed to be an LT-40, but Paul decided to enlarge the size just a wee-bit — like approximately 20%! He also did some modifications to the original design: removed dihedral; increased the control surfaces by 10%; and changed the airfoil a bit.

Paul is currently flying his "LT-40 on Steroids" with a Saito .91 4-stroke engine, but has made provisions if he would like to increase the engine size in the future. He flies mostly at 1/2 throttle — which is an excellent speed to move this 13 lb. model. Paul also states this model goes directly where he points it and is therefore not as forgiving as a "stock" LT-40.

He also did something that reveals his respect for model aviation by requesting two local, experienced pilots pre-flight and test fly his creation. An experienced pilot can save the day if the plane is not in trim or not balanced correctly, whereas a pilot with little current experience will probably bring home a bag of broken balsa. So enjoy your plane Paul, and welcome back!

Many new pilots want to progress to the "next" one a bit too quickly. In consultation with your instructor, it is wise to invest in a second plane as soon as it is possible, as one does not know when it will be needed. Nothing can slow up a pilot's progress worse than not being able to fly because your (first) plane has been crashed. Most modelers only have the weekends available to fly, and weather and/or other obligations can wash out some of those weekends, so the sooner you get airborne the better.

However, a newbie's first trainer takes a real beating and requires more and more epoxy as they practice flying, landing as well as take-offs. Wings get patched up, new firewalls are glued into place, and numerous times the landing gear get replaced or at least repaired. This is all normal as each experienced pilot has gone through this and emerged with a love for flying.

The old adage used to go something like this: "As soon as you finish your ARF (Almost Ready to Fly), start *building* your next plane." Currently, we have so many excellent ARF options; the desire to *build* a kit takes second place to assembling your second ARF. Most of the time the entire plane can be assembled without the installation of the engine or radio, which will be supplied from the first plane when needed.

Therefore, one can have the second plane airworthy in less than a week if all that is required would be the installation of the radio and engine. This concept has a second benefit: there is no hurry, so assembly/construction can proceed at

Frank Tiano Enterprises are now offering an accessory for the Dremel tool with these excellent abrasive wheels. Use this type of tool to cut off bolts, flatten axles for wheel collars, etc.

Du-Bro has introduced a glow starter that has a test button on the top that when pressed will indicate whether or not the glow plug is functioning!

An example of flying in the wind. This electric powered Shock Flyer weighs less than 1/2 a pound and can handle the wind as this photo demonstrates.

a careful pace, making sure everything fits correctly.

The other day, a relatively new pilot (Bob) brought two planes to our flying field and you see them pictured here. His primary trainer was the Hangar 9 Alpha 60. After flying a couple of flights with the Alpha (to "loosen up my fingers"), Bob then turns to his Carl Goldberg Tiger .60. This low-winged ARF requires an additional level of skill to take off and fly but is much more aerobatic than the Alpha 60.

Taking off with a taildragger like the Tiger 60 can be a challenge but, with a good instructor, can be mastered in a very short period of time. In my opinion, learning to fly a taildragger on a grass field is much easier than on a hard surfaced runway! And in the process you get to learn to use your rudder.

Landings on the other hand are very similar with both models, in that they can land very slowly without the worry of tip stalling. In fact with a 5-10 mph headwind, these planes can land "at walking speed," thereby giving the pilot additional time to think and react. By the time you are reading this, spring will have arrived and so will the spring winds, but they will soften as we approach summer.

I'm not aware of Bob's *third* plane yet, but at the rate he is learning, anything will be within his reach.

On to another topic: items that make modeling even more fun! Take for example the number of times you try and start your engine only to hear the loud sound of silence! One of the first things your instructor probably taught you is to check the glow plug and see if it is functioning properly.

This will obligate the modeler to remove the glow plug, connect it to the glow starter and see if it glows (indicating that it is working). Du-Bro has released a new glow starter (called "E/Z-Glo" P/N 927) that may accelerate the diagnosis process! All that is needed is a quick push on the top of the glow starter and if the plug is indeed working, a "beep" will be heard. If the plug has seen its last day, no sound will be detected.

Therefore, if the balky engine isn't even barking, the modeler can quickly eliminate the glow plug as the source of frustration with this item. Another neat feature is that this glow starter's rechargeable 1700-mAh battery can be easily replaced. Check out this product at your local hobby shop or visit:

www.dubro.com

While building or assembling a model, there are many times when you need to cut a bolt off, or cut a slot in the wood. Frank Tiano Enterprises have an excellent product called "Disk'it" that will make your Dremel tool much more efficient. These very strong cutting discs are reinforced on the side of the wheel that matches up with the heavy-duty mandrel. There is a maximum limit of 30,000 rpm, but because the Disk'it cuts bolts so quickly, there is no need to spin them that fast. For more information, point your browsers to:

www.franktiano.com

The last topic for this month deals with wind. As mentioned previously, a headwind can slow the ground speed of your model to not only near zero, but at times (and with good throttle management) your ground speed can be negative! Many novice pilots do not like to fly in windy weather and for a good reason — it isn't relaxing. In fact some days even the most experienced modelers will be "grounded" by high winds.

How much wind is too much wind? Only you can answer that. And by now you probably have heard "the bigger the plane, the easier it is to fly." Well check out the photo of the little electric plane flying behind the windsock. The day that picture was taken, no one at our field was flying because of the strong wind (as demonstrated by the horizontal windsock). Despite the high winds, my son, Jonathan, decided to fly his Shock Flyer Edge 540 by Ikarus anyway. This plane had a wingspan of 31", weighed a whole 8 oz., and he managed to not only fly loops and rolls, but also a rolling circle, inverted harrier, blender and of course the elevator! It wasn't pretty, but that little bird showed what could be done in the wind.

Of course he is an experienced pilot and knows his limitations. You on the other hand have to discover your "comfort zone." One of the best methods to expand that zone is to participate in a local fly-in. After a day of flying, you will be surprised at how little the wind affected your decision on whether to fly or not. In fact, other than noticing which runway was in use, you probably forgot all about the wind!

It is just amazing isn't it? After all, your plane doesn't know whether or not the wind is blowing — it just wants to fly ... so maybe I'll be lucky to see YOU at the flying field — wind or no wind!

FOR WHAT IT'S WORTH

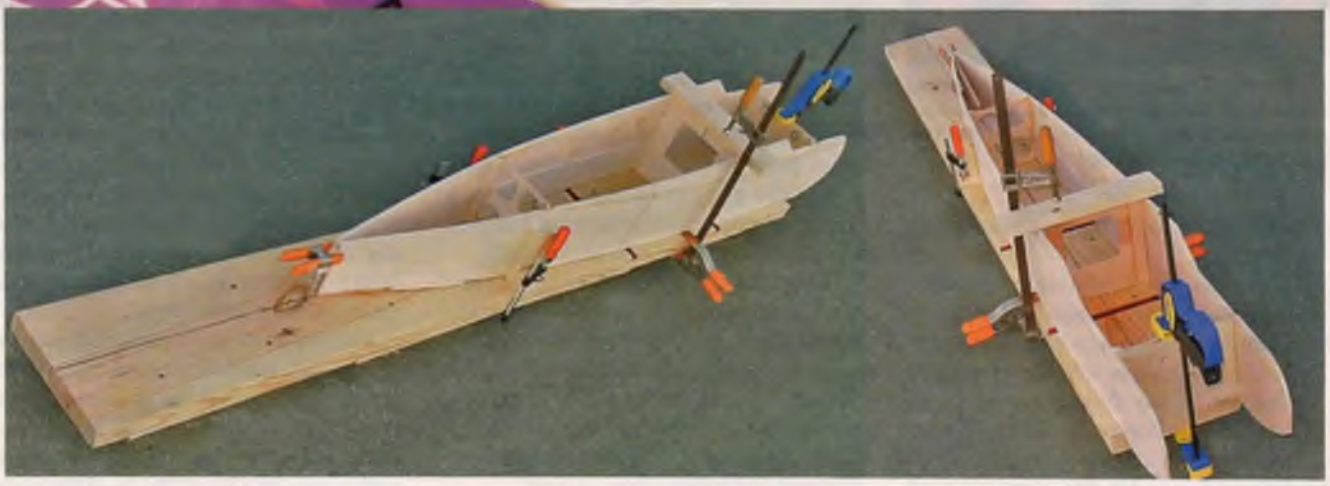
A NOTE FROM JERRY

By Jerry Smith

Many readers have been sending me suggestions by e-mail. They are good, usable ideas that could be published; however, I cannot use them if you do not include your address. Your e-mail address is not enough. I need your complete home address in order to get back to you when, and if, your suggestion is published. So please include it. And, while I have your attention, please submit an SASE when asking for information if you want to receive an answer ... Jerry.

WINDSHIELD FROM PLASTIC BOTTLE

It is possible to make different detail parts for your airplane from a plastic bottle. The best part is, it already has a curved surface. For example Mark Murray, Eatonton, GA, needed a windshield for his Astro Hog. In the kit was a flat piece of clear plastic supplied for the windshield. However, he found a clear plastic bottle and cut a formed windshield from it, making it easier to fasten to the fuselage. Using your ingenuity, other parts such as panels, fairings, scoops, covers, and blisters can be made from a plastic bottle and painted if necessary.



FUSELAGE BUILDING BOARD

Having trouble building a straight fuselage? Here is a suggestion sent to me by Thomas Allen, Winston-Salem, NC. Go to your local Home Depot or building supply store and purchase (1) 2" x 10" x 8', (1) 2" x 3" x 8', (1) 1" x 3" x 8'.

The 2" x 10" is cut down to 6 feet and carefully add a Magic Marker line down the center of the board for proper alignment of all formers. I cut eight 2" x 3" x 12" pieces for legs, four for each side. These pieces were glued/dry wall screwed to the bottom. The two end pieces are located 3" from the end, with all pieces being located 1-1/2" in from the outside edge. The other two pieces on each side were centered between the end pieces with about a 6" gap between all four pieces. The gap between each leg piece can be used for larger clamps to go farther under the board. The 1" x 3" board was made into "L" pieces, 1-5/8" for the base, and 4" for the top, and are glued together. I also cut two 12" long pieces that can be put any place on the top of the plane. Additionally I grooved two slots in the 2" x 10" for Shop Fox's "T" track hold down clamps. For a little over $20, you have a building/gluing board that will guarantee the plane's fuselage a true and square alignment.

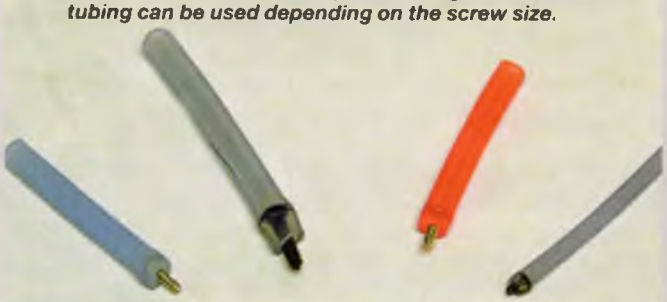
DU-BRO FILLING STATION PROBLEM

If you had a problem with the Du-Bro Filling Station large hex nut breaking out at the top, you can call Du-Bro at (800) 828-9411 and they will gladly replace it with a revised version, free of charge. The plastic mold was too thin in this area and didn't have enough strength to hold the tool and fuel pump platform while operating the pump ... Jerry Smith, editor.

DIFFERENT STRIPING WIDTHS

The Top Flite Striping Machine makes striping easy. Once you make the stripe width and later on want to repeat the same one, here is a good method of keeping track of how to make a duplicate width. This is what Loran Page, St. Helena, CA, had to say: "When I make my stripes I count the number of turns on the Striping Machine it takes to make the width. Then I wrap a sample stripe around a cardboard tube (my favorite is a depleted toilet paper roll core) and write down the number of turns it takes to make that width next to it. It has worked great for me so far."

An easy way to install small screws in places hard to reach — for that matter any place. Large or small fuel tubing can be used depending on the screw size.



SMALL SCREW STARTER

Here is a great way to start small screws: Insert the screw head into a piece of fuel tubing. You may have to use a piece of large or small tubing depending on the size of the screw head size. Eliminate the fumbling, dropping on the floor, and spending precious time trying to find them. You'll love this suggestion. Submitted by Michael Tevis, Royersford, PA.

Win A DREMEL *Variable Speed MultiPro Super Kit*

in RCM's For What It's Worth Contest

Every modeler has a trick or two up his sleeve that comes in handy when solving a particular modeling problem. We would like you to share your "shop secrets" with us and our readers and, in so doing, be eligible to win a Dremel Variable Speed MultiPro Super Kit for your shop, furnished by Dremel. Each month we will draw a name at random from all "For What It's Worth" ideas submitted that month to determine the winner.

Send your ideas to:
R/C Modeler Magazine, "For What It's Worth Contest"
P.O. Box 487, Sierra Madre, CA 91025

Congratulations To Our March 2005 Winner!

The following winner won a prize from RCM and Dremel:

Mike Brown, Bella Vista, California

Offer void where prohibited. Substitutions may be required due to availability of item.

The Dremel Variable Speed MultiPro Super Kit (Model #3956) includes Flex-Shaft for precision, hands-free operation. Cut, grind, carve, route, sharpen, drill, polish, sand, and more. Contents include: Variable Speed MultiPro Tool; Flex-Shaft Attachment; Wrench; "New" Customized Storage Case; 72 Assorted Accessories; and a 175+ Uses Book.

