

Electric Fun-Fly
March 30 see page 14

**Send Your Articles &
Build Logs to the Editor**

**Thanks for
Renewing**



Flight Lines

GREG BOHRER'S F-4 PHANTOM

Charter No. 396
an AMA Gold Level Leader Club
our 47th Year

Photo by Gary Pyles

**LAST CHANCE
TO RENEW
YOUR MEMBERSHIP**

NEXT MEETING
MARCH 13TH, 2013
BRIDGETON TRAILS LIBRARY, 7 PM





Stuff

by: Gary Pyles

As I write this month's edition of "Stuff" I look back at all of the meetings that I have been present at with amazement at the scope and extent of talented members we have. For those casual members that do not attend our meetings you are truly missing out on some excellent technical presentations.

Although I do my best to convey these presentations within the pages of Flight Lines, I fear I can never do them justice. Even during February's meeting, when I expected a minimal turnout, we had another great series of presentations. Four unique presentations kept the attention of the membership and generated a flurry of questions and interactions with the presenters.

These presentations often represent the latest in technological developments in our hobby and demonstrations of classic modeling skills that many newcomers to the hobby may not know about. Many of these presentations leave me in awe of the skill of our members and their dedication to our hobby. I look at each of these as a learning experience and an honor to be present at.

Sometimes a presentation is as simple as presenting a new model that a member purchased or as complex as a scratch-built wonder from concept to creation. As our hobby continues to grow the amount of new products and systems continue to expand and seems limitless. The popularity of electric power and the growth of foamy airplanes, helicopters, and multi-rotor aircraft continue to expand. The breadth and scope of these systems provide an aircraft that most hobbyists find intriguing and an within their price range.

I mentioned electric power above but I should not dismiss the developments in electronics. From radios, to receivers, 3G stabilization systems, batteries, speed controllers, and cameras it seems their is no limit to the technology that can be adapted or adopted by our hobby.

The monthly meeting's technical presentations is a great venue to show off your latest acquisition and share it with the membership. I realize that the meeting site is not convenient for all members and that there are often scheduling conflicts. If that is the case send me note and some photos of your latest creation or purchase and I'll get it in the newsletter. See you at the meeting or at the field.

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MEETING MINUTES

Meeting Minutes: February 14, 2013

By Dale Buchanan, Secretary

Meeting was called to order at 7:00PM by President, Gary Pyles.

Attendance

17 members were present.

Announcements:

Anyone who has not renewed their club membership by the end of the March meeting will be subject to the \$25.00 In Arrears fee. This fee is applicable to anyone renewing after the March meeting.

Gary Pyles also talked about looking into a display at the Toy Show at Westport Plaza next year.

If you are interested in First Person Viewer you need to review the AMA's guidance on FPV flight. If you do this at our field, you must follow the AMA's rules on FPV.

New Members in Attendance:

William Bath	AMA 91806
Norbert Becker	AMA 193955

The new members were accepted and welcomed by the membership.

Secretary's Report:

Dale Buchanan, Secretary:

The West Tennessee RC Flyers Club will have their Annual Fly-In, Saturday, May 18th. There will be a flyer posted on our club bulletin board at the field for anyone interested in going to this event.

The club Charter documents have been sent in to the AMA. I have received a copy of the insurance certificates for the land owners.

I have received AMA Gold Leader Club Leader Pins for members who do not have one. Any new member from the time these were last given out to the February 2013 meeting should get a pin. They will be given out at the club meetings, events or I can meet you at the field.

A motion was made to accept the Minutes as published in last month's newsletter.

Treasurer's Report:

Bill Lindewirth

A motion was made to accept the Treasury Report as presented. The report was accepted by the membership.

Field Report:

Gary Graul, Field Chairman

Gary was not present. Cracks in the runway and where the taxi way meets the runway are getting fairly large. They will be addressed in the Spring.

Safety Report:

Russ Watts, Safety Chairman

Russ was not present.

Membership Report:

Ralph Doyle, Membership Chairman

Ralph reports out of 168 members last year, 98 members have renewed plus another 19 new members. When renewing or joining send a copy of your 2013 AMA card. NOT a copy of the temporary card.

Events Report:

Vic Bunze, Event Chairman

Vic was not present.

There are still events that need contest/event directors. Contact Vic if you are interested in running an event.

The indoor fun fly at the New Hope Lutheran Church on Hwy 94 and Pralle will be coming up at the end of March. For more information on this event, contact Jeff Becker.

