VARIOMETER

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THE UPS AND DOWNS

OF THE

KANSAS SOARING ASSOCIATION

Editor: Tony Condon

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MATT GONITZKE (2019-2020)

MIKE LOGBACK (2018-2019)
TIM DOUBLE (2018-2019)

Aerial view of Operations Building construction, via **Matt Gonitzke.**

KSA Calendar

April 6th - Spring Work Day - Sunflower

April 13th - Opening Day - Sunflower

May 7th - 15th - 15 Meter Nationals - Lancaster, SC

May 12th - 18th - 20 Meter 2 Seat Nationals - Albert Lea, MN

May 30th - June 5th - 1-26 Championships - Moriarty, NM

June 2nd - 13th - Club Class Nationals - Sunflower

June 18th - 27th - 18 Meter & Open Class Nationals - Hobbs, NM

June 22nd - July 1st - Standard & Sports Nationals - Waynesville, OH

July 1st - 5th - Women's Soaring Seminar - St. Louis

July 20th - Kansas Kowbell Klassic - Sunflower

August 19th - 24th - Region 10 Contest - Waller, TX

Spring Work Day April 6th 10 AM

Fill cracks in Runway

Clean up hangar

Inspect and photograph Woodstock project for sale.

Wash towplanes

Make towropes

Check out base station radio

Inspect operations Building progress.

??????

Notes from the President

Greetings KSA! It has been a long but busy winter. I had a great time flying the Formula 1.0 Grand Prix in Australia but between that and the holidays I fell behind on newsletter editing. Then being behind just kept getting me further behind. Work got busy. Excuse excuses, so here is the first issue of the year. I intend to stay ahead of the ball for the rest of the year and publish monthly!

So, what's been going on?

Monthly Meetings - Wednesday nights seem to be working well with strong attendance at the meetings over the winter. We will stick with this and target April 17th for our spring safety meeting. Anyone interested in presenting?

Club Class Nationals - Organizing committee has met a few times. We've identified a CD, Hugh Grandstaff, and are awaiting approval of that by the SSA. **Paul Sodamann** is in charge of ground operations again this year. We're working on confirming a couple extra towplanes and towpilots. **Leah** has put together a sponsorship prospectus. Would you or your employer be interested in sponsoring? Let her know! Additional projects - increasing RV hook up capability, identifying prizes for daily winners and trophies for overall winners, organizing dinners and outings.

Operation Building - The operations building is progressing well! **Mike Davis** has taken on the roll of inspector and has been making nearly daily trips to Sunflower to keep an eye on the progress, identify any issues quickly, and be our eyes and ears. The contractors have been quick to answer questions and concerns. As of this writing the building is almost if not completely sided and sheetrock sanding is nearly complete, which means that interior installation, flooring, painting etc is the next step. Last I heard they are back on schedule which would mean the building will be handed over in mid May. There will be work to be done between then and June 1 to have it ready to use and ready for the contest.

Windmills - NextEra Energy is planning to build a wind farm in southeast Reno County. **Andrew Peters** has been in contact with them since the beginning of the project. He and others have attended several meetings of the Reno County Commissioners and Reno County Planning Committee in the last year or so. In the beginning of the state legislative session, a bill was introduced in committee that would've established statewide setbacks for wind turbine construction. KSA & SSF both submitted written testimony to the committee in support of the bill. Summer Gajewski was a big help in getting the required 50 paper copies delivered to the state house by the deadline. The bill did not make it out of committee. **Andrew** is speaking at the upcoming (April 4) meeting of the Reno County Planning Committee to encourage that they establish setbacks from airports in the county plan. Independently of that, I have been in regular contact with NextEra to establish a written agreement between NextEra and us that would establish a setback within 3 miles of the runway (to the end of the runway) with a 5 mile protected zone off the ends of the runway at a 50:1 slope. I will share this with you once we have an agreement.

Grob - Work has continued steadily on the Grob. All gel coat removal work is complete. We have been working almost nightly on patching up the skin where needed. Once that is done then we will fill and sand the wings and control surfaces as needed, then prime and paint. We've been trying to work for an hour or two most weeknights. Let me know if you're interested in helping out.

Soaring - In case you haven't noticed, we've started to have some nice flying days. Lets get back into flying form, knock the rust of the winter off, and have some fun going soaring!

See you at Sunflower,

Tony

Sunflower Seeds

March 15th - **Mike Orindgreff** made the first soaring flight of the year, his comment: “It has been a LONG winter”

March 16th - Auto Tows! **Mike Davis** drove. **Tony Condon** instructed **Kevin** & **J Riedl**. **Mike Orindgreff** self launched. **Tony** gave **Steve Leonard** a tow for a birthday flight in his Ka-6CrPE. A nice early spring soaring day. **Jerry Boone** made an appearance in the morning, checking out the operations building.

March 17th - More Auto tows to start the day with **Tony Condon** instructing **Kevin Riedl**. **Mike Davis** again drove. **J Riedl** and **Jeff Thornburg** helped. **Michael Groszek** arrived via Mooney to aero tow. **J Riedl** got so-loed again. **TJ Rausch** made his first glider solo! **Mike Orindgreff** self launched and flew over 200km! **Dave Wilkus** flew his Diamant, SR. **Doug Fisher** flew in in his Citabria for his intro glider flight. A Comanche flew in and its pilots visited with **Steve Leonard** who was working in his hangar. **Ethan Beale** got a spring checkout and went solo. His wife Kelsey took a ride. **Mike Logback** came in in the Tailwind to visit and check out the building. The final airplane visitor for the day was **Bob Holliday** with Ruth who visited via 182. Busy day!

March 20th - **Mike Orindgreff** (F8) flew 140km.

March 24th - **Mike Orindgreff** (F8) flew 111 km.

March 26th - **Mike Orindgreff** (F8) flew 111 km, again!

March 31st - **Mike Orindgreff** (F8) flew 133 km.

TJ Rausch - Solo!

For Sale

Oudie 2 and Handheld Radio

$300

Keith Smith, kstrl.4488@outlook.com

In Memory - Richard Kirkland

Richard E.Kirkland, 84, son of Tom Kirkland and Edna (Hillebrand) Kirkland, born April 26, 1934 in Minneapolis, Kansas, died peacefully March 21, 2019. Married Darlene Postlethwaite on September 3, 1955 at Immaculate Conception Parish, Minneapolis, KS. Richard graduated from Kansas State in January 1957 and in 1961 moved to Wichita to join the Missile Division of Beech Aircraft Corp. as an electrical design engineer, retiring in 1992. Through the Beech Flying club he achieved his dream of getting his pilot's license, joining Experimental Aircraft Association/EAA. He was very active in starting the Young Eagle Program, to give children 8-18 years old their first flight, sharing his love and joy of flying. Flew his Clipped Winged Cubby that he built, and also enjoyed being a soaring pilot. Had the privilege of joining the great group of aviation enthusiasts in the Wichita Area. He is survived by his wife, Darlene, and four daughters, Sr. Mary Ann, IHM (Joni), Sisters of the Immaculate Heart of Mary of Wichita, Terri Ann Kirkland, Shawnee, KS, Laura Lara (John) of Wichita, Carolyn Andrews (Matt) of Pescadero, CA. Eight grand-children, Mark, Teresa, Beth, Maria and Paul Lara and Chance and Noah Andrews. Preceded in death by his parents and grandson, Evan Lee Lara. Rosary will be at 7:00 pm, Sunday, March 24, 2019, Downing & Lahey Mortuary, 6555 E. Central, Wichita. Funeral Mass will be at 10:00 am, Monday, March 25, 2019 at St. Paul University Parish, 1810 N. Roosevelt, Wichita. Graveside Service will follow at 3:00 pm at Highland Cemetery in Minneapolis, KS. In lieu of flowers, memorials to Sisters of the Immaculate Heart of Mary, 3550 N. 167th St. West, Colwich, KS 67030, St. Paul Parish, 1810 N. Roosevelt, Wichita, KS 67208, or EAA Chapter 88, P.O. Box 780833, Wichita, KS 67278.

Finding Lift

Tony Condon spoke at the Wichita NWS Aviation Weather Seminar about forecasting for soaring flight. **Paul Sodamann** recorded it, you can watch here:

https://www.youtube.com/watch?v=CyRAT0H4Ha8

SSA Request Birth Dates

The SSA is trying to build a better database regarding the age of its membership. To do this, chapters have been requested to collect the birth dates of their members. Please contact our Secretary/Treasurer, **Kirk Bittner** (kirkbittner@gmail.com) with your Birth Day. Thank you!

Sunflower Soaring Foundation's 2019 Board

Following is the members of the 2019 SSF BoD:

Andrew Peters - Member

Bob Hinson - President

Jerry Boone - Treasurer

Tony Condon - Secretary

Matt Gonitzke

Rob Rippy

Dave Pauly

Mike Davis

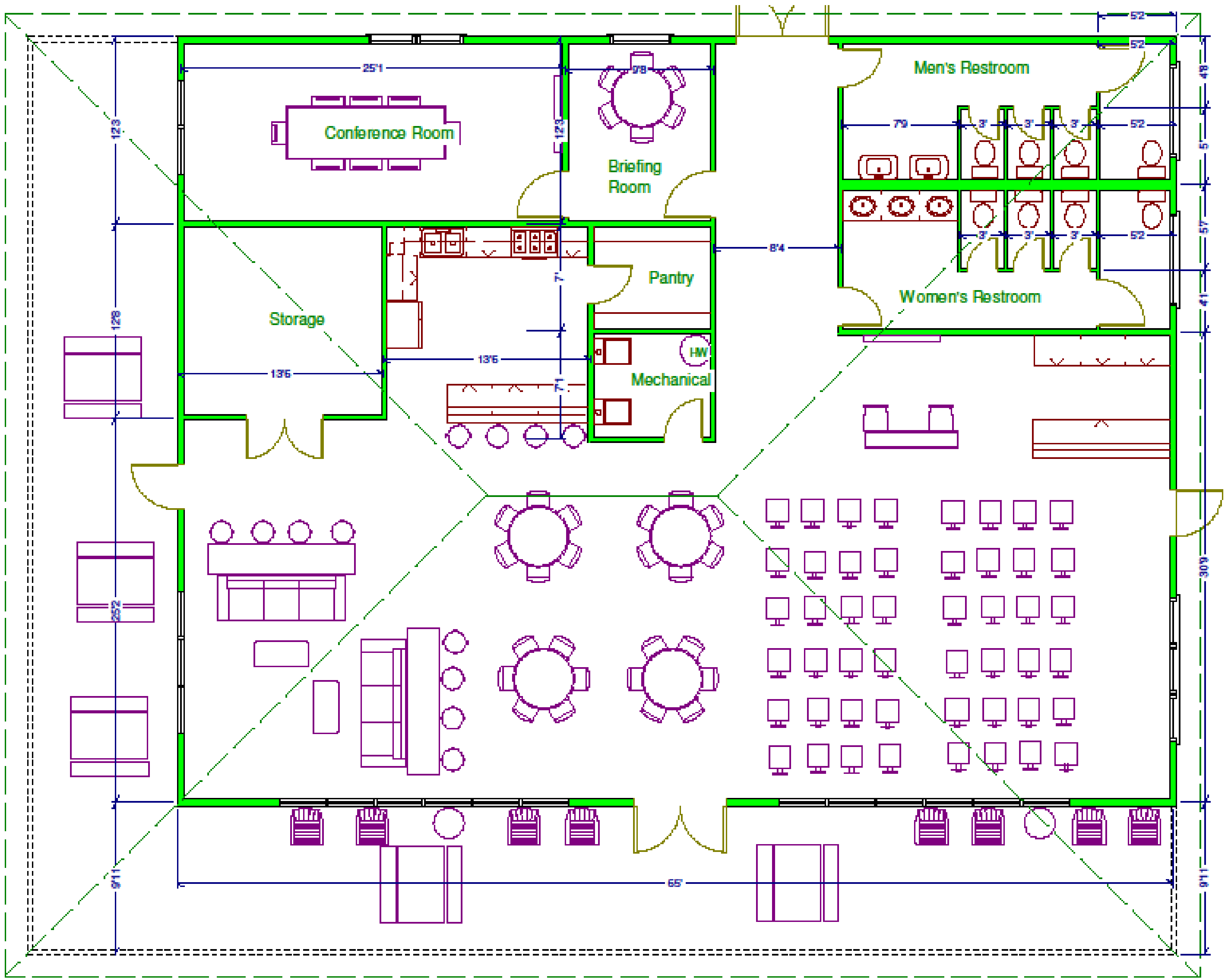
Hangar Space & Trailer Tiedowns

Rob Rippy will be managing Hangar Space & Trailer Tiedowns at Sunflower this year. Thank you **Rob**!

