The Air Bubble

The Newsletter of the Chicagoland Glider Council

Est. January 17th, 1937

- March 2015 -

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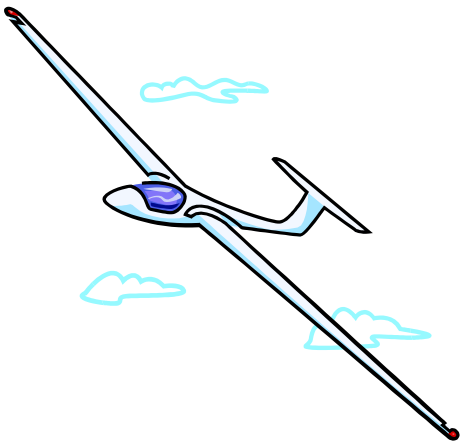


Next CLGC Meeting

"ADS-B and Gliders"

Speakers: Aaron Scicluna

Don't Miss It!!

Tuesday, March 10, 7:30PM
Herrick Junior High School

Synopsis: Automatic Dependent Surveillance – Broadcast (ADS–B) is a cooperative surveillance technology in which an aircraft determines its position via satellite navigation and periodically broadcasts it, enabling it to be tracked. The information can be received by other aircraft to provide situational awareness and allow self separation. ADS–B is "automatic" in that it requires no pilot or external input. It is "dependent" in that it depends on data from the aircraft's navigation system. ADS–B is an element of the US Next Generation Air Transportation System (NextGen). How might this impact Gliders?

2015 CLGC Youth Grant Application Deadline March 31!

This may be your last chance to get your application in for the 2015 CLGC Youth Grant. The deadline of March 31st is fast approaching. Apply for the CLGC Grant now! The application is attached to this newsletter. What are you waiting for?

The 2015 CLGC Safety Seminar Was a Great Success!

Two Seldom Seen Ways to Get a Glider off the Ground

2015 CLGC Dues Are Due!

Please send in your ChicagoLand Glider Council dues no later than January 1, 2014. The dues are $10 for the 2014 calendar year. Reminder that for the following clubs' members, your CLGC dues are included in your membership; Chicago Glider Club, Sky Soaring Glider Club and Windy City Soaring Association.

The 2014 membership renewal form can be found at the end of this newsletter. Please complete it and send your dues payment via check or money order to;

ChicagoLand Glider Council
5115 Carpenter St.
Downers Grove, IL 60515

Thank you for your support!

Directions to the CLGC Meeting Location

At Herrick Junior High School located at;

4435 Middaugh Rd, Downers Grove, IL.

Detailed directions are available at;

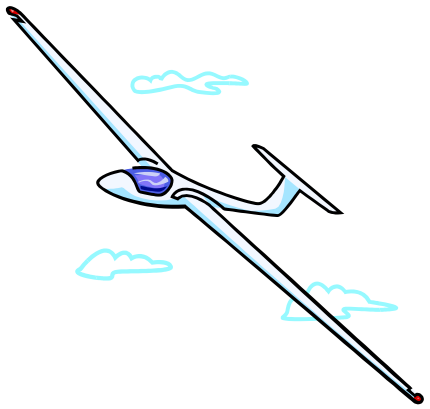
http://tinyurl.com/CLGCDIRECTIONS

Complete details at can be found at

http://chicagolandglidercouncil.com/grant

Upcoming 2015 Aviation Events

- Tuesday, March 10th – CLGC Meeting
- Tuesday, April 14th – CLGC Meeting



For Sale!

Oxygen Bottle - 22 cubic feet.. Price $80.

Dimensions are 18.5" x 5", steel bottle with approximately 500 PSI of oxygen.

I bought it 25 years ago from an aviation supply house so I believe it is a standard cylinder for aviation use.

Contact: Herb Kilian 312-405-3609

Newsletter **Contributions**?

Pictures? Accomplishments?
Suggestions? Articles?
Speaker Topics? For Sale Items?

Please let us know! If you have anything that you would like to have included in future newsletters or meetings. PLEASE send them to JOHN@DEROSAWEB.COM or call 847-844-8776.

Moved? New Email?

Please let us know to keep our database up to date.
Send an email to JOHN@DEROSAWEB.COM
or call 847-844-8776 Thanks!!

CLGC Newsletter Archive Old CLGC Newsletters Needed!!

