VARIOMETER

PUBLISHED TO RECORD

THE UPS AND DOWNS

OF THE

KANSAS SOARING ASSOCIATION

Editor: Tony Condon

Volume LVII **April 2017** **Number 4**

Notes from the President

Greetings KSA! I apologize for the tardy newsletter. I had a great time in Florida flying the Sailplane Grand Prix and thanks to the nice weather and good flying did not have time to put together a newsletter. We had a great turnout for the spring work day at Sunflower and are off to a good start for the season. The Grob will be ready to go for opening day on April 15th. The line duty and towpilot schedule is in the back of this newsletter. There are still some holes so contact **Tim Double**, tjd5185@gmail.com to fill in on line duty or **Steve Leonard**, zuni228@yahoo.com for towpilots.

Aaron Maurer had a bunch of KSA Business cards printed up. These will be really handy for you to give to those people you talk to about gliders so they have contact info for the club. Look for them in the hangar at Sunflower. KSA merchandise will be on its way soon for those who ordered at last months meeting. I will contact you directly when it comes in. If you missed the order, no problem. We will be getting a few extra t shirts to have on hand as well as KSA logo decals. Anything else you can order at your convenience from Yaw String at http://www.yawstring.com/#!/Kansas-Soaring-Association/

See you at Sunflower!

Tony

Auto Towing

By **Brian Bird**

Saturday March 18th was a busy day of auto-towing at Sunflower. The day got started bright and early at 0700 with Charles Pate along with a young student pilot from Wichita Gliderport named Montana Bennet. The day's plan was for Charles to conduct a CFI renewal for me followed by further ground launches for as long as the weather and interest allowed. **Alex Hunt**, **Kevin Riedl**, and **J. Riedl** all showed up shortly after 0700 and we moved to the comfort of the Riedl's mobile semi-truck/camper/toy box. Charles observed while I conducted a ground school on how to do ground launches. By 0900 or so, **Mike Logback** had arrived with his truck, tow rope, and tow hook. **Jim Frizzell** also arrived around this time. The 2-33 was moved to the south end of the field as the towrope was laid out onto the runway. There was a fairly strong wind from the east and in spite of all our efforts to yaw right, the rope ended up near "Mount Wheatmore". With very little N-S component to the wind, we decided to change runway directions after the second tow. We also changed tow vehicles since the transmission on **Jim Frizzell's** truck seemed to be at a better gear ratio for the speeds we were using. (My truck was jumping in and out of 2nd gear through much of the first two tows). After making several flights with **Alex** (and Charles) I was declared a bona-fide CFIG for the next two years. I also gave young Montana an introduction to auto-towing. Next on the list was **J. Reidl** who took 3 flights followed by **Mike Logback** who took three flights and completed a BFR. **Jim Frizzell** made a couple of flights, followed by one more tow with **Alex Hunt**. I signed off **Alex**'s ground launch endorsement as well as a BFR and he made a solo flight. Afterwards, he stated that the sailplane flew a lot better without me in the back seat (he's not the first person to point that out to me). At some point during all this, **Jerry Martin**, **Aaron Maurer**, and **Tim Double** all showed up. I'm not sure who it was, but someone made a run to the "Bulls-eye" and got a bunch of hamburgers and fries to go and we all ate lunch at the north end of the runway. Then I made two flights with **Jerry Martin**. During the ground school, I had pointed out that with a more aft cg, it is possible to fly more aggressively, but one runs a higher risk of a rope break. I was able to demonstrate that point with my next student **Aaron Maurer**. **Aaron** and I made three flights, two of which featured an actual rope break. **Aaron** was also endorsed for ground launch and made a solo flight which I believe ended with a normal release. The next student was **Tim Double**. **Tim** attained his ground launch endorsement and made a solo flight. If I recall correctly, he had an actual rope break near the end of the tow on his first ground launch solo. After that, I gave **Kevin Riedl** a flight which I was surprised to learn was his first ride in a sailplane. We need to get him in the air more! By now, my voice was almost gone and I needed to get home to get ready for a prior commitment that evening. So, I made one last tow with **J. Riedl** with plans to land long to facilitate putting the glider away. That tow also ended with a rope break at about 700', right at the point of steepest climb. As usual, things got pretty exciting at that point. I tried yelling all sorts of instructions from the back seat, but as I mentioned, I had no voice left and no sound was coming out. **J.** did a great job of doing what he needed to do and recovering the aircraft attitude in spite of my silence.

By the end of the day, we had accomplished 26 ground launches, 3 ground launch endorsements, 3 BFRs, my CFI recertification, and I think we got several people checked out on driving the tow vehicle. Tow drivers for the day included **Mike Logback** who did some tow driving instruction, **Jim Frizzell**, and **Kevin Riedl**. There may have been others driving, I am not sure as I was in the 2-33 in all but three of the flights.

KSA CALENDAR

April 15th - Opening day at Sunflower

April 20th-23rd - Wave Camp - Soaring NV, Minden NV

May 14th - 20th - Region 7 - Albert Lea, MN

June 5th - 14th - 15 Meter, Open, Standard Nationals - Cordele, GA

June 21st - 30th - Club Class Nationals - Hobbs, NM

July 2nd - 8th - 2nd Annual Junior Nationals - Harris Hill, Elmira, NY

Jun 29th - July 16th - 2nd FAI World 13.5m Class Gliding Championship - Szatymas, Hungary

July 1st - 8th - US Junior Camp & Contest - Elmira, NY

July 3rd - 7th - Women's Seminar - Chilhowee Gliderport - Benton, TN

July 15th - Kansas Kowbell Klassic - Sunflower

July 18th - 27th - Region 10 Low Performance Contest - Midlothian, TX

August 1st - 10th - 18 Meter Nationals - Uvalde, TX

August 28th - September 2nd - Region 10 Championship - Waller, TX

September 24th - Adventurous Babes Society

October 1st - Adventurous Babes Society Rain Date

October 7th - EAA Fly-In Newton, KS

October 29th - Closing Day at Sunflower

Nov 26th - Dec 8th - 2nd FAI Pan-American Gliding Championships - Santa Rosa de Conlara, Argentina

Colorado Soaring Camp

Where: Colorado Soaring Association 4CO2

When: June 10 – 18, June 10 Turkey Boil, June 11 winch day possible

SSA Tow Insurance Reciprocity Applies

http://www.soarcsa.org/index.php?page=csa-rates Six tow visiting pilot rate cap does not apply during camp.

O2 equipped gliders recommended.

KOA 3 miles, motels 6 miles, camping on gliderport, limited 20A service, limited bunking.

More information 970-568-SOAR

From June 1998 *Free Flight*

The elements of handicapping gliders

Part 3 Handicaps based on the pure MacCready model

Carl Herold

For the next few parts, I will be comparing the cross-country performance for seven gliders ranging in performance from the 1-26 through the Nimbus 3D. In Part 2, I challenged the reader to compare the cross-country speeds using the representative curves provided. We will generate an initial handicap for these seven gliders using a very simplistic MacCready soaring model with the following idealized assumptions outlined below.