If you have or would like to have a glider in a hangar or a trailer at Sunflower please coordinate with **Rob.**

His email is rjrippy@yahoo.com

March 31st status of the Operations Building, via **Matt Gonitzke**. Going to be a nice view out those windows, or outside under the shade!



Conference Room
Briefing Room
Men's Restroom
Women's Restroom
Storage
Pantry
Mechanical
HW
25'1
9'8
13'6
7'
7'1
8'4
7'9
3'
5'2
12'3
12'8
25'2
9'11
65'
4'8
5'
5'7
4'1
30'9

Operations Building Furnishing Fundraiser

The Operations Building project is moving along swiftly. It should be completed in time for Club Class Nationals in June! I know that we all are very excited to have the space, however there is one potential problem!

Nowhere to Sit!

SSF has put up the money to build the building, but they are counting on us to fund the furniture! Let me make this clear...only the Foundation has put money up for the building.

This furniture fund drive was announced at the March KSA Meeting, and **Paul Sodamann** jumped out of his seat to donate the first $100. Let's all follow **Paul**'s lead and chip in to help buy the tables, chairs, bar stools etc that will finish the building out.

Contact **Jerry Boone**, SSF Treasurer, jerry@soarkansas.org to make your contribution. SSF is a 501(c)(3) and these donations are tax deductible. **Jerry** can provide you a receipt.

Early construction photo looking towards runway. Gonna be a good view!

KSA Banquet

The KSA banquet was well attended and enjoyed by all. Thanks again to **Bob Blanton** for organizing the catering and **Brian Bird** for arranging the Cosmosphere. **Steve Leonard** presented the travelling trophies with SSA State Governor **Jerry Boone** remotely awarding the Rex Hamilton Memorial Trophy. Here are the trophy winners for the 2018 season:

Wooden Wings:

Tony Condon

Mamie Cup:

Mike Orindgreff

100 KM Speed:

Bob Holliday

Dennis Brown Memorial 200 KM Speed:

Not Awarded

300 KM Speed:

Mike Orindgreff

Curt McNay Pilot of the Year:

Mike Orindgreff

Henning Memorial Trophy:

Mike Orindgreff

Praying Mantis:

Paul Sodamann

Kansas Kowbell Klassic:

Tony Condon

Kansas Kowbell Klassic Konsolation:

Not Awarded

WSA Triangle:

Jerry Boone

Club Maintenance:

Bob Hinson & **Tony Condon**

Tow Operations:

Kirk Bittner

Rex Hamilton Memorial Trophy:

Charles Pate - Years of dedication as DPE

Operational Risk Management Checklist

IVSM events have historically uncovered some flaws and highlighted some issues with older gliders, flown by visiting pilots at soaring sites (including Harris Hill) with which they are unfamiliar. Several ideas were tried at the previous IVSM event in 2016 to address this issue. One of these was an Operational Risk Management checklist designed to serve as a "self-check" on just how ready our pilots might be to undertake a flight in a specific glider at Harris Hill on a given day. This checklist covers pilot currency, aircraft characteristics, site challenges, weather, and flight complexity to aid pilots in making decisions about launching on a flight or modifying plans for the day to reduce risk. It is important to note that the checklist is only a guide and not a decision maker – that responsibility resides squarely with the pilot in command. The checklist does, however, provide one more tool to support a PIC decision. Its use will be encouraged not only at Harris Hill for our next IVSM in 2020, but also at every site where you want to fly.

Rusty Lowry

Question	*1*	*2*	*3*	*pts.*
What is your age?	Under 50	50-70	Over 70	
What is your flight time in gliders?	Over 500 hrs	100-500 hrs	Under 100 hrs	
How many glider flights have you had in the last 90 days?	More than 10	4-10	3 or fewer	
How many flights have you had in this type glider?	More than 10	4-10	3 or fewer	
How many flights have you had at this site?	More than 10	4-10	3 or fewer	
How do you feel today?	Great!	Moderate	Tired & sore	
How long have you been at the gliderport today?	Less than 8 hrs	8-10 hrs	More than 10 hrs	
What is your stress level?	Low	Moderate	High	
How long do you intend to fly?	Less than 1 hr	1-3 hrs	More than 3 hrs	
What is the temperature?	65°-85° F	32°-65° F 85°-100° F	Less than 32° F; Over 100° F	
What are the winds?	Less than 10 mph	10-15 mph	Greater than 15 mph	
What is the cross-wind component?	Less than 3	3-10	Greater than 10	
What are your glider's flight characteristics?	Forgiving/easy	Moderate	Demanding	
How comfortable are you in your glider?	Very	Moderate	Uncomfortable, doesn't fit	
What is your glider's L/D?	More than 30	20-30	Less than 20	
What is the gliderport activity level?	Low	Moderate	Busy	
What is the runway length?	More than 2000'	1000'-2000'	Less than 1000'	
What is the runway surface?	Smooth, wide grass	Tall grass or paved	Narrow paved or rough	
How are the approaches?	Good, no obstructions	Some obstructions or shear	Obstructions or windshear	
What are the off-field landing options?	Fields	Mixed	None	
Total points				

$\leq$ 34 points = Green, 35-47 points = Yellow, $\geq$48 points = Red

Green = Lower risk *(enjoy your flight!)*

Yellow = Moderate risk *(be careful out there)*

Red = Higher risk *(change something if you can)*

SUNFLOWER GLIDERPORT

Est. 1976

The Bill Seed Soaring Scholarship

The Sunflower Soaring Foundation provides scholarships to support soaring as part of its actions as a non-profit activity. This scholarship provides training at Sunflower Gliderport and Aerodrome so that qualified youth are given the opportunity to obtain glider pilot licenses that permit participation toward growth and development in all phases of soaring flight.

Bill Seed was the original owner and operator of the Sunflower Gliderport and Aerodrome. Bill supported soaring at the local, regional, and national level since the creation of the Sunflower Gliderport. This scholarship was created in the spirit of selflessness demonstrated over the many years by Bill.

The scholarship is awarded yearly to a 14-22 year old non-pilot full time student with a minimum 2.5 GPA. The application requires an essay, which must present a convincing argument that the applicant desires to participate in soaring and has an appreciation for the nature of the sport and the effort required to obtain proficiency. The essay must be of a high quality that demonstrates communication skills. Applications must be received not later than April 1st 2019. The award will be announced by April 30th. The recipient may not reach their 23rd birthday prior to September 30th 2019.

The award will consist of one year membership in SSA & Club Dues, Tow fees, Glider rental, and Instruction fees. The scholarship will be extended one year if the student has demonstrated consistent progress toward the glider pilot license goal.

The winner must participate in the SSA ABC badge program as they progress.

Applications may be obtained from and returned to the Sunflower Soaring Foundation Secretary:

Tony Condon

911 N Gilman

Wichita, Kansas 67203

abcondon@gmail.com

To learn more about soaring in Kansas, visit www.soarkansas.org

Sunflower Soaring Foundation

Bill Seed Soaring Scholarship Application

Date_______________

Name____ Age_________

Address________________________________Street DOB___________

________________________________City Gender__________

___________________State ______Zip E-Mail__________________

School of enrollment_________________________ Grade__________GPA_____

Expand answers onto separate pages if necessary. Attach Essay to this application.

Flying Experience

Experience associated with soaring

Soaring Goals

Other related Aviation Activities

Other activities, honors, and awards

Financial Need

Recommended by__________________________SSA#(not req'd) ___________Date________

To learn more about soaring in Kansas, visit www.soarkansas.org

February 17, 2019

RE: HB2273

Dear Mr. Chairman,

The Kansas Soaring Association was established in 1961 to promote the sport of Soaring in Kansas. We are a chapter of the 10,000 member Soaring Society of America. Our members across the state fly sailplanes for recreation and competition. Our main base of operations is the Sunflower Gliderport south of Hutchinson. At Sunflower we have hosted many regional and national championships. We will be hosting the US Nationals there in June 2019. There are other established soaring operations at the airport in Gardner, KS and at McMaster Field, near Wichita. Additionally there has been occasional gliding activity at many airports in Kansas, including Strother Field (Winfield), Wellington, Kingman, Newton, Ulysses, Hutchinson, Atwood, Colby, McPherson, and Jabara. Additionally, many of the airports in Kansas have at one time or another provided a safe landing site for a sailplane.

We write you today to support the concept of airport setbacks proposed in House Bill 2273. A study at the University of Kansas, Report no. K-TRAN: KU-13-6, released in January 2014, identified that the turbulence caused by wind turbines can present a high hazard to aircraft controllability. As can be seen in Figure E.1 of the report, the hazard can remain high at a distance exceeding 25,000 feet during high wind conditions. While we are fully supportive of the proposed 15,480 ft. setback, we would encourage the committee to consider extending the airport setback to 26,400 ft.

