BASS NEWS

The Baltimore Area Soaring Society Newsletter

Year XXIII, Vol.III, No. 7 "Information Provider to the Glider Guider" August 2003

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The next meeting will be held on August 7, 7:30 PM, at Villa Maria or Ridgley depending on the weather.

MINUTES FROM THE JULY, 2003 MEETING

Bill Cavanaugh -Acting Secretary

President Don Vetter Called the meeting to order at Villa Maria at 7:40 p.m. We had one guest, Garrett Guide, Treasurer Tony's son.

The secretary's report of the minutes of the June meeting were approved as printed in the newsletter.

Treasurer's Report

Treasurer Tony reported that we have $741.08 in the LTRC fund. The treasurer's report was approved.

Old Business

Kevin Sharbonda reported that there was an error in the newsletter listing the contest dates, namely the July 9 date for the monthly TD contest. The correct dates are as follows:

July 19 - TD Contest
July 26 – Sovereign Contest
August 9 – Sovereign Contest
August 16 – TD Contest
September 21 – TD Contest

The two rained out Sovereign contests will be rescheduled

New Business:

Tony reported that our ad appears in the Polo Club's annual publication, which we place in appreciation of their allowing us to fly at their field.

Kevin led a discussion of our ECHLC contest, which is ESL sanctioned, and thus we have to pay ESL $2 per contestant per day to cover their costs of membership, awards, winches, etc. We don't use their winches for the HL contest, but the contestant fee is the same. We need to decide if we want our contest to be ESL sanctioned by September.

Our continuing search for new contest sites was discussed again with at least one possibility that Kevin is following up.

Our picnic event was deemed a success; everyone had a great day.

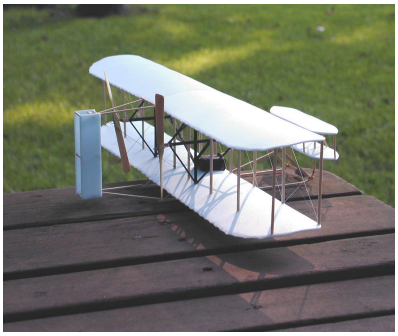
CLUB FLYING OPPORTUNITIES

Wednesdays, 1:00 PM, Villa Maria The BASS "Bald Eagles" gather at Villa Maria on Wednesdays to fly gliders and electrics. Contact Bill Cavanaugh for details: BillCavan@aol.com (443)535-0220.

Thursdays 4:30 PM, Polo Field Come out and enjoy the flying, fellowship and the scenic surroundings at our Polo field site. Visitors and student pilots are welcome. As with all our activities, gliders and electric ships are welcome.

BASS NEWS is a membership newsletter published 11 times each year by the Baltimore Area Soaring Society, a Gold Leader chartered club (#492) of the Academy of Model Aeronautics. Subscriptions are available via first class mail to non-members. Newsletter editors are welcome to reprint any article or portion of this newsletter provided that credit is given the author and BASS News. Article submissions are encouraged and should be submitted no later than the 15th of the month. We prefer submissions in either ASCII or Microsoft Word format, however other formats including printed or typed material are welcome. We reserve the right to edit any submission.

More Wright Flyer



Al Flesher has ressponded to the request for more information on the Wright Flyer.

Here is his account of some ofthe more interesting and not so well know facts about the development of flight.

1903 REVISITED - HOW DID THE WRIGHT BROTHERS DO IT?

The year 2003 marks the 100th anniversary since the brothers Orville and Wilbur Wright made the first manned heavier-than-air powered flight. Having been alive through two-thirds of this period, I have witnessed a remarkable development in flying machines. We modelers owe a great debt to the Wrights because the pursuit of our hobby would not be possible without their pioneering efforts.

On December 17, 1903, the four flights by the Wrights were stunningly successful. The first try of few inventions performed as well as this first airplane. History has not reported these first flights in a way that revealed just how successful they were. For example, we know that the first of the four flights covered a distance of 120 feet and lasted 12 seconds. This is only the diameter of the typical control line model circle. But let's examine the telegram sent to their parents in Ohio:

> SUCCESS FOUR FLIGHTS THURSDAY MORNING ALL AGAINST TWENTY ONE MILE WIND STARTED FROM LEVEL WITH ENGINE POWER ALONE AVERAGE SPEED THROUGH AIR THIRTY ONE MILES LONGEST 59 SECONDS INFORM PRESS HOME CHRISTMAS.