Basic MacCready model handicap assumptions

- The start gate and finish gate altitudes are the same.
- This is a very long distance flight with no landouts.
- All flight airspeeds and altitudes are at sea level at standard temperature and pressure (59°F and at 29.92"Hg).
- All gliders are 100% efficient in finding, entering, climbing, and leaving thermals.
- All gliders climb at the same rate for climbs ranging from 100 to 800 ft/min.
- The best speed to fly and the achieved cross-country speeds are based on the MacCready model.
- The cross-country cruising speeds are constant and stay on the course line.
- The model assumes 100% thermal intercept probability.
- There is no sink or lift between thermals.
- There is no wind.
- The start and final glide speeds are the optimum inter-thermal speeds.
- The glider polars are generated as a closed form equation fitting published performance measurements.
- The single place glider flying weight is based on its maximum takeoff weight plus 265 pounds (accounting for pilot, batteries, parachute, oxygen system plus 15 pounds).
- The multiplace glider flying weight is based on its maximum takeoff weight plus 475 pounds (accounting for pilot, passenger, batteries, two parachutes, oxygen system, plus 25 pounds) .
- The "scratch" glider (handicap = 1.00) will be the Standard Cirrus.

The MacCready (speed-to-fly speed ring) model was developed by 1956 Open Class World Soaring Champion, Paul MacCready, as an aid to the pilot to fly at the best inter-thermal speed to the next thermal. It was based on the pilot's expected rate of climb to be achieved at the next thermal and, in addition, provided the pilot with the best additional speed to fly (via the speed ring attached to the variometer) in increased sinking conditions. We will now use this same MacCready model as we develop a simplistic sailplane handicap. Subsequent parts will add realizable complexity to this model which will progressively modify this basic handicap. These real world functions which will be investigated are:

- The impact of start gate speeds (eg, red line limitations) and gate altitudes and finish gate altitudes on the handicap.
- The impact of task distance on handicaps.
- The impact of glider weight changes on handicaps.
- The impact of wind on handicaps.
- The impact of height band on handicaps.
- The impact of contest site field elevation on handicaps.
- The impact of task types (O&R, POST, triangles) on handicaps.
- The impact of density altitude on handicaps.
- The impact of the different climb rates for each of the gliders due to wing loading and minimum sink differences on handicap.
- The impact due to wingspan changes and winglet additions on handicap.

By the time I have done all this, I will begin to explore what winning pilots in the past and currently are accomplishing in competitions compared to this series of idealized incremental developed models. We will learn that the highest performance Open Class racing gliders in the world are winning with thermalling percentages as low as 17% or better, even for long tasks. In addition, I notice the instrumentation (Total Energy compensation, wind measurement in real time, GPS flight recorders, thermal marking, good True Airspeed corrections, and GPS interconnected glide computers) has made measurable performance gains with increased pilot confidence and decision making skill for all gliders incorporating them. Obviously the higher performance gliders with longer reach are able to achieve larger gains from this than the lower performance gliders.

Employing the list of assumptions above, I will now refer to the comparative curves for each of the seven gliders to be compared to the similar ones shown in Part 2. For each 100 ft/min rate of climb the optimum speed to cruise to the next thermal is shown in Figure 1. Each glider is shown with a different symbol with a glider name and the flying weight noted in pounds. Figure 2 shows the resulting achieved cross-country speeds as a function of rate of climb using these same reference curves for each of the gliders. Figure 3 shows the ratio of the achieved cross-country speed of each of the gliders for each rate of climb compared to the speed of the scratch glider. Thus, the Std Cirrus at 744 pounds will have a handicap 1.00 for all rates of climb. The cross-country speeds for all gliders climbing at 100 ft/min are ratioed. This produces a handicap for each of the gliders compared to the Std Cirrus for 100 ft/min, then 200 ft/min, etc.

You will note in Figure 3 that for high rates of climb the handicaps change very little for above 600 ft/min and for low rates of climb the handicaps begin to diverge for both the low and higher performance gliders. The glide of the very high performance gliders begins to dominate in weaker lift and the glide of the low performance glider begins to deteriorate due to its very low inter-thermal cruising speed.

Table 1 will be the interesting table to monitor as we proceed through the addition of the complicating factors listed above.

This table shows the percent of time the glider is assumed to be climbing during the cross-country flight for the model assumptions. This table shows the percent of total flight time the glider is thermalling. It is interesting to see that the actual time in each thermal is exactly the same for all the gliders at the same rates of climb. There is, however, a noticeable advantage for the higher wing loading and higher L/D (aspect ratio) gliders. For example, in very weak thermals (100 ft/min) the high performance gliders thermal only 57% of the time, while the lowest performance glider in this sample list (the 1-26) must thermal 70% of the time. The lower performance glider gets to lower altitude much sooner, thus have to endure more climbs per unit of distance than the more efficient (lower sink rate) gliders. Thus, the increasing difference in percent thermalling time.

As the lift increases to 800 ft/min for all gliders, the percent thermalling time diminishes to around 36% to 40% for all gliders. As they all fly faster inter-thermal speeds in stronger lift, the profile drag penalty begins to dominate as induced drag diminishes.

The next few chapters to be explored will show dramatic changes in the basic handicaps.