FIESELER Fi-156C STORCH

Sport Scale WWII S.T.O.L. Liaison Plane For .15 Glow Or Speed 480 Electric

Construction photos by Rob Caso, flight photos by Bill Sunick, electric model photos by Ron Call.

History:

Designed in mid-1930's, the Storch was the first operational STOL (short take-off and landing) aircraft. With its ability to take off in 50 yards and land in 30, the Storch was used by the Luftwaffe during WWII in much the same way helicopters are used today. Its primary roles were spotting, liaison, rescue and ambulance, and it saw action in all theaters, side by side with the more famous Focke-Wulf and Messerschmitt aircraft. Although lightly loaded and having a high lift, high aspect ratio wing, the full scale Storch was a somewhat unforgiving plane to fly and more than a few careless "hot shot" Luftwaffe pilots gained newfound respect for the plane after a hair-raising joyride.

Model:

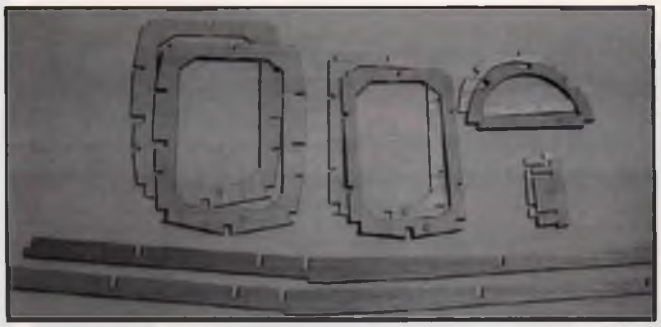
This model employs interlocking components to ensure speed and accuracy of construction as well as a rigid but light airframe. Use medium CA throughout and contest grade balsa for sheeting. Study the plans carefully before beginning assembly. A vacuformed canopy and laser-cut short kit are available from:

www.TurnKeyRC.com

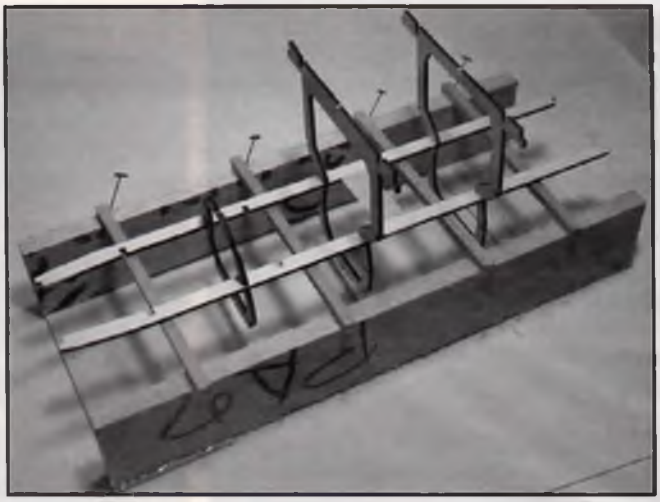
Fuselage:

The Storch's fuselage is constructed more like a boat than an airplane; it is not built side to side. Instead, fore and aft sections are constructed, the ventral spine (F6) providing the primary link for the two. Note that some components require laminatiing two 1/16" parts (noted as "2X" on the plans).

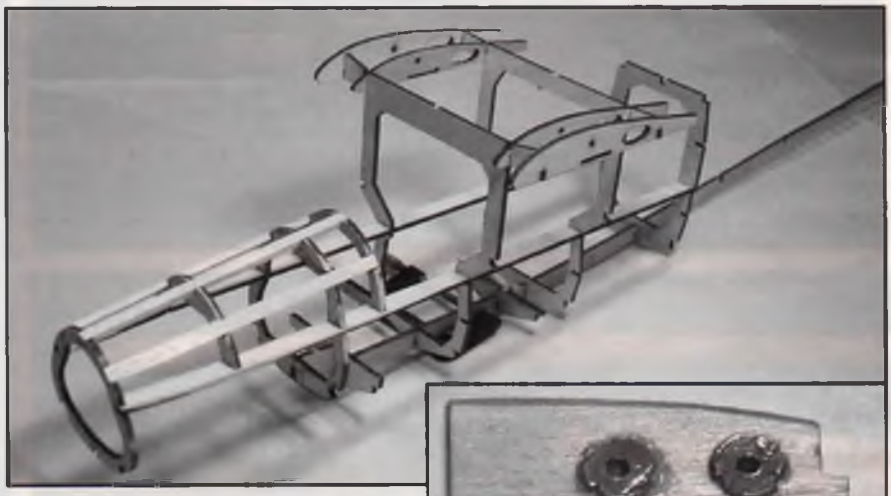
Build a 6" x 2" x 12" channel shaped box to support the fore section during construction. Start by resting each F1 on quarter square supports placed across the box. Dry fit bulkheads #1, 2, 3, 4, 6, 8 and 9, to F1, ensuring that each F1 is aligned square when viewed from above. Run a piece of tape across the F1's between bulkheads #6 and 8 to hold everything together. Holding each bulkhead vertically with a square, glue up the assembly. Affix ribs #1 and 2 and add the ply wing mounts. Affix the ventral spine, F6, ensuring that it is completely seated on each bulkhead.



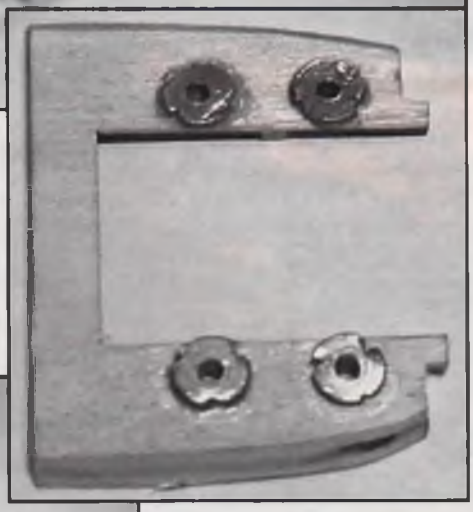
ABOVE: Some parts are comprised of two cross grain laminations of 1/16" balsa for strength.



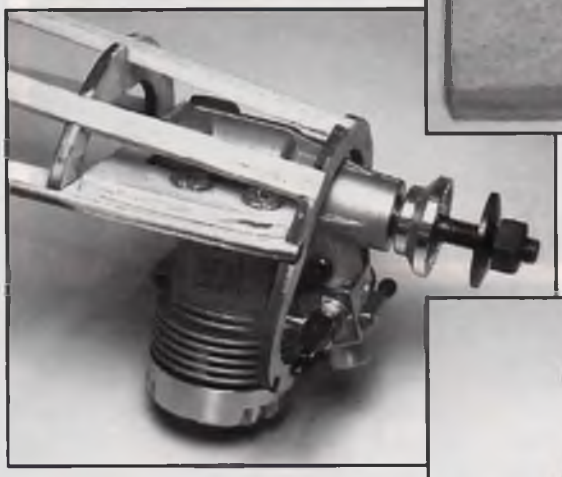
RIGHT: Fuselage construction begins by first making a jig on which to assemble the forward fuselage. The fuselage is not built in a conventional side to side manner — fore and aft sections are built separately and then joined.



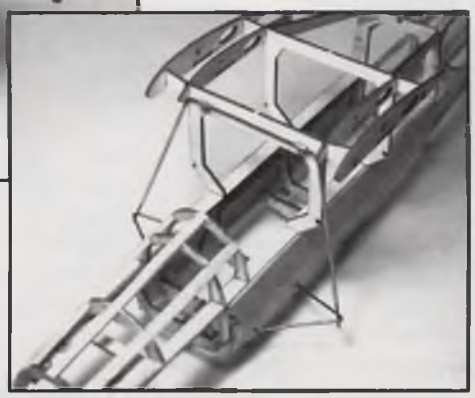
ABOVE: The completed forward fuselage framework. The ventral spine provides mounting points for the aft section assembly. Make sure that the spine is seated completely on all bulkheads.



RIGHT: 4-40 blind nuts are pressed into the 1/8" lite-ply engine mount and are secured with CA.



LEFT: The engine mount for the glow version is epoxied atop F1. Inverted O.S. Max .15 shown.



RIGHT: The main landing gear struts are made from 1/16" wire. The lower "V" supports are epoxied into previously installed brass tubes in the fuselage after the side sheeting is applied.

Construct the aft section on a flat surface, upside down. Join each laminated half of F4 and pin this down. Attach the bulkheads vertically to F4. With the fore section pinned to the channel box, dry fit the aft section again, making sure that each bulkhead is properly seated on F6. Sight down from the nose and make sure the assembly is straight, then glue in the aft section. Add the dorsal spine, F3, the tail post, the stabilizer support, F5, and the rear cabin framing, F7. Add bulkheads #5 and #7, and the wing srut attachment plate F8 (with 2-56 blind nuts) and run 3/16" square stringers from #5 to the tail post. Install the 3/16" x 1/16" and the 1/4" x 1/8" stringers as shown. Sand the side and corner stringers flush with the bulkheads back to #9. Add the side sheeting, noting that the lower fuselage and nose sheeting are added after the LG and the wing strut supports are installed. Apply thin CA on the vertical wing supports of bulkheads #6 and #8. Note that bulkheads #1A, #2A and #3A and F2 are used to form a removable cowl to provide engine access for the glow powered model.

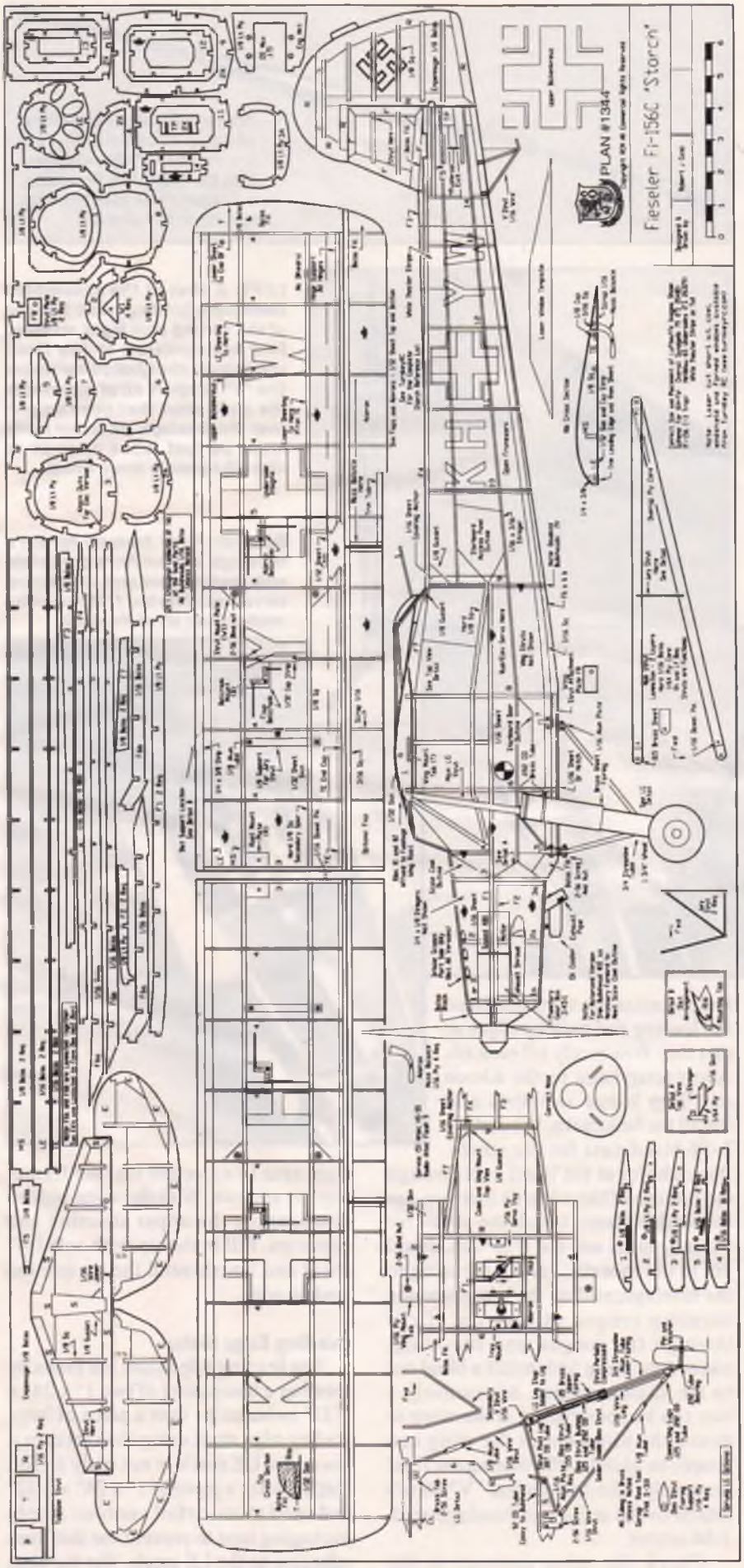
Affix 4-40 blind nuts to the engine mount and, after test fitting the engine, install the mount with slow set epoxy. Fuelproof the engine compartment.

Electric Version Fuselage:

Bulkhead #1E is used for electric power and bulkheads #1A and #3A are omitted for the electric version. Extra slots are provided in #3 for nose stringers used in the electric model.