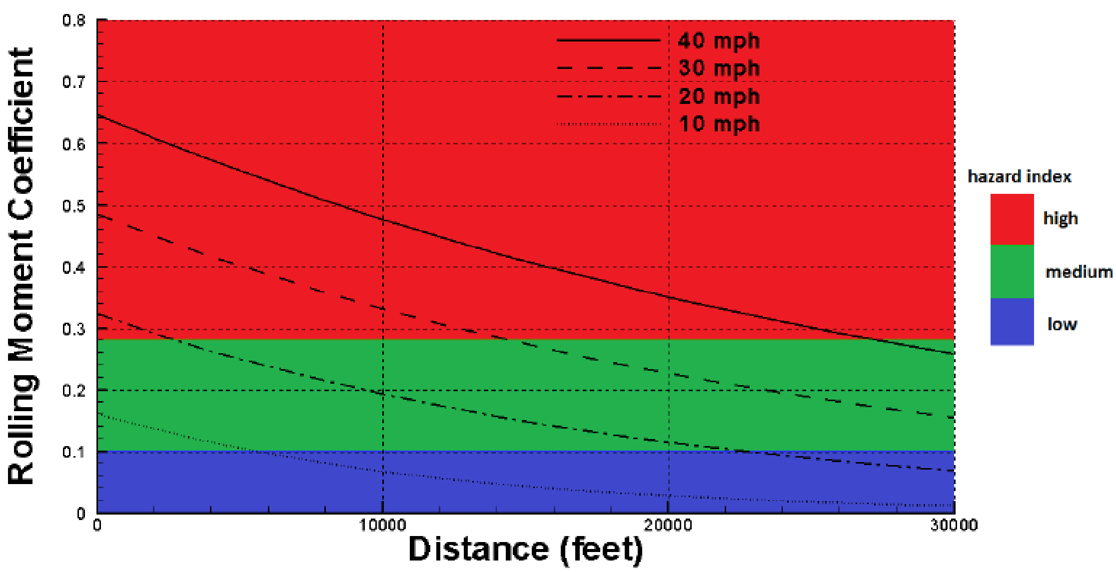


FIGURE E.1
Rolling Moment Coefficient Decay with Distance

We also encourage the committee to clarify the definition of the term "Airport" in the bill. You may be familiar with a similar statute from 2015 in Oklahoma, Senate Bill 808. Because of their loose definition of airport, the passage of this bill led to a "boom" of registered airports. These airports were, of course, being registered with the FAA for the sole purpose of landowners keeping wind turbine development away from their homes. We support the separation of wind turbine development only from legitimate established airports. Two of our states established soaring operations are based at private airfields. We would suggest that you apply this law to any private or public airport that has been established before the law takes effect.

Soaring flight is flight without an engine to pull you through the air. Our unpowered sailplanes occasionally make landings off airport as a result of this. Many of the farm fields that we currently use as safe landing sites will be affected by future wind turbine development. For this reason we strongly support the inclusion of legitimate established private airports in the setback law. This will help preserve safe landing options for our pilots around the state.

Kansas is a state with an incredibly well developed aviation system. Many airports have runways well over a mile long. Some like Topeka and Salina have runways over 2 miles long. Sunflower Gliderport was a Naval Air Station in WWII and has a 7000 ft long runway. For this reason we recommend that the setback distance be from the end of any runway rather than the official center point of the airport.

I would like to thank for your time and attention to this matter and thank you for taking the time to receive our testimony.

Sincerely,

Tony Condon

President – Kansas Soaring Association

References:

KU Study: http://dmsweb.ksdot.org/AppNetProd/docpop/docpop.aspx?clienttype=html&docid=9011677
Oklahoma Senate Bill 808:
http://webserver1.lsb.state.ok.us/cf_pdf/2015-16%20ENR/SB/SB808%20ENR.PDF

Handicapping Weight Adjustment Proposal for US Soaring Competition

Introduction

Handicapped scoring is broadly used in soaring competition in the US and around the world. The objective of handicapping is to permit pilots to fly in competition using available sailplanes of varying performance by compensating for the variation in performance attributable to the glider itself such that it doesn't unduly factor into the overall results. A well-designed handicapping system can allow for larger combined classes than would otherwise be possible on an equitable basis, thereby increasing the overall competitiveness of soaring contests with diverse glider types competing.

In the US, handicapping is used in three circumstances:

1) Sports Class – A class that allows any glider to compete and does not permit water ballast. Because of variations in pilot and equipment weight, installation of motors and/or second pilots in two-seaters, potentially significant variations in flying weight need to be accounted for. This necessitates setting a base handicap at a specific reference weight and varying the handicap with weight variations.
2) Club Class – Similar to Sports Class, but permitting only gliders in a relatively narrow base handicap range. No ballast, motors or two-seaters are permitted, resulting in relatively small handicap adjustments based on flying weight.
3) FAI Classes – Primarily used to combine two or more FAI classes to meet a minimum threshold number of competitors. FAI classes permit the use of water ballast and handicapping typically use small fixed handicaps between two class types (combined Std/15M or 15M/18M and Flapped/Unflapped 20M, 2-seat), but can also use glider-specific handicaps with significant weight adjustments (e.g. Region 11 FAI contest at Truckee).

Problem Statement

US handicap adjustments for flying weight, as described above, can lead to significant competitive inequities if the formula for adjusting handicaps for weight isn't consistent with the actual effects of weight on glider performance. Small variations in weight are less sensitive to inaccuracies in the way the formula predicts performance, but as weight changes get larger, these effects can grow significantly and the fidelity of the weight adjustment formula becomes more important. The following analysis lays out the theoretical relationship between flying weight and cross-country performance and suggests a new formula to adjust handicaps based on weight. It also compares the proposed formula to the current formula used in US rules.

Approach and Analytical Considerations

The following is a "from scratch" analysis based on the sailplane performance analytical methods described in "Cross-Country Soaring" by Helmut Reichmann and are based on quadratic-fit curves of available polars for several sailplanes: JS3-18, Arcus-M, ASW-27 and LS-4.

When this paper mentions thermal strength across multiple wingloading conditions and across gliders, it will show graphs for thermal strengths in 1-knot increments rounded to the nearest even number. Comparisons across wing loadings and across gliders will represent the same lift conditions, which means MacCready values will vary to the extent that minimum sink rates vary. Heavier flying weights and lower performance gliders achieve slightly lower climb rates in the same lift conditions. These are the appropriate comparisons to make when calculating achieved cross-country speed for any given lift condition.

A consideration in making weight adjustments to handicaps is that gliders with significant amounts of fixed ballast in the form of a motor or second pilot cannot dump the extra weight. On weak days – particularly with tight thermals – these heavier gliders may experience a significant percentage degradation in climb rate and therefore a degradation in cross-country speeds achieved. Given that the mathematical relationships governing achieved cross-country speed are increasingly non-linear at slow climb rates and glider sink rates are increasingly non-linear as thermal radius gets smaller, there can be a set of conditions where the combined effects of heavy gliders and weak thermals (particularly with small radii) will be particularly challenging to account for with a simple handicap adjustment model based only on glider weight rather than also accounting for the lift conditions.

Lastly, the following analysis is for classical McCready theory. No account is taken for wind effects, streeting/convergence/energy lines or ridge-running, though analysis of these effects is ongoing.

Title: Gravity wave over flat terrain.

Author: Daniel L. Johnson (MD), Mayo Clinic Health System, drdan@wwt.net

Abstract: Wave is everywhere throughout the atmosphere, whereever shear exists. Standing gravity wave is important because of its predictability and spectacular physics. Reports of widespread, workable lift over flat terrain, even with overcast conditions, has been reported. Satellite photos show that wave-cloud phenomena are common, though evanescent, involve geographically small areas, and often in weather traditionally not considered "soarable."

This paper reviews such wave conditions, and reports flight results. A flight program was devised, from which a single flight was feasible, though with interesting data that shows vertical movement to extend several hundred meters below cloudbase.

Keywords: gravity wave, flat terrain, undular bore, cloud streets, thermal wave

Introduction:

The research question concerns the conditions in which unusual soarable wave conditions may exist.

Atmospheric wave is everywhere; but not all wave is soarable. There is more wave that is generally realized, in conditions that seem poor for soaring, different from typical thermal soaring or mountain wave soaring.

Simplistically, the atmosphere is a stack of vast leaves of air moving across each other that differ in density (temperature, humidity), lapse rate, and/or velocity (speed or direction). These atmospheric leaves are relatively homogeneous; within them flow is generally laminar, and thus they have wide boundaries at which they interface.

Fluid flow is normally laminar unless disturbed. Soaring takes advantage of non-laminar flow. Consider water waves as analogous. A pond may be mirror smooth; then, a puff of breeze ripples the surface. The resulting wavelets have small breadth, short wavelength, and minimal height. They are not lined in rows. Consider flowing water: if it flows over a fixed irregularity, a standing wave is formed. Wave formed by wind moves with the flow.

Atmospheric wave is three-dimensional because vertical displacement.

Where there's difference across a boundary, and relative motion, there is undulant wave. When atmospheric moisture saturation permits condensation. linear cloud forms of several types may form.

There are several different forms of lined-up cloud.

- We are all familiar with thermal streets, in which clouds align with the wind in the boundary layer.
- Less well known is convective wave, in which lift aligns above cloudbase across the cloud face, as above a mountain or hill.
- Sometimes thermal streets interact with sheer above, creating a checkerboard appearance on satellite photos.
- Sometimes clouds are lined up in rows due to roll convection, in which the lift is not connected to a ground source and the sky may be completely overcast.

Not all atmospheric wave forms undulations or rolls. Some weather phenomena are analogous to water waves, in which energy is propagated across the air-water interface independent of any horizontal movement of the water. For example, frontal thunderstorm development occurs ahead of evolving storms, as unstable conditions propagate through the atmosphere, and dissipate behind, so that the "radar echo speed" of the storm exceeds the airmass speed in which the storm is embedded. Thus a squall line represents a wave phenomenon without having an undular appearance.

This research, is, however, focused on conditions that generate recognizable – and predictable – gravity wave where there are no orographic features to trigger or stabilize it. This may involve any of several types of atmostpheric periodicity:

-0 Stable: no wave; laminar flow, eddies damp out.

-1 Shear wave: periodicity due to difference of wind velocity (speed, direction) across a boundary (of density, humidity, temperature, velocity)

-2 Thermal wave (streeting). This is strongly affected by wind velocity and atmospheric instability.

-3 Convection wave involves periodicity enhanced by thermal penetration from lower layer to upper. This is strongly affected by instability of lower and stability of upper layer.

-4 Convective roll. This is less appreciated by most soaring pilots because it occurs in conditions that are less easily predicted, that are less comfortable for pilots (stronger surface winds in particular), and that may be difficult to reach without self-sustaining motors.

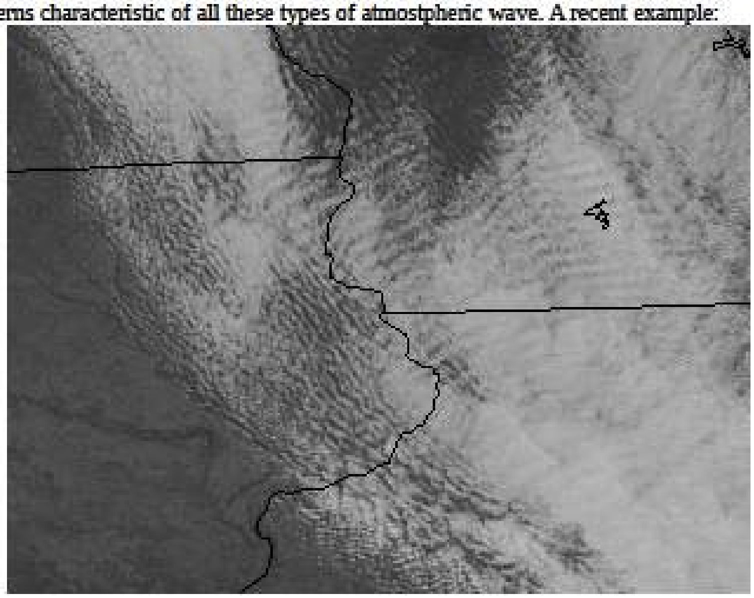
This is commonly seen on visible satellite photos in the overcast cloud disc behind cold fronts. The most famous convective roll is the Austrailian Morning Glory.

