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R/C Radio controlled SOARING DIGEST

THE JOURNAL FOR R/C SOARING ENTHUSIASTS

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R/C Soaring Digest (RCSD) is a reader-written monthly publication for the R/C sailplane enthusiast and has been published since January, 1984. It is dedicated to sharing technical and educational information. All material contributed must be exclusive and original and not infringe upon the copyrights of others. It is the policy of *RCSD* to provide accurate information. Please let us know of any error that significantly affects the meaning of a story. Because we encourage new ideas, the content of all articles, model designs, press & news releases, etc., are the opinion of the author and may not necessarily reflect those of *RCSD*. We encourage anyone who wishes to obtain additional information to contact the author. *RCSD* was founded by Jim Gray, lecturer and technical consultant.

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R/C Soaring Digest
556 Funston Drive
Santa Rosa, CA 95407
phone: (707) 578-7871
e-mail: rcsdigest@aol.com
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***RCSD* Staff**
Jerry Slates - Editor/Technical Editor
Judy Slates - Managing Editor, Subscriptions
Lee Murray - *RCSD* Index/Database (available on-line)
Bill & Bunny Kuhlman - *RCSD* Web Masters

Feature Columnists
Bill & Bunny Kuhlman (B^2), Lee Murray, Tom Nagel, Mark Nankivil, Dave Register, Steve Savoie, Jerry Slates, Gordy Stahl

Artwork
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The Soaring Site

Well, now that you're finally holding the October issue of *RCSD*, then you know we have finally arrived at our destination: Santa Rosa, California. Actually, we weren't so sure that's where we'd end up, as we considered both Lake and Mendocino Counties, as well. Having learned a great deal about real estate, and the economic times especially as it relates to the Santa Rosa area, if we ever say we're thinking about moving again, some time in the future, kindly remind us that in January 2002 we said, "We're never gonna do this again!!"

We drove the 1861 miles from Texas to California, with 2 greenish looking car sick cats, went through a temporary move as well as a permanent one, experienced the significant climate change which has been known to cause colds and the like (Achoo....), frequently found ourselves filing address changes more than once (Not everyone gets it right the first time...), and unpacked most (but obviously not all...) of the necessary items including computer equipment and the like. While some damage to computer equipment has been sustained, nothing significant has yet to be noted...

For those of you who have been patiently waiting for the October issue, we certainly appreciate your patience! And, for those of you that sent us e-mail messages wishing us well on the move, we are overwhelmed by your continued support!

Besides, Gordy's had too much spare time on his hands, and he's been dying to share his travel tales.

And, while we've been away from the keyboard, we find that CST has an interesting contest in progress, which some of you will likely want to check out right away. Also, the Eastern Soaring League has a new web site address (page 19).

Happy Flying!
Judy Slates

2001 Visalia Champion
Silent Wings Soaring Association's
Edgar "The Soaring Junkie" Vera

Edgar Vera flew a nearly perfect contest, with most of the USA's top pilots contending and two World Champs on his heels. Approximately 300 pilots competed in gorgeous weather at the new Visalia CVRC soaring site, Visalia, California.

Insert on back cover: **Addictions at Visalia.** (A lot of Fred Sage Addictions flew at Visalia this year!)

Photography submitted by Gordy Stahl, courtesy of Silent Wings Soaring Association.

Jer's Workbench

Jerry Slates
556 Funston Drive
Santa Rosa, CA 95407
RCSDigest@aol.com

Timing-101

You are the new kid on the block. You have been flying only a short time. You have been to only a couple of contests, but no one has asked you to time for them, or maybe you did time for someone once, but they never asked you to time again.

Why?

Well, let me say that there are people who time and there are people who are timer's.

What is the differance you ask?

Well, one who times is someone who will start and stop the stopwatch and that's about it, no more, no less.

A timer will WORK WITH and HELP the pilot for whom he is going to time for.

What kind of help you ask?

Well, there are a lot of little things. Like offer to pick up your pilot's transmitter, freq. pin and score sheet while the pilot picks up his sailplane. Some pilots get a bit nervous in competition, so talk to your pilot as you are walking out to the launch area; maybe you can scan the sky to see if anyone is in lift. Ask your pilot if his radio is turned on; if so, ask him to work the controls, then ask if the trims are set.

When it's your pilot's turn to launch, pick up the tow line and hook it onto his sailplane for him and step back out of the way.

When your pilot's sailplane comes off tow, start your stopwatch and say, "MARK!" By saying 'mark' your pilot knows that you are doing your job. You may also want to look down at your stopwatch to make sure that you did start it and that it is running.

Now after your pilot has come off tow and has started his search for thermals, put your hand on his back and walk him out of the launch area. Don't let your pilot walk into anyone while he is looking up at his sailplane or let anyone walk into him.

When you are in a clear spot to fly, you may want to scan the sky again and tell your pilot if anyone is in sink and to stay away from that area or, if anyone is in lift, let him know where it is.

Now there is one thing that as a timer you will never do. That is to tell your pilot that you will be back in 5 and go off and talk to a buddy. That is a no, no. Give your full attention to your pilot.

What you want to do is keep your pilot posted on his time: how many minutes he has been flying and how many minutes to go.

When it's time to land, again walk your pilot to the landing area. Sometimes the landing area can be quite busy, so keep an eye on another sailplane's landing and tell your pilot if there are other sailplanes in the area.

Now most pilots like to have a count down for their last minute. So, on the last minute count say, "One minute to go, 5 seconds, 10 seconds, 15 seconds and so on. Or, if you count backwards, say, "60 seconds to go, 55 seconds to go, 50 seconds to go and so on.

When the sailplane touches the ground you will stop the stopwatch and say "MARK!" and again look at the stopwatch to make sure that you did stop the stopwatch. You will then write down the time and landing points onto the score sheet. After your pilot has turned off his transmitter you will offer to return the transmitter and freq. pin to the transmitter impound and turn in the score sheet to the score keeper.

This is the way it should be for a normal flight. But there times when things just don't go right.

If there is an off field landing and your pilot has to go for a long walk, help your pilot mark the spot where his sailplane landed. But you return his transmitter and freq. pin to the transmitter impound. There maybe someone else who will need the freq. pin.

So remember, if you are a good timer, there will always be a timer around when you need one. ■

TECH TOPICS

Dave Register
Bartlesville, Oklahoma
regdave@aol.com

Discus Launch Gliders - DLG

Picture 2 - middle of the launch spin

Welcome to the second installment of Discus Destruction. Last time, your columnist was mourning the obliteration of two conventional HLGs that became sacrifices in the quest for discus launch knowledge. But surprisingly, an aging, over-weight Skeeter (somewhat like the author) had been successfully discus launched once sufficient sub-rudder and presets had been used.

Since then, much has been learned about side-arm launching (SAL) and I'm happy to report that this is about the easiest, most efficient launch method I've ever seen. Kudos are owed to the modelers who discovered and perfected this technique.

The basis for success lies with three changes:

1) Proper design of the sub-rudder and overall tail planform,
2) Using a wing tip peg for launching,
3) Use of a piezoelectric gyroscopic stabilizer.

There's another element that contributes more than all of the above and that's the valuable and friendly exchange of information and experience by quite a few people. E-mail correspondence with Tom Clarkson (TPG) and timely information from Mike Garton's columns in *Model Aviation* were extremely helpful. At our recent Fall contest, Mike Fox and Rusty Shaw were very open about discussing planes and techniques. And Randy and Pat McCleave really put it over the top by letting me fly (and launch!) their DLGs both in Tulsa and at a meet in Wichita.

If you're trying to learn this technique, one of the first things to do is buy (or build) a properly designed DLG. Trying to SAL a standard HLG can be painful. A number of folks have experienced the barrel roll of death by starting this way. Very ugly.

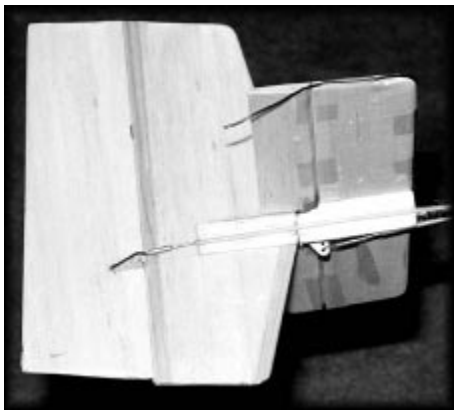
When I first encountered the launch barrel roll, it seemed like it was just my problem. Both Phil Pearson and Dick Barker (two of the pioneers of side-arm) note this same issue in their interview in Paul Naton's latest video release, *Endless Lift 3*. The use of a sub-rudder and presets is highlighted as a way to alleviate the roll over problem.