Wing:

The wing is a standard "D" tube. Lay out the wing by dry fitting a few ribs onto the main spar "MS". Pin down LE, position the secondary spar on the plans and then position the rib/spar assembly. Line everything up with the plans and



FIESELER FI-156C STORCH

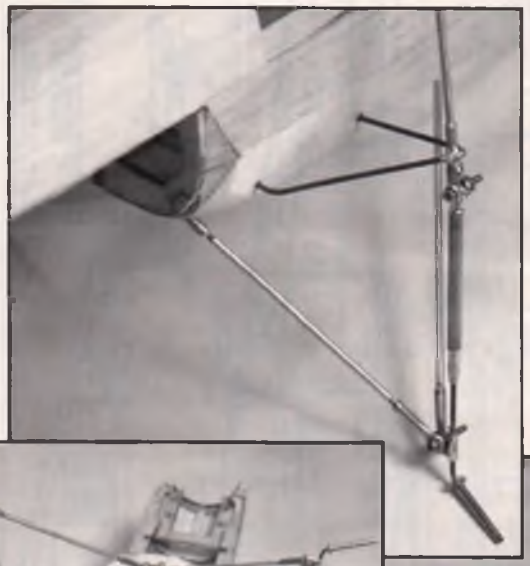
Designed by:
Robert J. Caso
TYPE AIRCRAFT
Sport Scale
WINGSPAN
46 Inches
WING CHORD
6 Inches
TOTAL WING AREA
276 Sq. In.
WING LOCATION
High Wing
AIRFOIL
Clark Y
WING PLANFORM
Constant Chord
DIHEDRAL, EACH TIP
Slight (see text)
OVERALL FUSELAGE LENGTH
31.5 Inches
RADIO COMPARTMENT SIZE
8" (L) x 2-1/8" (W) x 4-3/4" (H)
STABILIZER SPAN
10-3/8 Inches
STABILIZER CHORD (inc. elev.)
4-7/8 Inches (Avg.)
STABILIZER AREA
18-1/4 Sq. In.
STAB AIRFOIL SECTION
Flat
STABILIZER LOCATION
Top of Fuselage
VERTICAL FIN HEIGHT
2-5/16 Inches
VERTICAL FIN WIDTH (inc. rud.)
5-1/2 Inches
REC. POWERPLANT
Elect. Version: Speed 480, geared 3.45:1
Glow Version: O.S. Max .15
REC. BATTERY (Electric)
3-Cell LiPo, 1300 mAh
LANDING GEAR
Conventional
REC. NO. OF CHANNELS
4 or 5
CONTROL FUNCTIONS
Rud., Elev., Throt., Ail., optional Flap
C.G. (from L.E.)
1-1/2 Inches
ELEVATOR THROWS
3/8" Up — 3/8" Down
AILERON THROWS
3/8" Up — 3/8" Down
RUDDER THROWS
3/4" Left — 3/4" Right
FLAP THROW
3/4" Down
SIDE THRUST
—
DOWNTHRUST/UPTHRUST
—
BASIC MATERIALS USED IN CONSTRUCTION

Fuselage	Balsa & Lite Ply
Wing	Balsa & Lite Ply
Empennage	Balsa
Wt. Ready To Fly	32 Oz. (2 Lbs.)
Wing Loading	16.7 Oz./Sq. Ft.

PLAN #1344 Full-Size Plans Available See Page 125

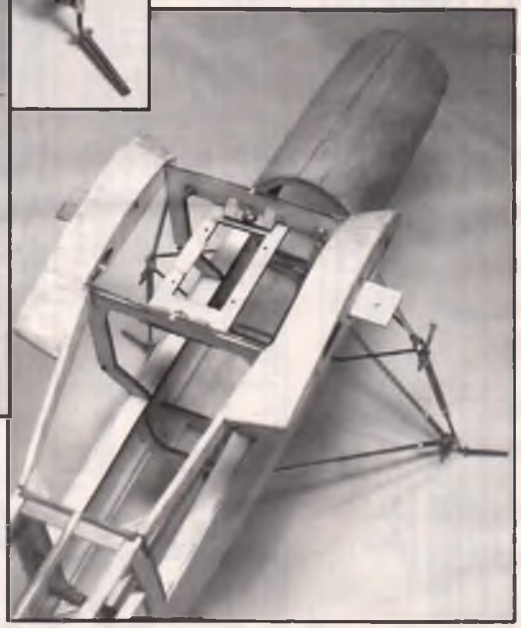
The lower "V" strut aluminum plates are mounted to bulkheads #5 and #7 with 2-56 screws. Three are required, two of which go on bulkhead #5. The blind nut plates for the wing struts are added before the underside is sheeted.

An exploded view of the oleo leg components. The lug on the left is soldered into the tube thus providing a compression point for the sprung 1/16" wire leg.



LEFT: A shot of the assembled telescopic landing gear. The top of the sprung oleo leg is screwed to a lug soldered to the fixed upper main strut just below where the "V" support strut intersects the main strut that goes up and over the fuselage. All screw joints must be just loose enough to allow the gear to move freely.

BELOW: Fully framed forward fuselage shown here complete with landing gear and aileron/flap servo tray. Note the 1/16" covering anchors just aft of the cabin.



RIGHT: An underside shot of the landing gear. The long "V" struts keep each wheel aimed in the right direction and also prevents fore and aft movement of the oleo leg. This set-up is very similar to landing gear on the actual aircraft. Note also the engine mount.

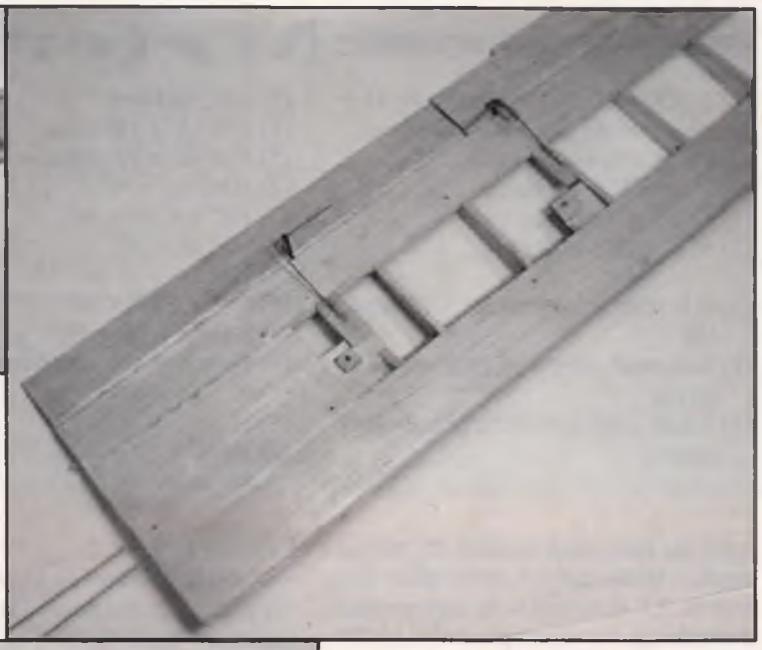
BELOW: Front view of the framed fuselage showing the landing gear installation.

pin the assembly down. Add TE, the balance of the ribs and the tip. Go over the joints with CA and affix the leading and trailing edge sheeting. Pull up the assembly and lay down the lower sheeting, extending the sheet to the tip, then reposition and pin down the framework and affix it to the sheeting. Cut the lower sheet wide enough to accommodate the flap and aileron and build these with the wing. Build up the surfaces, drill holes for the pin hinges and separate the sections. Sand the leading and trailing edges so that they flow nicely off each rib. Apply scrap balsa for the aileron and flap hinge supports and install the bellcranks, W1 and the 2-56 blind nuts for the struts. Punch holes at the blind nuts through the bottom of the wing so that you can locate them later. Install the plates for the jury struts and the 1/16" dia. dowel pin to the root rib. Test fit the wing to the fuselage, sliding the wing onto the locating tongue at the root. Drill through the tongue and the wing, remove the wing and install a blind nut on the fuselage tongue. Alternatively, a box can be constructed in the wing to house the blind nut or the wing can simply be glued to the fuselage at final assembly. The functional "V" struts attach to the wing and fuselage with 2-56 screws.

Check the wing contour at the leading and trailing edges and along the main spar to ascertain that the framework is smooth. With the wing pinned down, apply the upper sheeting and capstrips. Fill in the tip with soft 1/4" sheet and finish-sand the tip and the leading edge.

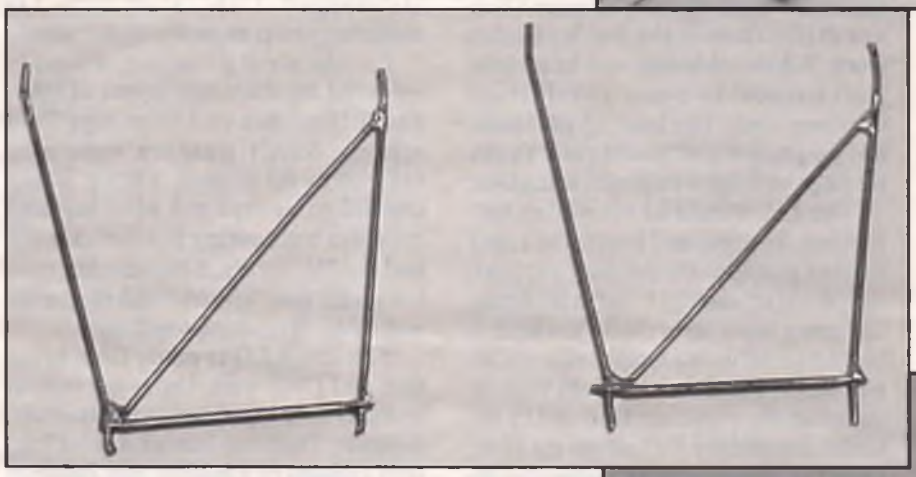
Leading Edge Slats:

The leading edge slats are made by forming a lamination of two 1" x 24" x 1/32" balsa strips over a piece of large leading edge stock using slow set epoxy. Since the LE stock is not truly airfoil shaped, affix a piece of 1" x 24" x 3/32" and sand to an airfoil contour. Apply packaging tape to prevent the slat from adhering to the LE stock. Wet the slats with ammonia-based window cleaner,



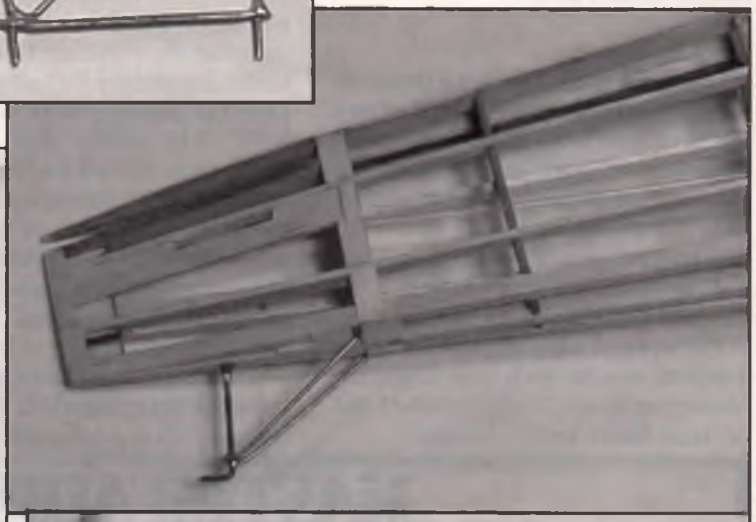
ABOVE: The wing is a conventional flat bottom "D" box sheeted and capstripped with 1/32" balsa. It is extremely strong and warp resistant — use an ultra flat building board. Note the wing tab mount at the root, the main and jury strut plates and the back fill for the hinges. Aft and root sheeting is next.

RIGHT: The underside of the wing showing the flap and aileron linkage installation.



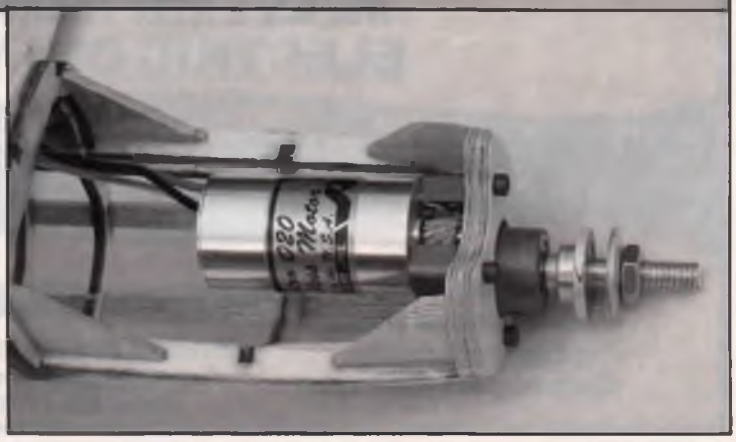
LEFT: The jury struts are 1/16" brass wire and keep the main struts from flexing upon landing. Epoxy these to holes in the main struts so that they are vertical to the wing when everything is assembled.

BELOW: The tailskid is simply 1/16" music wire soldered to brass wire braces. I let in small pieces of aluminum tube in the fuselage framework to accept the skid which was epoxied in.



ABOVE: A 3:1 geared Astro Flight 020 brushless motor/ gearbox combination was used in the latest E-powered model.

RIGHT: A look inside the nose at the motor installation. Motor is mounted to a hard ply plate and in such a way as to allow enough clearance for the cowl. Ply triangles are used to brace the nose against the weight of the motor/gearbox. Battery is accessed through open former aft of motor.