Convective roll development requires vertical windspeed shear with little direction change.

-5 Boundary wave is waviness at the interface between atmospheric layers with velocity shear across the boundary. Horizontal shear with little difference in wind speed appears to produce lovely thin wavy clouds. This phenomen is readily experienced in an airplane by flying just at the top of the haze layer. In this case, gentle pitch undulations of about .10-.30 Hz may persist for many kilometers.

Authors have speculated that roll convection must be triggered by some vertical displacement: I propose that boundary wave, for example at the top of the haze layer, or at the condensation level, is sufficient. Convective roll must be triggered differently from the mechanisms causing thermal wave (in which thermals condense and penetrate the sheared layer above) because its phenomology is completely different.

When satellite visible-light photos are studied, the cloud patterns near a low-pressure center often can be seen to contain, in different regions, patterns characteristic of all these types of atmostpheric wave. A recent example:



The broad cloud bands in this satellite photo ,19 November, 2016, 1300 UTC, the day following cold-front passage above southwestern Wisconsin, USA, are orthogonal to the gradient wind and represent convective roll. The narrower bands over eastern Iowa are thermal streets, aligned with the wind. 2-meter winds in this area were 15-25 kt with progressive speed shear to over 100 kt in the upper flight levels.

These conditions are typical after spring and fall cold-front passage over the flat terrain of the northern plains; one only needs to look at the southwest quadrant of low-pressure systems to find these patterns. Usability for soaring is mitigated by the strong winds involved and the difficulty predicting just where that quadrant will be located on any particular day.

Even if soaring pilots are not using these conditions, they are a source of annoying low-level turbulence to airline travellers.

In any case, the questions for the soaring pilot are whether this can be reached; whether it will endure long enough for flight; and whether the vertical velocities involved are enough to sustain flight. I propose that these conditions pertain more often than we expect, and that launching in windy overcast conditions and taking a high climb or tow, will sometimes turn out to be very interesting.

Thermal wave

Thermal activity creates vertical motion that in moderate wind velocities gathers thermals into rows-streeting, itself a complex wave phenomenon.

The base of cumulus clouds forms at the top of the haze layer. It was shown by Kuettner in 1957 and others, that the air lifted above cloudbase preserves the velocity (speed, direction) it had in the boundary layer.

If the wind above the boundary layer has a different speed, the cumulus presents a (malleable) boundary as a hill.

If the wind in the boundary layer creates streeting, rows of cumulus act as ridges.

If the wind above the boundary layer is approximately orthogonal to the wind below, this streeting will be augmented and thermal wave will be amplified. The challenge for soaring is that the required wind speeds are more than about 15 kt, a high-performance glider is preferred. Another challenge is that these conditions are rare.

If one studies post-frontal overcast, areas of wave are often seen. Sometimes there is no discontinuity; sometimes there are small clear breaks between long rolls. Typically, this is seen best far behind the cold front near the edge of the overdevelopment disc, where the roll clouds gradually fade, but presumably the rotor continues invisibly unless its mechanism requires the boost on the back side of the rotor that condensation would give.

If the wind above the boundary layer is approximately in line with the wind below, with a velocity difference that favors wave at the interface, streeting will be entrained by the wave and satellite photos may show a "checkerboard" cumulus array.

It is difficult to differentiate thermal wave from mountain lee wave when cumulus are being formed only a couple of hundred miles downwind from the range. In addition, lee wave would obviously augment thermal wave in ideal conditions.

A special situation that does not depend on actinic heating of the ground is the undular bore. This is a long, sausage-shaped, curved cloud that is most famous as the Australian Morning Glory.

This situation requires vertical velocity shear of about 2 kn per thousand feet or 3M/S per kilometer. Visible cloud also requires suitable dewpoint conditions so that the lifted air cools below its dewpoint in the upward-flowing part of the rotor.

Methology:

When waviness was observed in an overcase sky, and when work could be set aside, the airplane was launched: a Mooney 231 aircraft in which was mounted a GPS flight recorder. A stable climb was established at 2.5 M/S, 500 ft/min, into the gradient wind, to the base of the overcast. A 180-degree turn was then made, and the airplane flown near cloudbase that had an undulating appearance, then turned crosswind. The flight trace was downloaded to See-You flight analysis software and climb rates shown graphically.

Results:

On 13 March, 2016, wave conditions could be seen throughout the morning in the base of the overcast (Figure 1). Lift was encountered about 300 meters/1000 feet agl; and continued until near cloudbase at about 1500 meters/ 4800 feet agl – the depth of the roll convection was thus about 1200 meters/ 4000 feet, beginning just about at the usual altitude (Figure 2). During climb from ground to cloucbase, vertical air movement varied from -4 to +6 knots (Figure 3). During level flight near cloudbase, vertical velocities were similar: -2 to -3 kt to +2 to +4 kt. (Figure 4). The day's sounding showed both direction and windspeed shear (Figure 5). Research that includes cloud penetration has not yet been possible.

Conclusions:

Organized lift of usable strength was encountered from a conveniently low altitude above ground to (and surely into) cloud. This left extended across a wide local area, and the cloud base waviness persisted for several hours.

Additional flights that penetrate cloud and that explore the horizontal extent of this convective roll would be interesting. We already know from studying satellite photos that this lift is regional, and therefore will be more engrossing to pilots who want to extend their local and regional soaring-weather choices than to those wanting to set distance records by zipping back and forth over mountains. Still, oxygen masks or pressure suits won't be needed.

References:

Kuettner, J. P., P. A. Hildebrand, T. L. Clark, 1987: Convection waves: observations of gravity wave systems over convectively active boundary layers. Quarterly Journal of the Royal Meteorological Society, 113, 445-467.

Bohme, T., Lane ,T. P., Hallc, W. D. and Haufa,T., 2007: Gravity waves above a convective boundary layer: A comparison between wind-profiler observations and numerical simulations. Q. J. R. Meteorol. Soc. 133: 1041–1055.

Figure 1: Cloud conditions

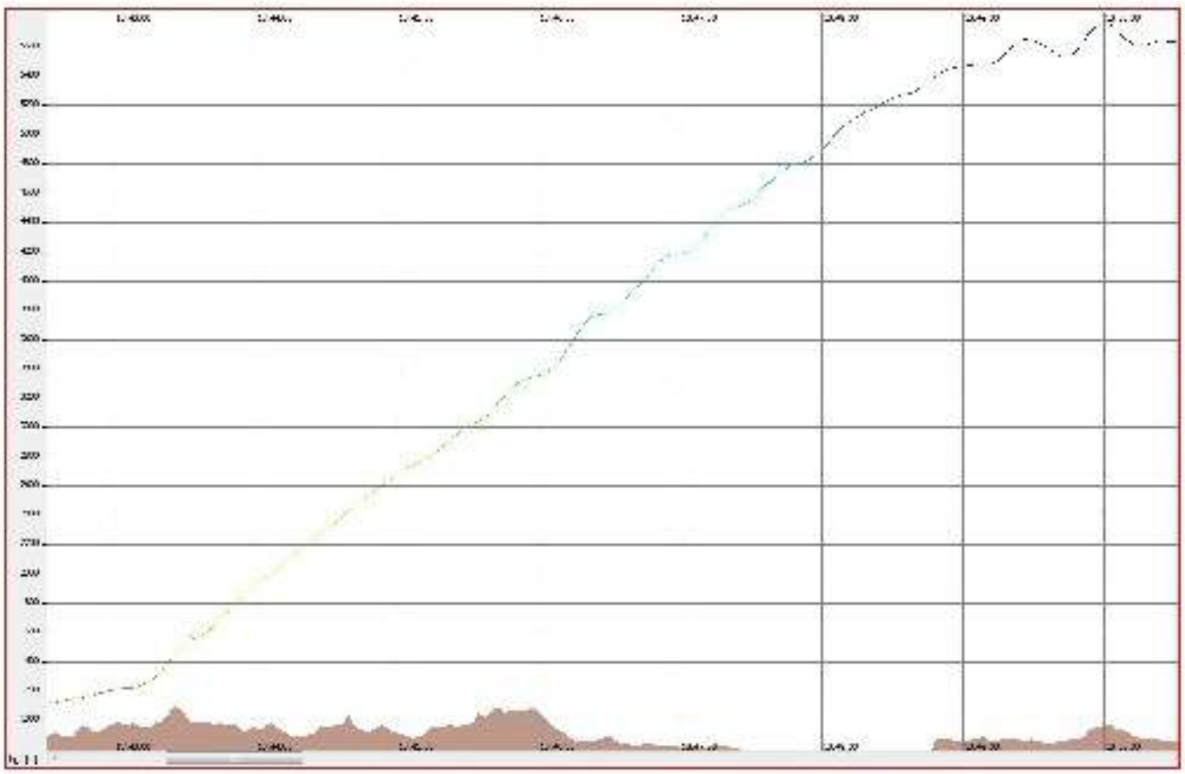


Figure 2: Climb cross-section: It can be seen that lift was encountered about 300 meters/1000 feet agl; and continues until near cloudbase at about 1500 meters/ 4800 feet agl – the depth of the roll convection was thus about 1200 meters/ 4000 feet, beginning just about at the usual altitude.

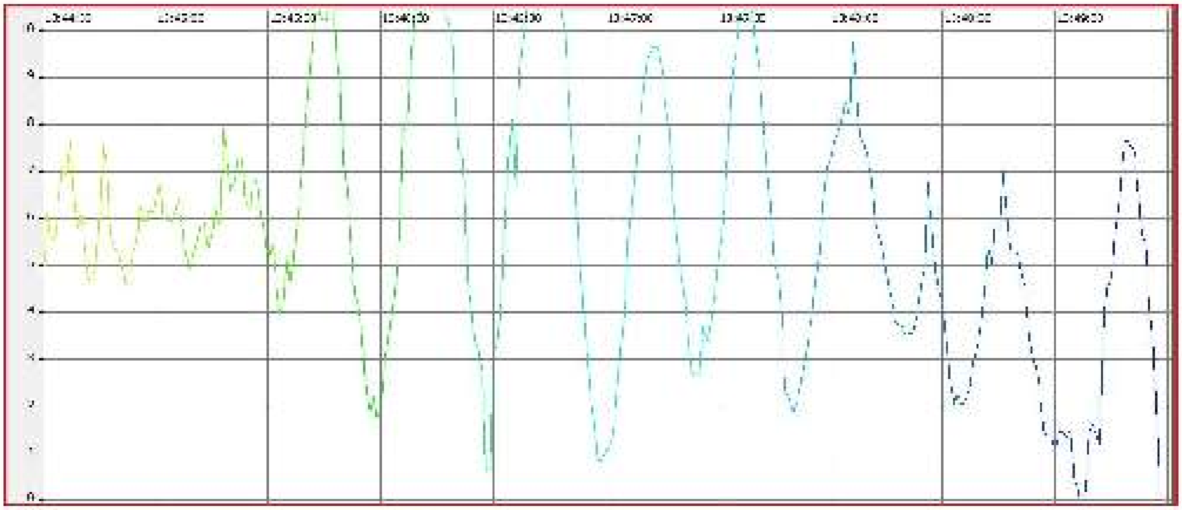


Figure 3: Strength of vertical movement during climb

The changes in vertical speed, in knots, are shown . The periodicity is short, about 30 seconds, related to the speed of the aircraft, about 100 knots. The aircraft's set climb rate of 500 ft/min (5 knots) means that the vertical air movement varied from -4 to +6 knots – very usable for soaring. (It was not possible to explore the lateral extent.)