From these facts we can calculate that, had the flight been made in calm air, the Wright Flyer would have traveled a distance of almost 500 feet on that first flight. Orville and Wilbur wisely waited for a day with a brisk and steady wind so their plane did not need great ground speed to take off from the short launching monorail. The last flight piloted by Wilbur covered a distance of 852 feet. Against the 21 mph wind, this flight had an equivalent distance of a half mile! Not bad for an untried aircraft. After that day in December 1903, the Flyer never flew again with the same configuration.
What was it about the Wright Flyer that made it airworthy when so many others had failed? To start with, the Wrights approached the problem with systematic engineering methods. Starting in 1899, they built kites, then man carrying gliders. Their research involved a small wind tunnel which they used to evaluate various airfoil shapes. The Wright's advantage over other would be flyers came from their recognition of the problems that had to be solved.

In their studies of available literature, the Wrights understood the accepted views that a wing with dihedral provided lateral stability, a tail behind the wing would provide longitudinal stability, and that steering could be accomplished with a vertical rudder. It is puzzling that they rejected all three of these ideas. Gradually their "Flyer" took shape with many innovative design features. Some of the lesser known:

- The Flyer had an unusually low wing loading of 1.4 lb/sq. Ft.
- The front canard wing had variable camber. When inclined upward, the airfoil had undercamber. When inclined downward, the airfoil had overcamber.
- The right wing was longer than the left by 4 inches to account for the weight of the offset engine.
- The propulsion system had two counter-rotating propellers so there would be no torque effect.
- The rudder was coupled to the wing warping mechanism to provide for coordinated turns.
- The Wright's propellers were the first properly designed with twisted blades to account for varying angle of attack

1903 REVISITED- *Continued*

These successful flights were possible only because the Wright brothers had piloting skills gained through considerable glider flying. What they did not realize is that the airplane they were flying was severely unstable in pitch. Through the last 100 years the 1903 Wright Flyer has been thoroughly scrutinized by many groups. The most recent testing program was sponsored by the American Institute of Aeronautics and Astronautics (AIAA). This program was conducted in March of 1999 and involved testing a full-scale replica of the Wright Flyer in the 40' x 80' wind tunnel at the Ames Research Center. This test revealed the following characteristics of the "Flyer":

- All of the unique aerodynamic features incorporated by the Wright brothers worked as intended.
- Pitching moment coefficient about the center of gravity at zero degrees angle-of-attack is -0.07 (nose down). This was caused by the undercambered airfoil.
- There is a severe spiral mode instability due to the negative dihedral.
- The Flyer has a very severe pitch instability with static margin = -25% of chord.

The last finding deserves explanation by interpretation of the aerodynamic jargon. Modern aerodynamic theory postulates that, for an aircraft to be stable in pitch, the center of gravity must be forward of the *neutral point*. This neutral point is defined as the longitudinal location on the aircraft where the pitching moment does not change with varying angles of attack. Unfortunately, the Wright brothers had no notion of this concept nor did they have a way to determine the neutral point. Hence they did not understand the significance of the center of gravity location. Their analysis of equilibrium included only the rectilinear forces acting on the aircraft: Lift, Weight, Thrust, and Drag. They thought that the center of gravity should be at the center of pressure of the wing and they incorrectly assumed the front canard contributed no lift, but served only as a control device. Contrary to this assumption, the AIAA wind tunnel test showed that, for trimmed flight, the canard would need a deflection of at least 6 degrees.

Consequently, Wilbur and Orville located the Flyer center of gravity at 30 percent of the wing chord. The wind tunnel testing showed that the neutral point for their canard aircraft lies four inches behind the wing leading edge or 0.05 of the wing chord. This explains why the *static margin* is stated as -25% of wing chord. Imagine flying one of your R/C ships with the center of gravity 25 percent behind where it should be. It would be a very exciting non-flight.

Of course, there is little the Wrights could have done to locate the center of gravity forward of the neutral point because almost the entire aircraft is behind its location. Installing sufficient nose ballast certainly would have rendered the aircraft unflyable. Thus, the Wrights simply had to cope with the serious pitch instabilities of their canard aircraft. Fortunately, due to the Flyer's low flying speed of 31 mph, its response to instability was slow and, as history has proven, flight was possible.