An example of a reasonable sub-rudder configuration is shown in Picture 1. Also note that the control linkage is set up in the pull direction for proper yaw correction. This was a suggestion from Tom Clarkson and keeps the linkage in tension to minimize control linkage flex during the launch maneuver.

Why is the sub-rudder so effective for correcting the rollover tendency? The reason normally cited is mass balance above and below the centerline to eliminate torque during the high speed launch. Although this is certainly structurally favorable, I'm not sure it's the whole story. I suspect that the turbulence from both the wing and horizontal stabilizer is blanking the normal fin-rudder configuration above the centerline during the first fraction of a second after release.

Whatever the true reason, a sub-rudder of at least 35% of the total vertical area seems to work. The rudder itself should be ~ 40% of the vertical stabilizer area and have significant travel.

To check some of this out, the vertical stabilizer on my DLG was originally designed to be over-sized. Although this worked nicely, weight and structure considerations argue for making it as small as possible. Consequently, the area was gradually reduced to determine reasonable size limits.



Picture 1 - DLG tail group

First, several cuts were made on the lower area until launch control started to be affected. Then several cuts were made from the upper surface until thermal turn authority got a little soft. While cutting off the area from the upper surface, no change was noted in launch stability. This suggests that the blanking idea has some merit.

From these tests, ~ 25% of the area of the vertical stabilizer was eliminated. For those who would like scalable numbers,

RVC = 0.075
Rudder = 46% of vertical area
42% area below center line
Tail moment = 26.5
Aspect ratio = 11:1
Wing area = 308 sq. in.

The next thing that seems to help with SAL is the launch technique. SAL is accomplished by grabbing the wing tip (left tip for most folks) and then spinning a full turn counterclockwise like a discus thrower hopefully releasing more or less in the direction you want to go. There are two basic ways to grab the wing tip: by hand or with the peg. After some trial and error, I definitely vote for the peg.

To launch by hand without the peg, grab the left wing tip with the index finger along the leading edge with the thumb on the lower surface and the other fingers on the upper surface. This gives a more natural upward motion at release which helps direct the initial launch trajectory better.

The downside to this technique is that the wrist isn't very flexible. Consequently, you tend to align the wingspan along the throwing arm. In this configuration, the outer wing is going

(continued on page 15)

on the Wing
B²
P.O. Box 975
Olalla, Washington
98359-0975
bsquared@appleisp.net
http://www.b2streamlines.com

Dave Jones' R-2, Part 3

Progress on this project has been slower than initially expected. Between some beautiful end of summer weather which had us out on the flying field at least twice each week, and the demolition and rebuilding of our huge deck, we managed to work on the R-2 fuselage and fin and rudder only in small increments. With a couple of snags in the construction procedure, this installment has been a long time in the writing, but it looks like we made the deadline for this issue!

Fuselage

With the help of a huge sheet of glass and a number of steel machinist blocks, metallic triangles, an aluminum template and layout grid, and a whole bunch of lead weights, construction of the fuselage was rather easy.

Using the aluminum sheet fuselage side template, we cut the two front sides from 1/8 inch plywood and the two rear sides from 1/8 inch balsa. The front and rear parts were then glued together so that further assembly could be completed using the layout grid to assure symmetry.

A nose block was glued on and bulkheads were then glued into position at the rear of the battery area, behind the receiver location, and at the aft end of the fuselage. See Photos 1 and 2. In the area of the tow hook, we constructed a reinforcing structure to spread the loads from the tow hook to a wide area of the fuselage sides. At the same time, we finished bonding the front and rear fuselage sides by fitting a balsa block which traverses the entire fuselage interior. This piece also makes the fuselage "crush proof" while gripping it for launch. Balsa sheet of 1/8 inch thickness was then used to form the bottom of the fuselage and ventral fin.

We used triangle stock to connect the plywood and balsa fuselage sides to the bottom sheeting. This makes a very strong structure, but initiated the first of our minor problems. We built the fuselage rather narrow and will be using older JR servos which are somewhat taller than those currently available. The balsa triangles, essential for achieving a nicely rounded cross-section, would not allow the servos to be mounted side-by-side. Additionally, the fuselage is too short for these servos to be placed in line. Our solution was to place the servos in the fuselage at an angle, as can be seen in Photos 3 and 4. The elevator servo is forward, the rudder servo toward the rear. The bottoms are barely clear of the triangles, and the total length of the servo installation turned out to be just short enough to allow receiver installation at the rear and a good sized battery pack to be placed up front. And it looks cool, too!

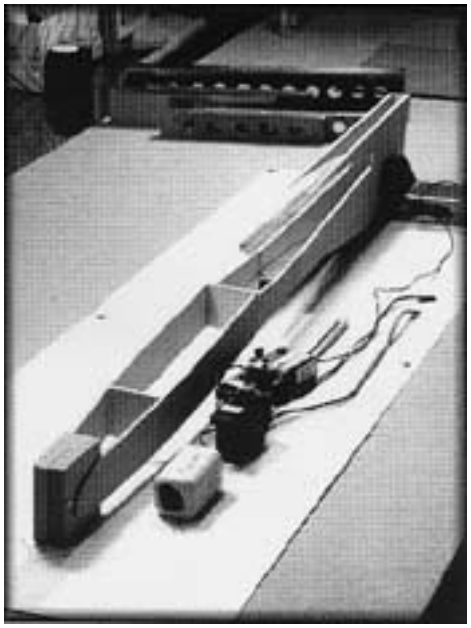


Photo 1

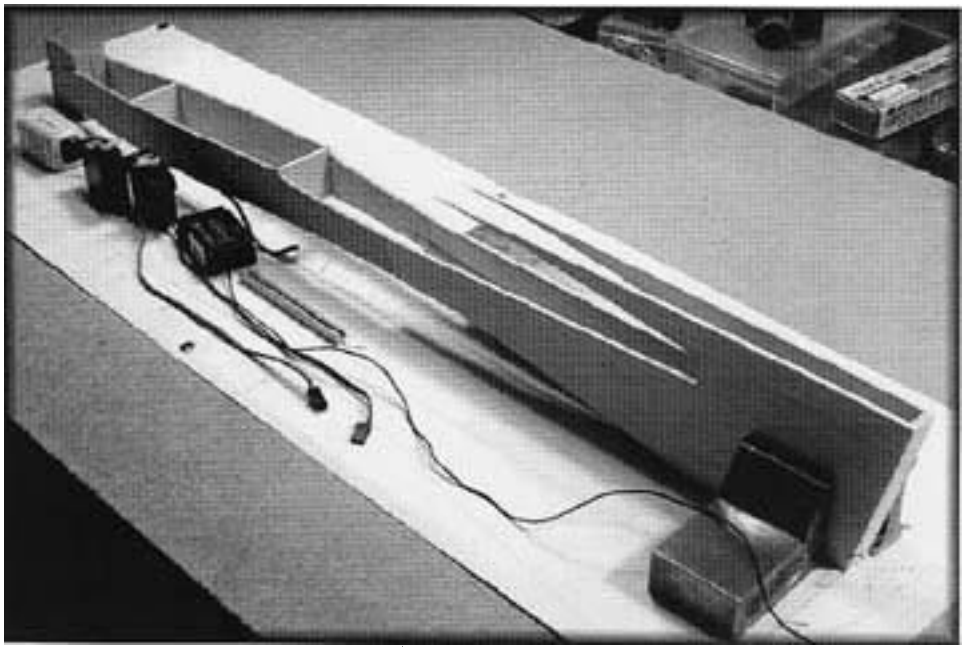


Photo 2

The canopy was initially formed by using the aluminum fuselage template to mark the outline and our 24" jig saw to make quick work of the cutting process. This roughly formed piece was then tacked to the fuselage and the final shaping started. We began with a heavy duty razor plane, then moved to an 80 grit PermaGrit plate attached to an aluminum T-bar, and finally used a 220 grit PermaGrit mounted on a T-bar