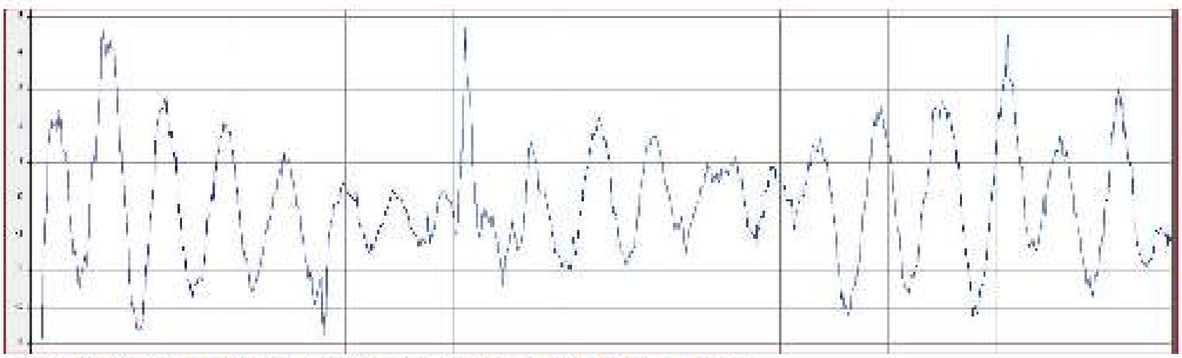


Figure 4: Strength of vertical movement during level flight near cloudbase

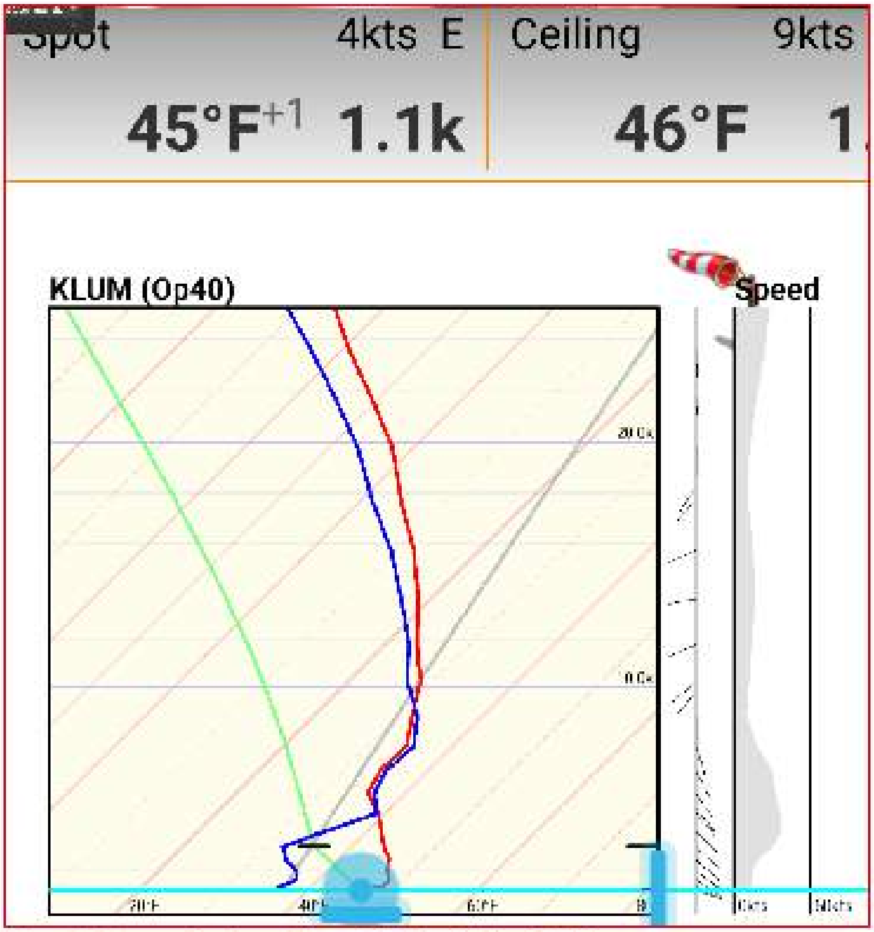


Figure 5: Forecast local sounding at 0900 hr, 13 March 2016

Handicapping Weight Adjustment Proposal for US Soaring Competition

Analysis

First, we need to set up equations representing the performance of a glider in terms of a speed polar that includes the effect of flying weight (W) as a function of the reference weight at which the polar was measured (Wref). We start with a base polar for a glider by fitting three pairs of gliding and sinking speeds to a quadratic of the form:

$$V_s = aV^2 + \mathrm{b}V + \mathrm{c}$$

Without going into the full derivation, we can create a new polar for any new flying weight by dividing and multiplying the first and last coefficients (a and c) respectively by the square root of the overload multiple (W/Wref). The new polar equation is:

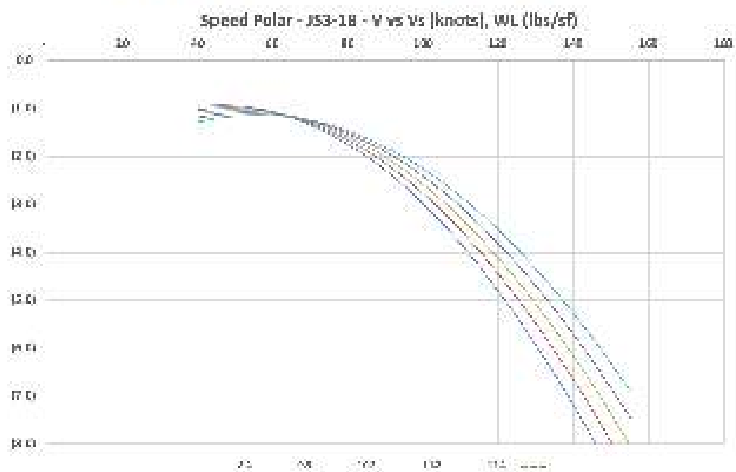
$$V_s = a'V^2 + \mathrm{b}V + \mathrm{c}'$$

Where:

$$a' = \frac{a}{\sqrt{(W/W_{ref})}}$$

$$c' = c\sqrt{\frac{W}{W_{ref}}}$$

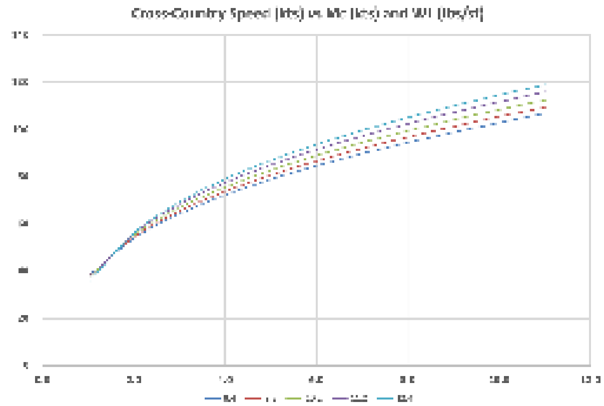
The resulting set of polars (calculated for a Jonker JS3-18 at wing loadings from 8.4 to 12.3 lbs/sf) are shown below.



Again, without going through the derivation, we can use these polars to calculate sustained cross-country speeds for a glider at any arbitrary weight for any average climb rate (Mc) by substituting the appropriate values for Mc, a', b and c' into the equation:

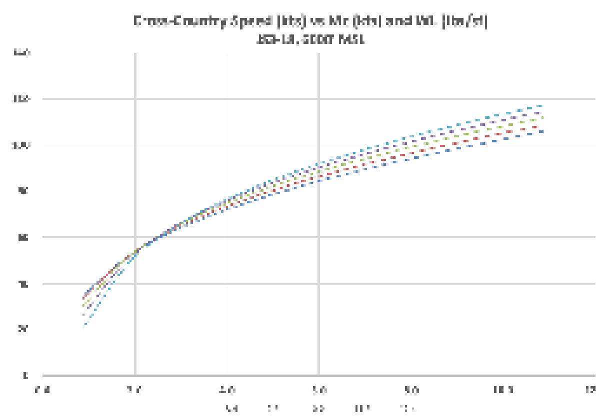
$$V_{xc} = \frac{Mc\sqrt{((c' - Mc)/a')}}{2(Mc - c') - b\sqrt{((c' - Mc)/a')}}$$

The resulting cross-country speed curves look like the following:



As previously mentioned, the above curves assume a single thermal strength across flying weights but climb rates (and resulting Mc values) used to calculate each Vxc at each weight will vary slightly based on the increasing minimum sink as flying weight goes up. In addition, achieved climb rates can vary based on weight for a variety of reasons that don't figure into the simple MacCready theory: 1) glider polars close to minimum sink speed can vary from the quadratic polar fit due to the vagaries of low-speed aerodynamics and 2) sink rate can go up significantly as turning bank angle increases. Tight thermals can alter achieved climb rates by several tenths of a knot, which can be particularly influential on Vxc for climb rates below 3 knots. 3) altitudes vary, resulting in changes in true airspeed for minimum sink, which will require a different bank angle for a given thermal radius, resulting a different minimum sink rate.

The effect of a 500-foot thermal radius on cross-country speed is shown below (for a glider flying at 6000 feet MSL):

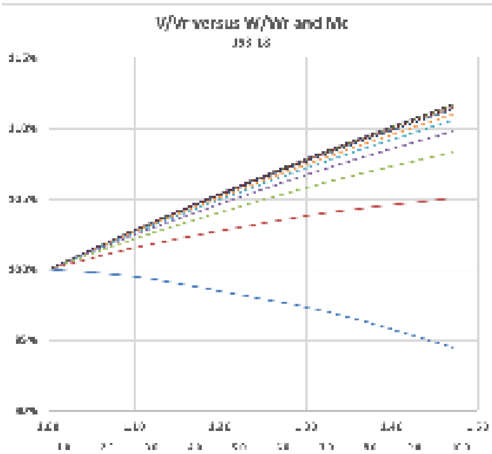


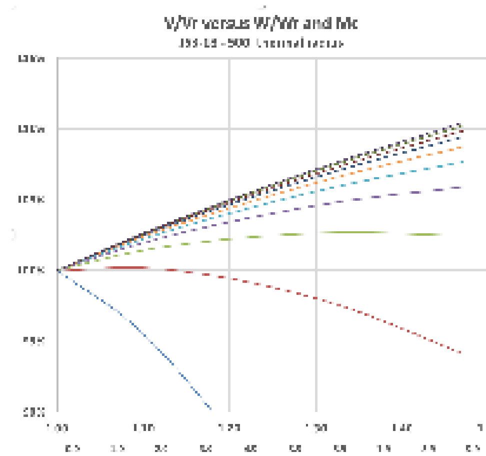
Handicapping

The goal of a handicap weight adjustment is to adjust for the achieved cross-country speed difference between gliders with the same polars due to flying at different weights. Handicap formulas will generally be more robust if generated in terms that are consistent with the underlying performance relationships. Therefore, it makes sense to start by calculating how big that advantage is and how the magnitude of the advantage varies with different inputs (particularly flying weight and lift conditions).