Experience with the 1903 Flyer led to a new design in 1905 which had a much longer nose and a reduction of static margin to -8%. Two years later their 1907 Flyer had an even longer nose and the static margin was reduced further to -5%. At this point the Wright brothers decided to abandon the canard configuration with its difficult-to-fly characteristics. Their next aircraft, Model B of 1910, had the complete tail aft of the wing in the so called "conventional" configuration. At last they had a stable airplane and the rest is history.

I hope each of us will find a way to celebrate the accomplishments of the brothers Wright in this centennial year of flight.

Polo Field Reminder

BASS is very fortunate to have access to the Maryland Polo Field for contest and sport flying. BASS members are reminded that the posts should not be moved. Also, be sure to keep the entrance gate locked.

Sovereign Contest(?) July 26
Bill Cavanaugh

After our rain-out of our first two Sovereign One-Design contests, our first one actually held on July 26 was not much of a contest. Of the twenty-something Sovereign kits in the club, you might think that we would have at least eight or ten contestants, as we did last year. I am sorry to report that this was not the case. We had exactly one contestant show up, in addition to Joe Allulis and myself, who ran the contest. We held it anyway, and Kevin S. was the hands-down winner after both Joe and I had a problem with the winch. It was clearly too strong for Sovereign wings if you were not VERY careful on launch.

Our next Sovereign One-Design contest is scheduled for August 9. In light of the dismal turn-out for this one, Joe and I have decided that it is not worth our effort to haul all the equipment to the field and set it up unless we are going to have at least six contestants. So we will have pre-registration. If you plan to fly your Sovereign August 9, call me at 443-535-0220, or Joe at 410-465-4853 as soon as possible, but not later than August 6. Otherwise contest and the One-Design concept is over for this season. Maybe July 26 was a fluke and everyone was out of town or something.

However, if you are interested in continuation of the one-design concept, now is the time to participate.

Some Pilot Humor
courtesy of Pete Schlitzkus and the internet

In his book "Sled Driver", SR-71/Blackbird pilot Brian Shul writes:

I'll always remember a certain radio exchange that occurred one day as Walt (my back-seater) and I were screaming across Southern California 13 miles high. We were monitoring various radio transmissions from other aircraft as we entered Los Angeles airspace. Though they didn't really control us, they did monitor our movement across their scope. I heard a Cessna ask for a readout of its ground speed. "90 knots" Center replied. Moments later a Twin Beech inquired the same. "120 knots," Center answered. We weren't the only ones proud of our ground speed that day...almost instantly an F-18 smugly transmitted, "Uh,Center, Dusty 52 requests ground speed readout." There was a slight pause then the response, "525 knots on the ground, Dusty." Another silent pause. As I was thinking to myself how ripe a situation this was, I heard a familiar click of a radio transmission coming from my back-seater. It was at that precise moment I realized Walt and I had become a real crew for we were both thinking in unison. "Center, Aspen 20, you got a ground speed readout for us?" There was a longer than normal pause... "Aspen, I show 1,742 knots." No further inquiries were heard on that frequency"

In another famous SR-71 story, Los Angeles Center reported receiving a request for clearance to FL 60 (60,000 ft). The incredulous controller, with some disdain in his voice, asked "How do you plan to get up to 60,000 feet? The pilot (obviously a sled driver), responded, "We don't plan to go up to it, we plan to go down to it." He was cleared.

There's a story about the military pilot calling for a priority landing because his single-engine jet fighter was running "a bit peaked." Air Traffic Control told the fighter jock that he was number two, behind a B-52 that had one engine shut down. "Ahhh" the fighter pilot remarked, "The dreaded Seven-Engine Approach".

Taxiing down the tarmac, the DC 10 abruptly stopped, turned around and returned to the gate. After an hour-long wait, it finally took off. A concerned passenger asked the flight attendant, "What exactly was the problem?" "The pilot was bothered by a noise he heard in the engine," explained the flight attendant. "It took us a while to find a new pilot." "TWA 2341, for noise abatement turn right 45 Degrees." "Center, we are at 35,000 feet. How much noise can we make up here?" "Sir, have you ever heard the noise a 747 makes when it hits a 727?" "Roger Center...Right 45 degrees.