Photo 3

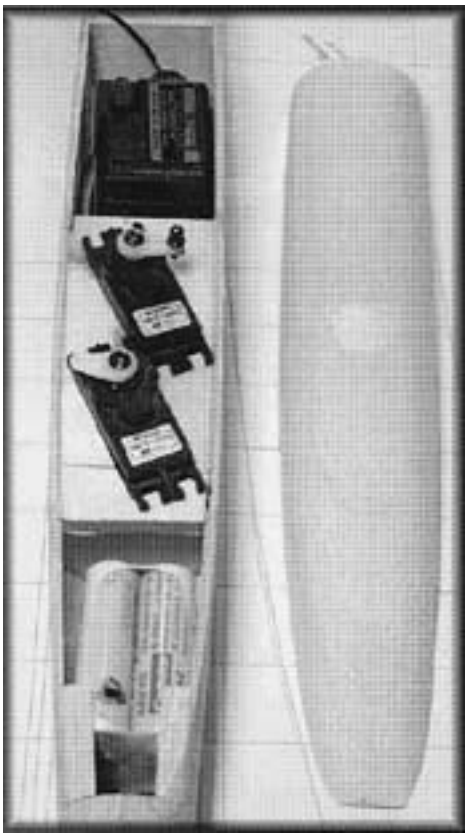


Photo 4

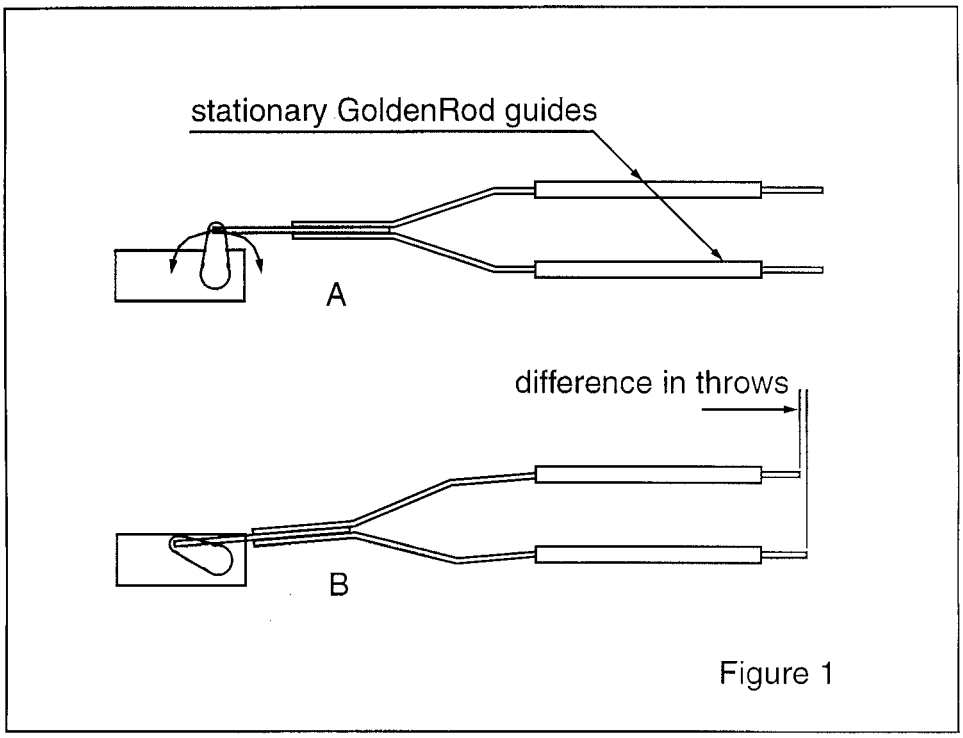


Figure 1

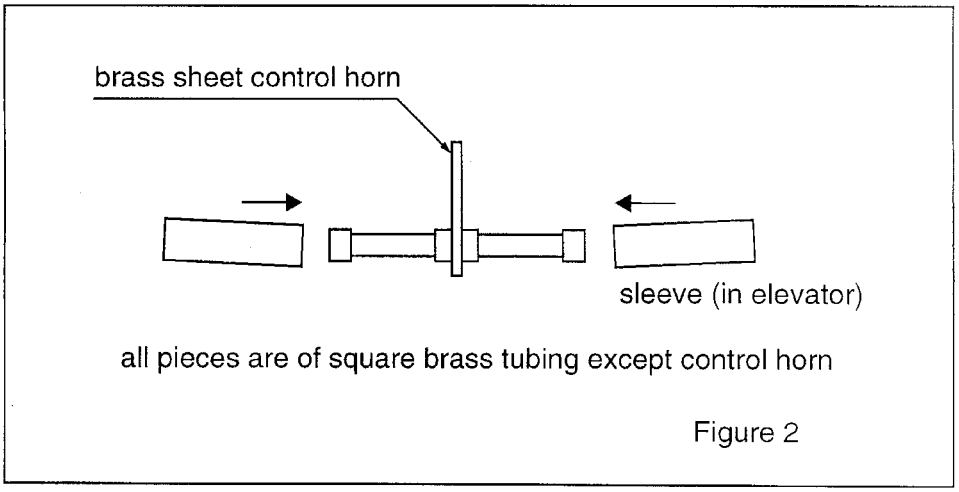


Figure 2

to get a good finishing surface. The canopy cross-section was checked with a series of plastic semicircle templates along the way.

To hollow the canopy and obtain a uniform thickness, we used a round router bit in a drill press. We set the distance between the router bit and the table to 1/8 inch, and then slid the canopy into the rotating blade. Work was slow, as we had to make sure that the exterior of the canopy contacted the table at a point directly under the router blade at all times. Things looked great after several minutes of cutting, so we finished off the inside with some 80 grit sandpaper attached to a dense sponge.

The exterior of the fuselage bottom contour was then shaped using the same basic techniques as the canopy.

As can be seen in the photos, the fuselage structure was beautiful from start to finish. We are extremely pleased with the final contour.

Elevator connection

The second difficulty came about when we tried to hook up the elevator halves to the servo. To explain our final solution in proper perspective, we have to quote a portion of Installment 2:

> "Since the center of the wing is bent to form the dihedral, it's somewhat difficult to fabricate and install a torque tube arrangement to drive the elevators. We chose instead to drive both elevators through a single servo using a forked control cable. This does pose some geometry difficulties when hooking up the connection to the servo. We'll cover both the problem and our solution in the next installment.
>
> "GoldenRods serve as the push-pull connections between the servo and the elevators. Because there is no area above the wing to run the pushrod assemblies, we drilled appropriately sized holes in the dihedral brace and leading edge sheeting. The photo of the completed wing may have enough detail that the elevator hookup can be discerned."

We were introduced to this problem in Dean Pappas' "R/C Pattern" column in *Model Aviation*, and thought we could get around it in some surreptitious way. We'll start by explaining the problem (elevator differential) and then describe our not so clever solution.

The forked control cable posed a

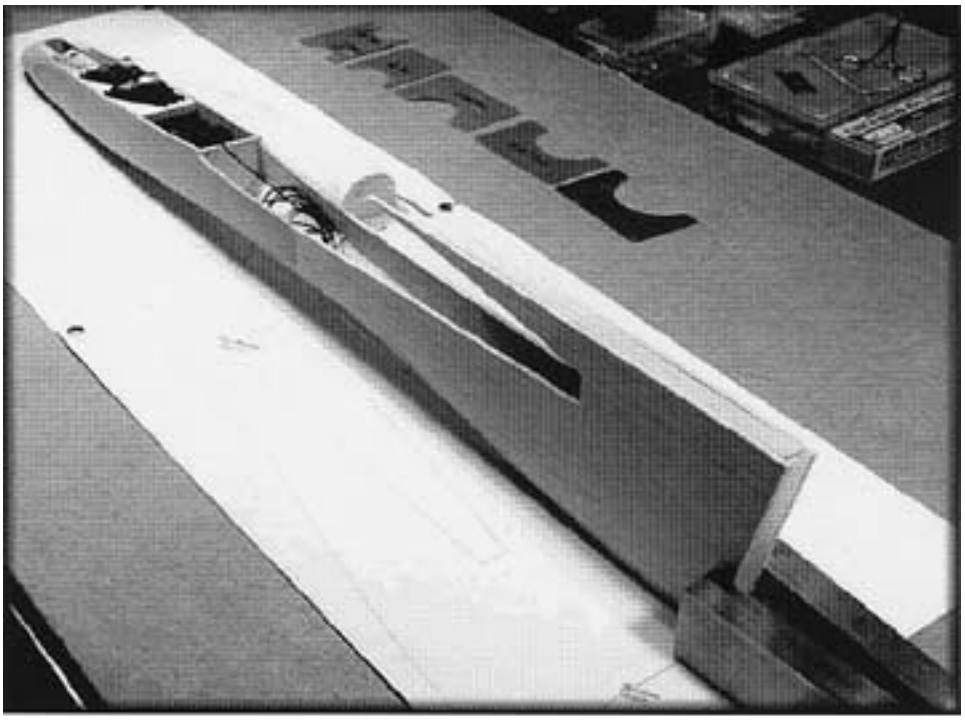
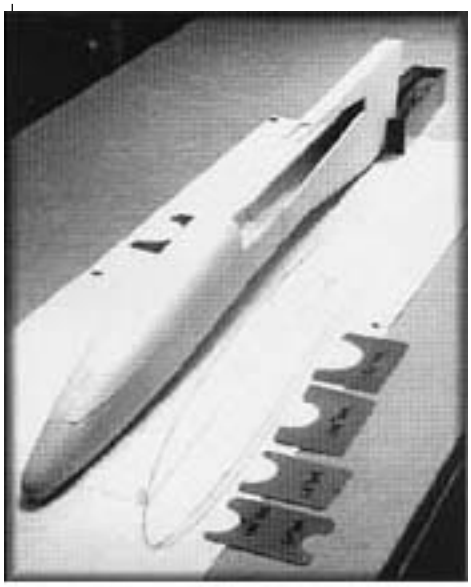