Flight Training:

The AMA has suspended the five dollar fee for intro pilots.

New Business:

No new business was presented.

Meeting was adjourned at 8:04.

The next meeting will be March 13, 2013 at the Bridgeton Trails Library at 7:00, meeting room 1.

the Joy of Electric Power part 2

by Vic Bunze

This article continues Vic Bunze's story on electric power from last month's issue.

Batteries

Two choices:

1. Increase the battery capacity. Selecting an 11.1V 5000 mAh battery will increase flight time to 5.5 minutes $[(5 / 54) \times 60]$ at full throttle and again, much longer with some throttle management. What is the downside? The 5000 mAh battery adds weight.

2. Go to a 4 cell (4S), 14.8 V 3300 mAh battery. This battery would allow (600Watts / 14.8V) or 40.5 amps to produce 600W of power. A 3300 mAh 14.8 V pack would deliver 40.5Amps for $(3.3/40.5) \times 60$ seconds or 4.8 minutes of wide open throttle flight. A 14.8V 5000 mAh pack would provide 7.2 minutes. The 14.8 V, 5000 mAh, 4S battery would weigh one third more than the 11.1 V, 3S version.

So what is the "C" rating of the battery about?

The C rating indicates how much current can be delivered while maintaining the rated voltage. It is expressed as a multiple of the battery Capacity. If you have a 2200 mAh battery rated at 20C, it can deliver 20 times the amp capacity while maintaining voltage. If current demanded is greater, the voltage sags and you don't have the power you hoped for. So such a battery can deliver 44 amps while maintaining 11.1 V. This battery power delivery is limited to $11.1V \times 44$ amps or 488 Watts. It doesn't meet our goal of 600 Watts.

A 30C rated battery would be able to deliver $(30 \times 2.2$ amps) or 66 amps and not cause the voltage to sag. Its power delivery



would be $11.1 V \times 66 A$ or 732 Watts, almost one HP! It's very important to pay attention to the pack C rating. Be mindful however, that a 2200 mAh battery at 30C will deliver for only $[(2.2 A / 66 A) \times 60]$ or 2 minutes.

Flight times in practice will be longer if you don't fly wide open all the time. It's possible to cruise at 25% throttle and do aerobatics at half throttle, so the average current for a flight might be 50% of the wide open value and extend flight time by factor of 2.

More electric facts to come in future installments.

Lithium-Polymer Battery

The 5.0 represents the 5,000 mAh capacity of the battery. Your fuel tank.

The number of cells in a LiPo battery determine the voltage of the battery pack.

The "C" rating of the pack represents the discharge capacity of the pack.

Happy Electrons!

SAFETY CORNER

With the recent articles about electric powered aircraft there are a couple of safety related items to keep in mind.

1. The motor and prop will run anytime the battery is connected and the throttle is moved.
2. Do all motor testing without a prop installed.
3. Setup your radio with a "Throttle-Hold" switch.
4. Treat the propeller as if it is always running. (Keep your fingers clear of the prop at all times!)
5. Get help from an experienced electric pilot.

Why a One Design Racing Plane?

by Paul Geders

A little history is in order for those new, and not so new to racing. In the early days of Spirits racing there were forms of class racing. One of the first was Top Dawg racing. Plans by Ken Willard, an OS .15, a stock built Top Dawg, and you were off and running. This was followed by "Spirit of St. Louis" racing. It was a design that was started in California for Quarter Midget racing. Built per the plans and any .15 size engines were allowed. Guess what? They went from an OS .15 to a Super Tiger, then a Rossi, and finally the Cox .15. If you didn't have the money to keep up with the engine changes you would not be competitive. Later on a race called "Run-What-U- Brung" was introduced. That meant anything you wanted to race, from a trainer, a pattern plane, and/or anything you wanted to throw together was eligible that met the wing area to engine displacement rules. Again the all-out racing airframes would always win. Right off this discouraged a lot of pilots who didn't want to spend the money on specialized aircraft and engines. What followed then was WARBIRDS racing with all kinds of rules that were specific to wing area, engine displacement, including bonus points for internal tuned pipes, recessed mufflers and on and on. Finally, someone (Don Ware) realized that if you set a time limit of no faster than 2 minutes then you could readily compete on a pretty level playing field, like we do now. Kenny Barstow built a stock P-51 kit with a Super Tiger GS40, and won a race with a 2:00.77 sec. time. Junk Stik racing then followed WARBIRDS. It used the cheap 3 channel Balsa USA Stik 40 with any .25 size engine. It lasted about 5 years. And again keeping up with the engine changes was part of its downfall.