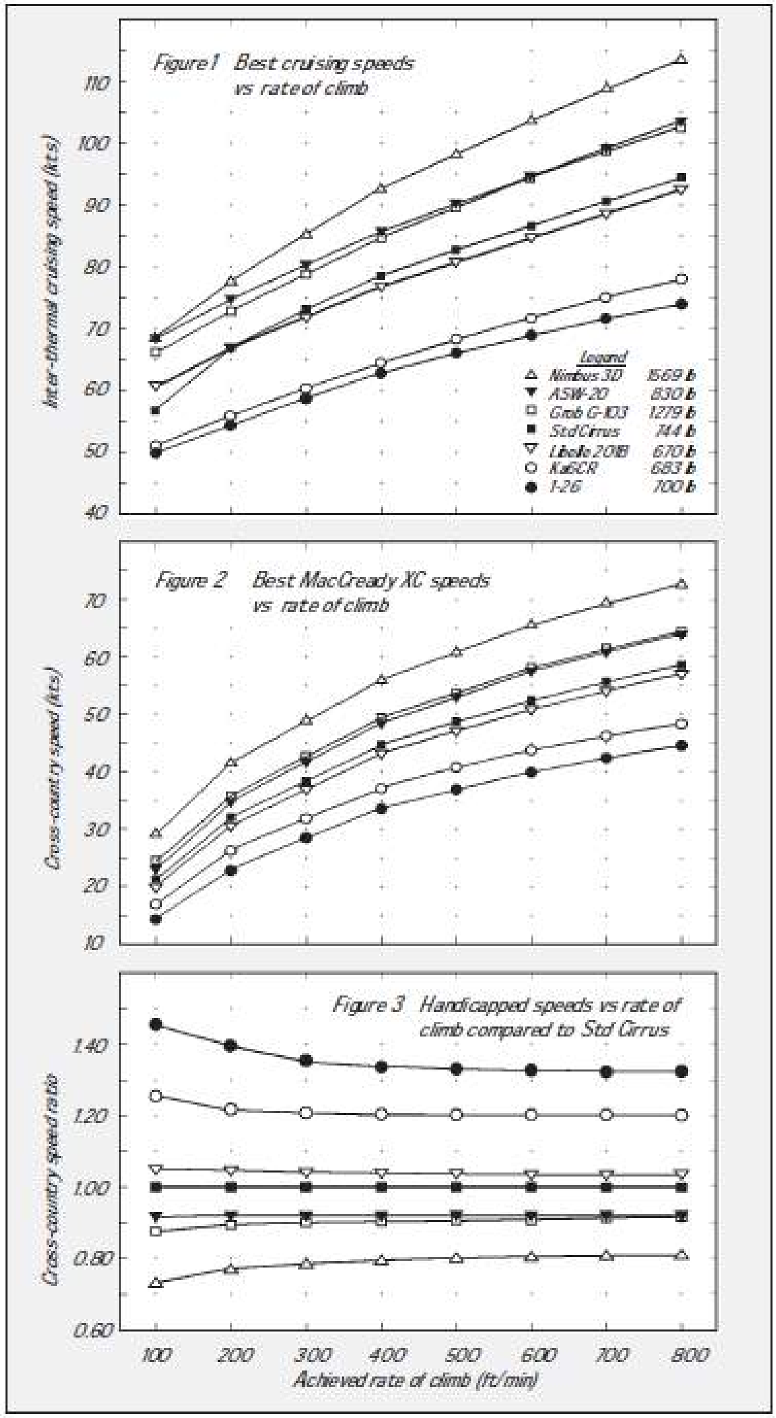
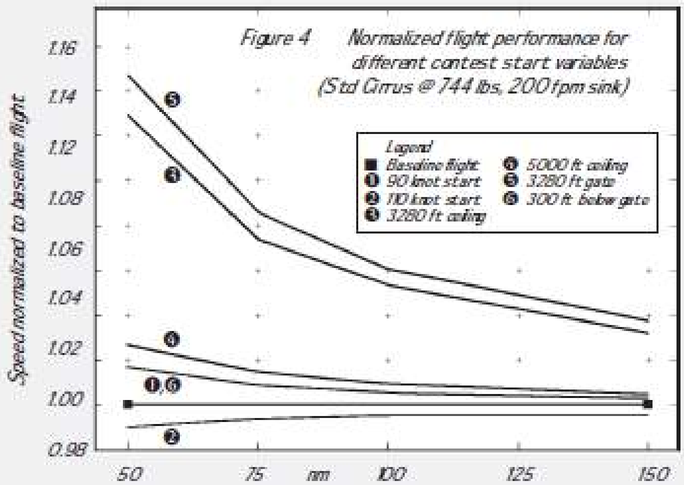
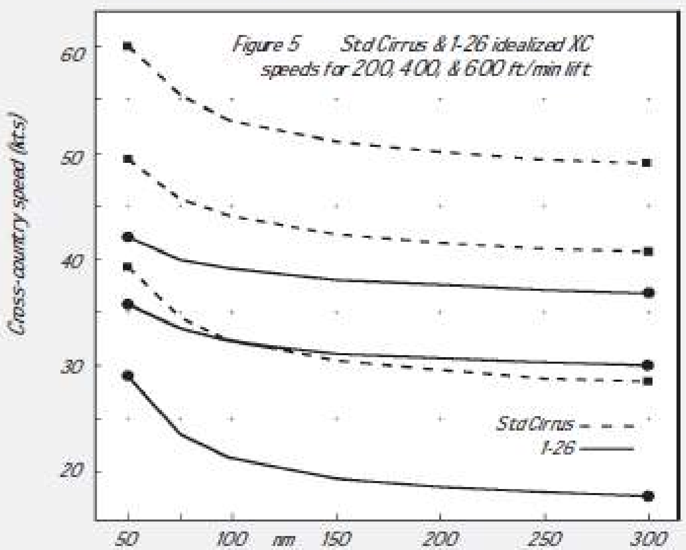
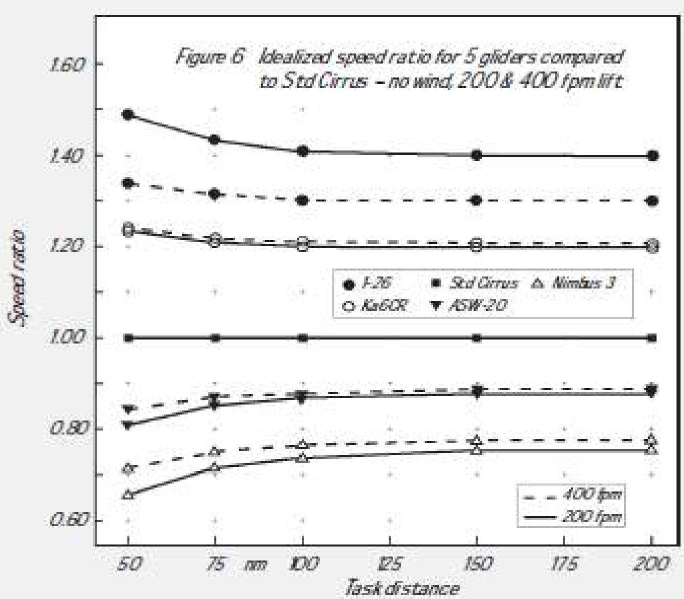


Table 1 Percentage of time thermalling

Glider @ flying weight (lbs)	Average rate of climb – ft/min 100	200	300	400	500	600	700	800
Nimbus 3D – 1569	57.2	46.5	43.1	39.6	38.3	36.9	36.5	36.1
ASW-20 C – 830	63.2	50.8	46.4	41.9	40.4	38.9	38.0	37.1
Grob G-103 – 1279	65.8	53.4	48.4	43.4	41.3	39.3	38.7	38.0
Std Cirrus – 744	62.6	52.0	47.8	43.6	41.5	39.5	38.8	38.1
Libelle H201B – 670	66.5	54.2	49.1	44.1	42.0	40.0	39.3	38.6
Ka-6CR – 683	66.7	52.7	47.5	42.4	40.7	39.1	38.5	37.8
1-26E – 700	70.6	57.7	52.4	47.0	44.7	42.3	41.1	39.8







Part 4 The impact of start gate height, start speeds, and task length on glider speed ratios.

Part 3 showed the speed ratio for six representative gliders against the Standard Cirrus at 744 pounds. This part will show a glider flying an idealized contest task on a no wind day. The probability of intercepting a thermal is 100% and all gliders finish. All speeds are at sea level at standard temperature and pressure (STP). This model and spread sheet produced the results shown in Figures 4 through 6 in this chapter.

The example shows the conditions for the Std Cirrus starting at 0.93 of its V_{ne} speed, flying under a 5000 foot agl start gate margin by 100 feet, pulling up to the MacCready cruise speed setting of 67 knots based on a string of perfect 200 ft/min thermals having a 7000 foot agl cloudbase. This model assumes the first thermal climb is to 6500 feet and the final glide altitude starts at 6500 feet. The final glide is flown at the MacCready inter-thermal speed to a finish altitude of 250 feet.