Photo 5

Photo 6 (Below)



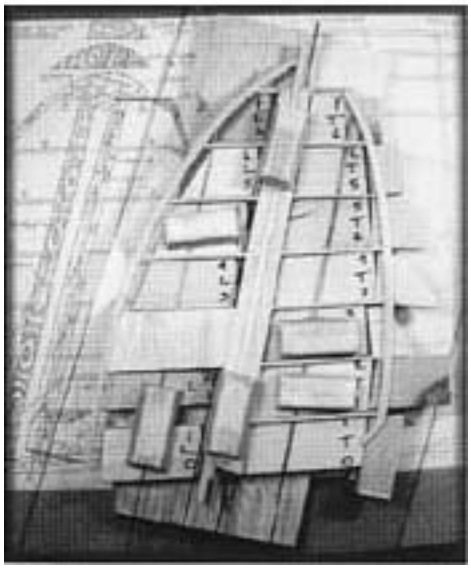


Photo 8

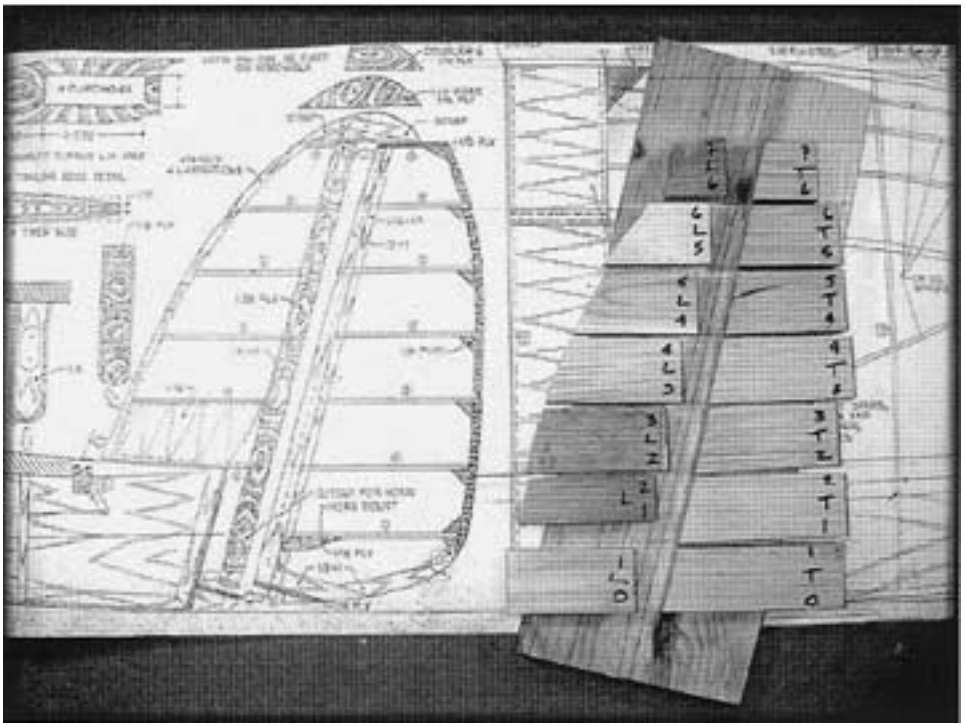


Photo 7

Photo 9

severe difficulty when it came to making a connection which would deflect both elevator halves the same amount throughout their travel. Imagine a Y-shaped pushrod arrangement where the split sections drive the two elevator halves and the stem portion is attached to the servo output wheel. As the servo wheel turns, the stem moves in an arc, tilting the split end. The two elevator control horns then do not move the same amount. See Figure 1. As can be noted from this illustration, as the length of the pushrod is reduced, the angular difference caused by servo rotation becomes more pronounced and the differential increases. On a tailless model like the R-2, the pushrod is so short that the differential is unacceptable.

In a larger fuselage, the servo could simply be laid on its side. The servo arm would then rotate through a vertical plane and eliminate the problem at its source. Unfortunately,

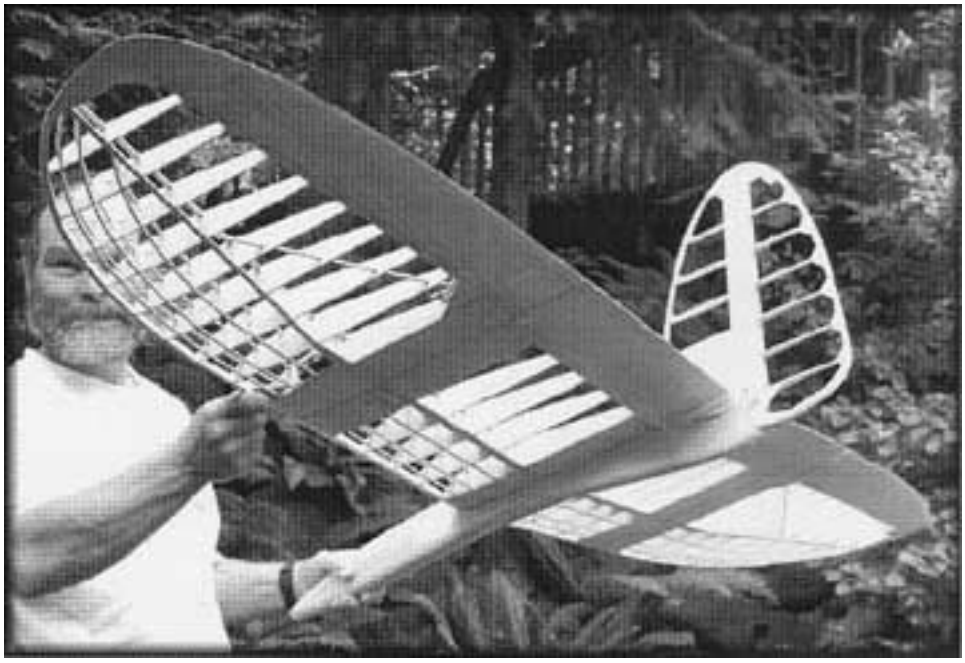
Photo 10

Fin and rudder

Both the fin and the rudder are of the same parabolic shape as the wing, and both use nicely streamlined symmetrical airfoils. The only straight lines in these structures are the trailing edge of the fin and the leading edge of the rudder. Rather than exercising our brain cells to develop a jig which would use the building table as a base and involve a large number of negative ribs and blocks of varying thickness, we decided to use a jig of the type often used to construct wings for control line stunt ships.

As can be seen in Photo 7, we used a large piece of 3/4 inch pine as a base and added custom cut pieces of 3/4 inch pine. These pieces were quickly cut on a table saw using just a few measurements. Each block was shaped to follow the rough outline of the flying surface, allow room for hinge point fabrication in place, and create slots of 1/8 inch width for the ribs.

Photo 11 (Below)



the servo we chose to use is too large to be placed in the fuselage in a horizontal position. There are also some mechanisms which can be attached to the servo output shaft to provide a linear rather than rotational output. We could not utilize this option because of minimal clearance with the canopy.