Enter Q-500 racing! In Quickee 500 the only differences are the engines, propellers, airfoils, and tail configurations. Every other dimension is covered by the AMA rules. The rules essentially defined the "plate area". Plate area is what you see by looking aft from the nose of the airplane. It is the total area that has to be pushed and/or pulled through the air. In the '90's the plane to beat was Craig Grunkmeyer's "Dodger"(134 MPH with Rossi's to 150+ with Nelson's), then came Mike Del Ponte's "Revolution"(160+ with Nelson's, Jett's and Edmond's), followed by the now currently fastest Q-500, the "Vortex" and sim-

ilar looking versions with different names.

Now, you might be asking how come with the same set of rules can one airframe be faster than another. It's simple... "drag counts" or the elimination of drag by using an airfoil optimized for the speeds they are running, (currently around 175 MPH) more efficient and effective propellers, and a clean tail configuration, which is why you see so many efficient V-tail configurations in Q-500. You also see airframes change at this level of competition because of technology improvements in construction (for example: carbon fiber vice wood for stiffness and no torsional changes to the airframe in violent rolls or pulls to the fuselage or wings, addition of skin hinges, no visible joints, etc.). \$\$\$!



Photo by Carolyn Schlueter

The above leads me to why we have a one-design Four-Star 40 race plane that has been very successful for more than 20 years (since 1991). So, how does the above relate/apply to our Four-Star 40 racing? Our rules define the single stock engine allowed, the airframe, the propeller, the fuel, the minimum weight, etc. If we were to allow other airframes like the LA-40, or maybe "knock off" Four-Star's, or whatever, one airframe ALWAYS (with everything else equal such as engine, propeller, minimum weight, and fuel) will be better than another as in my example above from Q-500 racing because of the differences in plate areas. Once the plate area is essentially the same then everyone has an equal chance of going the same speed. Ultimately everyone would be flying the same airframe anyway because the slower airframes would fall by the wayside.

The reason that all of the races such as Top Dawg, Spirits of St. Louis, Run-What -U-Brung, Junk Stik, WARBIRDS with lots of rules, even Q-500 racing died here in St. Louis was because it became a money race keeping up with engine, propeller, and airframe technologies.

The Spirits have eliminated all the variables, which helps keep the cost low, and has really made it a time proven event. Four-Star 40 racing has lasted 21+ years by keeping it simple. Try it and you probably will find it to be exciting, especially the teasing among racers which is all part of the fun!

TECHNICAL PRESENTATIONS

This month's Technical Presentations did not disappoint! In addition to some very impressive airplanes Gene Jones explained to us how he was able to put together a great classic trainer airplane for less than the cost of a small foamy.

Gene Jones showed his LT40. He purchased this plane from the Sig scratch and dent sale and modified it to electric. The plane cost \$20.00. Total cost with all electrics and little modeling skill was about \$100.00.

Paul Geders brought in a Red Star MIG 29 made by Sebart. The plane weighed about 4 pounds with battery. It has 9 servos, 7 channels and 3 very complex transmitter mixes.

Babe Raab brought in his Robbe Maxi. The instructions are in German and took a little deciphering. He used a motor made by Elf.

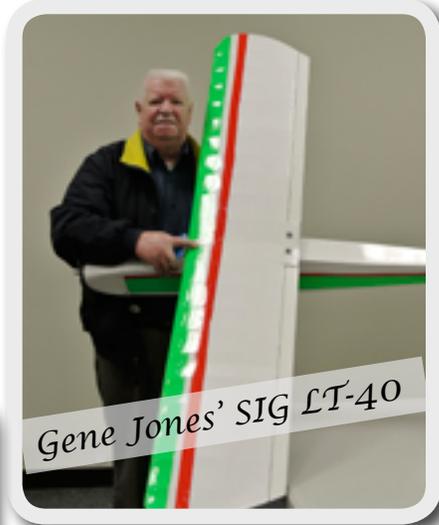
Babe also brought in some solid pine planes that he likes to build. Truly creative and perfect for the young aviator in your home.

Greg Bohrer brought in his Starmax F4(Foamy). He added MPI position lights, strobe lights and amber lights around the jet exhaust nozzles to simulate the afterburner. It has a 90mm fan with 6.5lbs of thrust. It is LOUD!