Materials

(1) TurnKeyRC Fi-156 Storch short kit
or substitute the following four items:
(2) 1/8" x 4" x 48" balsa
(2) 1/16" x 4" x 48" balsa
(1) 6" x 6" x 1/16" ply
(1) 6" x 24" x 1/8" lite ply

(1) O.S. Max .15 2-stroke/3.5:1 Speed 480
(1) 5-channel radio with lightweight servos
(1) 7 cells 1200 mAh battery and speed control
(1) 4 oz. fuel tank
(1) 4" x 36" 1/16" sheet
(5) 4" x 36" 1/32" sheet
(2) 3/16" sq. x 36"
(2) 1/8" x 3/16" x 36"
(4) 1/8" sq. x 36"
(1) 1/4" x 1/8" x 36"
(1) 1/4" x 5/16" x 36"
(4) 3/16" x 1/16" x 36"
(1) 12" x 3" x 1/4" soft balsa
(1) 4" 1/16" dowel
(1) 1" x 36" x 1/64" ply
(2) 1-3/4" light wheels
(2) Pkg. Robart pin hinges
(1) Pkg Du-Bro microconnectors #845
(4) Du-Bro pushrod #847
(4) Du-Bro bellcrank #851
(8) 2-56 blind nut and screw
(4) 4-40 blind nut and screw
(2) Rolls covering
Short kits, cowls, windshield, and rear windows are available from: TurnKeyRC, 128 Grandview Rd., Boyertown, PA 19512, (610) 564-9529.
sales@turnkeyrc.com

apply the epoxy and laminate the pieces together. While still wet, evenly place this over the LE form and wrap tape around everything. Put some pin holes in the tape to allow to dry 24 hours. Since the slats have an airfoil cross section, apply a strip of 3/32" to their leading edge and sand in, using the form for support. The slats must be installed symmetrically on each wing so that the air inlet is greater than the exit. Functionally, at increased angles of attack, the slat "opens" aerodynamically, forcing high velocity air over the wing, thus creating lift — like the "blowing on the paper" demonstration we have all seen.

Wing Struts:

The functional main wing struts are fabricated from a lamination of two layers of hard 1/16" balsa and a 1/64" plywood core with thin brass plates slid in the ends of the lamination and pinned. Note that the Storch's struts were a flat oval in cross section, not streamlined. The jury "N" struts are made from 1/16" wire and slide into holes in the bottom of the wing. A very slight amount of dihedral may be built in to avoid the "drooping wings" look; however, the full scale Storch had no dihedral.

Landing Gear:

A scale telescoping LG is shown on the plans but it is not really necessary for such a small model. The scale LG is not difficult to make but it is more work. When soldering, use heat sinks (wet tissues) to avoid unsoldering previous work. The landing gear must not be permanently attached to the fuselage until the windshield is in place.

The LG should be viewed as two sections, an upper and lower. The upper section provides the primary support, so it must be sturdy. 1/16" wire forms the upper main strut ("US"), which is bolted to #6 using brass tabs. I also added 1/16" I.D. aluminum tube to increase the cross section of US for scale. Secondary "V" struts emanate from the fuselage sides, supported by 1/16" I.D. tubes that run along bulkheads #5 and #6. The fuselage sides should already be sheeted; however, the bottom of the fuselage should be left open to allow installation of the tubes and the aluminum plates. Install 1/8" triangles inside the fuselage where the brass tubes exit. Install the tubes with epoxy and then bend the "V" struts so that they slide in the tubes (secure with thin CA) with the point of the "V" intersecting US and allowing 1/4" of US to extend below. Fabricate and install with 2-56 screws the three "U"-shaped 1/16" aluminum LG mounting plates as shown on the plans.

For the strut pivot lug, I simply soldered together two layers of tube, and drilled one end to accept 2-56 screws. Small washers were also soldered on for strength. The lug is then slotted to accept the oleo leg and provides a mounting junction for US and the "V" struts. Slide the lug onto US under the "V" strut and then wire and solder everything together.

The lower LG is made from brass tube and 1/16" wire. The lower section provides only a cushion — no structural support. The oleo (shock absorbing) strut consists of a bushed tube inside of which slides a sprung piece of 1/16" wire that is bent to form the LG leg and axle. To hold the sprung internals in place, a flattened lug is soldered to the top of the oleo. There must be some overlapping support for the sliding LG leg inside the oleo. Do this by soldering a long bushing inside the oleo tube. Also solder a bushing to the top of the sliding LG leg to prevent the leg from exiting the oleo and to provide a

pressure point for the spring. Each oleo pivot lug consists of two tubes, one inside the other, half flattened and drilled to accept 2-56 screws. The lug is soldered inside the top of the oleo after the (unbent) leg and spring are fed through. This oleo lug mates in the slotted pivot lug already soldered on US. There must be a minimum of play here — solder on washers to fill in the slack. This lug must also be long enough to eliminate any play in the spring.

Each lower "V" strut is comprised of two struts, the ends of each having a crushed tube to provide mounting points. These move with the action of the gear and provide lateral and fore and aft support to the LG leg. A drilled tab is soldered on the lower LG leg to provide a mount for the lower "V" struts. I dressed up the "V" struts with 1/16" aluminum tube. Note that the attachment points of the working sections of the LG must be allowed to move freely, but have a minimum amount of play.

The working telescopic strut fairings are made from .005" brass sheet for the upper and 3/4" wide streamlined aluminum tube for the lower telescoping slider. Cut the brass sheet 2.5" long x 1-7/8" wide and anneal it with a torch to make it more pliable. Make sure that you de-burr any cuts. Pre-bend the sheet into a shallow curve and form the leading edge at the center over a piece of 3/16" steel rod set in a vise. Work into a streamlined shape by making further curvatures over a dowel. Brass does not have much memory and we need a way to keep the pointed trailing edge together. We don't want to edge solder the TE since any globs of solder collecting inside the tube could interfere with the action of the lower telescoping fairing. Cut a 1/2" x 2.5" strip of brass and bend this into a "V" lengthwise, being careful not to induce ripples. Squeeze the trailing edge of the fairing together and slip on the "V" strip. It will want to pop off so use some stainless or aluminum wire twisted around everything to keep it together for soldering. All this is easier done than said! When you solder, use only enough to do the job. Now make another one!

The lower telescopic slider is easy. Cut a piece of 3/4" streamlined aluminum tube 2-3/8" and make a 1/4" long slot at one end about 3/16" from the leading edge on one side of the tube. This slot will fit over the lug on the LG leg that mates with the long "V" struts emanating from the center of the fuselage. Note that you must make a right and a left slider. The tube is fed on the oleo strut and is then captured on the lug by affixing a small slotted piece of aluminum sheet slid onto the lug from the other end. Test fit the two fairings to see that the slider will slide easily through the upper fairing. It's okay if the slider floats around or wobbles a little on the LG — the upper fairing will keep it in line when everything is assembled.

Almost there. The upper fairings are mounted to the oleo leg with 1/16" plywood supports cut in a streamlined shape and having a 3/16" hole for them to slide over the fixed part of the oleo. Prepare two for each leg; one should be epoxied at the top of the oleo and the second about 1/2" lower. Slide on the upper fairing (after the lower is in place) and epoxy it to the upper support. There is no need to glue the fairing to the lower support; its purpose is only to keep the fairing in alignment with the oleo leg during compression of the strut.

Storches were equipped with either a tail wheel or skid. Aluminum tube CA'd in the fuselage structure provides the mounting points.

Empennage:

Nothing exciting here. Piece the outlines together over the plans and add the 1/8" square ribs. Round out the empennage. Remove any covering from where the empennage is to be attached to the fuselage. Hinge the empennage with thinned down 1/8" pin hinges.

The following parts are available from:

www.TurnKeyRc.com

or you can vacuum-form your own.

Rear Cabin Glazing: The rear cabin glazing is vacuformed from .030 PET-G plastic. The rear cabin glazing should be made to be removable to allow for equipment access and adjustment. Trim the rear cabin glazing around its perimeter, leaving at least 1/4" of the vertical sides. The vertical side of the forward portion should be trimmed away so that the glazing sits flush atop bulkhead #6, under the rear portion of the windshield. Both are held in place with small sheet metal screws. The sides of the glazing should be notched to fit over bulkhead #8. Add a piece of hard 1/16" balsa to the aft vertical side and drill to accept a 1/16" dowel in the center. A corresponding hole is drilled in bulkhead #9.

Windshield: The windshield is vacuformed from .030 PET-G plastic. The side cabin glazing should be installed before installing the windshield and both should be installed before the landing gear. First trim off the bottom portion, up to the lower glazing line. Trim the curved section to about 1/4" from the demarcation line to provide a gluing surface and to allow for equipment. The rear portion of the windshield is made a bit longer to allow for attaching to bulkhead #6. Trim the rear so that the windshield overlaps bulkhead #6. Make 3/8" vertical and 1/4" horizontal cuts on the rearward sides of the windshield toward the top to allow for the landing gear and test fit the gear to check clearance. Scrap 1/16" ply should be applied to the top front of bulkhead #6 to provide a mounting point for the top of the windshield. A proper fit is achieved when the windshield rests flush with the top and sides of bulkhead #6 and is seated against bulkhead #4. Glue the windshield to the sides of bulkhead #6 and to bulkhead #4, leaving it loose on the top of bulkhead #6. The rear cabin glazing also rests on the top of bulkhead #6, however its front edge is positioned atop the windshield. Both are held in place with small sheet metal screws. Use Formula 560 glue, and tape the windshield in place while the glue sets.

Cowling: The vacuformed (.030 high impact polystyrene) cowling must be joined at the center with a strip of polystyrene. ABS pipe glue may be used to secure the joint. Trim the cowl to the outline shown on the plans and open a hole for the propeller shaft, the cooling air intake (see the plans) and in the front and rear of the exhaust cooling shrouds on the side of the cowl. Support the mounting points with 1/64" ply. The upper and nose sections may be permanently affixed to the model and a removable bottom portion provides access to the engine.

The procedure is similar for the fiberglass (fiberglass and epoxy) cowling, however, it is provided in one piece. The glass cowl must be washed in warm water to remove the mold release. Prime the cowl with auto body primer and fill any holes or imperfections with auto body filler and wet sand with 400 grit paper.

Finishing:

The Storch displayed a number of interesting paint schemes, depending upon the theater and role in which it was deployed. Aside from the standard RLM black green/green camouflage used in

Russia and mainland Europe, there were also a number of tropical and winter schemes. The winter camouflage was a water-based wash applied to the upper surfaces and sides and around the call letters and the national and unit markings, allowing some of the base camouflage to show through. The Storch also sported various national insignia other than German including Swedish, French, Italian and Spanish and some wore the insignia of capturing British and U.S. forces.

Equipment:

Place the battery as far forward as possible and use other equipment to balance out the model so that it is slightly nose heavy. On the gas model, place the servo battery behind the 4 oz. fuel tank and use the receiver to balance things out. On the prototype, the Hitec Hs55 rudder, elevator and throttle servos were placed in the rear of the cockpit cabin.

Flying:

Aileron and elevator throws should be about 3/8" each direction. If you have a computer radio, it's helpful to mix a little rudder with the ailerons to coordinate turns. The flaps are quite effective and enable very slow flying. A full flap, full power take-off in a slight breeze will get the Storch airborne in 8 feet or less and it will land in just about its own length. The first flight of the .15 gas powered Storch took place on a day with a little more wind than I would have liked, but it seemed to fly very easily and handling was not adversely affected. It will stay in the air easily on less than half throttle, but crank in a little more for turns where the bank is more than 15-20 degrees. The ailerons are very effective and with little or no dihedral, the plane will not tend to automatically right itself — you must fly it through the turns. The Storch will do all the prototype's maneuvers including STOL, tight turns and figure "8's" and at low throttle with flap and a breeze it will actually hover. I also did some loops and rolls, but don't let anybody see you doing these! The rudder is very effective; if you want to be a good STOL pilot, learn to use the rudder for slipping and for keeping the aircraft pointed into the wind. The sprung landing gear really soaks up the bumps on a grass field and even with the small wheels the Storch had no trouble flying off rough surfaces. It's a great everyday flier that looks very realistic in the air.