Our solution? We went back to the plan we had originally rejected — a torque tube arrangement. We successfully used a similar fixture in our Pioneer II-D, so it took only a short time to get something constructed for the R-2. Figure 2 gives the general layout of this assembly. Once the elevators were hinged to the main portion of the wing using small Klett hinges, the ends of the torque tube were inserted in the receptacles. A U-shaped stay was then bent from 5/32" music wire, slipped over the control horn, and the ends inserted into the trailing edge of the wing center section. This stay prevents the assembly from sliding side to side and removing itself from one elevator side.

The pushrod is connected to the servo arm by means of a standard clevis, and a similar clevis connects the aft end of the pushrod to the single elevator control horn. In the end, we used only one of the two elevator pushrod tracks we had initially set up. With the single pushrod, we don't have to worry about elevator differential, and the parts at the elevator end are fairly maintenance free over the long term.

The finished wing and fuselage were set up in a machinist block jig and permanently attached to each other with 30 minute epoxy.

While cutting out the ribs, we drilled two holes in the centerline of each rib in such a way that it could be slid onto separate lengths of 3/32 inch piano wire. The music wire was then placed across the blocks and the ribs were inserted into the predetermined gaps.

Lead weights were strategically placed to temporarily hold the music wire firmly on the blocks. The trailing edge

of the fin and the leading edge of the rudder were then glued to the ribs to act as anchors for the rest of the fabrication process. The leading edge of the fin was laminated exactly as we had the leading edge of the wing, and glued in place. We chose not to use the music wire hinging of the original, and rejected the hollow tube leading edge for the rudder in lieu of a more simple box structure. The plywood trailing edge of the rudder was cut using an aluminum template and reinforced with a number of balsa gussets. Photo 8 shows the completed fin and rudder structures in the jig.

Once everything was glued together, the parts were removed from the jig and large Klett hinges were used to connect the fin and rudder assemblies. Photo 9 shows the completed fin and rudder in place on the fuselage. After covering, mylar hinge gap seals will be installed to prevent air leaks.

Completed framework

Photos 10 and 11 show the completed R-2 framework.

We're extremely pleased with the lines of the completed fuselage, especially the ventral fin which shows well in Photo 10. We were a bit concerned about this area, as it underwent a complete change of outline during the design process. The fin has to be deep enough to drive the wing to a negative angle of attack upon contact with the ground, yet be both streamlined and smoothly integrated with the fore portion of the fuselage which is based on the *Model Builder* Raven.

We're very eager to start 'glassing, painting, and covering.

Next installment

The final installment in this series will cover fiberglassing and painting the fuselage, covering the wing and fin-rudder assemblies, and test flying. As was true with our last project(s), weather is going to be a large factor in the timing of Part 4 of the R-2 saga, as that will determine when the test flying occurs.

In the meantime, we're always open to suggestions for future columns, and always eager to hear of reader projects. We can be contacted at P.O. Box 975, Olalla WA 98359-0975, or at <bsquared@appleisp.net>.

References

Kuhlman, Bill & Bunny. "Our Pioneer II-D at 60 Acres." *RCSD*. March 1996, pp. 16-17.

—. Full size plans for a quarter scale model (129.5" span) of Jim Marske's Pioneer II-D can be purchased from Harry Volk, Cirrus Aviation, P.O. Box 1375, Nanton Alberta T0L 1R0, Canada. (403) 646-1188. Price is US$35.00, including packing and postage. *Model Builder* Raven plans from Bill Northrop's Plans Service, 2019 Doral Court, Henderson NV 89014-1075; (702) 896-2162 M-F 10A-5P Pacific, FAX (702) 897-7775 any time.

Pappas, Dean. "R/C Pattern." *Model Aviation*. April 1998, pp. 40-41.

■

HAVE SAILPLANE, WILL TRAVEL!

Richmond Dale Ridge seen from the landing field, out behind the rabbit farm. Take-off slot is visible near the crest of the hill at center. John Alden photo.

By Tom H. Nagel
904 Neil Ave.
Columbus, OH 43215
tomnagel@iwaynet.net

Flying with the Ohio Fliers Hang Glider Club Richmond Dale, Ohio

First, there are three things you should know about Steve Warren:

1. He has served pastrami to Bill Clinton at his deli.
2. He has lots of customers who poach in my office parking lot.
3. He flings himself off mountains with wings strapped to his back.

I guess I have known Steve and his wife Diane for 15 years or so, ever since they opened Katzinger's Deli, right behind my law office. If you order a deli sandwich at Katzinger's they yell out your name when it is ready. Diane could never remember my name, so I started giving her a different name every time I went in.

"What can I get for you today?"
"Smoked turkey on challah."
"Name?"
"Attila."

About the third time (after Attila, Wolfgang, and Ebenezer, if I recall correctly), she started getting my name right. But even after 15 years of motza ball soup and chopped liver on whole wheat, it never came up that Steve was a hang glider pilot, and that I flew RC sailplanes. A mutual acquaintance finally tipped us off. Ever since, we had been talking about meeting up at Richmond Dale, the place Steve calls Ohio's premier hang glider flying site.

Richmond Dale slope is located about an hour south of Columbus, Ohio in Ross County, just about ten miles south east of Chillicothe on Rt. 35. Chillicothe is a Native American word that means "smells like a paper mill." Chillicothe was the first capitol of Ohio, but the legislature eventually moved to Columbus, because they had too much trouble spelling Chillicothe. Also, the football was better in Columbus.

As you drive south out of Columbus, down the Scioto River valley, the first real hills you come to are at Chillicothe. Those are the same wooded hills that are seen on the Great Seal of the State of Ohio. Mead Paper owns those hills, and that's where the smell comes from.

Mead owns the hill at Richmond Dale, too, and has leased space for a cell tower on top of it. The hang glider folks made a deal with Mead about 25 years ago to use the road and part of the hill; and they cleared out a wedge-shaped field on the side of the hill for take offs. The hang glider folks land out across the valley, but RC pilots have to try making a downwind uphill landing back at the 3 acre take off field. The bottom of the hill is just too far away to fly RC accurately enough allow an RC pilot to keep the wings level and the attitude adjusted for a landing.

John Alden and Larry Wright are the two noted Ohio hang glider pilots who put the deal with Mead Paper together.

John Alden photographed himself circling several hundred feet above Richmond Dale Ridge. The access road is on the ridge line; the takeoff zone is the cleared area in the center right part of the photo.

John explained the process to me, which involved scouting out slopes from the road, investigating ownership, gaining permission, and then actually clearing land for a "takeoff slot." The process took time, and had some reverses in it. One site John and his friends used was owned by a local judge. He decided to end permission when there was a fender-bender on Rt 35, caused by drivers watching the hang gliders overhead instead of watching the road.

What clinched the deal with Mead Paper, John says, is the fact that his friends formed an official chapter of the American Hang Glider Assn, thus making third party liability insurance coverage available for the landowner. Richmond Dale is now the "home field" for the Ohio Fliers. There are about 80 active hang glider pilots statewide, which isn't bad, considering the glacial flatness of most of the state.

In addition to Richmond Dale, the Ohio Fliers launch from other slopes I have mentioned in this column: the Big Hill at Plainfield, Ohio and Dean's Farm at Malvern, Ohio. John was good enough to give me some leads on other slopes in the Central Ohio area of which I was unaware. Our local RC club will be making trips to new sites in the near future - including one that I think may be workable for dynamic soaring.

Richmond Dale works best with a southwest wind. Hang gliders need 15 to 20 mph winds to work there. They claim that the ridge is flyable for about a mile north to south, and that they have about 490 feet above ground level from their takeoff point. Because of the shape of the hill, RC slopers see their ships more than a few hundred yards left or right, but there is plenty of room to fly out front.

In the last decade, hang glider pilots have learned how to thermal, and Steve tells me that it is not unusual for them to gain 5000 feet after leaving Richmond Dale. The longest known cross country hang glider flight in Ohio, about 75 miles, was flown by John Alden, starting at Richmond Dale.

I first flew Richmond Dale in late November, 2001, on the day before deer season was to open in Ohio. We had hunters scouting the woods and game wardens scouting the hunters, as John and I drove up the steep narrow access road that exists courtesy of a local cell phone company. There was a surprising amount of parking space, a porta potty and a big cell phone installation, all nestled in the heavily wooded hilltop. John started setting up his hang glider, and I unpacked my trusty old Zagi LE and the RPVI U-2.