The \$20.00 gift cards from Mark Twain Hobby Center was won by Greg Bohrer.

Great work!

Check out the next page for more photos.



Gene Jones' SIG LT-40



Babe Raab's Robbe Maxi



Paul Geders MIG 29



Greg Bohrer's Phantom



Babe



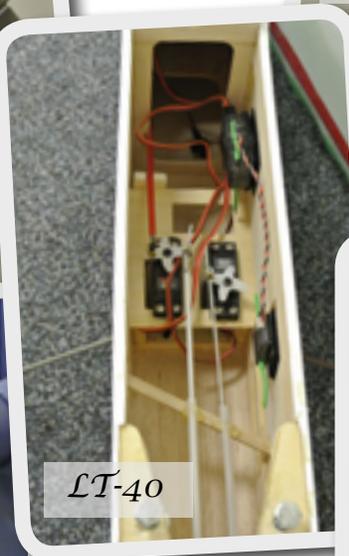
Greg



Paul



Babe



LT-40



F-4

How to Add Skirts to Your Retracts

by Ralph Doyle

Do you have a plane and installed a set of retracts but don't like the looks of those bare wire struts and would like to add skirts to reduce the ugliness of those wires?

I found a simple solution to this problem of adding skirts that requires very little adjusting and what adjusting there is, is EASY!

The bill of materials includes:

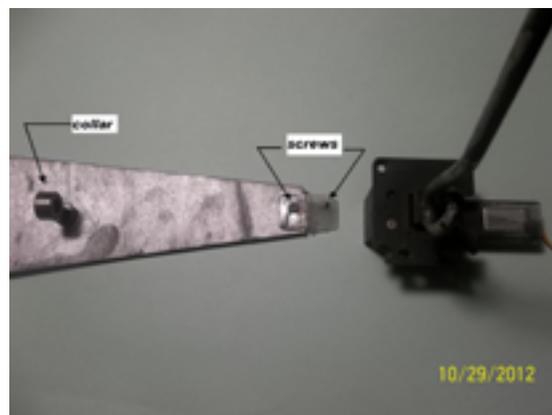
1 - A piece of 1/64 to 3/32 inch thick plywood (or basswood) big enough to cut out 2 skirts. I used 1/64 inch on my .60 size plane and 3/32 inch on my larger planes.

- 2 - wheel collars
- 2 - screws and nuts (size depends on wheel collar size)
- 2 - hinges
- 2 - wood screws

Picture 1 shows the assembled parts. Note that the retract motor in the picture is an electric one and I was able to use one of the screws in the retract to mount the pivot hinge. The hinge is held to the skirt with a small wood screw. Use a wheel collar that is large enough to slide up and down the strut; no fancy wiring or hinges are necessary. Also, adjusting the length of the screw allows the skirt to lie as flush as possible to the wing just by lengthening or shortening the screw. The nut is used to hold the screw to the skirt.

If you are using RHOM air retracts, there are no mounting screws available on the retracts. The hinge must then be glued to the wing.

Picture 2 shows the finished installation.



10/29/2012



10/29/2012



Reminder: Your AMA & Spirits' membership expired December 31. There is **NO grace period**. If you have not renewed by Dec 31 you **MAY NOT FLY** until you renew. If you renew your Spirits membership before the end of the March meeting there is no "In Arrears" penalty. *You must be a current member or guest to fly at Spirits.*

The Spirits of St. Louis R/C Flying Club, Inc.

MEMBER APPLICATION & AGREEMENT

FOR THE PERIOD **JANUARY 1 TO DECEMBER 31, 201**___

spiritsofstl.com

AMA and Spirits memberships run from January 1 to December 31st of each year. You must be an AMA member for the year you are applying for membership. (AMA Introductory memberships are not valid)

Check New or Renewing Below	Check the appropriate box or boxes		
<input type="checkbox"/> New Member	<input type="checkbox"/> Full Membership \$135	<input type="checkbox"/> Youth Member \$25 (under 19)	<input type="checkbox"/> Aug./Sept dues \$10/month (\$2.50 youth)
<input type="checkbox"/> Renewing Member	<input type="checkbox"/> Family Membership \$160	<input type="checkbox"/> Associate Member \$25 (non-flying)	<input type="checkbox"/> "In Arrears Fee" \$25 after the March meeting

Membership includes a subscription to "Flight Lines", our monthly newsletter. Check below to indicate how you would like to receive your copy: online @ spiritsofstl.com by US Postal service