Did you know that there is an archive of CLGC newsletters dating back to 2001 on the CLGC web site? Take a look.

http://chicagolandglidercouncil.com/newsletter.htm.

Do you have any old CLGC newsletters? We would love to scan them in for the archives. Contact John DeRosa at john@derosaweb.com.

CIRCLING THE HOLIGHAUS WAY - OR DO YOU REALLY WANT TO KEEP THE YAW STRING CENTERED?

BY RICHARD H. JOHNSON

ANSWERS:

1. During Straight Flight - YES, that minimizes drag and maximizes the sailplane's performance.

2. During Turns - NO, not really, because then the sailplane is actually in a slight skid, and more-than-necessary cross aileron is required to prevent over-banking. That will be explained below.

3. During Circling Flight - NO, that does not minimize drag, and the possibility of an inadvertent spin entry can be reduced significantly if one maintains a true mild sideslip while circling.

INTRODUCTION

The well-known German sailplane engineer, designer, Schempp-Hirth factory owner, and sailplane pilot Klaus Holighaus generously brought the benefits of maintaining a mild sideslip while circling to my attention some 30 years ago while we were both competing at the World Gliding Championships in Yugoslavia. He was flying his beautiful new Nimbus 2 sailplane for the German Team, and I was flying an equally fine ASW-17 for the U.S. Team. I was and always have been impressed with his knowledge, generosity and sportsmanship. He died in an unfortunate mountain soaring accident some 9 years ago, but his legend will always live on.

WHY MAINTAIN A MILD SIDESLIP WHILE CIRCLING?

Essentially all sailplanes are designed with positive wing dihedral. During a sideslip, that causes the windward wing to achieve a slightly higher angle-of-attack relative to the airstream than the leeward wing. That creates a rolling moment toward the leeward wing.

That is easy to prove. During straight and level flight while holding the control stick fixed, push on one of the rudder pedals and note your sailplane's roll response. It should definitely roll toward whichever rudder pedal that was depressed. That is known as positive roll stability.

The beneficial effect of positive roll stability is not so obvious during circling flight, but it is still there. The lowered inside wing panel has less airspeed, and hence less lift than the raised outside wing panel. To compensate for that, while keeping the sailplanes' skid ball centered, one must deflect the lower wing's aileron downward to increase its lift so that the lower wing's lift equals that of the upper wing. If that is not done, the sailplane would keep increasing its bank angle, and a steep spiral dive would result.

When the lowered wing's aileron is deflected downward, not only is its lift increased, but also its drag is increased, and a skidding turn will be induced. The skid can easily be corrected for by adding some top rudder to keep the skid ball centered. The danger here is that when the aileron is deflected downward, it is more prone to stalling. When that happens, an out-of-control spin will likely result unless corrective action is promptly taken.

Figure 1 shows a cross section of a typical sailplane wing airfoil and its airflow streamlines. The upper airfoil represents a relatively high angle-of-attack thermaling condition with the

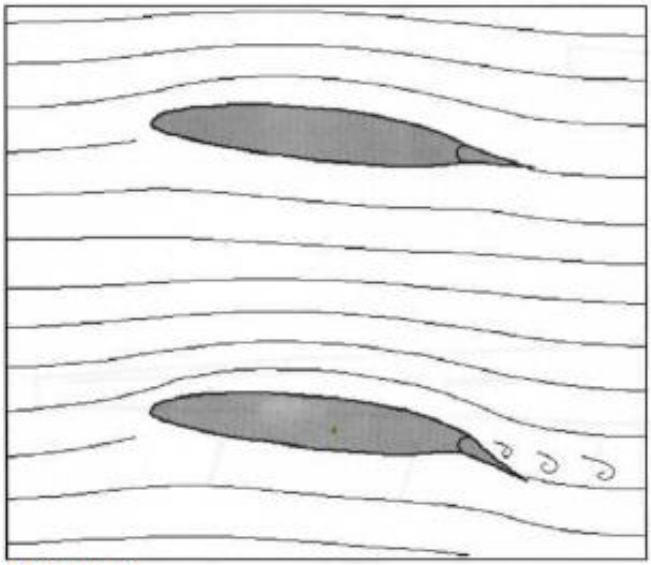


FIGURE 1

aileron un-deflected. There both the upper and lower surface airflows stay attached to the wing surfaces, and near maximum wing lift is achieved. The lower airfoil shows the same airfoil, but with the aileron deflected downward. If the aileron is deflected downward far enough, the airflow will separate from the upper portion of the aileron surface, and that will increase the wing drag and decrease its lift. If a pilot then increases the aileron downward deflection angle in an attempt to compensate for its lost lift, it only makes things worse. A spin entry is likely, unless the aileron deflection angle is neutralized, and/or the wing angle-of-attack is promptly reduced.