By varying the baseline parameters and plotting the results in Figure 4, the fractional impact on performance as a function of task length is identified. Examples of this impact are summarized below in diminishing order for task length of 100 nautical miles:

a. if the cloudbase is lowered from 7000 feet to 3280 feet, the task speed will be reduced by 6%.

b. lowering the gate from 5000 to 3280 feet will reduce the task speed by 5.5%.

c. increasing the margin passing under the gate from 100 feet to 300 feet or increasing the finish altitude from 250 feet to 500 feet will each reduce the task speed by 1% for a 100 nm task.

d. if the start gate speed is decreased from 102 kts to 90 kts the task speed will be reduced by 1%.

e. if the cloudbase is lowered from 7000 feet to 5000 feet, the task speed will be reduced by 1%.

f. if the start speed is increased to 110 kts, the task speed is increased by 0.5%.

One can selectively combine the above results to achieve a multiplicative (plus or minus) effect on overall task speed. Later parts will show (current) soaring techniques by which much higher speed performance gains are obtained by the more modern gliders and instrumentation, such as cruising along paths of delayed sink or on final glides along lines of lift. Later, I will also show the impact of density altitude on cross-country speed.

Figure 5 shows the comparison of the baseline Std Cirrus starting at 103.2 knots and a 1-26E starting at 93.6 knots. This figure shows idealized cross-country speeds as a function of task distance for the baseline tasks of 200, 400, and 600 ft/min rate of climb, with a 100 foot gate margin under a 5000 foot gate, with a cloudbase of 7000 feet, and finish at 250 feet. This figure shows higher cross-country speeds for the shorter task distances. This is the result of the start gate energy (potential and kinetic) reducing the MacCready distance one has to fly to start the final glide. Note that for a 200 ft/min lift, this start gate energy adds 3% (to the MacCready task speed for the Std Cirrus at 450 nm and for the 1-26 at 335 nm. For a 150 nm task, the start gate energy boosts by 15% (Std Cirrus) and 7% (1-26) respectively to the MacCready speed for a 200 ft/min thermal.

The speed advantage increases for the higher performance glider on shorter distance tasks. The higher red line speed gliders also have a task speed advantage with higher speed starts, most especially at high density altitude sites (like Minden, NV).

Larger excursions will produce proportional speed reductions or gains. Adding time delays to the model assumptions, eg, taking extra time getting centred and leaving a thermal or turning wide around the turnpoints reduces your achieved cross-country speed. These are all calculable losses, and a fixed model component could be incorporated in an idealized performance model.

Figure 6 shows the speed ratios (or the speed advantage of the Std Cirrus over the compared glider) for the 200 ft/min and 400 ft/min climb conditions respectively. The curves are plotted for the speed ratios for the Std Cirrus, 1-26E, Ka6CR, ASW-20, and Nimbus 3D at the all-up weights previously given. These speed ratios are developed for each of the gliders by using the Std Cirrus as the reference glider. Its cross-country speed for a given climb rate is divided by the compared glider's speed for this climb at each calculated task distance. Thus, the Std Cirrus speed results in a constant ratio of 1.0 (compared to itself) for all task lengths for a climb rate. The lower performance gliders will have a speed ratio greater than 1.0 and the higher performance gliders will have a speed ratio of less than 1.0. If we could agree on the model, this could be the means of producing a first generation handicap. We still have a lot more factors and variables to compare and discuss.

You will notice from studying these curves for 200 and 400 ft/min climbs that there is a task length dependency and a rate of climb dependency. With what criteria should we pick an idealized handicap? The speed ratios tend toward slow convergence with increased task distance and more rapidly diverge for weaker climb rates. Later in this series, actual contest trend data from 40 years ago to recent contest results around the USA and the world will provide insight on the impact on soaring location, geography, and weather conditions on selecting one handicap number for all gliders flying in weak and strong conditions. Can one pick an acceptable or fair fixed number for each glider? We will look at the impact of glider weight, wind, site elevation, task types, and changing contest rules.

Later I will make available the spread sheets, the mathematical models, the equations and the coefficients for producing the plots being shown for your own use. Much of this material has practical use for self-study on your personal soaring techniques as well as understanding some elements of handicapping.

Tony Condon receives the SSA's 2016 Henry Combs Trophy from Region 10 SSA Director **Steve Leonard** at the March KSA Meeting

From Feb/March 1999 *Free Flight*

The elements of handicapping gliders

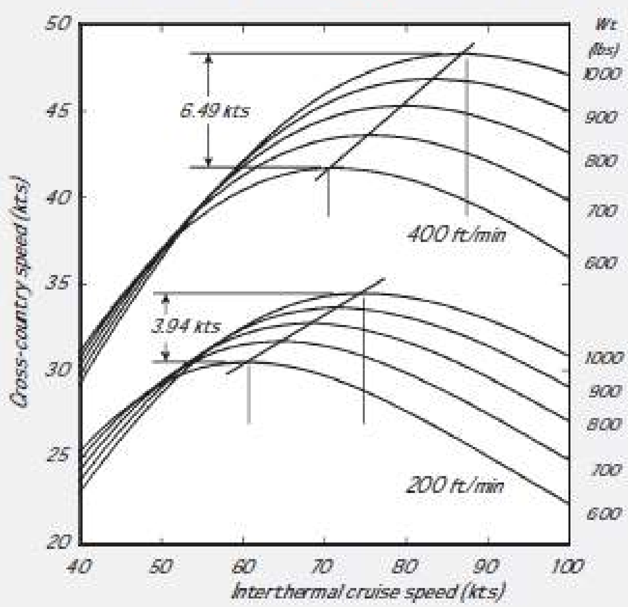
Part 5 The impact of changing weight on MacCready speeds

Carl Herold
from *WestWind (Pacific Soaring Council)*

Part 4 developed a glider cross-country model with many idealized assumptions. One of those assumptions was that each glider model flew with a fixed weight. This chapter will show the impact of changing weights on the MacCready cross-country speed and will summarize the weight impact on the handicap and the options for selecting a handicap derating factor (not penalty) for overweight gliders for a range of soaring conditions.

Figure 1 shows cross-country speed contour plots for glider weights ranging from 600 to 1000 pounds. These contours are for a Standard Cirrus with an idealized lift rate of 200 ft/min and 400 ft/min respectively. These plots show the dramatic shift of the best MacCready speed-to-fly as the weight and/or lift increases and the corresponding achieved cross-country speed increases. This figure shows that a 400 pound weight increase for 200 ft/min and 400 ft/min rates of climb amounts to a 3.94 knot and a 6.49 knot cross-country speed increase respectively. In other words, the cross-country speed benefit increases with increasing rate of climb as well as the increasing weight.

Figure 1 Best speed to fly over a range of weights for a Std Cirrus – for 200 and 400 ft/min rates of climb



The two sloping lines show that adding 400 pounds to a 600 pound Cirrus will increase its idealized achieved cross-country speed by the fractional rate of 3.94/400 = 0.00985 knots increase per ft/min climb for the 200 ft/min thermal. This slope increases to 6.49/400 = 0.01622 knots per ft/min climb in a 400 ft/min thermal. An easier way to relate to this is to multiply the slope value by 100 which results in changing the units to show that the speed increase is nearly 1% per 100 pound increase in weight for 200 ft/min lift and 1.6% for 400 ft/min lift. These percentages will be different for each glider and its assigned weight. Figure 1 uses the same idealized assumptions given in Chapter 3.