One look at the landing zone convinced me to stick with the Zagi for the first outing. I have more stick time on the Zagi, it can maneuver more tightly, and it is already as beat up as an RC sailplane ever gets. The lift was absolutely amazing, and I was having a ball doing climbing loops and vertical upward rolls, when I began to realize that sooner or later I was going to have to try landing. John assumed I knew what I was doing as I dove back toward the hill and its relatively tiny takeoff slot. I ducked over the tree line, about a hundred feet or so below where I was standing, and then pulled up parallel to the hill. The Zagi ran out

of airspeed and energy right at my feet, and sort of plopped over into an inverted stop. I managed to repeat this performance on the next flight, and started feeling cocky.

Later, John launched himself, zipped up his "body bag" and we flew in formation for about 15 minutes. John hit a thermal and disappeared back over the crest of the hill. It was getting late, and I had a turkey in the oven and needed to get home, so I landed for the third time, and without an audience managed to fly uphill right into a tree trunk. After a short hunt for the winglet, I headed down the hill to leave, only to find that the game warden had locked the gate behind him on his way out — and I was locked in! John was 2800 feet up, but saw my predicament and landed across the road with the key.

Directions

If you are traveling through south central Ohio, here is how to find Richmond Dale hang glider slope:

Check your odometer and go 10 miles SE out of Chillicothe on Rt. 35. As you hit 10 miles, you will see a cell tower up ahead on the left, and Caldwell Cemetery conveniently located on your right. The next intersection is Higby Road, marked by a combination craft store and rabbit farm. (Remember, this is rural south central Ohio.) Higby is a T intersection, running west only. The access road to Richmond Dale slope is right across the road, marked by an orange metal gate and a sign that says "Pick Up Trash or Don't Park Here." Sounds fair to me.

The gate is locked unless someone is flying. If you don't have a key, be prepared for a pretty fair hike up to the top, prefaced by a quarter mile hike south along the gravel road, before the trail starts to climb. Expect to see hunters and backpackers along the way. The Ohio Trail runs through the area, and during the windy fall weather Mead Paper hosts a lot of deer and turkey hunting on the land.

Special Safety and Cooperation Statement

Common sense and safety considerations must take a high priority when flying RC sailplanes around hang gliders. We all spend so much time around our wonderful RC toys that we rarely worry about being hit by a plane. When spectators or visitors are on the field, we all need to be more careful. And when real live people are hanging from tube and fabric wings out in front of us, we need to be extremely cautious.

If hang gliders are aloft at Richmond Dale, don't launch unless invited to. The hang glider club leases the space; everyone else is just a guest. Fly away from hang gliders. Give them a wide berth, in both slope and thermal lift.

Announce your landing attempts in advance - and in view of the narrow slot at the top of the hill, it is probably best to ask other folks to clear the area when you are heading in.

Volunteer to test for lift or thermals.

Help out on the field. Brush clippers are always welcome. The hang glider club spends a lot of time and effort clearing their flying space.

That being said, there seems to be plenty of opportunity for hang gliders and RC sailplanes to cooperate and coexist. We often fly in lighter lift or colder temperatures than the hang glider folk. We fly closer in and land back at the top; the hang glider folks tend to move away from the launch site, seek higher altitudes, and land out away from the slope. And of course, the hang glider folk are always glad to have a "slope dummy" rc plane go out and check the lift before they launch themselves off the hill.

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This column is dedicated to soaring vacations. If you have a favorite sailplane saga, consider writing it down for *RCSD*. If you are planning a vacation that includes your plane and transmitter, consider making notes as you go, and working up an article later. Take photos. Collect maps. And send your story to Tom Nagel at tomnagel@iwaynet.net for gentle editing and suggestions.

Tom

(continued from page 5)

faster than the inner wing. For polyhedral wings, the excess lift on the outer wing produces a strong roll response until the rudder correction compensates. Since the rudder acts through yaw-roll coupling, there is a slight delay. You can sometimes see this in launches where the plane rolls left, then yaws right and straightens out in the first 20 feet or so after launch. This looks like a high drag maneuver you don't really need.

When using the peg, you normally allow your arm to lag the twist in your torso through about three-quarters of the spin. In the last quarter, you use your torso muscles and the lag with your arm to provide a final whip to the launch. Since the plane is free to rotate around the peg, the force is applied at the inboard wing while inertia allows the outboard wing to lag. At the moment of release, there's better velocity balance between the wing tips and thus less roll response to correct.

Picture 2 shows part of the launch rotation. Note that the aircraft angle is lagging behind the angle of the launching arm. I'll also note that the aircraft is at its high point in the spin and that part of the maneuver is deliberate.

Launch calculations suggest that there is an additional 10 feet or so of altitude to be gained by launching nearly vertical as compared to the more usual 45 to 60 degree launch angle. To facilitate this steep launch, I've found it useful to swing the plane high at ~ 225 degrees into the spin and then drop low between 270 and 315 degrees so a steep upward release can carry good momentum through the release and arm follow through.

The results of all the above are seen in Picture 3.

Final topic this time is the gyrostabilizer. At first this sounds like an intimidating high tech, high cost option. Cost is a consideration as these units run ~ $50 (about the cost of the two micro servos in your HLG). And yes, they are fairly high tech. But for the end user they are basically set and forget. In most cases, the factory settings will be very close to where you want to be.

A piezoelectric gyrostabilizer is simply a solid-state device that produces an output signal in response to a change in the force applied to the unit. The level of output is proportional to the input (force applied).

For our purposes, the single axis piezogyro is perfect. When aligned with the yaw axis, the output is used to drive a servo to counteract the yaw direction. Since the servo output from the receiver also passes through the gyro circuit, the rudder servo operates under normal pilot control in the absence of a strong externally applied yaw force.

The only trick is aligning the piezogyro axis properly. You can install it to ENHANCE the yaw response which leads to interesting and often destructive launch gyrations. If this happens, flip the gyro end for end and try again (assuming there is enough plane left to make this worthwhile).

Due to servo rotation directions and linkage setups, it's not possible to uniquely say which way your gyro should point. The gyro axis needs to be vertical but that doesn't define up or down. With a gyro installed, a sharp counterclockwise (left) twist of the airplane (as viewed from above) should produce a brief right rudder response. If the rudder moves in the direction of the twist, then flip the gyro over and it should be OK.

Finally, I'd highly recommend checking out some video clips provided by Craig Coles on the Inter Mountain Silent Flyers web site. Craig captured these at the 2001 IHLGF and they can be downloaded and viewed in the QuickTime viewer available as a free download from the Apple web site. It's very instructive to view some of these a frame at a time to be able to visualize some of the effects we've discussed in this column.

Thanks very much to all those who helped me work through the first phase of this project. For those who haven't tried this method, you gotta do it. Once the ship is set up properly, the method is almost foolproof. This past weekend (mid-January) I let a young, novice pilot SAL my ship and he had no problems either launching or flying and he'd never touched a DLG/HLG up to this point.

That first zoom launch will have you staring slack-jawed in wonder at what you've done. But the launch only last about 2 seconds so don't gape too long before you get back on the sticks!

Reference Material:

MPG-10 Cirrus Piezo gyro from Hobby People:
http://www.hobbypeople.net/gallery/444510.htm

PG-03 Micro-Gyro-System from Todd's Models:
http://www.toddsmodels.com/servo.htm

IHLGF Pictures and Videos, Craig Coles on the Inter Mountain Silent Flyers web site:
http://www.silentflyer.org/ihlgf01.html

QuickTime Viewer (free download):
http://www.apple.com/quicktime/download/

Paul Natons videos (Endless Lift 3 and others):
http://www.radiocarbonart.com/

Chris Adams Scrollsander web site (CD-ROM on HLG technical specifications):
http://www.scrollsander.com

Charles River R/C Website (plans and articles of interest to DLG):
http://www.charlesriverrc.org/articles.htm

Yahoo Chat group for SAL:
http://groups.yahoo.com/group/SALglider

Picture 3 - final launch

■

GORDY'S TRAVELS

Gordy Stahl
Louisville, Kentucky
GordySoar@aol.com

What's All the Buzz About?
(Or 'Buzzing Digitally)

On a recent trip to the CVRC (Visalia, California) thermal duration soaring extravaganza, I had an opportunity to chat with folks, and observe lots of things. But the one thing that pops into my mind right now is servos.

"Digital" has become one of the buzz-words when the topic of servos comes up. And like other electronic innovations in our hobby, and like others in the past, the word is used, yet what it means to us is not well understood.

Nope, I am not going to get into a boring electronic discussion about digital servos, or offer an opinion on whether or not they are 'better/worse' than non-digital (analog controlled) servos. This trip is about the 'buzzing' you sometimes hear from your servos.