How does one require less-aileron deflection while circling? That is easily achieved by just maintaining a small angle of sideslip and let the sailplane's dihedral effect provide some additional lift to the lower wing. **Figure 2** depicts how the wing dihedral combined with a sideslip increases the lift on the windward wing, and decreases lift on the leeward wing.

Klaus recommended maintaining a gentle sideslip while circling. The optimum degree of sideslip depends to some degree on both the sailplane's wingspan and dihedral angle. After many hours of flying my 16.6 meter Ventus A and similar sailplanes, I find that my best overall circling performance and handling characteristics occur while the canopy mounted yaw string is deflected about 10 degrees on the high side of the turn (a gentle sideslip actually), because the yaw string forward placement error accounts for about half of the 10 degrees. See section below.

THE SKID-BALL INDICATOR

A skid-ball indicator is a curved glass tube filled with a clear compass-like fluid, and within which a round ball is free to roll from side-to-side. It is mounted laterally on an instrument panel

MORE ON SLIPPING FOR PERFORMANCE

Dick Johnson's article talks about a technique, slipping in thermals, that has been used by some competition pilots (including me) for many years. This sidebar adds some ideas about why and how much.

On my first reading of Dick's article, ten degrees of slip seemed like too much. Four things contribute to how much you should slip in thermals; yaw string position, true airspeed, bank angle and the flow around and along your wings. A yaw string 2 meters ahead of the glider CG, 45 knots, and degrees of bank results in nearly 5 degrees of yaw string error. (Including a factor of 2 for cross flow on the canopy.) You need the yaw string about 5 degrees to the high side of the turn to be perfectly coordinated. The yaw string 1.5 meters ahead of the CG, 30 degrees of bank, and 60 knots (a typical Western thermal in a fully loaded glider) results in only about 1 degree of yaw string error. Canopy cross flow exagerates yaw string angles and how much is difficult to estimate. Comparing the yaw string to a centered skid ball, as Dick recommends, is probably the simplest way to check yaw string error including cross flow.

Why slipping improves the climb in some gliders is not well understood. In generating lift, wings also generate spanwise flow, outward along the bottom and inward along the top of the wings. It is possible that there is flow separation near the tip of some circling sailplanes, and that slipping changes the spanwise flow enough to eliminate or reduce this. Separation can increase the drag significantly long before the tip actually stalls. I flew a Discus for 16 years without winglets and am convinced that it thermaled better in a slip.

As Dick says, and I say more emphatically, it doesn't work with winglets. My experience is with 15 and 18 meter spans, it may still work with wingletted open class gliders. Winglets change the flow over a large portion of the wing and reduce spanwise flow. They may correct the same problem that causes some gliders to thermal better in a slip. Properly designed winglets will not stall in a slip, and gliders with winglets that don't stall climb better in coordinated turns. The angle of attack of a winglet depends more on the flow field generated by the wing than it does on the slip or skid angle. If you can stall your winglets in a slip, my advice is to take them off the glider.

How much you should slip, beyond the yaw string error, is a difficult problem. You are looking for a small improvement that is very hard to measure. Seek advice from pilots who are very familiar with your type of sailplane. I added about 5 degrees in my Discus (5 to 7 degrees total flying wet), which is less than Dick uses in his 16.6 meter Ventus (10 to 20 degress total flying dry).