Do you wish to be contacted by email, by the Spirits, about upcoming events & announcements: Yes No

Primary Member Information (please print clearly)		
First Name:	Last Name:	AMA No:
Address:		State:
City:		Zip:
Telephone:	Email:	Age (optional)
Signature:		Date:
Family Member #1 Information (please print clearly)		
First Name:	Last Name:	AMA No:
Relationship	Email:	Age (optional)
Signature:		Date:
Family Member #2 Information (please print clearly)		
First Name:	Last Name:	AMA No:
Relationship	Email:	Age (optional)
Signature:		Date:
Family Member #3 Information (please print clearly)		
First Name:	Last Name:	AMA No:
Relationship	Email:	Age (optional)
Signature:		Date:

By signing this application you agree that you have read and will comply with the current AMA Safety Code (available at: modelaircraft.org/files/105.pdf) & the Spirits' rules and regulations as stated in the latest version of the Spirits' Bylaws, Constitution, and Safety Rules available for review at spiritsofstl.com.

New members that join in August or September shall pay \$10 (\$2.50 for Youth Members) for August and or \$10 (\$2.50 for Youth Members) for September, plus the annual membership dues for the coming year. New members joining after October 1st pay only the annual membership dues for the coming year. (For example: If you join October 1, 2012 your membership will extend through December 31st, 2013.)

RENEWING MEMBERS: There is **NO** grace period when renewing! Not renewing your membership by Dec 31 results in your complete loss of flying and voting privileges with the Spirits in the coming year, until you have renewed. Additionally, if you have not renewed by the end of the March meeting you are subject to any "In Arrears Fee" listed on the membership application.

Send this completed and signed application, a copy of your (all family members) AMA card(s) with your check made out to Spirits of St. Louis R/C Flying Club, Inc. (no cash accepted) to the Membership Chair. You will receive your card in about 2 weeks. You may also apply in person during one of our meetings. Check our website for our next meeting time.

Mail applications to: Ralph Doyle, 2463 Wesington Dr, Maryland heights, MO 63043

You may contact Ralph by telephone at: 314-878-7914 or email: membership@spiritsofstl.com



Links

to stuff in this
issue & other things

About the Spirits

[Click here](#) to see all of the elected officers, Board of Director positions, and the chairmen that administer the club's affairs.

Events

[Click Here](#) to go to the Spirits Events Page and see the list of events that are scheduled.

[Click Here](#) to visit the Local Events Page where we list events in the surrounding area. If you know of an event, send it and a flyer to the [Webmaster](#).

Membership

[Click Here](#) to view or download a Spirits, Membership Application for 2013.

Reminder: If you are reading this and have not renewed your Spirits or AMA membership you are no longer legal to fly at the field. There is **NO grace period**. If you renew your Spirits membership before the end of the March meeting there is no "In Arrears" penalty. *You must be a current member or guest to fly at Spirits.*

**Support your
local hobby
shop!**

**If you don't, one day they won't be there
when you need that critical part to go
fly!**



Safety matters

Safety always matters in our hobby. Please be careful this winter while building and refitting your aircraft. If you are new to electric aircraft, consult a member

experienced with electric models to get some tips on preventing injuries from unwanted tor starts.

Safety is everyone's responsibility.

The following links discuss AMA and Spirits Safety:

[AMA Safety Code](#)

[Spirits Field Layout](#)

[Spirits Bylaws](#)

[Spirits Safety Rules](#)

[Click Here](#)

to go to the "Useful Links" page of our website. You will find dozens of links to manufacturers, Distributors, Hobby Shops, RC organizations, Local RC Clubs, Information for Newcomers, and info on Spirits' safety Program. Enjoy!



Lost & Found

Transmitter found at the Field. If it is yours contact Gary, gp@gtp ltd.com



Renewal and In-Arrears

Here is the club policy on the "In Arrears" fee and membership renewal:

To clarify the issue surrounding the "In Arrears" fee and timing. The By-Laws dictate that a member is "In Arrears" if not renewed by Dec 31 each year and that they lose ALL flying and voting rights at the Spirits.

It does not dictate the fee amount or if there is any restriction or mandate on the timing when the fee may be charged. Since this fee amount and timing is not explicit in the By-Laws it falls under "dues" and therefore is recommended by the Officers of the club and approved by a simple majority of the membership at a regular meeting. This action does not require a change in our By-Laws, only approval by the membership at a regular meeting, the same way annual dues may be changed.