BASS CONTEST RESULTS

June Contest - E Schlitzkus, CD
Two-meter, two function - no altitude controls

	Contestant		1		2		3		4		5		Total Score Raw	Total Score Norm	Place
1	E. Schlitzkus	E	5:01	25	4:42	0	5:55	0	6:02	25	1:58	25	###	###	1
			324		282		355		383		143				
2	A. DeRenzis	E	1:48	0	2:22	0	2:42	25	6:00	25	4:19	25	###	859	4
			324		98		187		385		284				
3	J. Allulis	E	3:50	95	4:57	89	7:00	79	3:09	79	3:02	85	896	602	9
			108		118		365		88		217				
4	Al Flesher	S	4:50	25	2:07	0	5:45	0	5:28	0	3:49	25	###	911	2
			315		113		345		328		254				
5	R. Bennett	E	4:41	25	3:36	25	5:55	25	4:14	25	1:56	0	###	889	3
			306		241		380		279		116				
6.	K. Sharbonda	S	1:54	25	1:44	0	5:25	25	4:43	25	3:00	25	###	743	6
			139		104		350		308		205				
7	P. Schlitzkus	E	5:01	25	1:59	25	2:50	25	2:57	25	4:34	25	###	782	5
			324		144		195		202		299				
8	S. Myers	S	4:12	0	1:50	0	3:19	0	3:17	0	2:59	0	937	630	8
			252		110		199		197		179				
9	J. Appling	E	3:20	25	4:26	0	2:02	25	4:00	25	3:00	25	###	728	7
			225		266		122		265		205				

July Contest - Tony Guide, CD
Unlimited Thermal Duration

	Contestant		1		2		3		4		Total Score Raw	Total Score Norm	Place
1	E. Schlitzkus	E	4:35	10	6:01	10	7:04	25	6:58	10	1523	924	3
			285		369		441		428				
2	A. DeRenzis	E	5:10	25	5:09	25	6:09	10	7:06	10	1452	881	4
			315		334		379		424				
3	J. Allulis	E	4:54	10	4:32	10	6:59	10	6:46	10	1433	870	5
			306		282		429		416				
4	R. Bennett	E	5:01	25	6:05	25	7:01	25	7:04	10	1574	955	2
			324		380		444		426				
5	K. Sharbonda	S	2:35	10	3:37	25	7:07	25	3:25	10	1060	643	6
			165		242		438		215				
6	T.Guide	E	5:04	50	6:22	25	6:59	50	6:59	50	1647	1000	1
			346		363		469		469				

TASKS

1st Round 5: Minute flight, 2nd Round 6: Minute flight
3rd Round 7: Minute flight, 4th Round 7: Minute flight

Buy and Sell

All new JR radios;
JR 378 complete set with either 4 ballbearing 537 standard or two JR micro
and the R700 very small slimline 7 channel receiver. Standard new set at $290.
and with micro servos$305. Also 4 new 537 servos for $75. Bernie
410-296-0321
SHADOW, 2M fiberglass fuselage, wings balsa covered foam $110 With 6 installed servos $199. Mike Miecznikoski (410) 668-8775

Last Sunday your president and your editor were flying, (actually Don was doing the flying and I was doing the talking) We started talking about the importance of effective rudder use during the turbulent flying conditions Don was experiencing. The discussion brought to mind Russ Bennett's article which is on our website, and also the following article by Dr. Mark Drela, which I had seen on Denny Maize's Polecat Aeroworks site (www.polecataero.com). With the generous permission of both Dr. Drela and Denny Maize, here is some heavy-duty "must" reading for all pilots, and certainly BASS Glider Guiders.

"DLGs especially benefit from a good left thumb."

Using the Rudder in Thermal Flying

by Mark Drela

Purpose of ruddering

Maximizing the performance of your aileron sailplane when thermal flying requires effective use of the rudder. The main objective is to minimize the sideslipping which naturally results from the roll and yaw motions during typical thermalling manuevers:

rolling in and out of turns
maintaining a steady turn
adjusting the turning radius

Aileron to rudder mixing can somewhat reduce the maximum sideslip angles during these maneuvers, but it can never completely eliminate them. The reason is that the required rudder deflection is not in general proportional to aileron deflection. In fact, they frequently must go in the opposite directions(!), as in the case of a slow tight sustained turn.
Flight path geometry and sideslip

Figures 1a and 1b show the geometry of steady turning flight, with and without rudder deflection. In each case, the vertical tail tries to yaw the glider so that the apparent wind at the tail lines up with the tail's zero-lift line. In other words, the vertical tail seeks its zero-lift position.