Fifteen Minutes Of Fame

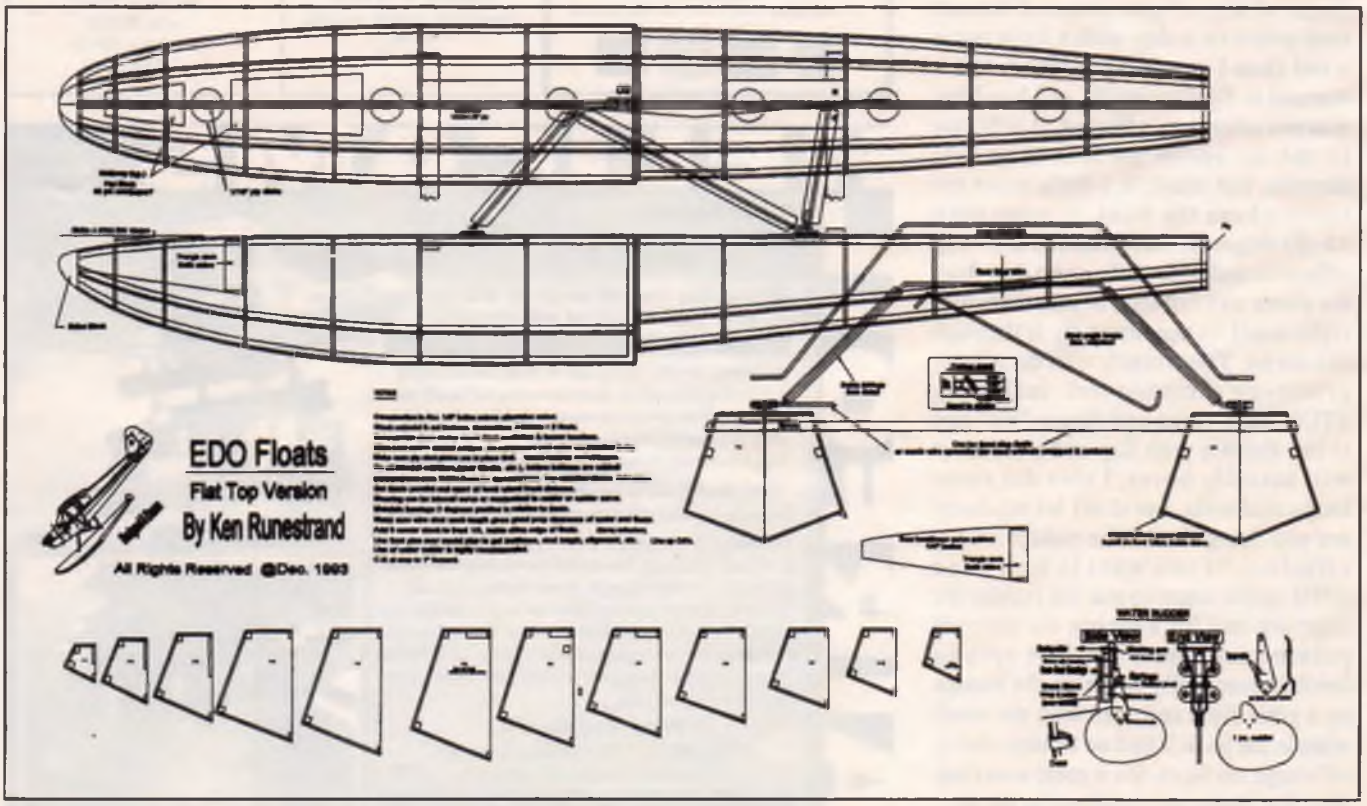
Why not make your float plans a finished product and share them with others? You have already done the hard part to design and build your own floats. It can be fun, add to your modeling enjoyment, prestige ... you have become a "designer," right? And a single page float plan is an uncomplicated place to start. You can donate copies to club prize drawings and even peddle a few. Being a "designer" and marketing plans by an individual has to be a labor of love for the most part because any return can be slow in coming. But, it can be fun to share and if your local club is into float flying, you can have many opportunities to "share" your efforts.

It isn't necessary to make a full blown set of plans for a project of your own. But, if you think that you may want to "share" your design, it is a good idea to have that in mind as you start the drawing chores for your own project and make the drawing as complete as possible. You might check with nearby copy/blueprint businesses to see what your requirements will be. I've had penciled line drawings reproduced but would recommend that drawings be "inked" to get the best reproduction. Do all of your drawing and corrections in pencil and just trace over lines in ink. You may get successful copy results even on butcher paper. The best results would be inked lines on Mylar, a plastic drawing sheet. Of course the more "professional" you try to be, the more expensive your product. That is why I would suggest that you take an example of your drawing effort to a copy or blueprint house and pick their brains to see what will work best for your needs and wallet.

Layout

In most cases, drawings should be no more than 36" wide but can be 6' or more in length. Blueprints can be many differing sizes/widths but you will run into "size" problems. Those problems can be because of packaging, reproduction, or even the post office which has length limits for overseas mail. Some of my plans are 42" wide and had to be copied by a blueprinter business. This created a cost problem, and any plans sent overseas had to be folded. I, as well as others, seriously dislike folded plans but ... it does make storage easier if you are a "plan collector" like myself. I probably have every model plan that I've built from and make a serious effort to keep them in fairly good shape. Having this in mind, you'll note a float plan of mine shown here. It is to be an example of my idea of a good plan layout. Notice that all former outlines are located in a manner that they can be cut off of the plan without affecting the plan usefulness. Yes, we're cutting up a plan! But, tracing the parts to preserve plan integrity can be a pain. So OUR plan is to have those bulkhead outlines copied. Then the plan can be carefully taped back together if it is to be preserved. If a copy business could manage with the plan size and copy parts as needed, that would be much better. While you are at it, get two or three bulkhead copies and you could build floats for any/all of your similar size models, right?

Modern technology can take your plan and print it in differing sizes that will make it useful to other modelers no matter the size of their planes. While at the copy business, check on their ability to enlarge or decrease the plan size and it might well be that the plan can become a "universal" float plan for any size model. A caveat here though ... a change in printout size also changes the size of your building stock as well as hardware sizes and can be a problem as "sizes" may not be standard or desirable. An alternative would be to just use outlines and draw a new plan with



Author's float plan as a layout example.

standard wood stock sizes. This would not be as hard as drawing the original plan. Outlines and bulkhead sizes will be right. Just the notches will have to be resized and material sizes changed.

Another neat thing about making a float plan your first designing project is that construction is so simple that instructions, as such, are not a necessity. A few "notes" right on the plan can suffice, as you can see on my plan here.

Fiberglass

If you have some experience with fiberglass, it's possible that a built-up float could be used as a "plug" without the chore of making a carved one. Build up just one float, add detailing and either construct two halves, tack glued together or just saw a completed float in half. It could be hard to accurately split a float having a lot of differing contours, so I would probably opt for the first method. If all of the bulkhead centerlines are just tacked together in a couple of spots with minute application of CA glue, they could hold things together for float construction. The top and bottom sheeting could be applied with unglued edges at the centerline. Hopefully the two halves would pry apart easily or use a hacksaw blade to separate them.

Finish sanded, the halves could be fixed on boards and your release agent and fiberglass applied. You should have some supporting bulkheads, hard points for strut mounting and steering controls figured out before float halves are joined. An internally mounted servo is a possibility or external pushrods or cables. Note that any bulkhead for the glass floats will be larger than the ones used in the built-up float. You could use the same patterns but with sheeting thickness added to the outlines. This could be a weight saving effort. My floats with struts permanently mounted, usually weigh about 4 lbs. But weight is not my main concern with giant models though and I find little if any difference in the model's performance.

Consider building and designing your own floats and you might well become your club's "Float Guru." You might even write a model magazine construction article and get 30/40 minutes of fame!

FLYING LOWE

Don Lowe

Gary Wright and his electric. It's a good flying aircraft. See text.

Control Systems:

I was recently flying my Godfrey 42% Ultimate Bipe and experienced again the importance of a good control system set up for precision flying. This model is the same size and similar in weight to the Hangar 9 Bipe Ultimate which I have also flown. My Ultimate has a very bad habit of over-snapping, making it difficult to exit a snap precisely. The Hangar 9 Ultimate is very crisp in this respect, making if far better in this maneuver. The difference between the aircraft is primarily the servo and control system set-up. I am using very high torque servos on the Godfrey rudder that are semi-fast. The H9 Ultimate uses very fast high torque digital servos. I'm sure what is happening is a product of servo speed effect; extremely fast servos allow the pilot to maneuver to an atitude and let go of the control with almost instant stopping of the maneuver. A slow system requires you to "lead" the exit, leading to uncertainty.

A friend of mine, familiar with control system analysis, is going to try and quantify the problem by identifying how the character of the contributing factors influence the answer. He will look at servo character, such as speed, resolution, holding power (digital), aircraft inertia, and also human response. If he is successful in this effort I will report it in a later column.

Electric Pattern Flying:

It is apparent that Jason Shulman's success in using an electric motor in F.3.A. (World Championships and in the AMA Nationals) has influenced the Pattern world. Electric power has now won the European Championships, and, no doubt, 2005 will see a lot of activity in this area.

It is interesting to note the divergence of views between two top F.3.A. fliers: Jason Shulman and Tony Frackowiak in regard to the virtue of electric power in competition. Jason, in essence, discounts its value v.s. conventional engines and Tony feels it has a strong influence. The set-ups being used result in a aircraft that is comparable in weight. The optimum prop size is larger than normally used on piston engines, and the pitch and rpm range used results in a slower flying model, which also is slower on the down lines.

There is also a perception of "smoothness" in flight by electric that may influence the judges. Both piston engine and electric set-ups are very quiet, so that should be a toss-up. Obviously, the lower vibration of electrics has virtue in reduced structural fatigue.

The cost of electric power is a deterrent, although high performance piston engines set-ups aren't cheap. I understand that the brushless high performance electric motors are hand-made for the model industry. Until there is a larger market for these motors, cost will continue to be a factor. I suggest reading Jim Oddino's article in the January 2005 issue of *RCM* where he discusses Tony Frackowiak's electric F.3.A. model aircraft. It is very informative and might just help you decide on electric power for F.3.A.

I had a chance recently to fly Gary Wright's big aerobatic electric that employs the same motor/battery set-up used by the Pattern guys. This model is very light and the wing loading is only 13 oz./sq. ft. The model is very precise in calm air. In a hammerhead stall, there is no oscillation on the down line due, I'm sure in large part, to its low inertial qualities.

I am continuing to fly my electric "foamie" and enjoy it very much. It is making me a lazy flier since it is so easy to get it into the air. It is interesting to note the merger of the toy industry and the modeling industry as influenced by the electric revolution. One can buy ready-to-fly electrics almost anywhere. What is lacking of course in a lot of instances is the flying skill that must be a learning experience. Even that is eased by the relative toughness of these crashable models. Of course, the availability of good flight simulators is a big help. I always advise new fliers to buy a simulator and learn to fly with "painless" crashes!

I recently acquired an IPACS "Aerofly Professional" simulator marketed by Ikarus and am thoroughly enjoying it. It is very realistic and is reasonably priced. It is the best I have tried so far. You can go online to:

www.ikarus.net

to view their offerings. It's a real blast!

Engine Problems:

I have been running an M&R 100cc twin for a number of years in several models with good success, except for a short plug life. It eventually drops a cylinder and is reluctant to fire until it has thoroughly warmed up. I normally use Champion RCJ7Y resistor plugs. I recently tried the Auto Lite 2974 (equivalent plug) and the AutoLite 2956. I have run the 2956 in my ZDZ100 and it works fine. However in the M&R, the 2956 will hardly fire and will not run. The 2974 will start and run for a while but will not continue. This is all a bit mysterious to me since I am no plug expert. Are there any opinions on what the problem may be? Your response may help others with a similar problem. All of the plugs fire fine uninstalled. I know that more energy is required to fire under pressure, but is it all that critical? I have never had this kind of problem with other engines. I always use 6 volts on the ignition system to boost spark energy.

Years ago we developed our own ignition system for the RPV program engines and we found that by greatly increasing the spark energy (volts) our engine set-up was easy and the acceptable fuel mixture was much broader. If anyone can help I may be reached online at:

lowefl@aol.com

Model Aircraft Shows:

I fly a lot, and attend as many events that I can; usually fly-ins or shows. I recently participated in an RCACF (Radio Control Association of Central Florida) show. This show was advertised and aimed at entertaining the general public. It was extremely successful in terms of quality of flight demos by a number of outstanding pilots and the appreciation of the attending public. The show included the complete spectrum of R/C flying, from trainers to jets, including fantastic helicopter flying, combat demos and a variety of R/C models. If you want to provide a "shot in the arm" for R/C flying and at the same time reach out to the interested public, try a model aircraft show.

E-Flite/Horizon Hobby

ULTIMATE EP 3D PROFILE ARF

& TRIBUTE EP 3D PROFILE ARF

By Brett Ostland

SPECIFICATIONS

ULTIMATE EP 3D PROFILE ARF
TRIBUTE EP 3D PROFILE ARF

Aircraft Type
3D Foam Profile
Mfg. By
E-Flite
Dist. By
Horizon Hobby, 4105 Fieldstone Rd.
Champaign, IL 61822
(877) 504-0233
www.horizonhobby.com
Expected Street Price
(Ultimate) $49.95; (Tribute) $44.95
Available From
Retail Outlets
Box Size
(Ultimate) (L) 30-1/2"x (W) 9-1/2" x (H) 3"
(Tribute) (L) 39-3/4"x (W) 13" x (H) 3"
Wingspan
(Ultimate) 28"; (Tribute) 37"
Total Wing Area
(Ultimate) 385 Sq. In.; (Tribute) 375 Sq. In.
Overall Length
(Ultimate) 29.5"; (Tribute) 37.5"
Stabilizer Span
(Ultimate) 12"; (Tribute) 14"
Total Stab Area
(Ultimate) 60 Sq. In.; (Tribute) 70 Sq. In.
Mfg. Rec. Motor
370 Brushless Electric
Mfg. Rec. Battery
LiPo 3-Cell, 1320 mAh
Rec. No. of Channels/Servos
4/4
Rec. Control Functions (# Servos)
Rud.(1), Elev.(1), Throt.(ESC), Ail.(2),
Basic Materials Used In Construction
Fuselage
Depron Foam, Carbon Fiber Rod
Wing
Depron Foam, Carbon Fiber Rod
Tail Surfaces
Depron Foam
Cowl & Wheel Pants
Depron Foam
Instruction Manual
Photos & Text (39 pgs.)