On Thursday December 13, 2012, at a regular membership meeting the club officers recommended the following fee amount and timing, regarding the "in Arrears" fee:

An in Arrears fee of \$25 shall be charged to any member renewing their annual Spirits' Membership after the March meeting. Does not include "New Members" as defined in our By-Laws.

The membership present voted in the simple majority to approve this policy recommended by the club officers.

Here is a graphic to illustrate the policy:



Explanation of how the "In Arrears" fee is applied

Spirits

Advertising Section



If you have something you wish to advertise for sale please in the next Online newsletter please send it to the [editor](#) with photos, and your contact information. These services are free for club members.

Offered by:

Gene Jones, 314-291-5823, gjones4829@att.net

Item #1:

Horizon Hobby Christen Eagle
has 7 Hitec 652mg servos, Turnigy 52 overbore engine, Sullivan smoke system, spectrum 7ch RX engine & smoke & RX included but not installed
\$375.00

Item #2:

SIG Rascal 110" Saito FG21 (26 cc) spectrum RX
All batteries, ready to fly NO TRANSMITTER
\$600.00

Item #3:

HORIZON DECATHLON
Zenoa 26cc engine, spectrum RX, all batteries
Ready to fly NO TRANSMITTER
\$350.00

Item #4:

HURRICANE aerobatic shoulder wing
Turnigy 52 overbore engine
Sullivan smoke system installed
Spectrum RX installed, all batteries
NO TRANSMITTER
\$350.00



Offered by:

Gary Pyles, 314-680-2786, gp@gtptld.com

JR 11X, 11 channel DSMX/DSM2 transmitter
Purchased as a backup for my other JR 11X, programmed my models into it but never used at the flying field. Warranty card still in the package. No receiver. Like new because it is.
Priced to sell

Read more about the 11X at Horizon Hobby [click here](#).

\$400

Offered by:

Bill Lindewirth, 314-839-0282,

mrbillstl@charter.net

- AnyLink works with virtually any transmitter, regardless of brand, band or modulation.
- AnyLink enables your transmitter to send out a true, 2.4GHz signal — and operate with all of the interference-free dependability of a frequency-hopping, spread-spectrum system.
- AnyLink offers all of the convenience, versatility and benefits listed above for far less than the cost of a new 2.4GHz radio system.

“ANY-LINK” 2.4 GHz radio adapter

\$15.00

See [“For Sale”](#) section on our website.



The following article is courtesy of Jim Newman, the AMA Insider, and Model Aviation magazine.

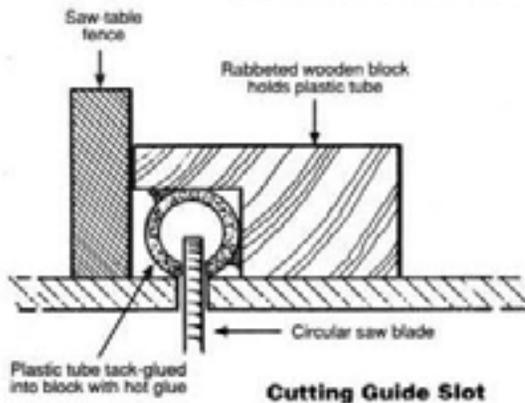
Contact the Editor:
newsletter@spiritsofstl.com