Using the Rudder in Thermal Flying *Continued*

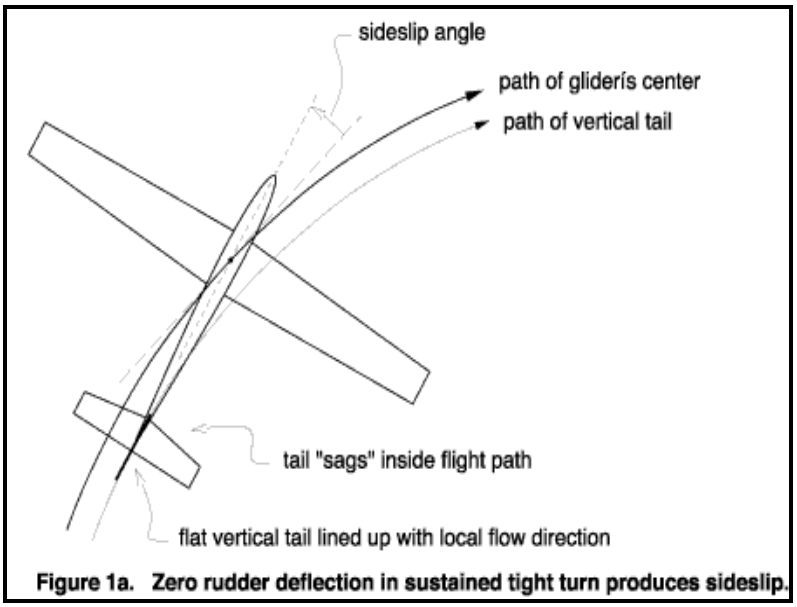


Figure 1a. Zero rudder deflection in sustained tight turn produces sideslip.

In Figure 1a, no rudder deflection is used, resulting in the tail "sagging" inside the glider's flight path, and a sideslip is present. In Figure 1b, the rudder is deflected such that the sideslip is eliminated. The tail now rides outside of the glider's path, giving the illusion of skidding (negative sideslip), although the wing in fact sees zero sideslip all along the span. This is likely to be the lowest-drag flight orientation

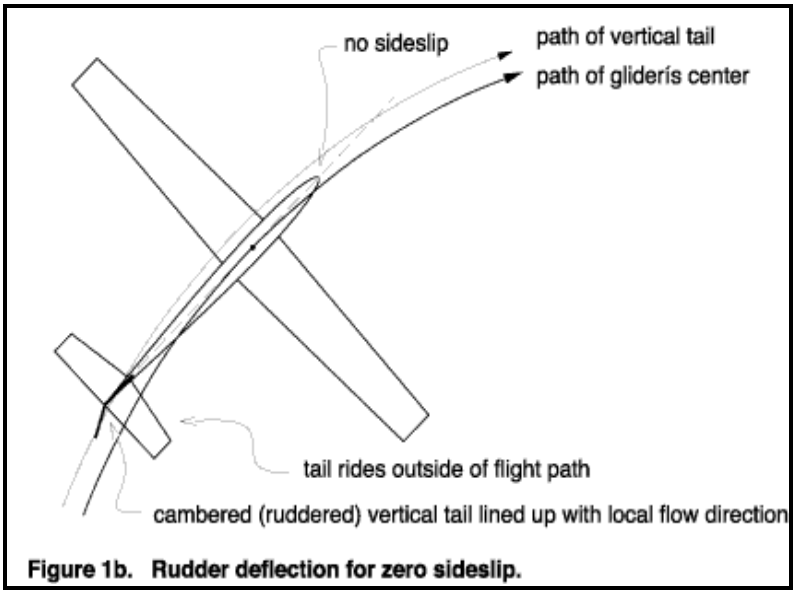


Figure 1b. Rudder deflection for zero sideslip.