—Chip Garner

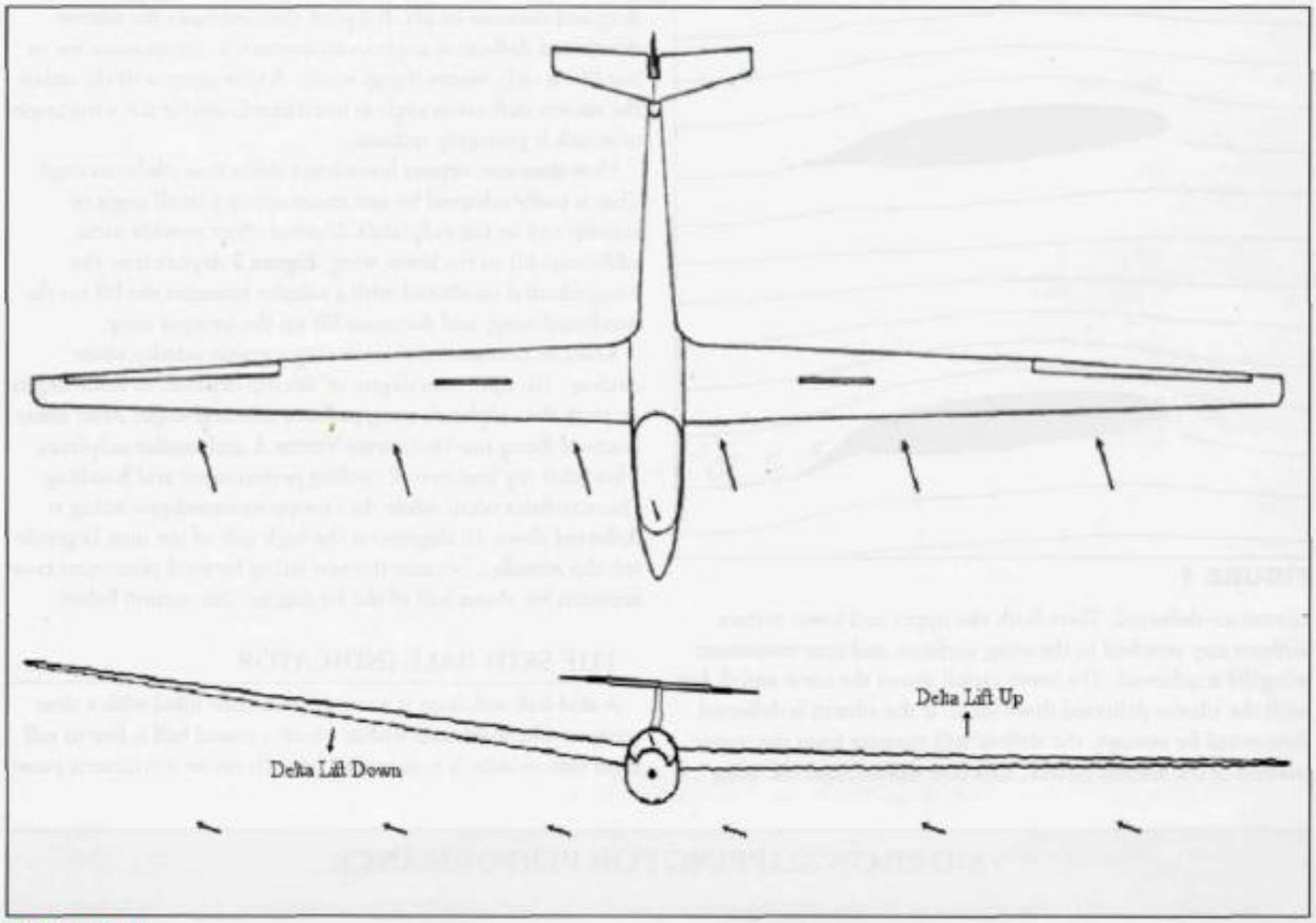


FIGURE 2

and is designed to sense and indicate lateral accelerations of the sailplane. Commonly it is called a ball-bank indicator in the U.S., but it does not actually indicate bank angles, just lateral acceleration.

I observe that under that optimized circling conditions, my Ventus instrument panel mounted skid-ball is not centered, but rests about 1/2 ball diameter on the low side of the turn. **Figure 3** illustrates a hypothetical sailplane cockpit view while thermaling in a slightly slipping circling flight condition. The instrument panel includes a ball skid indicator, and the canopy sports a typical forward mounted yaw string deflected about 10 degrees toward the high side of the turn.

WINGLET PROBLEMS

I did not have winglets installed on my 16.6-meter wings during that flight-testing, and they often are prone to stalling during slipping or skidding flight. Sailplanes equipped with winglets likely need to just keep the skid-ball centered to avoid winglet-stalling problems. Place some wool tufts on the inboard sides of your winglets and see for yourself during a test flight.