By the mid-80s, Sports class contests implemented an assigned weight for each sailplane to eliminate the dramatic impact of weight on handicapped racing, and this initiated the weighing of gliders at these contest. A handicap adjustment (not penalty) was required for those gliders exceeding their assigned weight. Figure 2 shows a quick analysis performed in 1989. This figure shows that the decimal cross-country speed impact of adding weight to assigned glider weight varied from 0.00015 to 0.0003 decimal increase in cross-country speed per pound of weight increase for the assigned weight for the 200 and 400 ft/min lift cases.

Another way to explain this data is say the 0.00015 can be converted to indicate a 1.5% increase in cross-country speed per 100 pound weight increase from a base weight. You will note the suggested trend for lower derating for longer span high performance gliders. For the first few years, 0.00025 was conservatively selected for the handicap derating adjustment for "overweight" sailplanes. This handicap derating number was reduced (with concerns) to 0.0002 in the 1994 Sports class rules.

Since developing a large family of closed form analytical expressions from flight test data for over 100 gliders, I have been able conduct a more exhaustive analysis of the overweight and varying thermal strength impact on handicaps. This analysis takes into account the aerodynamic and materials technology impacts on the decimal weight impact on MacCready cross-country speeds. Figure 3 shows a recent study of a technology range of nine selected gliders ranging from the 1-26 to the high-end Nimbus 3DM for thermal climb rates ranging from 200 to 800 ft/min. The vertical scale is the fractional speed increase rate of the handicapped speed change relative to the assigned weight. These results are sensitive to the weight change and the thermal strength change shown in Figure 1.

Notice that all of these gliders have different characteristics that can fall into technology groups. You will see that the Nimbus 3DM rises to less than 0.00012 (1.2% MacCready speed increase per 100 pounds) to 0.000167 (1.67%/100 pounds) in spanning the 200 to 800 ft/min lift rate region. The L-23 Blanik is the next lowest, running from 1.88% to 2.65% for thermal lift spanning from 200 to 800 ft/min respectively. This medium performance trainer has a low derating factor as its weight is high for its moderate basic cross-country speed performance. The Ka6CR ranged from 3.26% to 4.33% speed increase per 100 pounds increase in weight.

The analysis of many more gliders shows that these gliders can loosely be grouped into technology groups. Not surprisingly, the very light weight, low cost PW-5 was the most sensitive (for the range of glider studied) to weight increases spanning from 3.38% to 4.47% for the 200-800 ft/min lift rates respectively. Figure 4 shows bar charts giving a more detailed breakdown for 16 gliders at assigned weights for 200 and 400 ft/min achieved rates of climb respectively. These gliders are listed in order of increasing performance. Note the difference between the low weight 1-26A and the more heavy 1-26E. There is a noisy trend of 0.00032 for the 15 metre gliders and 0.00014 for the very heavy super-span gliders.

The data set for 400 ft/min climb (dark grey bars) shows that the fractional speed per pound for the 15 metre or lower performance gliders increases from 0.00032 to 0.00038, but the large span gliders have a limited increase from 0.00014 to 0.00016. The implications for 100 ft/min lift suggest a derating range of 0.0001 to 0.0005 be considered by weight and technology groups. More on this subject in a later part.

The real world of cross-country flying encounters changing lift strengths and lift gaps along the course line. We will study these impacts, summarize and compare them with real national, regional, and Sports class contest results and soaring sites in a future part.

The MacCready cross-country speed ratio doesn't include start, finish, and altitude factors, task distance or wind, but does include the more detailed cross-country model assumptions stated in Part 3. Figure 3 in Part 3 *(ff 6/98)* provided the handicapped speed ratios against a Standard Cirrus for a wide range of climb rates for seven fixed weight gliders. Figures 3 through 5 in Chapter 4 *(ff 6/98)* showed the dramatic range of fractional cross-country speed increase with rate of climb for a wide range of nine to sixteen gliders.

Figure 5 compares the MacCready speed ratios for six gliders, each at two flying weights: at their all up weight (AUW), and at AUW-plus-100 pounds. The speed ratios are referenced to the Standard Cirrus at 744 pounds AUW.

Each additional 100 pound increase will shift the curves at nearly the same increment higher (or lower) for speed ratios greater than 1.0 (or less than 1.0). You will also notice that for lowering climb rates the low performance glider MacCready

Figure 2 *Best speed to fly increase with increased glider weight*

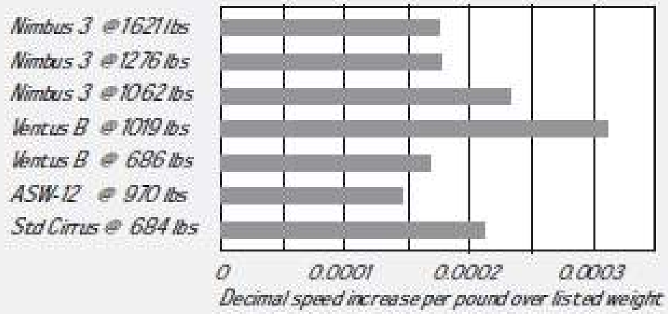


Figure 3

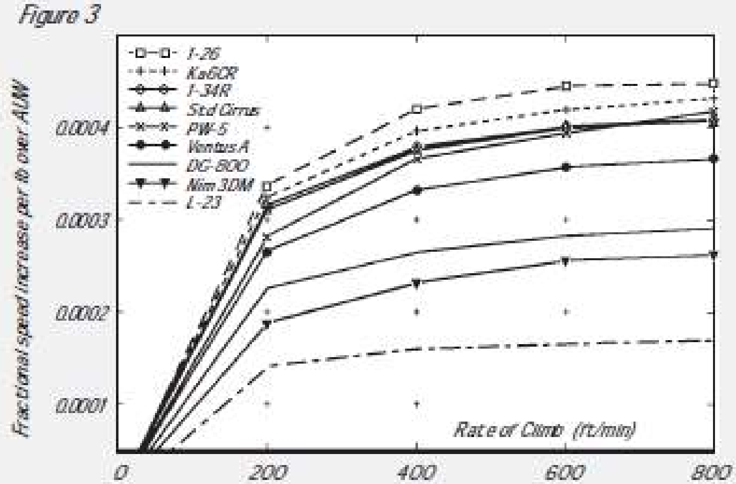


Figure 4 *Fractional speed increase per pound above glider AUW for 200 and 400 ft/min average rates of climb*