A simple experiment

As a motivation for learning effective ruddering, first do a simple flight experiment in calm air, sketched in Figure 2.
Establish a straight slow glide, and note the L/D and sink rate.
Apply 20 degrees (or about 50%) left rudder, and just enough right aileron to keep the wings level. Some elevator may also be required to maintain pitch trim. The glider will now fly at a 10-15 degree right sideslip.
Note the reduction in L/D and increase in sink rate.

Using the Rudder in Thermal Flying *Continued*

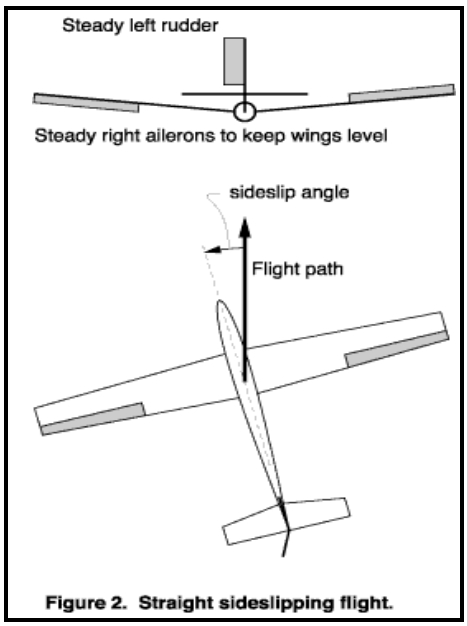


Figure 2. Straight sideslipping flight.

Such sideslip angles and resulting performance losses are typical in aggressive thermalling maneuvers at slow speeds if the left thumb is asleep. In turbulent thermals it is not uncommon to occasionally see sideslip angles of 30 degrees or more, with each such sideslip excursion resulting in considerable altitude loss. Skillful ruddering will prevent these from occurring.

Rolling into a turn

To prevent the appearance of sideslip in a turn like that shown in Figure 1a, it is necessary to coordinate the rudder input appropriately with the ailerons. The example here, calculated with a simulation program, shows the control inputs required for one specific Discus-Launched Glider, flying at a particular weight and airspeed, and reaching a specific bank angle. The required control inputs for another set of conditions or another type of glider will of course be different. The control input values shown are intended merely to be representative to allow visualizing what's going on.

Figures 3a and 3b show turn-entry maneuvers for a DLG in a fairly slow glide at 11 mph, CL = 0.7, close to the minimum-sink speed. In each case, right aileron is applied, ramping up from 0 to 10 degrees over a 0.5 second interval, and then immediately ramped back down to 0 degrees over the next 0.5 seconds. The glider reaches a 30 degree bank angle over the entire 1.0 second interval. Consider two different rudder actions during this roll entry maneuver:

a) 1:1 Aileron to rudder mixing, left thumb asleep.

In this case the right rudder exactly follows the right ailerons in the ramp up and ramp down over the 1.0 second interval. Figure 3a shows the resulting glider motion. Note that a severe sideslip develops during the ramp-down as the slaved rudder is (incorrectly) neutralized along with the ailerons. The large sideslip is sustained throughout the subsequent steady turn.

b) 1:1 Aileron to rudder mixing, left thumb applies proper rudder deflection.

In this case, substantial right rudder is independently applied by the left thumb as the intended bank angle is approached and the ailerons are neutralized, as shown in Figure 3b. This right rudder is then sustained throughout the subsequent steady turn, producing a minimal slideslip angle. Note that this rudder action cannot possibly be achieved with any kind