I will say that the implication of the feature 'digital' is that the control information (battery power pulses) sent from your thumb to the servo is broken up into thousands of pulses versus hundreds. (That must be a 'good' thing, right? Isn't 'more' always better?)

Actually, like all good things, there are trade-offs or costs for most things involving energy and the digital thing is no exception. For instance, it's unlikely that the control chips have been specifically designed for the use in servos, rather they have been adapted. The early entry electronic speed controls (RC cars, boats and planes) went through a period where adapted components were found to be awesome devices... But when put to use, caused all sorts of havoc with the motors they were controlling. It was found that there was an optimum pulse rate for the motors being used, and specific to the application not just the motor components.

All that being said, it's important to consider (intimately) the components, which make up our servos:

The case and gear deck.
The gears and pins.
The amplifier.
The pot.
The motor.

Not a whole lot of things in the case to get confused about.

Pots were always blamed for servo problems and still are, yet were never really a problem. A pot (potentiometer) consists of a 'table' made of a carbon composite material and a count of wipers (some servos use pots with 2 wipers, some with 4, cost being the factor as the wipers are made of some pretty expensive materials). Actually, the pot is not unlike windshield wipers sliding across your windshield. (In fact, your windshield wipers use a pot to control their range of movement.)

With all of the technology using composite electrical contact material, pots have become a non-issue, lasting for hundreds of thousands of cycles.

The true 'weak-link' in the servo components hasn't changed in all these years: the motor. Inherently, the motors can't be made as 'durable' as the rest of the servo's components, partly due to size and partly due to friction.

Size meaning, you can only fit so much wire thickness, bearing, magnet, commutator surface, and brush contact material, into a small package. Friction meaning that if a lot of brush contact (wear area) and pressure is used, it's more resistant to current; heat and life span is used, and then the motor's ability to move micro amounts, on-demand, is compromised (slight trim commands and micro centering).

About 90% of the energy used in moving a servo, is used in getting it started moving, so it makes sense to use a motor that has as little internal mechanical resistance as possible. What that means is less component to component contact, or in the case of our servos, less brush contact to the armature's commutator.

When you have servo 'buzz', it means that the surface is attempting to move the servo from the instructed position (by your thumb+TX). The servo happily will sit idle (as long as there is nothing internal to cause the gear train to resist the position instruction).

Yes! It is the resistance in clevis, linkage, controlled-surface weight, or hinge stiffness that causes a servo to buzz. The amplifier says, "Here is where you gears and motor are supposed to go." The pot says, "Okay, we're here." And everyone rests – unless something is attempting to get it to move from its assigned spot.

So, if Buzz is caused by something keeping the servo's components from resting at their instructed position, the solution to 'Buzz' is to look for that something.

Digital Buzz versus Analog Buzz:

A recent craze in our hobby is the trend toward Digital Servos. Multiplex (MPX) having taken the lead with JR and others following. MPX took the digital idea to the most interesting and valuable step by including the ability to independently 'program' their digital servos for various tasks. Such as slowed or increased speed, limited or expanded travel stepped operation, and probably some other features, as well. (A separate (available from MPX) programming device is needed.)

A 'digital' servo uses an amplifier, which pulses the servos drive motor's information thousands of times versus hundreds. It is easy to tell a digitally controlled servo by listening to it work or by stalling it. A high frequency whine can be heard, versus more of a 'growl' heard on analog amplifier servos.

One of the big touts from digital servo suppliers, or at least digital servo owners, is the idea of substantially increased 'holding' power. That is, if an Analog servo with 30 oz. of torque has, say 90 oz. of torque, the reported holding power of a like torque digital

may be 180 oz. or more... And who wouldn't want that? More is 'better' isn't it? "Better" being the key word.

Let's take a look at the energy chain in your sailplane's radio system. Starting with the battery, what happens if you were to short the battery wires? Big smoke!

Okay, let's move down the way some. What happens if you short the servo plug power wires at the RX? Big smoke again! But hold it, where is the first spot in the trail that would get hot first?

Not the wires, nor the plug. The thinnest material carrying the power from the battery in this chain would be the RX's circuit board traces. They become the 'heating' elements first.

Moving down the power trail, that is the servo leads going to the wings, shorting the power wires just before the servos would cause the same result, as the wires and connectors are thicker than the RX's circuit board traces.

Moving out to the servos, while they certainly have circuit boards in them, the focus of current in a stalled (sort of shorted) servo is at the motor's 'brushes' (thin alloy metal wipers which act as brushes). The reason for this is the small amount of contact surface and their light 'touch' to the motor's armature commutator plates.

The reason a digital amplifier controlled servo 'whines' when operated or stalled is simply because the motor is being actuated (power-pulsed) thousands of time per minute. Meaning that the armature is sort of kicking in gear against the load attempting to move it from its instructed holding position.
pulsed fast or slow, the brushes get hot. It could be argued that with a high frequency pulsing of the digital servo, the brushes stay in contact at the same spot on the commutator, accumulating more wear on a single spot.... Due to its improved 'holding' power. With an Analog controlled servo with less holding power the motor is allowed to be overcome or moved slightly.

Also, electric RC flyers learned early on that Ferrite Magnet motors didn't last long with high frequency controllers as the high pulsing worked the magnets harder, causing them to heat up, losing their magnetic fields, giving rise to the popularity of Cobalt Magnet motors and ultimately brush-less motors. Our servos all use Ferrite Motors.

So, are Digital Motors good or bad, better or worse than Analog servos? Digital amp'd servos do have the benefit of improved centering. Their high rate power pulsing aides the servo's motor in finding that micro spot of rest, indicated by the TX stick and your thumb.

However, take into account there is a 'cost' to that ability, and 90% of surface 're-centering' is due to less than firm servo mounting, skin flex, linkage slop, growth and shrinkage of airframe materials, quality of power connections, hinge stiffness or friction and surface weight. All that pulsing uses more battery, initial purchase cost is higher, and the added 'holding' power adds little value beyond digital servos as both usually exceed the needs of our application. (IF you keep that servo arm short!)

Having said all that, the digital craze is pushing servo mfg'rs to find more efficient motors, gear train designs and digital amplifier circuit components, better matched to our application and the motor designs available for use in servos.

One of the biggest sources of re-centering quirks: your TX's stick friction (dirt causing binding), stick return spring tension, stick and trim lever pot health and, to a degree, the temperature of your transmitter's internal components, as heat causes 'drift' in electronic component + or – accuracy.

So, what's the moral of this story? Servo buzz shortens any servo's precision serviceability. Using a 5-cell pack, without a properly rated voltage regulator, is a sure way to send those servos (and maybe your sailplane) to RC heaven, well before their time.

As I listed in the beginning of this article, servos consist of more than an Amplifier; choosing the right one for your application should include a number of criteria, such as size, power, mounting convenience, speed, current consumption, cost and application.

Remember what I said in previous article? Buzz words like 'metal gears' can trick us. Lead is metal, mercury is metal, aluminum is metal, however it's unlikely those are what you would chose as the 'metals-of-choice' for your tough application installations.

MPX USA (Karlton) deserves a tremendous amount of credit for pushing awareness of new radio component technology, available until now only, outside the USA modeling market. Their Programmable Digital Servos, the MPX high end TX's and their new IPD (processor controlled/filtered) RX's, just to name a few MPX innovations show that our modeling future still has a lot of new and exciting developments in store.

.... And that's the 'Buzz' on this trip!

You can see more about MPX USA products by checking out Karlton's web site, www.Multiplexusa.com.

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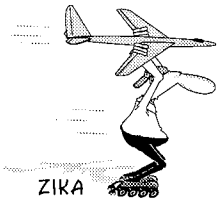

Visalia 2001
CVRC Visalia Fall Fest
300 pilots, first weekend of October

Top Ten Pilots! Really close scores!

1	VERA, EDGAR	SWSA	OPN	2338
2	CLERX, BEN	HSS	OPN	2310
3	TIMBS, NORM	PBSS	OPN	2301
4	JOY, GEORGE	TPG	OPN	2297
5	COPP, TOM	HSS	OPN	2296
6	MARKIEWICZ, ARTHUR	TPG	OPN	2296
7	ZUCKER, DAVID	PBSS	OPN	2295
8	TAYLOR, MARK	HSS	OPN	2293
9	AKERS, THOMAS	PBSS	OPN	2289
10	TRIEBES, MARK	SVSS	OPN	2287

Photography submitted by Gordy Stahl, courtesy of Silent Wings Soaring Association.

Top 2 Meter: Bob McGowan 'Perenial' 2 meter Champion

(Left) Visalia's Landing Zone 5-10-25... This one is OUT! (Don't land off the grass! The landing area was plush grass, outside of it was NOT!)