by JIM NEWMAN

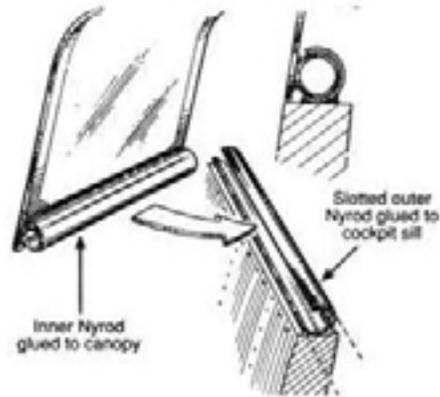
From the Drawing Board

20 SCALE BUILDING DETAILS AND IDEAS

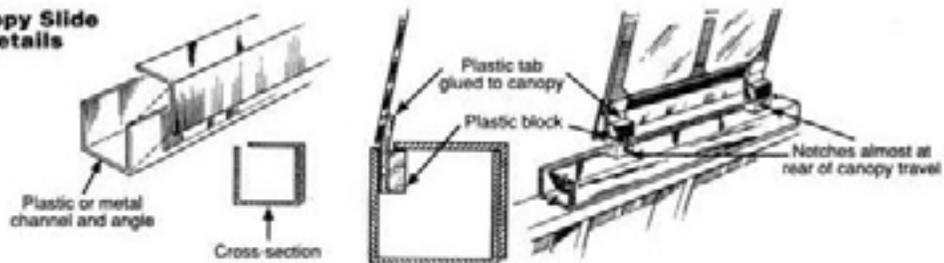
Sliding Cockpits



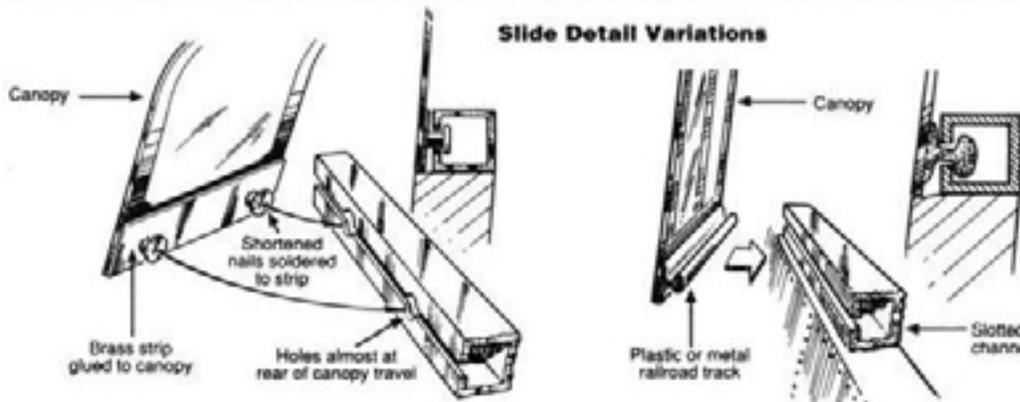
Guide Installation



Canopy Slide Details



Slide Detail Variations

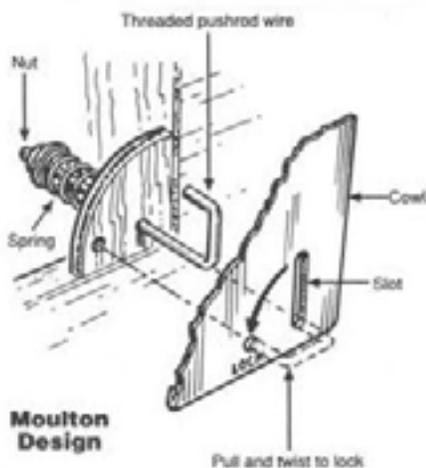


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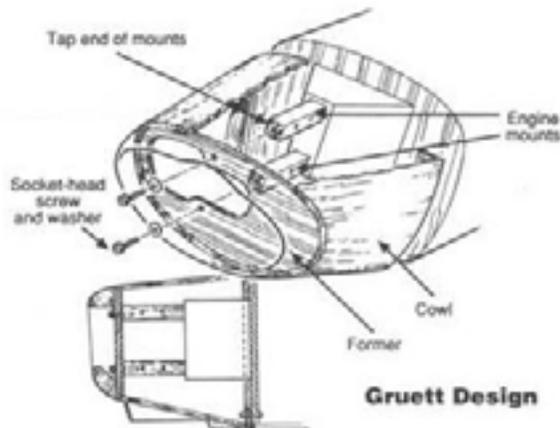
Contact the Editor:

newsletter@spiritsofstl.com

Cowl Attachments



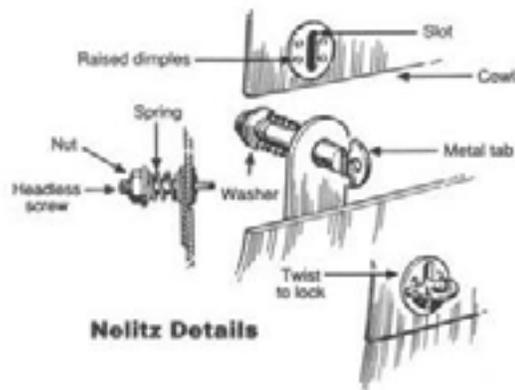
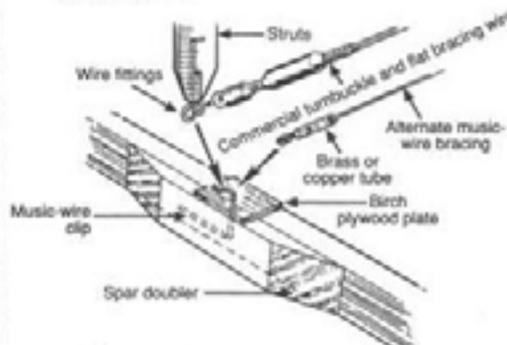
Moulton Design