RCM REVIEW MODEL
Radio Used
TX: JR631, RX: R610M,
Batt: BEC,
Servos: GWS/Hitec
Electric Motor Used
E-Flite 370 Brushless;
ESC: Castle Creation Phoenix 10
Electric Motor Battery Used
LiPo 3-Cell, 1320 mAh
Propeller
APC 11 x 4.7 and 10 x 4.7
Weight, Ready to Fly
14 Oz.
Wing Loading
5.40 Oz./Sq. Ft.
Runway Surface
Dirt and Asphalt
Field Altitude
350 ft. ASL

SUMMARY
WE LIKED THE:
Great 3D performance, ease of assembly, excellent platforms for electric power, fun factor, convenience and size.
WE DIDN'T LIKE THE:
The Tribute: Weak landing gear and wing flex. The Ultimate: Method for joining the upper and lower ailerons prevents equal travel. Both Planes: Extra long servo arms required for elev. & rud., the brushed motor supplied with the kits is not adequate for 3D flight.

The E-Flite Ultimate and Tribute are both electric powered and are constructed entirely of flat pieces of Depron foam, carbon fiber tubes and tape. Now, that may not sound real exciting at first, but before you wrinkle your nose in disapproval, let me ask you this. Have you ever seen them fly? I have witnessed similar planes demonstrate some very impressive 3D capability. If fact, last year, a number of the top fliers in the country competed in the ETOC, an indoor competition created just for these types of planes. And George Hicks, the designer of the E-Flite Ultimate and Tribute, won first place.

Due to the power to weight ratio provided by the high efficiency brushless motors and lithium batteries, these little beauties boast spectacular vertical performance that would make a space shuttle blush. In general, these little foam profile planes are best suited to indoor flying in a large hangar or gymnasium, or outdoors in calm conditions. However, I have successfully flown both of these planes in what I would describe as breezy conditions without much difficulty, in fact, it was rather fun.

Before doing this review, my knowledge of electric powered planes was very limited. Although I have learned a lot, I am definitely not an expert on E-power (electric power) so some of my explanations will not be overly technical or all encompassing. An E-powered plane is actually easier to set up than a glow powered plane, but it is an entirely different system that includes such things as gear drives, ESC's, lithium batteries and their idiosyncrasies and precautions, connectors, soldering, brushless motors and so on. I will cover some of these in more detail later for the benefit of the uninitiated reader.

Overview:

The Ultimate and the Tribute are constructed with the same high quality foam and both are reinforced with carbon fiber rods. The foam has a smooth finish that provides an excellent surface for the adhesive-backed servo mounting tape, Velcro, and decals to adhere to. Both planes come with a brushed motor, gearbox, all the required hardware and a 12 x 6 prop. The included brushed motor will not provide the performance required for 3D flying and since this is the primary

role for these planes, you should not plan on using it. The E-Flite Park 370 brushless motors will bolt up to the gearbox with the aid of a supplied adapter ring, and will provide all the performance you could ever want or need. Other required components include a new brushless speed controller and a 2- or 3-cell lithium battery along with a micro receiver and four micro servos.

Motor:

The E-Flite Park 370 brushless motors are available in two different versions: the Park 370/ KV4100 and the Park 370/KV5400. The KV ratings basically represent the rpm's per volt, so the 5400KV motor is a higher rpm motor in the simplest terms. The 12 x 6 E-Flite prop that is included with the planes is rather large and heavy, it worked okay with the Park 4100KV but do not use it with the 5400KV version if powered by a 3-cell pack. I run an APC Slowfly 10 x 4.7 on the Tribute with the Park 370 5400KV and an APC Slowfly 11 x 4.7 on the Ultimate with the Park 370 4100KV. Running smaller props helps prevent the motors and the batteries from overheating and extends the flying time on a charge. Both set-ups provide their respective planes with an excellent power to weight ratio and spectacular vertical performance.

Electronic Speed Controller (ESC):

Castle Creations Phoenix-10 ESC's (electronic speed controllers) were used on both planes. (Castle Creations, 402 E. Pendleton Ave., Wellsville, KS 66092, (785) 883-4519)

www.castlecreations.com

These are fully electronic devices and they plug directly into the throttle channel on the receiver. They also provide the power for the receiver, eliminating the need for a separate battery pack for the controls. These are available for either brushed or brushless motors but they are not interchangeable. I was surprised to learn that these units are programmable. Programming can be accomplished with the transmitter and newer units can be connected to a PC via a USB cable; providing the user even more advanced customization and convenience. Features include voltage cutoff levels, hard or soft starts and cutoffs, over current protection, braking, safe starting features, timing advance and more.

One of the most important settings is the voltage cutoff. This setting will cut the power to the motor when the batteries are discharged to a selected voltage. Lithium batteries should not be discharged below 3 volts per cell so I set the cutoff at 9 volts for my 3-cell pack. The instructions suggest a 7.2 volt cutoff for a three-cell lithium pack. This is theoretically possible due to the fact that the controller is reading the voltage under a load and this voltage is substantially lower than the standing voltage. I like to be nice to my batteries and 7.2 volts seems to be a little low. I would set the cutoff at 8 volts if I had the USB version, but the 9 volt cutoff provides plenty of flying time and ensures that the batteries will never be overly discharged

Assembly:

The Tribute and Ultimate share the same manual. The Ultimate assembly is a little more involved due to the fact that it has two wings, but both planes are very easy to put together. The carbon fiber reinforcing rods are pre-installed and the control surfaces are taped on as well. Be advised that there are lots of small parts to lose or misplace -- try to work in an area that will make locating a part easy to find if you drop it.

The decals are applied first. I like to add couple of drops of dishwashing liquid to a spray bottle of water for this purpose. Moisten the plane and the back of the decal, this will allow the decal to be easily floated into place and then simply squeegee out the excess water. The leftover decal material can be trimmed and used as tape for the control surfaces or for repairs.

Be sure to use foam-safe (odorless) CA as regular CA will destroy the foam. CA accelerator will also dissolve foam so use it carefully and sparingly. I moisten a Q-tip with accelerator and then lightly brush it over the CA.

The landing gear is secured to the plane by string and CA. This combination was sufficient for the Ultimate but not for the Tribute. I would recommend using epoxy instead of CA, and for a super strong solution, substitute Kevlar string for the string supplied with the kit.

The edges of the tape hinges will tend to work loose, particularly on the beveled side (underside) of the surfaces. I found that applying CA along the edges with a Q-tip prevented this from occurring. Adding additional tape over the edges of the pre-installed tape is another option.

Ultimate Notes:

The upper and lower ailerons are joined together by a pushrod wire. The pushrod wire is attached to control horns located near the trailing edge of the ailerons. If these wires are connected to the outermost holes on the control horns the ailerons will not deflect equally in both directions. The pushrod wires should be connected to the innermost holes. The control horns will have to be trimmed in order to allow clearance for the pushrod keepers. I made the decision to cut the control horns down to approximately 1/4" high and then drilled a new hole in each for the pushrod wires.

IMPORTANT: Be sure to place the battery on the cabane and as high as possible (see photo).

Tribute Notes:

The landing gear on the Tribute needs additional support to prevent them from doing the "splits." I joined the gear legs together with a piece of braided stainless steel fishing leader; Kevlar string, wire or even dental floss will work as well.

The Tribute's wing will deflect

significantly under high G maneuvers. This wing flexing did not appear to create any major performance issues, but it was a bit disconcerting. Adding a piece of small diameter carbon tube to the bottom of the wing will eliminate this flexing; I used a 12" length of arrow shaft (see photo). I just taped mine on in order to experiment with it; at some point I will probably secure it with CA or epoxy. If this affected the flight performance in any manner it was not noticeable to me; try it for yourself and see. Remember, these are inexpensive foam planes, experiment, be creative, use your imagination and have fun.

Repairs:

These planes are more durable and resilient than they first appear to be. For the most part, this is due to the fact they both weigh only about 14 oz., ready to fly. Most damage can be easily repaired and although these repairs may not be cosmetic enhancements, they have not affected the performance of my planes in any significant manner. Most cracks and tears in the foam can be fixed with foam-safe CA. Carbon fiber tape or fiberglass cloth can be utilized if structural strength is required. Reinforced strapping tape can be used for added strength, temporary repairs, or to help straighten bent or warped foam pieces

The prop drive shaft in the gearbox is easily the weakest link on the plane. This shaft will be damaged (bent) virtually every time the prop touches anything and this usually results in the large plastic spur gear being damaged as well. In order to help prevent this damage you should consider using a prop saver set-up. Prop savers can be purchased or you can make one yourself.

I made mine with a Futaba six arm servo control arm, a 3mm nut that came with the prop shaft and an extra long, thin rubber band -- I'm sure multiple smaller rubber bands would work as well (see photos). The prop shaft will need to be shortened; the prop shaft should not extend beyond the prop hub. This will allow the prop to tilt or even come off when it hits something. The 3mm nut fits snugly into the splined hole in the servo control arm; thread this servo control arm onto the prop shaft so that the nut is closest to the spur gear. A couple drops of CA will ensure that it won't loosen. This set-up has virtually eliminated damage to the prop, shaft or gears. Make sure you test these set-ups in a safe manner before flying to ensure that the prop will remain

attached at full throttle. I have never had a prop come off unless I hit something

NOTE: I have only used APC props with this set-up and I am not certain that other props are suitable. The APC slow-fly props come with adapters for smaller shafts but these are still too large for the 3mm prop shafts. GWS makes adapters for APC props or you can try a piece of fuel tube. I just happened to have some carbon fiber tube that fit almost perfectly. I put a piece of heat shrink tube over the shaft for a perfect fit.

Radio:

I made use of a variety of radio equipment as follows:

My Tribute set-up: Hitec HS 56-HB/ rudder; Hobbico-Cirrus CS-5 Nano/ ailerons; GWS Naro/elevator; Great Planes 4-channel ElectriFly receiver; Thunder Power 1320 mAh LiPo/11.1V.

My Ultimate set-up: GWS Naro/std for rudder, ailerons, and elevator; JR 6-channel RC610M receiver; and Thunder Power 1320 mAh LiPo/11.1V battery pack.

The servo arms supplied with most of these small servos are usually not long enough to reach through the fuselage and allow enough control throw for the elevator and rudder. The exception was the Hitec HS-56 -- this servo came with servo arms long enough for this purpose. For the other servos, I made an extra length arm with a piece of 1/16" carbon plate, and then glued the arm to a round servo wheel, using epoxy. The hole in the arm for the pushrod connector should be approximately 5/8" from the center of the output shaft (see photo).

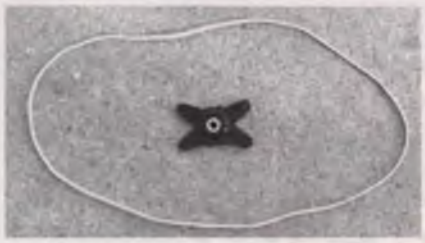
Lithium batteries do require special handling and care. These batteries can catch fire if they are damaged or charged improperly or even discharged improperly. Lithium batteries must be charged with a lithium battery charger. Be sure to familiarize yourself with the all the necessary precautions before using them.

Prop saver mounted on the plane.

Flying:

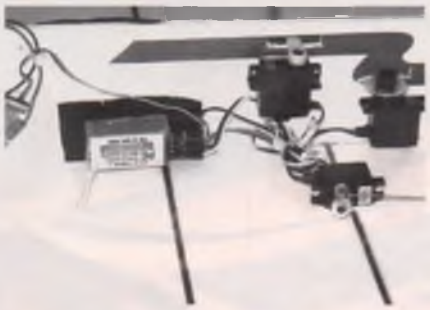
I will admit that I was just a little apprehensive about the first flights for these planes. As it turns out, any concerns that I may have had were totally unfounded, as both planes were very well behaved on their respective maiden voyages. Be advised that the Ultimate and Tribute are not intended for full throttle, high speed, bank and yank flying. Flight times range anywhere from 10 minutes up to 20 minutes or more on a charge, depending how much of the flight is spent hovering. The Ultimate and the Tribute are both highly maneuverable and yet they handle very predictably. These planes can take off in less than five feet although it is usually easier to just hand-launch them. Soft and slow landings will require a nose high attitude with a bit of throttle.

The Ultimate is very stable and controllable for a small biplane; in fact, it is the best flying small biplane I've flown. The Ultimate is better suited for higher speeds than the Tribute; it is superior at tumbling maneuvers and has a much quicker roll rate due to the very effective dual ailerons and shorter wingspan. Torque rolls and hovering with the Ultimate are not quite as stable as with the Tribute due to the short fuselage and shorter wingspan. The Ultimate does great flat spins, harriers, elevators and knife-edge loops. Keep in mind that the



Prop saver: Futaba (6 arm) servo arm with 2 arms removed and a 3mm nut pressed into the center.

Extra length servo arm made from 1/16" carbon fiber plate and a round servo arm.



Tribute radio set-up.

Tribute: Note the short carbon fiber tube (middle) added to prevent wing flex.

Ultimate; proper battery location.

location of the Center of Gravity will affect the pitch coupling when the rudder is deflected. If your plane is pulling towards the belly when you are in a knife-edge, try moving the C.G. forward by moving the battery towards the front of the plane

The Tribute is particularly suited to a slower, throttle controlled, smoother style of flying. The maneuvers that the Tribute excels at include flat spins, climbing flat spins, slow high alpha knife-edge flight, parachutes, elevators, and harriers, and it is particularly easy to hover and torque roll. Pointed into a gentle breeze, the Tribute is capable of the best knife-edge elevators of any plane I know about. In fact, this little plane is virtually a pocket sized, 40% gas powered, TOC plane. Bear in mind that I am specifically referring to high-alpha/hovering 3D flight and power-to-weight ratio.

Conclusion:

The Ultimate and the Tribute are both cool little 3D planes that are a lot of fun to fly. There is nothing wrong with either plane that would prevent me from recommending them. The Tribute, with its longer fuselage and wingspan is better suited to my flying style and it is the plane I would recommend for a novice 3D flier. These are definitely not for beginners and should not be confused with traditional park flyers.