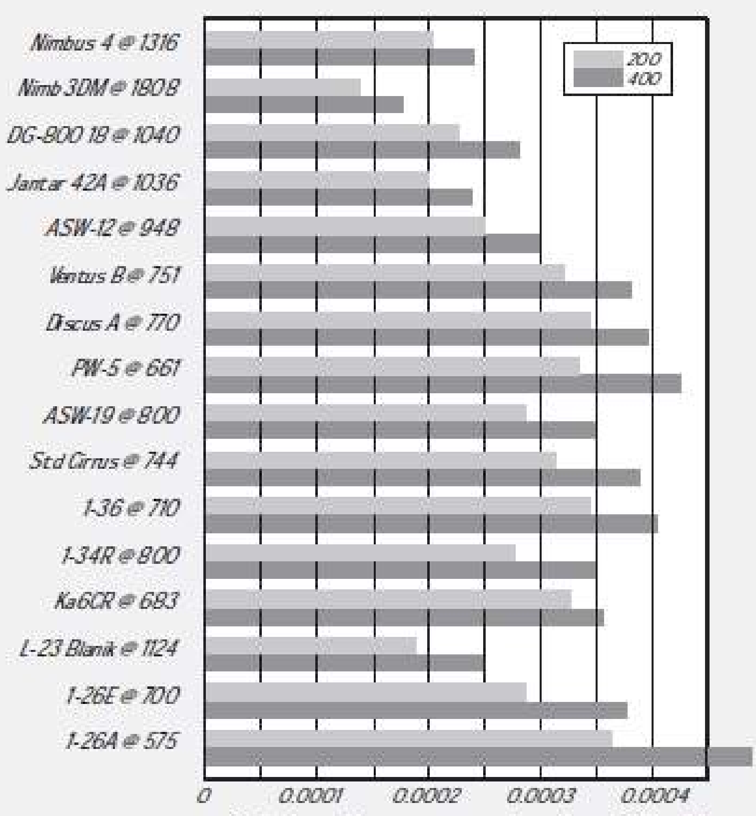
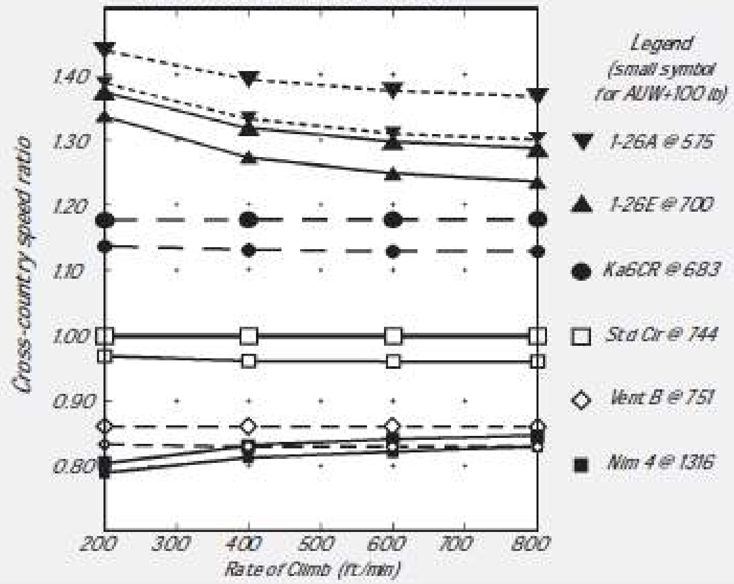


Figure 5 Cross-country speed ratio difference between AUW and 100 lbs over AUW



speed ratios arc upward and the higher performance gliders arc downward. You will also note that, for strong uniform soaring conditions, the speed ratios become nearly flat. Speed comparisons for less than 200 ft/min climb rates will be discussed in a later part covering weak soaring conditions. Figure 5 and the above referenced figures show the benefits of adding ballast to gliders for increasing achieved cross-country speeds for many soaring tasks in addition to racing. In the last thirty years, gliders with ballast have demonstrated an enormous performance benefit in strong soaring conditions.

What is the AUW and how is it determined?

In 1966 Region 11 (Pacific Soaring Council), and subsequently the SSA Contest Board and a few SSA Directors, started the investigation and demonstration of non-sanctioned handicapped contests. In 1971, Region 11 and Region 10 (Texas Soaring Association) began non-sanctioned handicapped contest trials. In 1975, SSA approved Regional handicapped contests, including an allowance for ballast-capable gliders. As a result of these contest results, in 1991 Sports class pilots moved to incorporate a weight limitation to all gliders to improve fairness. This weight limit was defined as the "All Up Weight" (AUW). The AUW is made up of the empty weight of the glider (without parachute, batteries, and oxygen) plus an allowance for pilot, oxygen, batteries, and parachute of 250 pounds for a single place glider and 450 pounds for a multiplace glider. There was no AUW limit for multiplace gliders. The rationale was to encourage passengers getting an introduction to the less competitive Sports class environment as a means to develop new contest pilots and increase interest to improve glider pilot growth and retention.

Due to increasing pilot concern, the AUW was revised for 1998 by adding another 15 pounds to the AUW below 1000 pounds, and 25 pounds for gliders above 1000 pounds AUW. In addition, a 30 pound fuel allowance was provided for motorgliders which in 1996 were allowed to self-retrieve from a landout. This process required a major recomputation effort for most of the gliders on the handicap list to fit the new AUW weights.

A more complex component of this last AUW change was the determination of the glider empty weight. The actual empty weights from weight and balance data produced dramatic variations from the advertised data sheets. Early production runs of gliders could be 50 to 100 pounds heavier than the data sheets. Later production could be reduced by up to 50 pounds from original advertised weights. In addition, later data sheets tended to revise the empty and gross weight upwards over time. For Standard class gliders this empty weight variation (neglecting oxygen, parachutes, and batteries) was a min/max range of 80 pounds — up to nearly a pound per square foot in wing loading. For 15 metre class gliders the range was up to about 120 pounds for 98 to 115 square foot wing area gliders, over a pound of wing loading.

In producing the most recent handicap list (CH-98), a big effort was made to minimize the number of complaints from many pilots owning gliders which exceeded the AUW because their empty weight was higher than the AUW allocation. The empty weights published in the SSA Soaring Directories over the years tended to retain the original factory estimates (this is especially true for all *OSTIV*, *Technical Soaring*, and *Janes* publications). Further, these publications have tended to blur all the variants over time. The SSA Directory was never meant to be used in this manner; it can be a very misleading document and is not the bible it once was. The flight test reports published over the years by Zacher, Johnson, Bikle, the Akafliegs, and a few others have been a key resource for accurate and up-to-date glider performance data.

This increased AUW allowed the pilots with lighter ships to load to that AUW number with non-disposable ballast. As wing loading and span loading are factored in producing the handicap, this was more fair to all. Handicap reductions due to exceeding the AUW should be reduced to a very few starting in 1998.

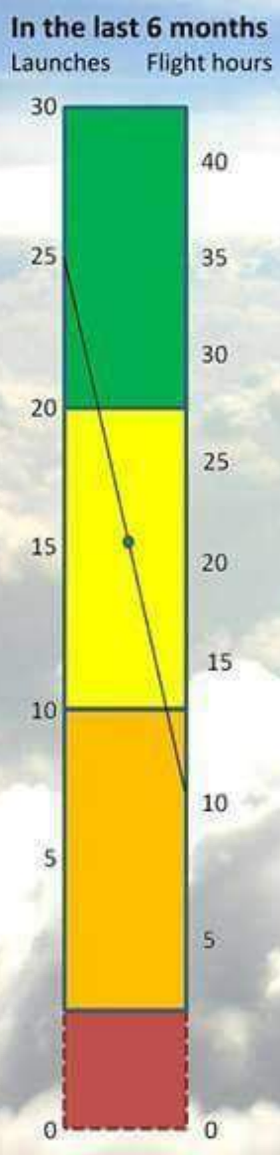
In either case, the AUW could not exceed the maximum non-disposable payload. This was easy for the early generation gliders that were not designed for water ballast and recorded empty weight. More modern sailplanes have tended to not list the unballasted maximum weight. For these ships, the maximum gross weight has not been a factor until we get to large multiplace motorgliders.