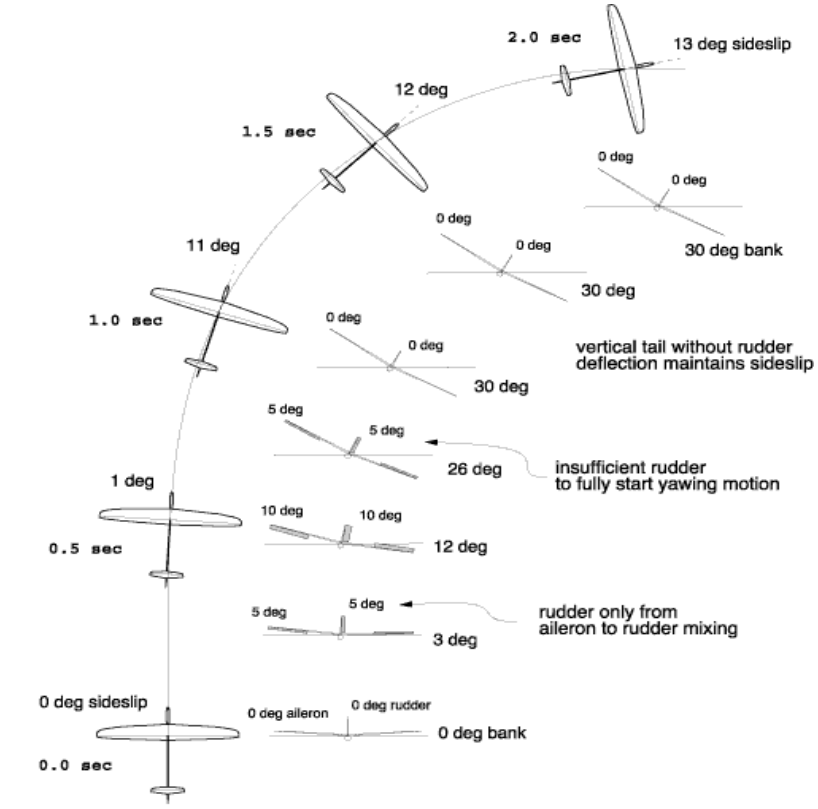


Figure 3a. Sideslip development during turn entry with no independent rudder input.

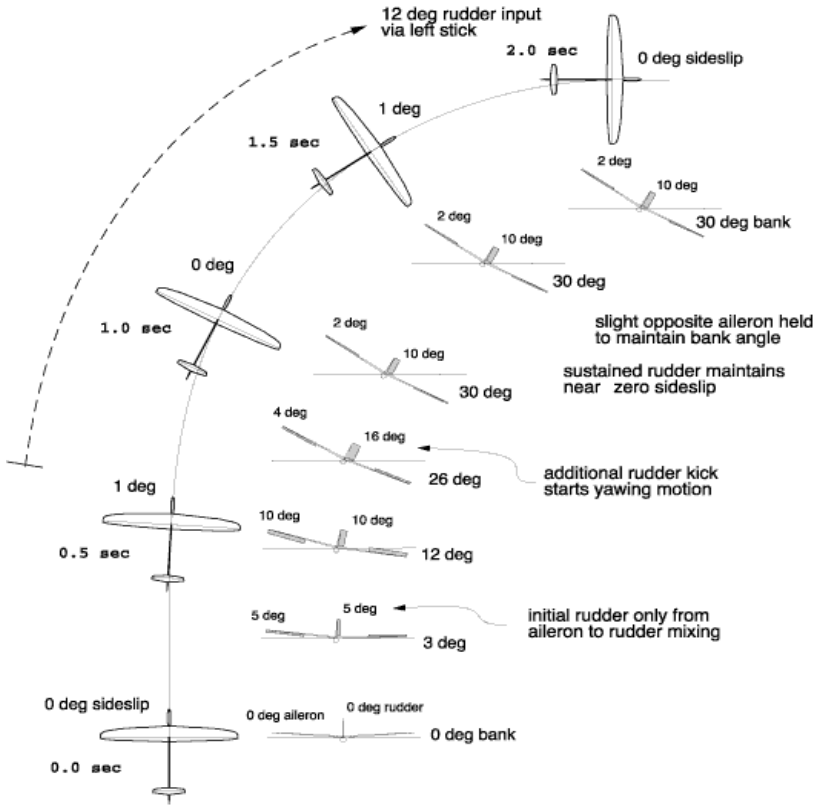


Figure 3b. No sideslip during turn entry and in sustained turn with proper rudder input.

Sustained banked turn

a) Left thumb asleep.

The last aircraft position in Figure 3a shows the 13 degree sideslip which results when no rudder is held during the turn.

The slight aileron deflection required to sustain this steady turn depends on the amount of sideslip and the dihedral angle (zero aileron deflection is shown). With little or no dihedral, some opposite aileron must be held to maintain the bank angle and prevent rolling into the turn. With generous dihedral, some rolling moment is already provided by the sideslip/dihedral combination (just like in a poly glider), and the required held aileron deflection may be either into or out of the turn.

b) Proper ruddering into the turn.