YAW STRING LONGIDUDINAL LOCATION PROBLEM

Figure 4 depicts a plan-view of a sailplane while thermaling. Circling with the yaw string centered actually results in a slightly skidding turn because the yaw string is mounted well ahead of the sailplane's CG. That concept is true, and **Figure 4** illustrates that point. The yaw string is mounted about 2 meters or so ahead of the sailplane's CG; therefore the air approaching the yaw string arrives slightly from the left of the sailplane's nose. Another way to view this turning flight situation is to consider the sailplane to be motionless in space, while the thermal is rotating at say 45 kts against the sailplane. That makes it easier to appreciate the effectively curved airflow approaching the nose-mounted yaw string.

Many single-seated sailplanes do not carry ball skid indicators today, but fortunately most 2-seated training sailplanes come equipped with them mounted on their instrument panels. The canopy mounted yaw string angle errors can easily be seen during turning flight by referring to the true ball-slip indicator. In a tandem 2-seater with separate yaw strings, one can compare the difference in the angles between the rear and front cockpit yaw strings, and see the differences.

If the yaw string could somehow be mounted at the sailplane's CG, and utilized by the pilot, the yaw string would then show zero yaw deflection when the sailplane was being flown with the skid-ball centered. Because of its normally well-forward mounting location, the yaw string indicates a slight sideslip, even though the sailplane's more accurate skid-ball shows none.

Ventus A instrument panel and canopy view during a gentle right turn at 43 kts, when the yaw string angle is momentarily at almost 20 degrees on the high side of the turn. Author's Ventus thermaling experience showed that the yaw string angles normally varied between abo 10 and 20 degrees on the high side when keeping the skid ball at the advocated 1/2 ball width on the low side of center. Unfortunately, I forg to power the electric turn indicator.

FIGURE 3

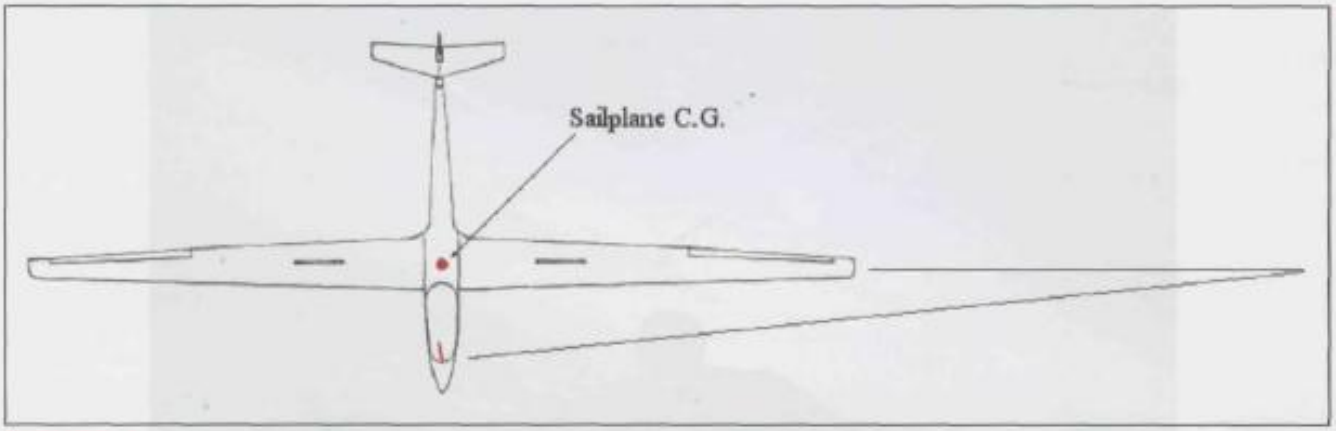


FIGURE 4

Obviously, the skid-ball more accurately portrays the sailplanes' true flight condition.

CANOPY CROSS-AIRFLOW MAGNIFYING EFFECT

During both straight-ahead yawed flight, and also during skidding and slipping circling flight, the canopy air cross-flow has a magnifying effect on the canopy local airflow direction. The actual sailplane slip or skid angles are likely about half that indicated by the yaw string.

SUMMARY

1. Because the canopy-mounted yaw strings are typically mounted well ahead of the sailplane's CG, they indicate a slight side slipping condition while turning, when in fact the sailplane is not slipping.

2. Better and safer sailplane circling performance can be achieved by maintaining an actual slight 1/2 ball width sideslip while thermaling. When circling in that condition, the yaw string typically needs to ride about 10 degrees on the high side of the turn.