If there is a downside, it might be the initial set-up cost. If you don't already have the electronics, be prepared to spend anywhere from $350 to $450 for a complete set-up; including the plane, lithium charger, lithium batteries, brushless motor, micro receiver, ESC and four micro servos (not including a transmitter). I'm not implying that they are not worth it, only that it usually comes as a bit of a surprise to discover that your $50 foam plane is going to set you back another $400 to get it in the air.

Nevertheless, the simplicity, convenience, and fun factor of these nifty little planes is hard to overstate. In less time than it took to read this review, you could have grabbed a couple of LiPo packs, tossed your plane and transmitter into your car, and been in the air at a nearby park or ball field. Maybe you would have a serious 3D practice session, or perhaps you would choose to merely tickle the sky with a relaxing bit of foam-filled frolicking. Imagine if you can ... no fuel bottles, glow igniters, dead sticks, glow plugs, starters, engine adjustments, clean-up, or noise.

Hey, who knew that foam and electricity could be so much fun. ✈

AIRPLANE STUFF Jim Oddino

Eagle Tree Systems' Seagull Wireless Dashboard Telemetry System

We previously reviewed the Eagle Tree Flight Data Recorder in the December 2003 issue of *RCM*. I had seen the Seagull System (an add-on telemetry system to the flight recorder) advertised but hadn't had the time to write to Bill Parry about reviewing it until recently. I had been talking to Tony Frackowiak about his electric-powered pattern plane and he mentioned it would be desirable to have a device that would record the peak current drawn by the electric motor during flight. Too high a current would warn the pilot that something was wrong and needs to be fixed before an expensive catastrophic failure occurs. Tony was thinking of an onboard device with its own annunciator or with a separate read-out package, that you would plug in after the flight, to read the peak current. Rather than reinvent the wheel I thought of a flight data recorder. It appeared to me that the Eagle Tree Flight Data Recorder had the ability to measure and retain the peak current reading and all that would be needed is a readout module similar to that provided with the Aero Sport Data Recorder we reviewed a few years ago.

I contacted Bill and asked him if his hardware could support Tony's requirements and threw in that it had to operate without a laptop at the field. He responded that the Seagull TM system did exactly what I described with current and much more. He said the receiver module's LCD would display the peak current as well as real time current and offered to send me one for a review. And no laptop was required at the field. A few days later it arrived.

Since I had an early version of the flight data recorder, he sent a complete system with a V2 recorder.

System Description

I was very impressed when I looked at the system. The two major components that must be installed in the plane are the Flight Data Recorder and the Wireless Telemetry Transmitter shown in Photo #1. The recorder measures 2" x 1-3/8" x 5/8" and weighs 0.8 oz. The transmitter is 3-1/4" x 1-1/4" x 5/16" and weighs just 0.6 oz. The best news is that it all runs off your receiver battery so no additional batteries and switch harness are required, which saves additional weight. The current sensor and one temperature sensor would add .3 oz. for a total of 1.7 oz. if that were all you wanted to measure. That is a very attractive weight considering the capability.

The Flight Data Recorder package also includes four "y" cables for monitoring the servo commands, three feet of tubing for a Pitot tube, one temperature sensor, one rpm sensor, four tiny magnets for the rpm sensor, a custom USB cable, a CD-ROM and a backup battery harness in case you want to run a separate battery. I also received an optional electric motor current/voltage sensor. The Seagull

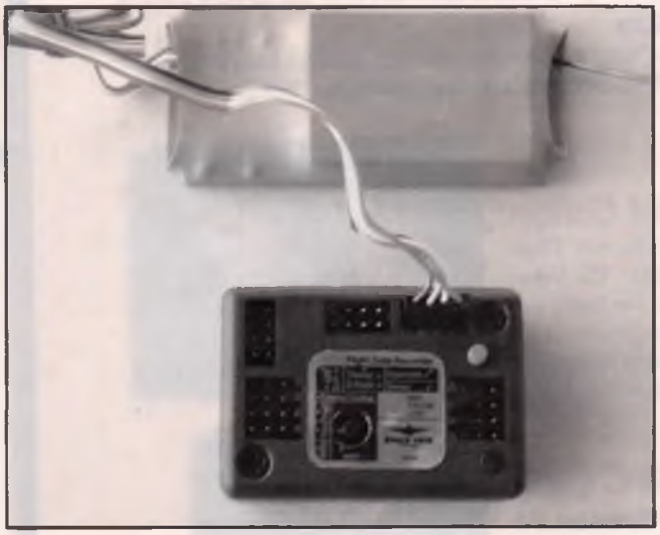


Photo #1

Photo #2

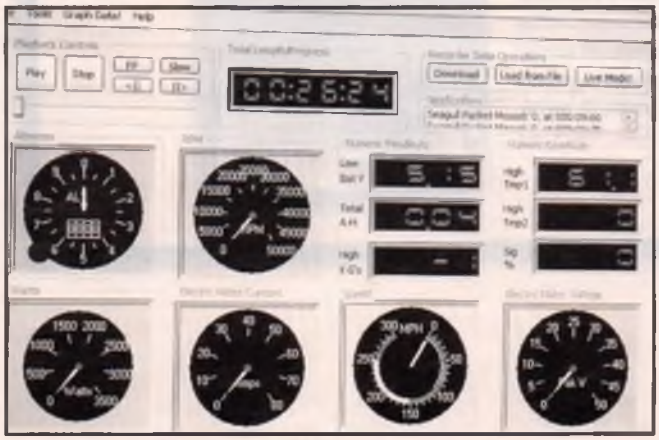


Photo #3

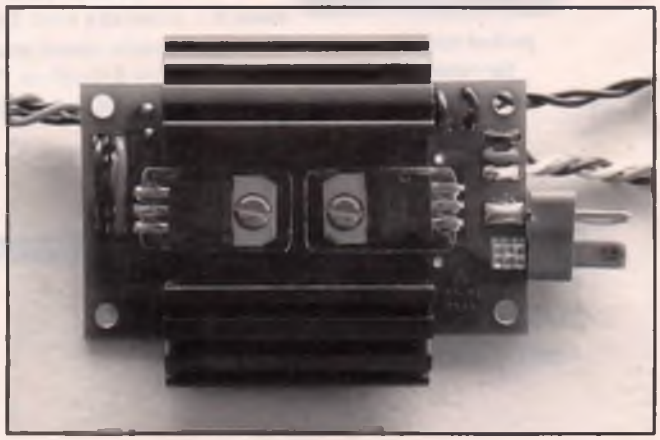


Photo #4

package includes the Wireless Telemetry Data Dashboard Receiver and the Wireless Telemetry Transmitter mentioned above.

System Capabilities

The parameters that are monitored are shown in the chart:

Airspeed	9 to 290 MPH
Altitude	0 to 32000 Ft
Receiver Voltage	4.35 to 7.0 Volts
Temperature	Dual inputs, 0 to 424°F
RPM	100 to 40000 RPM
Servo Commands	4 channels

Optional parameters include G-Force, Exhaust Gas Temperature, and Electric Motor Current/Voltage.

In addition to all that, the recorder flashes a number of times when you turn it on to indicate the state of charge of the system battery. It is sensing voltage only so it should be used as a guide only. The recorder will also log an error if the voltage drops below 4.35 volts during flight. You can also select an option that records three types of glitches: short pulses (less than .740 mSec), long pulses (greater than 2.25 mSec) and missing pulses (no pulse for 100 mSec).

You can still use the flight recorder as a data logger but that requires a computer to read it out after each flight. The Seagull Dashboard Receiver shown in Photo #2, measures 3-1/4" x 2-1/4" x 1" and weighs 4.7 oz. with its internal 9-volt battery. It allows you to look at the data without a computer on its 16 x 2 Character LCD screen. You can view four parameters at a time on one screen page and you can scroll through five pages for a total of twenty parameters. The set-up procedure allows you to group the parameters for optimum viewing. For example on an electric powered model, you might want motor voltage and current and motor and battery temperature on one screen page so you wouldn't need to scroll around to view those parameters. Altitude, speed, rpm and gs might be a desirable grouping. It is up to you.

Minimum or maximum alarms can be set on the temperature channels, on the motor voltage and current channels and on the altitude, speed, rpm and g-force channels. So if the battery voltage on your electric motor gets too low or the current gets too high you can set an audible beep to get your attention.

You can also set alarms on climb rate and sink rate that would be useful as a variometer in a glider.

In addition to the buttons that let you page up and down to view the five screens there is a push-button that lets you toggle between Max (the maximum value since reset) and Live modes. If you hold this button down for about 2 seconds it will zero the Max parameters. The fourth button is the on/off switch and allows you to selectively turn on/off the various audible alarms.

You can also use the Seagull in a Laptop live mode. If you have a laptop at the flying site you can view the data parameters in a big screen format displaying your instrument panel as shown in Photo #3. Unfortunately you can't view all the parameters but this also enables almost unlimited data recording of all channels. To invoke the live mode make sure you are receiving data from the transmitter. Then connect the Dashboard receiver to the USB port on the laptop and press the live button on the application. I had a little trouble initially getting the computer to record the data. There are a couple of things you need to do. In the tools menu, open the set live mode options and click the box that indicates you want to save the live mode data to a disk file. In the file menu, click Save Recorder File and you will get a save as window allowing you to name the file and specify where you want to save it. At the end of the flight, when you click stop, it will ask you if you want to save the file and you click yes. You can then always go back and replay the data through the instrument panel or open it in Excel to view or graph the data.

The instructions are a little overwhelming at first because the system has many options. But like all computerized stuff, the more the capability the more complicated the instructions. But don't fear, if you can get an R/C plane in the air and operate your computer you can master this system.

Rather than put this system in my plane and give you results similar to our previous tests of data loggers and telemetry systems, I thought it would be more interesting to put it in Tony's electric airplane and get some data on it. Tony agreed so come back next time and we'll see what goes on in the air with these high performance electric airplanes. It should be very interesting.

FMA Power Force VRL12 Voltage Regulator

Seems like there is a new voltage regulator on the market every other month these days. A few years ago only a few airplane and helicopter competition pilots appreciated the improved system performance produced by a constant voltage flight after flight. I guess now that Lithium batteries with their higher output voltage are being used, people are forced to regulate so the market is booming. Other changes in R/C, namely larger airplanes with many servos, have created a new requirement for the voltage regulators because of the relatively high currents being used. The combination of high input voltage and high current results in high power dissipation and that translates to heat. Therefore, we are now seeing regulators rated at high current with large heat sinks to assist in dissipating the heat.

The FMA Power Force VRL12 shown in Photo #4 is one of these. It is designed specifically for powering high current flight electronics (receivers and servos) in radio controlled aircraft. It accepts input from two to four cell Lithium-Ion or Lithium-polymer packs or five to twelve cell NiCd/NiMH packs. It supplies up to ten amps continuously, enough for a plane full of high torque servos. I should point out right here that you couldn't regulate ten amps continuously if you had a three or four (in series) cell Lithium pack. You normally would select a 2S pack for this high current application but there might be an application in an electric powered plane where you'd want to run off a 3S or 4S pack and you don't need the high current.

The output voltage can be set to 5 or 6 volts and has an advertised extremely low, 0.15 volt dropout, meaning the output will never be more than .15 volts below the input if the input drops below the regulated output.

In addition to performing its main function, three status LEDs provide a quick indication of battery condition. It also includes an on/off switch with failsafe operation. If the switch fails open, the VRL12 stays on.

So, the VRL12 is very versatile.

A simple set-up procedure programs the VRL12 for the type and number of cells you are using. I set mine up for two LiPo's and found that the LEDs went from green to yellow when the voltage dropped below about 7.4 volts. If the green is on, the pack is charged, but if the yellow is on it is low and you should charge before flying. If the red is on, it is very low. The instructions also recommend a load test that is accomplished by moving the transmitter sticks and observing the LEDs. All three might light up while the sticks are moving but you want to note the time it takes to return to green after the servos

stop. If it is slow to recover, charge before flying.

I tested the regulation using a power supply and a resistive load using input voltages of 8.4V and 6.2V and loads from 6 to 0.5 ohms corresponding to currents from 1 to 12 amps. Both regulator output cables as well as the loads and voltmeter were connected to a typical receiver bus. The data is shown in the chart:

LOAD-Ohms	8.4 Volts in	6.2 Volts in
6	6.07 Volts out	5.98 Volts out
5	6.06	5.96
4	6.04	5.94
3	6.01	5.91
2	5.96	5.85
1	5.82	5.71
0.5	5.54	5.45

We see a change of about .1 volts from 1 to 3 Amps and only .5 volts from 1 to 12 Amps. This is very good regulation over such a high current range. I didn't run the high currents for more than a minute but I saw no signs of the output voltage fading due to the high power dissipation. I consider that longer than one would expect to ever encounter in actual use. I also consider the input voltages' extremes. A real battery would not hold 8.4 volts and I would not expect one to drop to 6.2 volts during flight even under high loads. If it does you need a higher capacity battery.

Next I ran a dynamic test by putting it in my plane with the Telemetry system. First I tested the battery, an old Li-Ion that was not fully charged and wiggled the sticks. The ailerons were not attached so the rudder and two elevator servos were the significant part of the load. The yellow LED came on and it took a second or two to recover and go green after the sticks were returned to neutral. Then I put a new freshly charged FMA LiPo in and it never went out of the green as I exercised the sticks. I recorded the telemetered regulated voltage during this time and you can see the results in Figure 1. The voltage stayed above 5.7 volts at all times, similar to the flight data we recorded on the Flight Data Recorder with a Jaccio regulator.