SCHEDULE OF SPECIAL EVENTS

June 21-23, 2002
Mid-South Soaring Championships — Atlanta, GA
www.atlantasoaring.org
Tim Foster, (770) 446-5938

Aug. 31-Sept. 2, 2002
SOAR UTAH — Salt Lake City, UT
www.silentflyer.org

Please send in your scheduled 2001 events as they become available!

NEW PRODUCTS

The information in this column has been derived from manufacturers press releases or other material submitted by a manufacturer about their product. The appearance of any product in this column does not constitute an endorsement of the product by the R/C Soaring Digest.

Handy Tool Box Epoxy Kit
...from Willoughby Hobbies

Willoughby Hobbies is now offering and all purpose, self contained, complete five minute epoxy package for instant repairs to broken wing tips, split fuselages (wood or fiberglass), or a dinged rudder. Small enough to fit in most flight jacket pockets, it is a two part, colorless epoxy packaged with a mixing container and snap off, replaceable plastic caps joined together as are the tubes of epoxy, making it mandatory to dispense equal amounts with no concern regarding the proper mix. A black mixing paddle is also furnished to allow rapid application to the damaged part with a set up time of less than five minutes — working time, in normal flying weather, under ten minutes, thus providing a PSI strength of 1500 lb. per square inch when cured. It can also be used to mend concrete, glass, china, and plastics. Available for $5.00 first class mail, plus $.80 for postage and handling. Send money order to: Willoughby Hobbies, 31 SE Thompson Ave. #14, Winston, Oregon 97496. ■

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Classified ads are free of charge to subscribers provided the ad is personal in nature and does not refer to a business enterprise. Classified ads that refer to a business enterprise are charged $5.00/ month and are limited to a maximum of 40 words. *RCSD* has neither the facilities or the staff to investigate advertising claims. However, please notify *RCSD* if any misrepresentation occurs. Personal ads are run for one month and are then deleted automatically. If you have items that might be hard to sell, you may run the ad for 2-3 months.

For Sale - Business

PARACHUTES: $12.50 (includes S&H U.S.A.) Send check or money order to Dale King, 1111 Highridge Drive, Wylie, TX 75098; (972) 475-8093.

DesignAire: EASY TO USE AIRCRAFT DESIGN SOFTWARE (PC). 3-D sketch, performance, Wt/Bal, inertias, color graphs, panel analysis, static stability, airfoils, FAR 23A loads and envelope. Runs "airfoil ii". $119. JammAero POBox 69, Wallops Island VA 23395. www.jammaero.com.

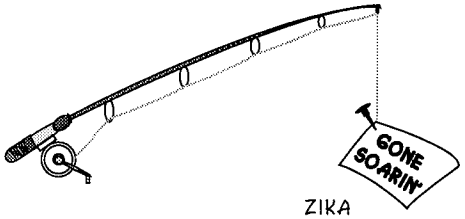
BUZZ WALTZ R/C DESIGNS: For sale while supply lasts: Maria & Little Birdy - Speed 400 sailplane kits: $21.00 each postage incl. Buzz Waltz R/C, 68-320 Concepcion Rd., Cathederal City, CA 92234, 760-327-1775 or www.buzzwaltzrc.com.

Reference Material

Summary of Low-Speed Airfoil Data - Volume 3 is really two volumes in one book. Michael Selig and his students couldn't complete the book on series 3 before series 4 was well along, so decided to combine the two series in a single volume of 444 pages. This issue contains much that is new and interesting. The wind tunnel has been improved significantly and pitching moment measurement was added to its capability. 37 airfoils were tested. Many had multiple tests with flaps or turbulation of various configurations. All now have the tested pitching moment data included. Vol 3 is available for $35. Shipping in the USA add $6 for the postage and packaging costs. The international postal surcharge is $8 for surface mail to anywhere, air mail to Europe $20, Asia/Africa $25, and the Pacific Rim $27. Volumes 1 (1995) and 2 (1996) are also available, as are computer disks containing the tabulated data from each test series. For more information contact: SoarTech, Herk Stokely, 1504 N. Horseshoe Circle, Virginia Beach, VA 23451 U.S.A., phone (757) 428-8064, e-mail <herkstok@aol.com>.

BBS/Internet

Internet soaring mailing listserve linking hundreds of soaring pilots worldwide. Send msg. containing the word "subscribe" to soaring-request@airage.com. The "digestified" version that combines all msgs. each day into one msg. is recommended for dial-up users on the Internet, AOL, CIS, etc. Subscribe using soaring-digest-request@airage.com. Post msgs. to soaring@airage.com. For more info., contact Michael Lachowski at mikel@airage.com.



Books by Martin Simons: "World's Vintage Sailplanes, 1908-45", "Slingsby Sailplanes", "German Air Attaché", "Sailplanes by Schweizer". Send inquiries to: Raul Blacksten, P.O. Box 307, Maywood, CA 90270, <raulb@earthlink.net>. To view summary of book info.: http://home.earthlink.net/~raulb

T.W.I.T.T.

(The Wing Is The Thing)

T.W.I.T.T. is a non-profit organization whose membership seeks to promote the research and development of flying wings and other tailless aircraft by providing a forum for the exchange of ideas and experiences on an international basis. T.W.I.T.T. is affiliated with The Hunsaker Foundation which is dedicated to furthering education and research in a variety of disciplines. Full information package including one back issue of newsletter is $2.50 US ($3.00 foreign). Subscription rates are $20.00 (US) or $30.00 (Foreign) per year for 12 issues.

T.W.I.T.T., P.O. Box 20430
El Cajon, CA 92021

The League of Silent Flight (LSF) is an international fraternity of RC Soaring pilots who have earned the right to become members by achieving specific goals in soaring flight. There are no dues. Once you qualify for membership you are in for life.

The LSF program consists of five "Achievement Levels". These levels contain specific soaring tasks to be completed prior to advancement to the next level.

Send for your aspirant form, today:

League of Silent Flight
c/o AMA
P.O. Box 3028
Muncie, IN 47302-1028 U.S.A.

http://www.silentflight.org

Sailplane Homebuilders Association (SHA)

A Division of the Soaring Society of America

The purpose of the Sailplane Homebuilders Association is to stimulate interest in full-size sailplane design and construction by homebuilders. To establish classes, standards, categories, where applicable. To desiminate information relating to construction techniques, materials, theory and related topics. To give recognition for noteworthy designs and accomplishments.

SHA publishes the bi-monthly ***Sailplane Builder*** newsletter. Membership cost: $15 U.S. Student (3rd Class Mail), $21 U.S. Regular Membership (3rd Class Mail), $30 U.S. Regular Membership (1st Class Mail), $29 for All Other Countries (Surface Mail).

Sailplane Homebuilders Association
Dan Armstrong, Sec./Treas.
21100 Angel Street
Tehachapi, CA 93561 U.S.A.

The Vintage Sailplane Association

Soaring from the past into the future! The VSA is dedicated to the preservation and flying of vintage and classic sailplanes. Members include modelers, historians, collectors, soaring veterans, and enthusiasts from around the world. Vintage sailplane meets are held each year. The VSA publishes the quarterly BUNGEE CORD newsletter. Sample issues are $2.00. Membership is $15 per year. For more information, write to the:

Vintage Sailplane Association
1709 Baron Court
Daytona, FL 32124 USA

The Eastern Soaring League (ESL) is a confederation of Soaring Clubs, spread across the Mid-Atlantic and New England areas, committed to high-quality R/C Soaring competition.

AMA Sanctioned soaring competitions provide the basis for ESL contests. Further guidelines are continuously developed and applied in a drive to achieve the highest quality competitions possible.

Typical ESL competition weekends feature 7, or more, rounds per day with separate contests on Saturday and Sunday. Year-end champions are crowned in a two-class pilot skill structure providing competition opportunities for a large spectrum of pilots. Additionally, the ESL offers a Rookie Of The Year program for introduction of new flyers to the joys of R/C Soaring competition.

Continuing with the 20+ year tradition of extremely enjoyable flying, the 1999 season will include 14 weekend competitions in HLG, 2-M, F3J, F3B, and Unlimited soaring events. Come on out and try the ESL, make some new friends and enjoy camaraderie that can only be found amongst R/C Soaring enthusiasts!

ESL Web Site: http://www.e-s-l.org

ESL President (99-00): Tom Kiesling (814) 255-7418 or kiesling@ctc.com