3. Winglet equipped sailplanes may suffer stalling on the inboard winglet during the 1/2 ball sideslip. In that case, keeping the skid-ball centered will most likely optimize climb performance. To achieve that, the yaw string still needs to ride about 5 degrees on the high side of the turn.

4. For safety's sake never skid a turn, unless a spin entry is to be an acceptable condition. Never fly with the yaw string on the low side during any turn because that is a dangerous skidding flight condition, and too much aileron deflection is required to prevent over-banking. Skidding is an indication that too much pro-turn rudder is being applied. At low airspeeds that can easily lead to a highly unwanted loss of roll control and a dangerous spin.

5. It is very important that a yaw string be installed on modern sailplanes, but it is also prudent to have a simple skid-ball mounted on the instrument panel to indicate true slipping or skidding. Next to the airspeed indicator, the yaw string is, in my opinion, the most important sailplane safety instrument.

6. Although the ability of a yaw string to correctly indicate a skid or slip is only fair, it is cheap and simple. Its most redeeming feature is its mounting location, squarely in the pilot's forward field-of-view.

Author's Ventus A cockpit view during a properly coordinated left turn at 43 kts, with yaw string at about 10 degrees on the high side during this relatively gentle turn.

About the author: Dick Johnson is well-known in the soaring community, and has graciously provided the readers of *Soaring* Magazine with flight test evaluations of sailplanes through the years.

2015 ChicagoLand Glider Council
Membership/Renewal Application & Change of Information Form

Membership Renewal Due Date: January 1, 2015

Please mail this form with a check or money order for $10 made payable to "ChicagoLand Glider Council" to:

ChicagoLand Glider Council
5115 Carpenter St.
Downers Grove, IL 60515

Your Name _____

Your Address _____

City _____ State _____ Zip _____

Email Address (**please print very clearly**) _____

Phone Number(s) Home _____ Work _____ Cellular _____

Primary Airport and/.or Club where you fly _____

Pilot ratings that you hold (student, private, commercial, instructor, etc) _____

Type of Glider(s) that you own _____

☑ Please check the appropriate box(es) below

❑ New Member ❑ Membership Renewal ❑ Change of Street Address ❑ Change of E-Mail Address

❑ Change of Telephone ❑ Change of Glider/Airport Information

ChicagoLand Glider Council

2015 Soaring Youth Grant

The ChicagoLand Glider Council Grant program is hosted under the auspices of the membership of the council and is paid by their dues. A primary grant of $500 is generally awarded each year. Other secondary grant(s) may be awarded based on merit. This grant will be paid directly to the recipient's home glider port and placed "on account" for use by the recipient for their continuing soaring education.

Application Requirements: The applicant must meet all of the following requirements:

- Be a member in good standing of the ChicagoLand Glider Council as of January 1st of the grant year.
- Be between the ages of 14 and 21 (inclusive) as of January 1st of the grant year.
- Home glider port lies within 85 miles of Chicago (city center).
- Have not previously received a primary grant award. However, you might be considered for a secondary grant.
- Obtain a written recommendation from a Certified Flight Instructor Glider (CFIG) who is familiar with the applicant's qualifications.
- Write an original essay of 500-1000 words on "What Soaring Means to Me….". This essay should include your thoughts about soaring, your accomplishments to date, your future plans and your financial need.
- Send all necessary documentation to the email address and/or surface mail address shown below **no later than midnight, March 31st of the grant year.**

Applicant Information

Name _____

Current Age: _____ **Birthdate:** _____ / _____ / _____

Address: _____

City/State & Zip: _____ **Phone:** _____

Email Address _____

Soaring Facility Location: _____

Applicant's Signature: _____

Submit this application and all required documentation shown above to the ChicagoLand Glider Council Grant Committee via the email address listed below (required) and/or via the surface mail address below. The application and documentation must be received no later than the deadline date shown above.

The ChicagoLand Glider Council Grant Committee consists of the board of the ChicagoLand Glider Council. Decisions of the committee are final. The Grant Committee is not responsible for lost or incorrect applications. Grantee(s) award announcements are made at the regularly scheduled CLGC meeting in March.

Applications and other information is available at http://chicagolandglidercouncil.com/grant. Good luck!

Email to: jhderosa@yahoo.com
Surface Mail to;

ChicagoLand Glider Council Grant Committee
c/o John DeRosa
35W529 Parsons Rd
West Dundee, IL 60118