All in all, this regulator looks like a winner for large planes with high current loads. I'd still recommend two separate regulators on two packs for these applications though just to get the redundancy. The only downsides to this regulator that I can see are the size and weight and the fact that you must remove the battery to charge it. FMA did this on purpose because they feel it is not safe to charge LiPo's in the plane. Neither of these are serious problems in a large airplane with plenty of space and easy access.

FIGURE 1 FMA Regulator Test

Flash! EaglePicher Acquires a 2/3 Interest in Kokam Engineering, Ltd.

I received an announcement from FMA that during December, EaglePicher an American company that has been in the battery business for many years has bought controlling interest in Kokam, the company that has been supplying Lithium Polymer cells to FMA. I believe this is good news for R/C modelers. EaglePicher has been a solid company supplying high performance batteries to the aerospace industry for as long as I can remember.

"These agreements represent the next step in EaglePicher's strategy to broaden its portfolio of lithium-ion power solutions," said John Weber, president and CEO of EaglePicher Incorporated. "We see an increasing interest in lithium-ion technology, due to its low self-discharge, extended lifespan, light weight, rechargeability, low maintenance and environmental friendliness. We believe EaglePicher's customers will benefit from Kokam's patented lithium-ion pouch cell and battery packaging technology and the quality built into Kokam's products through its outstanding automated production engineering technology."

FMA will continue as a distributor and has plans to continue to improve the battery packs and supporting products. They have perfected a charger and pack design with the following features:

- Unitized with configurations that permit up to 10S and capacities to 9.6Ah
- Have a new MIL SPEC equivalent connector and cable system with total integrity
- Can be charged in as little as 20 minutes
- Have the most compact interconnect system possible for near-zero voltage loss under load
- Offer output up to 4700 watts and energy delivery to 355 watt-hours
- Install like a normal glow fuel tank
- Can be packed in a new proprietary IMPAD™ that is so impact absorbent that an egg can be dropped on it from six feet and bounces but does not break.

They also announced that the ultimate system is now being introduced by FMA Direct, i.e., a cell balance charger that accesses and controls each cell in a pack to bring all cells to within 5 milivolts (0.005V) of each other. This technology also applies to discharge in that the same technology permits cut off of any ESC when the first cell to go below cut off voltage causes the ESC to cut the motor. We are finding that this new concept extends cell life significantly since no cell is ever put in a condition of stress.

And finally:

Did you know? It costs $1.35/flight to fly the average 0.40 glow powered model, but cost per flight for an equal performance ten-minute flight with a modern LiPo-powered brushless motor is <$0.15. This info will become well known in their 2005 campaign.

According to a report from Business Communications Company, Inc., (www.bccresearch.com) RGB-210N Lithium Batteries: Materials and Markets, the U.S. lithium battery market is estimated at $2.1 billion in 2004. Rising at an average annual growth rate (AAGR) of 4.7%, this market will reach $2.7 billion in 2009.

It looks like things are progressing faster than anyone could predict in the electric-powered model world. Have you started building yours?

Send comments and questions to:

joddino@socal.rr.com

ZERO 40 ARF

SEAGULL/HORIZON HOBBY

By Ken Kehlet

ZERO. This name was symbolic of Japanese air power and was the name that both Japan's friends and enemies came to know. The Mitsubishi A6M Reisen (Zero) was one of the most outstanding combat planes to see duty in the Pacific. More Zeros were built than any other Japanese plane in the course of World War II. The Zero was the first carrier-based fighter to outmatch the performance of its land-based counterparts. The superiority of the Zero was short lived though, by December of 1942 the A6M6's were unable to match the performance and sheer number of the latest Allied fighters. Out of the 10,449 aircraft that were built, there are only two that are known to be flying today.

The colorful Zero .40 ARF box measured 39-3/4" x 19-3/4" x 8-3/4". All major components were neatly wrapped and packed in protective plastic, separated by cardboard compartments. A beautiful set of self-stick decals, a pre-painted black fiberglass cowl, and a large plastic bag containing all the hardware are included. As I previewed the 22-page assembly manual, I was thoroughly impressed. Upon examination of the built-up components, I found laser-cut lite ply formers in the fuselage, a

fiberglass tail cone, and over 100 photos and illustrations in the manual. The Zero .40 ARF is produced in Vietnam by Seagull Models and was designed and produced with the intermediate/advanced Sport Flier in mind. It is a semi-scale model airplane that goes together quite easily.

The Assembly Manual lists the additional items required such as a .40-.48 2-stroke engine or .50-.72 4-stroke engine, a 4-channel radio with five servos, and stick-on weights for balance (you will need several ounces). There is also a list of tools that will be needed for assembly and a list of the assembled components that are in the kit.

Wing Assembly:

Following the steps in the assembly manual, the protective bag was removed from the two wing halves and they were examined for obvious damage. The fixed landing gears were installed, wing halves joined using Pacer "Z"-Poxy, servos, pushrods, control horns and the nylon clevises were installed to complete the wing assembly.

Note: Each clevis already had safety keepers installed and all hinges are double pinned to prevent them from pulling out. I'm sure that's beyond "Standard ARF Specifications." With the wing assembly complete, the pre-painted pilot is secured in the cockpit area using Z-Poxy and the pre-painted canopy is installed using Pacer Canopy Glue. Supplied small sheet metal screws are used to help secure the canopy. The supplied fuel tank was trial-fitted and then the assembly started to get interesting.

Engine Selection:

I had a beautiful Saito .56 G.K. ready and waiting for the Zero. It was to be installed in the inverted position on the already installed aluminum engine mount. Good idea, but it wouldn't fit. There was no way that I could move this engine or any other 4-stroke engine back far enough and still utilize the supplied aluminum mount, steel plates, and mounting bolts that came with the kit. I tried various engine mounts made for 4-stroke engines, but the engine would be so far forward that the

SPECIFICATIONS

ZERO 40 ARF

Aircraft Type
Sport-Scale
Mfg. By
Seagull Models
Dist. By
Horizon Hobby Dist.
4105 Fieldstone Rd.
Champaign, Illinois 61822
(877) 504-0233
www.horizonhobby.com
Expected Street Price
$159.99
Available From
Retail Outlets
Wingspan
57 Inches
Wing Chord
9-1/2 Inches (Avg.)
Total Wing Area
540 Sq. In.
Overall Length
47 Inches
Stabilizer Span
24-1/2 Inches
Total Stab Area
122.5 Sq. In.
Mfg. Rec. Engine
.40-.48 2-stroke; .50-.72 4-stroke
Rec. Fuel Tank Size
9 Oz. (supplied)
Rec. No. of Channels
5
Rec. Control Functions
Rud., Elev., Throt., Ail. (2 servos)
Basic Materials Used In Construction
Fuselage
Balsa, Lite Ply, Fiberglass Cowl & Tail Cone
Wing
Balsa
Tail Surfaces
Balsa — built-up
Building Instructions on Plan Sheets
NA
Instruction Manual
Yes (22 pages)
Const. Photos/Illus.
Yes

RCM PROTOTYPE

Radio Used
Futaba, T6XAS 5 Servos
Engine Used
Saito .56 Golden Knight
Fuel Tank Used
9 Oz. (supplied)
Weight, Ready to Fly
110 Oz. (6 Lbs. 14 Oz.)
Wing Loading
29.3 Oz./Sq. Ft.

SUMMARY

WE LIKED THE:
Ease of assembly and excellent workmanship.
WE DIDN'T LIKE THE:
Heavy wing loading.

The engine mount had to be modified to provide enough space to mount a 4-stroke. Relieving the firewall for the two screws that hold the carb onto the Saito gave a little more clearance.

The author chose to use the top part of the tail wheel strut to drive the rudder. This allowed him to eliminate the complexity and weight of the supplied rudder pushrod.

Excellent craftsmanship. Look at all those stringers!

cylinder head would be sticking out through the front of the cowling and that just wouldn't do. As a final solution, I modified the supplied mount by using a hack saw to remove most of the upper mounting area, leaving just enough on each side to drill new mounting holes. A slight relief was cut into the firewall for the carburetor screws, and I had gained just enough clearance to use the Saito with the supplied aluminum engine mount (see photo).

The throttle pushrod had to be moved to the other side of the firewall to accommodate the 4-stroke engine, and the cowl was then carefully cut and trimmed to provide clearance for the rocker covers and cooling outlets.

Note: The big round cowl fits so nicely over the round fuselage that holes must be cut into the bottom rear area of the cowl for the cooling air to escape.

Stabilizer Installation:

The stabilizer/elevator assembly was test fit into the pre-cut fuselage opening. It aligned perfectly, no adjustment was necessary, so some 30-minute Z-Poxy was applied and the stabilizer was placed back into position.

Servo Installation:

The servo tray is already cut and installed inside the cavernous fuselage. The instructions say to use two of the

three pre-made pushrods to control the rudder and the tail wheel assembly and the third pushrod to control the elevator. The tail wheel pushrod and the elevator pushrod exit the fuselage below the stabilizer. The rudder pushrod was supposed to have two 90-degree bends that exit out of the top of the fuselage, and then attach to the rudder. I noticed that the tail wheel wire was very long so I simply bent it back 90° and attached it to the bottom of the rudder. This eliminated the need for, and weight of, the separate rudder pushrod (see photo).

Small pushrod exit holes were cut into the UltraCote covering between the fuselage stringers and then the control horns were installed so they would line up with the pushrods.

Each pushrod clevis was installed and control throws were set up per the assembly manual. The fiberglass tail cone was installed, covering up the tail wheel mounting, then the fin was installed using Z-Poxy. Finally, the large self-stick decals were applied per the photos of the model using the soapy water and squeegee technique.

Balance:

The instructions say it is critical that your airplane be balanced correctly. The Center of Gravity (C.G.) should be located 6-8cm back from the leading

edge of the wing, measured at the wingtip. This is a low wing aircraft, so I rolled it upside down and attempted to check the balance. Stretching out 57-58 inches, wingtip to wingtip, while attempting to balance a model is not easily accomplished by one person. So I measured off 25-30% near the wing root and started adding lead weights to the nose area. Nine ounces had to be added to bring the balance within the measured C.G. range.

Flying:

It's January with the weirdest weather ever in this part of the country. Temperatures in the 60-70 mark when it should have been 30-40. Time to take advantage of this "Bonus Flying Weather." With the colorful Zero fighter model in hand, pre-flight checks all complete, it's off to our beautiful TORKS R/C flying field. Transportation is easy; the assembled model easily fits into my Windstar van.

At the field there are the usual examinations that are performed by our club comrades, the only person with any apprehension was me. This model was heavy for its size. Almost 29 ounces per square foot of wing loading.

With the Saito .56 running nice and smooth, another ground range check was completed and all radio functions verified. My spotter and I walked out to one of the flight stations and I taxied the Zero out past the runway and into the grass area. A few short bursts of power proved that the ground handling was excellent on grass. As I taxied over to our asphalt runway there was no nose-over tendency of any sort. I turned into the slight wind, added power, and within 100 feet the Zero was airborne. Two clicks of down trim and the Zero was flying hands-off. High speed with no trim change, low speed all okay, stall speed and the right wing dropped slightly, but with rudder correction the model just mushed along at slow speed. Loops were round and smooth and turns were easy. After several laps around our field, I set up for the landing. The model was about 400 feet out from the end of the runway at about 50 feet high. A nice smooth approach, all looking good, over the grass, a slight amount of elevator, then it happened, at about 6 feet of altitude the Zero fell out of the sky. From 50 feet away it looked like a disaster. Why? At first, I just stood there, I couldn't believe what had just happened. I didn't do anything out of the ordinary.

Upon examination, there was very little damage except to my pride. The engine "box" had broken off from the face of the firewall and a section of the left stabilizer was broken. I kept thinking about it, what did I do wrong? Maybe I had allowed the model to slow down too much and it just stopped flying.

Within a few hours and the help of Z-Poxy, the model was repaired and ready for another test flight. I did add additional triangle stock in and around the engine mounting box to offer a little more support. I then re-adjusted the ailerons to provide a slight amount of "washout" in hopes that this would provide a little help during landing.

Additional Flights:

Back to TORKS R/C Field on another fine day in January. Got my frequency pin, another radio check, fueled up and all set to go. The first flight was uneventful, easy lift off, a few laps around the pattern to check the controls and a landing that was slightly faster than normal. This time was different; the Zero was doing exactly what it was supposed to do, FLY. Each flight was a little easier as confidence was building. With my helper/spotter waiting with his new camera, it was time to take some photographs. Knife-edge flight showed a tendency to fall off, but it was good enough to get in some photo shots — loops and inverted flight were no problem, slow speed and high speed showed no trim changes. Best of all, landings were no problem, as long as I kept the speed up. Several flights have been made and my confidence has been restored. Just remember to keep the speed up during the landing and there should be no problem. I believe that the "washout" that I put into the ailerons did help the landings. The "fall off" in knife-edge flight occurred in either direction, so I may be able to remove some of the lead ballast from the nose. For now, the model looks good and has put in some very nice flights.

Conclusion:

Assembling the Seagull Zero is quite easy even for the novice. Flying (because of the high wing loading) is for the experienced.

This model looks and performs very well and the quality of workmanship is well above average. Overall, this model turned out to be a very pleasant experience.

My Saito .56 provides more than enough power to give this model realistic flights. The high wing loading does not seem to affect the flights except for the landing speed.

My thanks go to my good friend Fred Wettengel for his flight photographs. ✈