The current 1998 German Aero Club and the British Gliding Association handicaps for Club class include no handicapping limitations for gross weight (or winglets or wind) other than those the aircraft are certificated to meet. *(The SAC Sporting committee also has not incorporated an AUW limit in our Sports class contests. ed.)* This is likely the result of the weaker average soaring conditions in Europe compared to the large range of soaring conditions available across the USA. A future part will discuss the world-wide variation of soaring conditions and foreign country handicapping differences.

As a footnote, I recommend that those of you interested in following this series make a copy of each article and insert it in a ring binder. As we progress, I will be referring to earlier material as I assemble more data, and combine material from earlier parts. ❖

EGAST
Component of ESSI

TRAINING BAROMETER for Glider Pilots



Green Zone

Your recency is good – however be careful!

Pilots in current practice have made the following errors:

- Sailplane incorrectly rigged
- Cockpit checks missed
- Launch failure actions incorrect
- Poor approaches (especially into fields)

Yellow Zone

More training can't do any harm – Unexpected events can be hazardous

More attention is required when launching

- in unfamiliar areas (e.g. mountains)
- from unfamiliar airfields
- in unfamiliar aircraft types
- using an unfamiliar launch method

Amber Zone

Additional training is strongly advised - Flying in these circumstances is risky

For pilots with little recency:

- The first flights after a long gap should be on a familiar type in unchallenging weather conditions
- If your previous flight was over 3 months ago, a training flight with an instructor is the best way to regain recency.

Red Zone

If you have less than 5 hours flight time or less than 15 launches and have not done two training flights with an instructor in the previous 24 months, you must pass a proficiency check with an examiner or complete the requirements dual or solo under the supervision of an instructor.

Your training status depends on the numbers of launches and flying hours in the previous 6 months.

Draw a line between the number of launches carried out with the number of hours flown in the period. The Zone in which the centre of the connecting line lies gives your training status.

Example (shown): - 25 hours and 10 launches

Result: Despite your hours, your training status is in the yellow Zone!

www.easa.europa.eu/essi

» EGAST

Published on the basis of the »Trainingsbarometer« of the Deutscher Aero Club e.V. built on the initial idea from Ole Didriksen, Danish Soaring Association.

2017 US Junior Camp & Contest Announcement

The 2017 event will be hosted by the SSA Youth/Junior Committee at Harris Hill in Elmira, NY on July 1-8. Harris Hill is an incredibly unique flying site. Situated ~700 feet above the valley below, it offers a beautiful view on takeoff and some great east coast soaring weather. It's also a good, place to learn XC techniques. If you miscalculate a final glide, you have 700 ft of margin to the auxiliary landing field below.

The event is separated into two groups: single seat ("sports" as it's known on the SSA site) and two seat. The only requirement to fly in either class is that you will be 25 years old our younger on the first event day (defined as a "Junior"). If you will be over 25 but interested in participating, you are able to register and fly in Region 3 during the same week (Register at: http://www.ssa.org/Contests?cid=2379) and participate in the JRCC lectures.

1. Single seat is intended for pilots who have some XC experience (either a silver badge or OLC 50km flight) and are interested in flying in an SSA sanctioned regional contest. The single seat classes is ranked and provides a score that can be used to enter national soaring events.
2. Two seat class is intended for juniors new to soaring, student pilots, licensed pilots, CFI-Gs, etc. who do not have sufficient cross country soaring experience, confidence, or the ability to borrow a glider for the single-seat class. In two seat class, you will fly with an experienced mentor pilot who will coach you as you fly a cross country task. This mentor pilot will keep you out of trouble while sharing their racing experience.

Each day will begin with a pilots meeting where everyone will get a briefing on the weather and operations notes. After this meeting, we will give a short lecture on a cross country soaring topic and have a group discussion. The two-seat juniors will then be assigned their mentor for the day and the single-seat pilots will begin preparing to fly.

Lunch will be provided (paid for and prepared) by the JRCC and served in the Harris Hill clubhouse. Glider launches will begin at approximately 12:00 PM each day. The single-seat and two-seat flights will nominally be 2-4 hours. Depending on the number of two-seat gliders and pilots, each two-seat pilot will expect to fly at best, every day and at worst every-other day. On the two-seat pilot's off days, we will have Condor (a glider racing simulator) setup for them to practice race techniques.

After flying is done for the day, there will be a de-brief for everyone to discuss their flights over dinner (also provided by the JRCC). Throughout the week, there will be several social events and a few soaring movie nights. Of course, there is also a campfire…

The JRCC has reserved the use of the Harris Hill youth camp and will have the camp site and shower houses available right next to the airport. As the event becomes closer (at the end of May), we will coordinate tents, sleeping bags, etc to make sure that everyone has a comfortable place to sleep and can make arrangements if you do not have the ability to bring them.

The entry cost for the event covers all tows/flight fees, the campground use fees, and all meals through the week. It is currently set at $200 for the event though there may be a refund at the end depending on the success of fundraising efforts.

You can register for the event at: http://www.ssa.org/Contests?cid=2379 If you are bringing a glider to fly in single seat ("sports") class, please fill it out accurately. If you are flying in two-seat class, please fill it out as completely as possible and put "N/A" in any fields that are related to the glider.

If you have any questions or suggestions about the event, need help with anything, would like to help host or fund the event, or anything else… please do not hesitate to reach out here: http://juniors.ssa.org/home/how-to-help/

RULES FOR KSA FLYING AWARDS, 2017

Unless otherwise noted, the following applies to all awards:

For definition of bold terms, refer to the FAI Sporting Code Section 3-Gliding.

Awards are to be made for SOARING PERFORMANCES with a START POINT in the state of Kansas.

On distance and speed flights, the maximum LOSS OF HEIGHT allowed is 1000 meters (3281 feet)

For sailplanes without a SSA handicap, a handicap will be established by the KSA Board of Directors.

If disposable ballast is on board at takeoff, any handicap will be further multiplied by .92.

Flight documentation shall be submitted in .igc format

Task Declarations may be electronic, written, or verbal

TURNPOINTS will be attained by entering an OBSERVATION ZONE

Wooden Wings

The Wooden Wings Trophy is awarded for the longest distance SOARING PERFORMANCE in a wooden winged sailplane. The task may be FREE DISTANCE or 3 TURN POINT DISTANCE.

If the COURSE is abandoned before all TURNPOINTS are achieved, the flight will be scored as the distance for the achieved TURNPOINTS, plus the distance to the next declared TURNPOINT, minus the distance from the FIX establishing a landing or starting of a MoP to the next attempted TURNPOINT, but not less than the distance to the last achieved TURNPOINT.

Mamie Cup

The Mamie Cup is awarded for the longest distance SOARING PERFORMANCE of the year. The task may be FREE DISTANCE or 3 TURN POINT DISTANCE.

If the COURSE is abandoned before all TURNPOINTS are achieved, the flight will be scored as the distance for the achieved TURNPOINTS, plus the distance to the next declared TURNPOINT, minus the distance from the FIX establishing a landing or starting of a MoP to the next attempted TURNPOINT, but not less than the distance to the last achieved TURNPOINT.