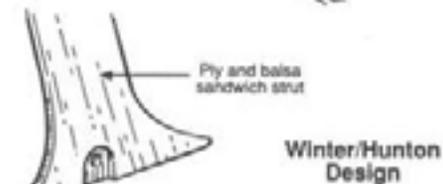
Gruett Design

Attachment Details

Wing Struts

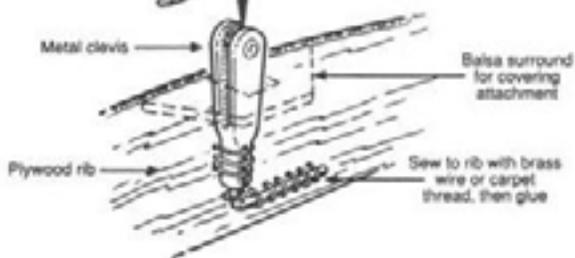


Neiltz Details



Winter/Hunton Design

Interplane Strut Attachment



Spirits of St. Louis RC Club

Presents

Indoor Fly-In



New Hope Lutheran Church
1975 South Old Hwy. 94
St. Charles Mo.
In the gym

\$5.00 entry fee AMA required
Public spectators are free and welcome

Saturday March 30th
11:00AM to 3:00PM

Visit our web site: spiritsofstl.com
Hoop course - Table landing - Open flying



All Aircraft must be safe for
indoor flight
and approved by event staff

Contact: Jeff Becker
Becker8972@SBCGlobal.net





Coming Soon! The popular SIG Four-Star series of R/C sport models will shortly be back in ARF form. The re-design of these two classic airplanes include several important upgrades ...

- The new 4-STAR 54 EG is a redesign of the original Four-Star 40, while the new 4-STAR 64 EG is a redesign of the original Four-Star 60. The "54" and "64" in the names indicates the wingspan.
- The "EG" in the name means the airplanes are designed for either Electric or Glow Power. The 4-STARS fly great with a 2-stroke glow engine, a 4-stroke glow engine, or a brushless outrunner electric motor with a 3-4 cell LiPo battery. It's your choice!
- Clipped wings! Both the 4-STAR 54 and the 4-STAR 64 have had their wingspan clipped slightly, which improves the roll rate and overall maneuverability, with no loss of the original 4-STAR stability and slow flight characteristics. It still lands like a trainer!
- All the control surfaces (ailerons, elevator, and rudder) have been enlarged for better control response at slow speeds.
- The Canopy has been streamlined for a sleeker appearance. That's another change that many Four-Star pilots have been making on their own for many years - replacing the original "high bubble" canopy for a lower one. However, if you still prefer the traditional bubble shaped Four-Star 40 canopy, you can still get that as an option. They both fit perfectly!
- Other upgrades include a molded Fiberglass Cowling and a removable Hatch on top of the fuselage for quick access to the battery/tank compartment. Also the top of the fuselage between the canopy and the fin (the turtle deck) is now fully sheeted with balsa for smoother appearance and greater strength.
- The new 4-STARS are beautifully handcrafted all-wood ARFs. Professionally covered with premium UltraCote (aka Oracover) polyester covering material. Engineered for quick assembly with a minimal number of components. All the parts are CAD-drawn, laser cut, and jig assembled, so everything fits the way it should. A photo illustrated assembly manual takes you quickly through each step.

We are very excited about the changes being made to the 4-STARS, and we hope you will be too. Available in early July.

PRE-ORDER YOURS STARTING APRIL 1ST!

4-Star-54 Specifications

Wing Span:	54 in.
Wing Area:	585 sq.in.
Length:	47.5 in.
Flying Weight:	5 - 5.5 lbs.
Wing Loading:	19.7-21.7 oz/sq.ft.
Glow Power:	
	2-Stroke .40-.46 cu.in.
	4-Stroke .40-.54 cu.in.
Electric Power:	
	500-800 watt Brushless Motor (800-1000 KV);
	60-75A ESC;
	3-4S 4000-5000 mAh LiPo Battery Pack