Below is a summary of the achieved cross-country speed as a percentage of speed achieved at reference weight (V/Vref) versus overload ratio (W/Wref) for a variety of lift conditions. As described above, W/Wref is the weight adjustment variable in quadratic glider speed polars and MacCready cross country speed formulas. The curves for lift conditions above 3-knots are gently arced and fairly close together with slightly different slopes. In contrast, there is a substantial falling off in performance improvement with wing loading for Mc<3 knots and the relationships show a significant amount of curvature with increasing weight. The same analysis for narrow (500' radius) thermals shows even more performance deviation for weak lift conditions to

the point that cross-country speed performance actually decreases with increasing W/Wref. A single-factor handicap based only on flying weight (W/Wref) won't be able to fully account for all lift conditions – particularly on the very weak side. A handicap weight adjustment system that accounts for key performance factors would need to include average climb rate - or more realistically something that can be easily measured in a contest environment that represents the speed potential of the day.





For Sports Class a typical motor and/or second pilot weight variation can easily be 200-350 lbs. For mixed FAI classes with ballast the weight variations can also be quite large, depending on what ballast variations might be permitted (at R11 Truckee pilots may declare any weight up to MTOW). For very weak days with 2-knot and below average climbs in tight thermals, heavy motorgliders and two-seat gliders could be at a disadvantage under a handicap system that is based solely on W/Wref (and also works for other lift conditions) because they cannot get rid of very much (if any) weight.

Let's assume for now that we don't want to do get into a multi-factor handicap system. If we want to pick a Mc value that minimizes the error in handicaps on most days (this is called minimizing the mean-squared error) the handicap based on W/Wref ought to be set for a Mc value around 3 knots. This has been the historical target Mc design point for handicapping.

Handicap Weight Adjustment Formulas – Current versus Proposed

The objective of a handicap weight adjustment formula is to adjust the base handicap to compensate for the change in cross-country speed attributable to the change in weight. Ideally this is simply the inverse of the V/Vref curves above to exactly cancel out the incremental cross-country speed attributable to glider performance.

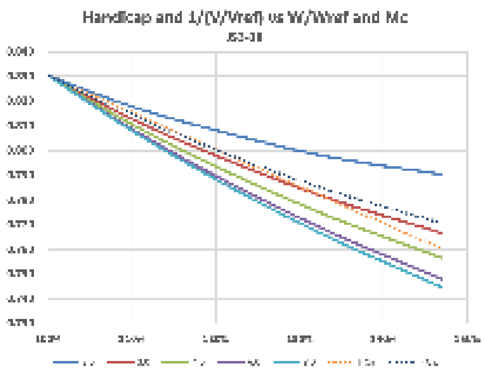
The following is a comparison of 1) the current RC rule (HCrc) and, 2) the handicap committee recommendation to modify the current RC rule (HChc):

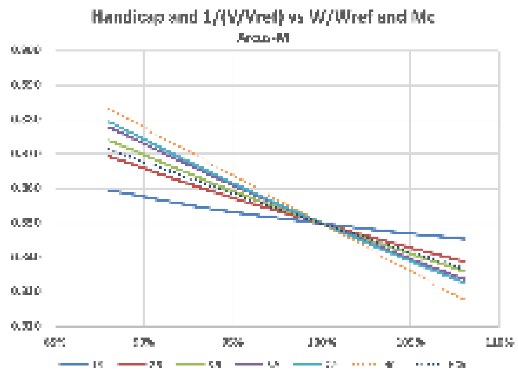
1) HCrc = HCref*(1- 0.0002*(W-Wref))
2) HChc = HCref*(1.3 - 0.4*(W/Wref) + 0.1*(W/Wref)^2)

Where: W = Competition Weight
Wref = Handicap Reference Weight

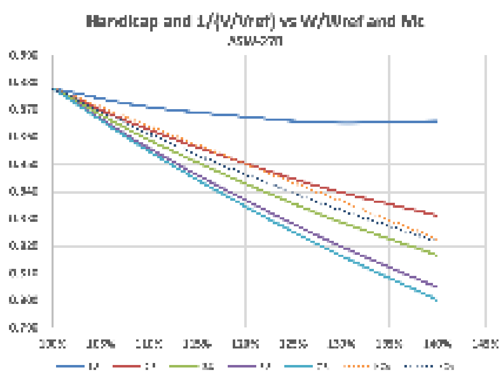
One challenge with the current formula (HCrc) is that it is based on a linear relationship using change in weight in pounds (W-Wref). However, as shown above, glider cross-country speed is determined by a non-linear relationship based on percent change in weight (W/Wref). This creates two problems: 1) the fit of the handicap to weight change is only good for a narrow weight band as the linear and non-linear curves diverge at higher values of W/Wref and 2) the fit of the handicap line varies with the starting weight of the glider. For example: a 150 lb change in a 1500 lb glider is a 10% change in W/Wref compared to 20% for a 750 lb glider. A weight adjustment formula designed to properly adjust for 750 lb glider is way too aggressive for a glider that weights 1500 lbs. This means that for a weight adjustment to work well over a range of weight changes it can't be a simple linear relationship with weight change, it needs to be non-linear and based on W/Wref. This is what the HChc formula does.

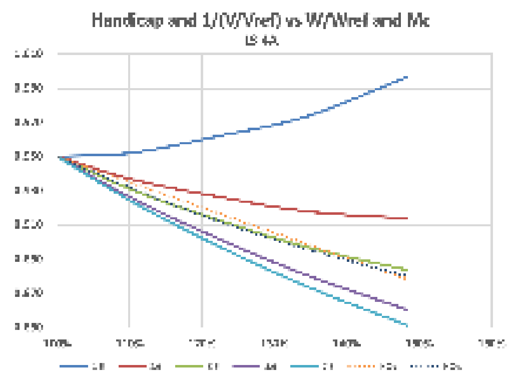
Below is a comparison of each weight adjustment HC formula as a function of W/Wref along with the HC_{base}/(V/Vref) "theroretically perfect" handicaps across various Mc values overlaid for reference. The first comparison is for a JS3-18 based on the factory-published polar. The HChc curve follows the Mc=3 curve (the small variation is due to rounding to single significant digits in the formula), while the HCrc curve over-compensates by ~1% as W/Wref increases. The second comparison is for a much heavier Arcus-M. The reference weight for the Arcus-M includes a motor and two pilots, so it is possible for flying weight to be significantly below, as well as above, Wref. Here the effect of the Arcus' relatively high reference weight shows a pronounced over-correction at weights both above and below Wref.



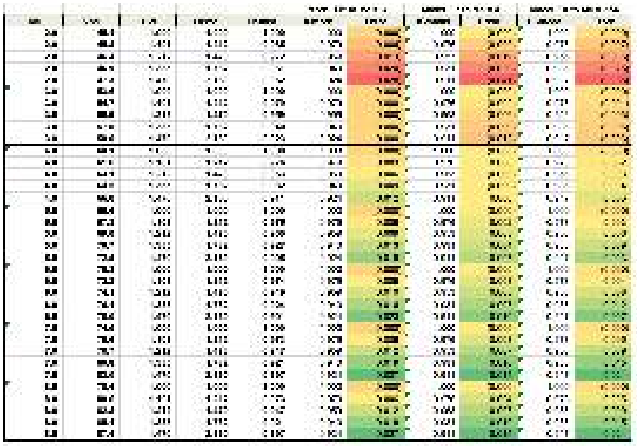


Below is a comparison of HCrc and HChc plus 1/(V/Vref) for a variety of Mc values for an ASW-27B and an LS-4A. As previously mentioned, because these gliders have slightly higher minimum sink rates, the curves reflect slightly different Mc values for the same lift conditions.





Because the Vxc and HChc are both based on quadratics, it is possible to set HChc to track V/Vref for any Mc value with zero error versus theory. However, because each Mc value generates a different V/Vref curve the HC formula will differ from theory at all other Mc values. In the table below "errors" versus theory are shown for HChc formulas centered on Mc=3, Mc=4 and Mc=3.5. Highly loaded gliders in very weak and very strong conditions are over- and under-handicapped respectively by 2-3%, with the model fit to Mc=3 showing the most symmetrical behavior in error versus "theoretically perfect" handicaps. This is why Mc=3 has been selected as the best compromise value for handicap weight adjustment.



There are many factors that can affect cross-country speeds beyond base handicap plus weight adjustment (e.g. lift conditions, flaps/no flaps or other polar variations with speed, tight thermals and streeting) that are challenging to account for by even the most elaborate handicapping system. Nevertheless, a base handicap plus weight adjustment formula for Mc ~3 keeps glider performance variation to <1% for the majority of flying conditions. A winner's speed adjustment could reduce the remaining variation by $^1/_2$ to $^2/_3$ but at the cost of complexity and reduced scoring transparency.

Simulator Training Doubles Solo Rates at the United States Air Force Academy

AM-251 students practicing maneuvers on the Mach 0.1 Simulated Glider Cockpits.

INTRODUCTION

The United States Air Force Academy (USAFA) offers its students the opportunity to fly gliders each summer in its Glider Airmanship course, AM-251. Over 300 cadets, along with a handful of ROTC students, are divided into three groups. Each group goes through an intensive three-week session of training, consisting of both ground and flight instruction. Students are given a maximum of 14 flights during the course. Due to weather, time, medical, and other constraints, not all students receive 14 flights. The USAFA defines course completion as either (1) soloing; or (2) completing all 14 flights without soloing.

In the spring of 2016, the USAFA contacted Russell Holtz about creating an Enhanced Training Device (ETD) consisting of the Mach 0.1 Glider Cockpit Simulator with lessons designed in the Condor 2 glider flight simulator program.

The requirements for the ETDs were that they be:

quickly and easily implemented
relatively low cost
reliable
effective at increasing the solo rate

The Academy purchased one Mach 0.1 for evaluation. In the spring of 2017, they ordered eight more units for use in the summer of 2018. Russell then developed USAFA specific training scenarios for use in the ETDs. Also, pertinent parts of his textbooks, ***Glider Pilot's Handbook of Aeronautical Knowledge*** and ***Flight Training Manual for Gliders***, were prepared as an online course supplement to be used in addition to the standard AM-251 materials.