KSA Flying Horse (Silver)

The KSA Flying Horse Trophy is awarded for the highest speed achieved around a CLOSED COURSE with a maximum of two declared TURNPOINTS and OFFICIAL DISTANCE of at least 100km and less than 200km.

Dennis Brown Memorial

The Dennis Brown Memorial Trophy is awarded for the highest speed achieved around a CLOSED COURSE with a maximum of two declared TURNPOINTS and OFFICIAL DISTANCE of at least 200km and less than 300km.

KSA Flying Horse (Gold)

The KSA Flying Horse Trophy is awarded for the highest speed achieved around a CLOSED COURSE with a maximum of two declared TURNPOINTS and OFFICIAL DISTANCE of at least 300km.

Curt McNay Pilot of the Year

The Curt McNay Pilot of the Year Trophy is awarded for the best combined score in four tasks - DURATION (6 hours maximum), GAIN OF HEIGHT, Handicapped Distance, and Handicapped Speed. Each task will be scored from a different SOARING PERFORMANCE.

The Distance task may be FREE DISTANCE or 3 TURN POINT DISTANCE.

If the COURSE is abandoned before all TURNPOINTS are achieved, the flight will be scored as the distance for the achieved TURNPOINTS, plus the distance to the next declared TURNPOINT, minus the distance from the FIX establishing a landing or starting of a MoP to the next attempted TURNPOINT, but not less than the distance to the last achieved TURNPOINT.

The speed task must be a CLOSED COURSE with an OFFICIAL DISTANCE of at least 100 KM. However, a 3 TURN POINT DISTANCE of at least 200 KM may be used if you are flying a sailplane with a handicap of 1.36 or greater. In this case, a wind correction factor of 15 MPH will be subtracted from the achieved speed prior to scoring.

1000 points will be awarded the best performance in each task. Each contestant's performance will be ratioed according to the best performance in the task being evaluated. The sum of each contestant's scores will be compared, the highest being the winner.

Charles Henning Award

The intent of this trophy is to encourage more people to fly cross country.

1) The cross country task will be a CLOSED COURSE with any number of TURNPOINTS.

2) Handicapped Speed will be determined by the DURATION or 2 Hours, whichever is greater.

3) There is no limit on start or finish altitude.

5) TURNPOINTS may be any TURNPOINT published in the KSA Turnpoint File or a public use airport marked on a Sectional Chart.

6) The winner will be determined by averaging the two best tasks of the year for each pilot. The averaging will be accomplished by adding the two speeds and dividing by 2.

Lead C

Awarded to the pilot or soaring supporter who makes the most noteworthy non-achievement during the calendar year.

Praying Mantis

The Praying Mantis is awarded to the pilot who makes the most significant advance in his or her soaring ability during the calendar year. To be eligible for this award, the pilot must not yet have his or her Silver Badge at the beginning of the calendar year. The Praying Mantis selection committee consists of the KSA President, WSA President, *Variometer* Editor, WSA Chief Instructor, and the SSA State Governor for Kansas.

Towing Operations

The Towing Operations trophy is awarded to the person making the most significant contribution to the operation of the KSA Towplanes for the year.

Maintenance Trophy

The Maintenance Trophy is awarded to the person making the greatest contribution via maintaining equipment related to soaring flight during the year.

Submit flights at

http://www.soarkansas.org/soar/scoring.aspx

KSA Schedule 2017

Date	Line Managers	Towpilot
Saturday, April 15	Dave Wilkus 316-706-9261	Paul Sodamann 785-456-5654
Sunday, April 16		Bob Holliday 316-641-6178
Saturday, April 22	Alex Hunt 785-224-6330 Matt Gonitzke 815-980-6944	Tony Condon 515-291-0089
Sunday, April 23	Steve Leonard 316-249-7248	Ben Sorenson 316-655-0257
Saturday, April 29	Tim Double 724-954-2938	Paul Sodamann 785-456-5654
Sunday, April 30	Don Jones 620-960-6444 David Kennedy 316-841-2912	Jerry Boone 620-474-4177
Saturday, May 6	Robert Estagin 316-573-5881 Brian Silcott 620-204-0051	Tony Condon 515-291-0089
Sunday, May 7	Steve Leonard 316-249-7248	
Saturday, May 13	Dave Wilkus 316-706-9261 Matt Gonitzke 815-980-6944	
Sunday, May 14	Don Jones 620-960-6444 David Kennedy 316-841-2912	Jerry Boone 620-474-4177
Saturday, May 20	Brian Silcott 620-204-0051 Kevin Ganoung 785-536-4540	Paul Sodamann 785-456-5654
Sunday, May 21	Keith Smith 785-643-6817	Bob Hinson 316-841-5561
Saturday, May 27	Alex Hunt 785-224-6330 Dave Wilkus 316-706-9261	
Sunday, May 28	Harry Clayton 316-644-9117 Sue Erlenwein 316-644-9117	
Monday, May 29 Memorial Day	Don Jones 620-960-6444	

Online Schedule at

https://www.brownbearsw.com/cal/ksa

KSA TOWCARD

TOW NUMBER ____________ START TACH TIME ____________

TOW PILOT ____________

PILOT: ____________

ADDRESS: ____________

SAILPLANE: ____________

TOW HEIGHT: ____________

TOW SPEED (MPH): ____________

DATE: ____________

KSA TOWCARD

TOW NUMBER ____________ START TACH TIME ____________

TOW PILOT ____________

PILOT: ____________

ADDRESS: ____________

SAILPLANE: ____________

TOW HEIGHT: ____________

TOW SPEED (MPH): ____________

DATE: ____________

KSA TOWCARD

TOW NUMBER ____________ START TACH TIME ____________

TOW PILOT ____________

PILOT: ____________

ADDRESS: ____________

SAILPLANE: ____________

TOW HEIGHT: ____________

TOW SPEED (MPH): ____________

DATE: ____________

KSA TOWCARD

TOW NUMBER ____________ START TACH TIME ____________

TOW PILOT ____________

PILOT: ____________

ADDRESS: ____________

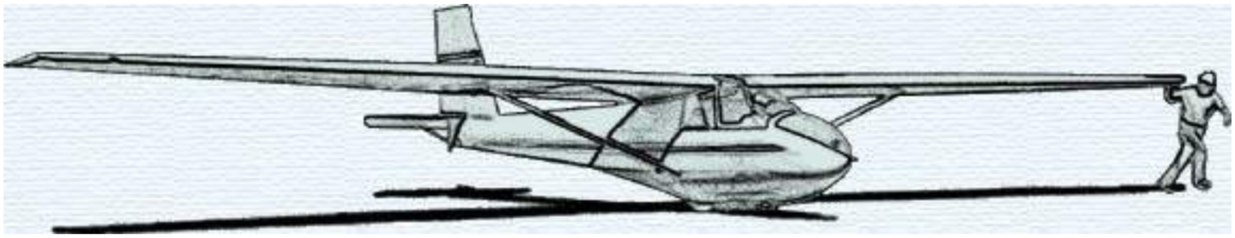
SAILPLANE: ____________

TOW HEIGHT: ____________

TOW SPEED (MPH): ____________

DATE: ____________

KSA VARIOMETER
911 N Gilman
Wichita, KS 67203
abcondon@gmail.com



KSA Meeting
May 13th - After Flying
Cookout at Sunflower