The last aircraft position in Figure 3b shows the control deflections required for a slow, tight, steady sustained turn without sideslip.

The lack of sideslip means that some opposite aileron must be held to prevent rolling further into the turn, regardless of the amount of dihedral. In fact, one way to discern if a sufficient amount of rudder is being held (in addition to observing the sideslip) is to note the average aileron stick position which is being held to maintain the steady bank. Adjust the rudder until the ailerons must be held slightly opposite. This will produce efficient nearly zero-sideslip circling flight.

Effects of airspeed

How much rudder input is required depends considerably on the flight speed. In general, the higher the flight speed, the less rudder action is required. The examples in Figures 3a and 3b are for a slow thermalling turns. In contrast, the same glider in a fast upwind glide will require little or no ruddering.

Other types of gliders

DLGs have unusually long tail arms relative to their turning radius, and hence require considerable rudder input in steady turns. This in fact makes them excellent left-thumb trainers, because the sideslip resulting from poor ruddering is relatively easy to see.

Large TD gliders are likely to have short tails relative to their turning radius, and also a smaller vertical tail volume. The main consequences of this are:

> More initial rudder kick is needed to start the yawing motion upon turn entry. The 16 deg rudder deflection position in Figure 3b may need to have a somewhat larger momentary rudder input.
> Less steady rudder needs to be held into the turn to maintain zero sideslip. With relatively little aileron differential, the drag of the inside downward aileron may in fact produce a sufficient yawing moment to eliminate the need for any rudder at all.

In any case, correct ruddering for a specific glider must be learned by observing the sideslipping, and by noting whether some small amount of opposite aileron is properly being used to maintain a turn.

MEMBERSHIP

Baltimore Area Soaring Society

2003 Membership Application

Full memberships are $30.00. Junior memberships are $12.00, and associate memberships are $18.00. If you would like to join BASS, or have not renewed, please take a moment today to write out a check and send it in along with a copy of this application. Please complete all information.
2003 promises to be another award-winning year for BASS. Be part of it!

Personal Information

NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

PHONE (WORK): _____ PHONE (HOME): _____

AMA NUMBER : _____ (Valid 2003 AMA Membership is required)

LEAGUE OF SILENT FLIGHT & LEVEL (if _____

PRIMARY RADIO FREQUENCIES USED: _____ _____ _____ _____

PRIMARY PLANES FLOWN: _____

_____

NAME OF SPOUSE OR SIGNIFICANT OTHER: _____

E-MAIL ADDRESS (IF AVAILABLE): _____

Signature: _____

In what areas of the club would you be interested in becoming involved? _____

_____

How can BASS help you? _____

_____

Please return this application with a check or money order payable to BASS.

SEND TO:

Mr. Tony Guide
115 S. Shaffer Drive
New Freedom, PA 17349

BASS EVENTS

Aug	7	7:30 PM	BASS Meeting, Villa Maria
Aug	9	10:00 AM	Sovereign One Design Contest Villa Maria
Aug	16	10:00 AM	Monthly TD Contest Polo Field
Sep	21	10:00 AM	Monthly TD Contest Polo Field

BASS Meetings during the summer are held at Villa Maria, weather permitting. Otherwise, at Ridgley Middle School

From 695, North on York Road. Right on Ridgley Road (Lincoln/Mercury dealer on corner) At first light turn right on

BASS Contests start at 10:00 AM unless otherwise noted. All skill levels are encouraged to attend. Be at the field 1 hour early to help set up contest. Fun flying after events. Spectators and

SOARING SCENE

Aug	2-3	SKSS 2 Newark, Delaware
Aug	9-10	CRRC Soar-In Sudbury, MA
Aug	23-24	South Jersey Marlton, NJ
Sep	6-7	CASA Open Warrenton, VA
Sep	14	South Jersey HL Marlton, NJ
Sep	20-21	LISF Long Island, NY
Sep	27-28	CASA HLG, Rockville, MD
Oct	4	ESL End of Season, Reading, PA
Oct	10	DESS HLG XC Wilson, NC
Oct	11-12	DESS HLG Wilson, NC

*** Denotes Eastern Soaring League (ESL) sanctioned event.**

BASS NEWS

The Baltimore Area Soaring Society Newsletter

7982 Honeygo Blvd # 48

Baltimore, MD 21236

August 2003

First Class Mail