ENHANCED TRAINING DEVICE

The Enhanced Training Devices (ETDs) consisted of:

The Mach 0.1 Simulated Glider Cockpit
A PC running Condor 2 Soaring Simulator software
Custom Training Scenarios

Mach 0.1 Simulated Glider Cockpit

The **Mach 0.1 Simulated Glider Cockpit** is a commercial product of GLIDERBOOKS.com, that features a realistic control layout, including stick, adjustable rudder pedals, airbrakes, trim, landing gear handle, and tow rope release. The device also features an “instructor’s remote” that can be used to practice rope breaks and airbrake failure with students. A supplied keypad, which rests on the pilot’s left thigh, provides convenient access to all the functions typically accessed through the full keyboard. The device is made from furniture grade PVC pipe and is quite durable.

Condor 2 Soaring Simulator

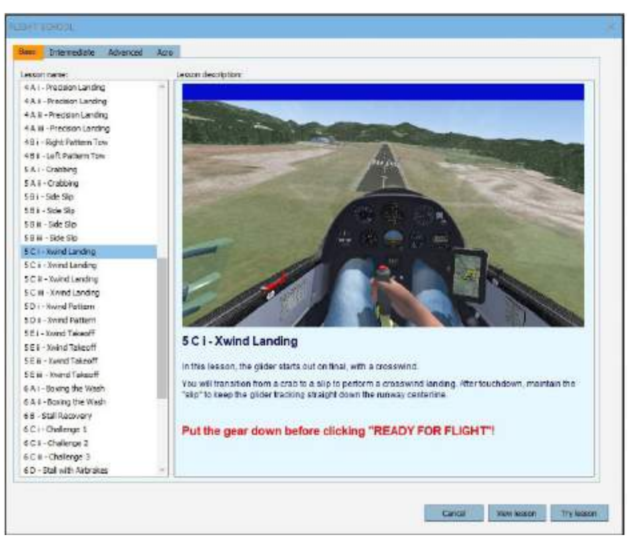
Condor 2 is a commercial soaring simulator software program. It uses state of the art physics and advanced weather models to depict glider performance and handling accurately. The flight school function allows for the creation of custom training scenarios. The glider’s initial position, altitude, and attitude can be set along with precise weather conditions including winds, turbulence, and thermal activity.

Custom Training Scenarios

Simulator training has the unique advantage of making it possible to practice individual elements of a maneuver separately before having to put them together in the correct order to perform the entire maneuver. For example, to complete a landing, the student must be able to:

Maintain a constant airspeed.
Fly along a straight line.
Control the gliders descent angle.
Fly the round-out, or flare, to transition from final to the “hold-off”.
Fly the “hold-off” as the glider’s speed decreases until it touches down.
Maintain a straight heading on the runway while “taxiing” after touchdown.

In the real glider, the elements must be completed in this order. As a student performs one aspect of the maneuver, they must immediately transition to another element that they may not have mastered, or even practiced. It would be more efficient if the student could learn and practice each of these skills independently, before having to combine them. Breaking down maneuvers into distinct elements is the philosophy behind the training scenarios developed for use in the ETDs.



Custom training scenario in Condor 2.

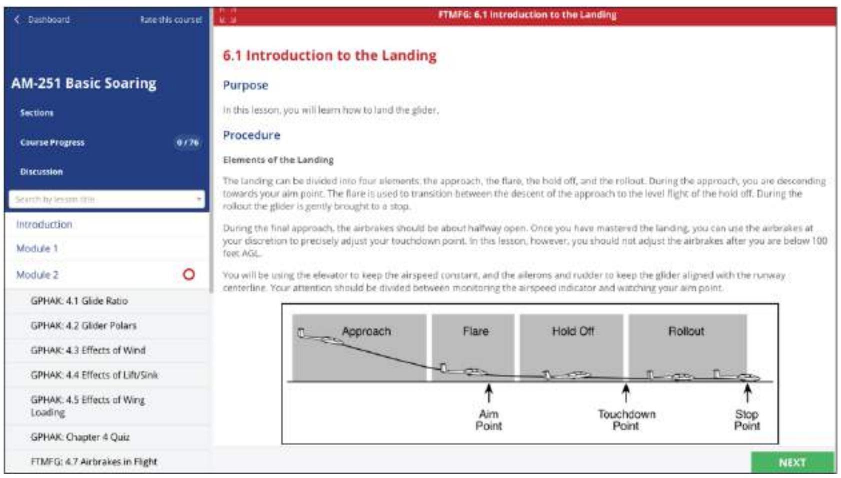
SUPPLEMENTAL MATERIALS

Selected sections of the textbooks, *Glider Pilot's Handbook of Aeronautical Knowledge (GPHAK)*and *Flight Training Manual for Gliders (FTMFG)*, were provided to the AM-251 students.

- *GPHAK* covers the principles that a student must understand to apply during flight. These include such things as glider familiarization, aerodynamics, performance, medical issues, and radio communications.
- *FTMFG* explains how to perform each of the flight maneuvers, including the purpose, procedure, common errors, and a completion standard.

Having this material available can help ensure that both the instructors and students are working from the same knowledge base and that all of the instructors are teaching the maneuvers to a consistent standard.

This material was made available as an online course and included review questions for all the topics. In the first two sessions of AM-251, the students had access to the online course. The third session, for unknown reasons, did not get this information until very late if at all. While unintended, this natural experiment did provide an opportunity to see what effect the material had on student success.



Online Supplemental Materials

TRAINING

The week before the start of the first summer session, Russell traveled to Colorado Springs to train the instructors on how to use the ETDs, and also stayed to observe the first week of the course. The instructors in this course consisted of a handful of officers, assisted by a large number of cadet instructors. Cadet instructors are students at the USAFA who have completed AM-251, along with another course that trains them to be instructors: they do not have anywhere near the training or experience of an FAA Certified Flight Instructor in Gliders (CFI-G).

While all of the instructors were working off of a common syllabus, during this time, it was clear that there were large discrepancies in how individual instructors taught the maneuvers. One of the advantages of observing the instructors training students on the ETDs is that these discrepancies could be identified and discussed, and a "best practice" agreed upon so that all students would receive consistent, high-quality training.

Each instructor worked with three students at a time on the ETDs. One student would "fly," while the other two observed. This allowed the students to learn not only from their own mistakes but also from those of their classmates.

RESULTS

Analyzing the data in this type of "study" is always a challenge. Uncontrolled variables make it difficult to make a direct comparison from one year to another. In this case, the two most significant factors were that the number of students increased in 2018, and the number of flyable days decreased significantly.

The number of students in the program increased 5% -- from an average of 326 students in 2016 and 2017 to 343 students in 2018. The number of sailplanes and tow planes stayed the same. However, more days were lost to weather and other factors in 2018. These factors combined to decrease the average number of flights per student by 22%, from 12.4 to 9.7.

The relationship between the number of flights and the number of solos is not linear. No one will solo in the first several flights. One would expect the total number of solos to increase significantly with increased flights. This non-linear relationship is seen in the data for the different sessions. The first session had an average of 8.3 flights per student, with 30 of the 115 students soloing, or 24%. The second session had an average of 9.6 flights per student, with 31 of 115 students soloing, or 27%. And the third session, with an average of 11.2 flights per student, had 40 solos out of 114 students, or 45%.

Solo Rates of Students Who Completed the Course

Due to the variation in the number of flights per student, the most accurate measure of the effect of the ETDs on student performance is to look at the number of solos among those students who "completed" the course.

In 2016 and 2017, 43% of the students who completed the course soloed. In 2018, with the addition of the ETDs, 89% of the students who completed the course soloed. The number of solos for students who completed the course increased by 110%, more than doubling the rate of the previous years.

Table 1 - Comparison between 2018 and 2016-2017

	Average of 2016/2017	2018	Change
# Students	326	343	5%
# of Flights/Student (average)	12.4	9.7	-22%
# Course Completions*	204	113	-41%
# Solos	87	101	9%
% Student Course Completions who Soloed	43%	89%	110%

*Course Completions = 14 flights or Solo

Even with the 22% decrease in the average number of flights per student from 2016/2017 to 2018, the number of solos still increased by 9%.

Supplemental Materials

In the first two sessions of AM-251 in the summer of 2018, students read and answered review questions covering the material before they took their flights. In the third session, this information was not given to students.

In the first two sessions, 100% of the students who completed the course soloed. In the third session, the one where they did not use these materials, the solo rate was 77%. While this is not enough data to make a firm conclusion, it suggests that studying the supplemental material did have a positive effect on solo rates.

Table 2 - Comparison between each of the periods in 2018

	2018		
	Session 1	Session 2	Session 3
Supplemental Materials Supplied	Yes	Yes	No
# Students	115	114	114
# Course Completions*	30	31	52
# Solos	30	31	40
% Student Course Completions who Soloed	100%	100%	77%

*Course Completions = 14 flights or Solo

Glider Damage

In previous years, the USAFA glider fleet has suffered significant losses due to damage incurred mostly during hard landings. Data is not available for this, but anecdotally, squadron instructors noted that this year's damage was significantly lower than prior years, with only two hard landings resulting in damage to a glider. In previous years up to 70% of the fleet suffered damages from hard landings.

Simulator Durability

One of the significant concerns that the Air Force Academy had about the Mach 0.1 Glider Cockpit Simulator was if it would be able to stand up to cadets using them for six hours a day, five days a week, for the nine weeks of the course. For the duration of the three sessions, there were no broken parts on the simulators, and only two switch failures, which were quickly replaced.

CONCLUSIONS

The data shows that the use of the ETDs more than doubled the solo rates for students who completed AM-251 in the summer of 2018.

Supplemental materials, provided in the form of an online course, also had a positive effect on solo rates.

Anecdotally, ETD use decreased damage to the gliders.

The durability of the Mach 0.1 Simulated Glider Cockpit was more than sufficient to meet program requirements.

APPLICATIONS FOR CLUBS AND FBOS

The results of this study indicate that glider clubs and FBOs that incorporate simulation training into their curriculum should see a decrease in the number of flights it takes a student to solo, and a decrease in the damage to their equipment.

In addition, commercial glider operations can increase their revenue by training multiple students at once with a single instructor, or by providing evening or winter courses, when actual flying would be impossible. Simulators can also be rented by students to practice by themselves before or after a lesson with an instructor.

For both clubs and commercial operators, simulator training can keep students involved, even when the weather isn't good for flying, leading to fewer canceled lessons, greater student retention, and more students getting their license.

As the USAFA learned, using a simulator is also an excellent way to teach instructors how to teach since an experienced instructor can watch an instructor candidate interact with a student while teaching. Versions of all of the material provided to the USAFA, as well as the Mach 0.1 Simulated Glider Cockpit, are available from the www.GLIDERBOOKS.com website.

Wind Effect in the Pattern

By Garrett Willat, from Wings & Wheels Newsletter

Last week we reviewed the AIM with regards to how to talk on the radio to maximize our spacial awareness for where everyone is.

Of course in your review from last week, you probably looked at the AIM and reviewed where we are and what those locations actually are called.

How do we think about the wind during the pattern? How will it affect me? Many times I have a student tell me the wind is from the South East and looks like it is gusting 15knts. Great, but what does that mean to us? If we are doing a pattern how will it affect us on downwind, base, final, and roll-out? Because the wind will affect every phase of the pattern, we need to review each phase during our wind portion of our pre-landing checklist.

If the crosswind is blowing you towards the airport, downwind you will have to crab pointed away from the airport. If you are only looking at the angle over your shoulder at the angle back to your aim point that will change in comparison to having to crab the other direction if the wind was from the other direction. Getting yourself started in the crab seems to be most of the battle.

Base also changes, probably one of the most noticeable. If the wind was blowing you away from the airport on downwind now you will have more of a headwind component and lose more altitude on base. You will also have to turn later to final because the turn radius is smaller. However when the crosswind is the other direction that turn to final seems to use a lot of distance.

An unplanned larger turn radius will cause some overshooting onto final and hopefully not inside rudder trying to align the nose with the runway resulting in a skidding turn. Skidding turns are generally not a good plan, especially when in the pattern. If that crosswind was really strong then your ground speed is noticeably faster, if you tried slowing down (not good) a little to slow the ground speed down as you skid the turn, you might unexpectedly impact the ground nearly directly below your current location, in a very nose down attitude, also known as a spin. Which I have had 2 students honestly really try and spin on base to final.

If while on final you are using a side slip for alignment the amount of crosswind will increase your approach angle. A 10mph headwind vs a 45-degree crosswind will have different angles on final. Another factor you are trying to think about when you are deciding when to start your turn base turn. The good news is we have spoilers to compensate for any error we will make on guessing our descent angle.

The roll-out is crucial for maintaining directional control and not having the wind pick-up the wing slamming the downwind wing into the ground. Few gliders have the large spring steel tip wheels like the 2-33.

One of the things I try and do when working on pattern work with a student is not repeating the same mistakes. In other words, if we are continuing to come in high between 2 or 3 circuits, something is not clicking with the student. Sometimes I will just say "let's not make the same mistake twice, last time you turned here it was bad, don't do it again." Once they get the new sight picture and figure out what works we are generally good.

I have been spending a lot of time in motor-gliders lately and we are able to practice landings at different airports. Which is entertaining for me. We have to deal with power planes practicing there Boeing 777 patterns in their Cessna 172. If you have not seen the parody on patterns from AvWeb I recommend it.

The Damon Family Flies

Steve Damon took his wife Becky for a ride right after completing his checkride in November (above). Over Thanksgiving weekend, he got the kids up for rides at Sunflower (below)

2019 Club Class Nationals Entry List

Name	Glider	ID	Ranking
Glenn Betzoldt	Discus 2a	W	92.00
Josef Bostik	Std. Cirrus	1H	84.25
Andy Brayer	ASW-20C	ND	100.00
Mike Brooks	Genesis	XL5	86.90
Walt Cannon	Discus 2b	NT	85.75
Tony Condon	Std. Cirrus	K	95.32
Jacob Fairbairn	Std. Libelle	37	62.66
Sylvia Grandstaff	Discus 2aW	XP	86.20
Bob Holliday	Std. Libelle	GF	96.05
Mitch Hudson	Discus b	AAA	85.71
Ryszard Krolikowski	LS-3-15	K	95.28
Ron Leonard	HP-18	4A	88.28
Tom McKnight	SZD-55	67	55.97
J.T. McMaster	?	?	77.15
David McMaster	Discus cs	HH1	73.74
Andrew Peters	LS-3-15	3T	73.04
Erik Redwik	LS-3A	SW	n/a
Walt Rogers	Discus 2a	WX	94.51
Ron Rose	ASH-26E	S	65.59
Todd Rutledge	LS-4A	1D	92.00
Collin Shea	Std. Cirrus	ML	69.00
Tony Smolder	LS-8	TS1	94.20
Bill Snead	LS-8	IA	89.93
Danny Sorenson	Discus 2aW	DS	99.67
Roger Thiemann	Mosquito	RT	31.27
Mike Westbrook	Discus 2b	5F	100.00
Boyd Willat	Discus a	JL	98.16
Chad Wille	PIK-20E	20E	56.33
Collin Mead	ASW-19	CM	93.30

2019 KSA Duty Schedule

Date	Towpilot	Line Manager 1	Line Manager 2
Saturday, April 13	Bob Hinson Rhinson1@cox.net	David Wilkus	Bob Holliday
Sunday, April 14	Brian Bird 620-664-7844	Steve Leonard 316-249-7248	Bob Holliday
Saturday, April 20	K.C. Alexander 316-943-7641	Matt Gonitzke 815-980-6944	
Sunday, April 21	K.C. Alexander 316-943-7641	David Kennedy	Ethan Beale 316-650-6931
Saturday, April 27	Paul Sodamann 785-456-5654	Derald Wright	
Sunday, April 28	Bob Blanton 316-841-2921		Bob Holliday
Saturday, May 4	K.C. Alexander 316-943-7641	David Wilkus	David Pauly 316-250-2045
Sunday, May 5	K.C. Alexander 316-943-7641	Derald Wright	Rob Rippy 316-213-8241
Saturday, May 11	Kirk Bittner 860-670-5544		
Sunday, May 12 Mother's Day	Tim Double 724-954-2938	Harry Clayton 316-644-9117	Sue Erlenwein 316-644-4586
Saturday, May 18	Bob Holliday	Mike Orindgreff 316-200-5046	
Sunday, May 19	Tim Double 724-954-2938	Steve Leonard 316-249-7248	Ethan Beale 316-650-6431
Saturday, May 25	Paul Sodamann 785-456-5654	Steve Damon 620-386-0770	
Sunday, May 26	Bob Blanton 316-841-2921	David Kennedy	
Monday, May 27 Memorial Day	Michael Groszek Mig82au@gmail.com	Matt Gonitzke 815-980-6944	
Saturday, June 1	Kirk Bittner 860-670-5544	Mike Orindgreff 316-200-5046	
Sunday, June 2	Bob Hinson Rhinson1@cox.net	Robert Estagin 316-708-2311	Leah Condon 316-249-3535
Saturday, June 8	Kirk Bittner 860-670-5544	Robert Estagin 316-708-2311	Rob Rippy 316-213-8241
Sunday, June 9	Michael Groszek Mig82au@gmail.com	Steve Leonard 316-249-7248	Rob Rippy 316-213-8241
Saturday, June 15		Steve Damon 620-386-0770	
Sunday, June 16 Father's Day	Michael Groszek Mig82au@gmail.com	Mike Orindgreff 316-200-5046	

Saturday, June 22	Tony Condon 515-291-0089	Matt Gonitzke 815-980-6944	Mike Davis 316-772-8535
Sunday, June 23	Bob Blanton 316-841-2921	Robert Estagin 316-708-2311	
Saturday, June 29	Paul Sodamann 785-456-5654		
Sunday, June 30		David Kennedy	Rob Rippy 316-213-8241
Thursday, July 4			
Saturday, July 6		Matt Gonitzke 815-980-6944	
Sunday, July 7	Michael Groszek Mig82au@gmail.com	Harry Clayton 316-644-9117	Sue Erlenwein 316-644-4586
Saturday, July 13	Kirk Bittner 860-670-5544	Mike Orindgreff 316-200-5046	
Sunday, July 14	Bob Blanton 316-841-2921		Mike Davis 316-772-8535
Saturday, July 20 Kowbell			
Sunday, July 21			Rob Rippy 316-213-8241
Saturday, July 27	Paul Sodamann 785-456-5654		
Sunday, July 28	Bob Hinson Rhinson1@cox.net	Steve Leonard 316-249-7248	Mike Davis 316-772-8535
Saturday, August 3	Kirk Bittner 860-670-5544		Mike Davis 316-772-8535
Sunday, August 4	Bob Blanton 316-841-2921	Rob Rippy 316-213-8241	Leah Condon 316-249-3535
Saturday, August 10			
Sunday, August 11	Tim Double 724-954-2938	David Pauly 316-250-2045	
Saturday, August 17	Tony Condon 515-291-0089		
Sunday, August 18	Kirk Bittner 860-670-5544	Steve Leonard 316-249-7248	
Saturday, August 24	Paul Sodamann 785-456-5654	Steve Damon 620-386-0770	
Sunday, August 25	Brian Bird 620-664-7844	Harry Clayton 316-644-9117	Sue Erlenwein 316-644-4586
Saturday, August 30	Bob Hinson Rhinson1@cox.net	David Pauly 316-250-2045	

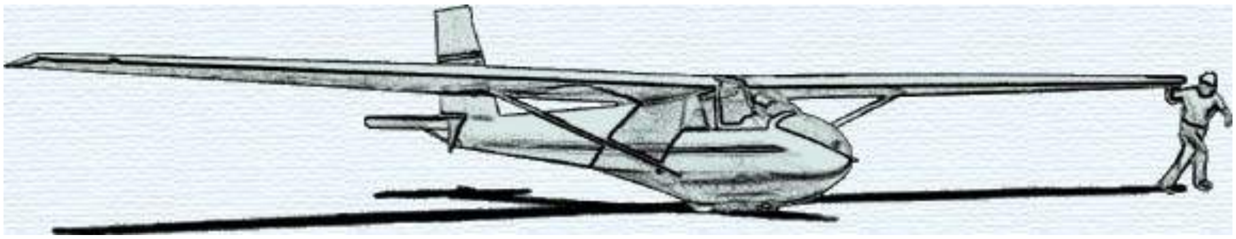
Sunday, September 1	Bob Blanton 316-841-2921	David Kennedy	
Monday, September 2 Labor Day	Kirk Bittner 860-670-5544		
Saturday, September 7	Tony Condon 515-291-0089	David Wilkus	
Sunday, September 8	Tim Double 724-954-2938		
Saturday, September 14	Mike Logback 620-755-1786		
Sunday, September 15	Mike Logback 620-755-1786	Steve Leonard 316-249-7248	Jerry Martin 620-960-5418
Saturday, September 21			
Sunday, September 22	Tim Double 724-954-2938	Jerry Martin 620-960-5418	
Saturday, September 28	Paul Sodamann 785-456-5654		
Sunday, September 29	Brian Bird 620-664-7844	Jerry Martin 620-960-5418	
Saturday, October 5	Kirk Bittner 860-670-5544		
Sunday, October 6	Bob Blanton 316-841-2921	Jerry Martin 620-960-5418	
Saturday, October 12	Tony Condon 515-291-0089	David Wilkus	
Sunday, October 13	Bob Hinson Rhinson1@cox.net	Leah Condon 316-249-3535	
Saturday, October 19	Mike Logback 620-755-1786		
Sunday, October 20	Mike Logback 620-755-1786	Harry Clayton 316-644-9117	Sue Erlenwein 316-644-4586
Saturday, October 26	Paul Sodamann 785-456-5654	Matt Gonitzke 815-980-6944	
Sunday, October 27	Brian Bird 620-664-7844	Steve Leonard 316-249-7248	

KSA VARIOMETER

911 N Gilman

Wichita, KS 67203

abcondon@gmail.com



KSA Meeting

Spring Safety Meeting

Update on Operations Building & Nationals

NCAT Room 210

April 17th 6:30 PM