



Skywriter



Monthly newsletter of the Calgary Ultralight Flying Club - COPA Flight 114

July 2004

From the Cockpit

by Dave Procychen

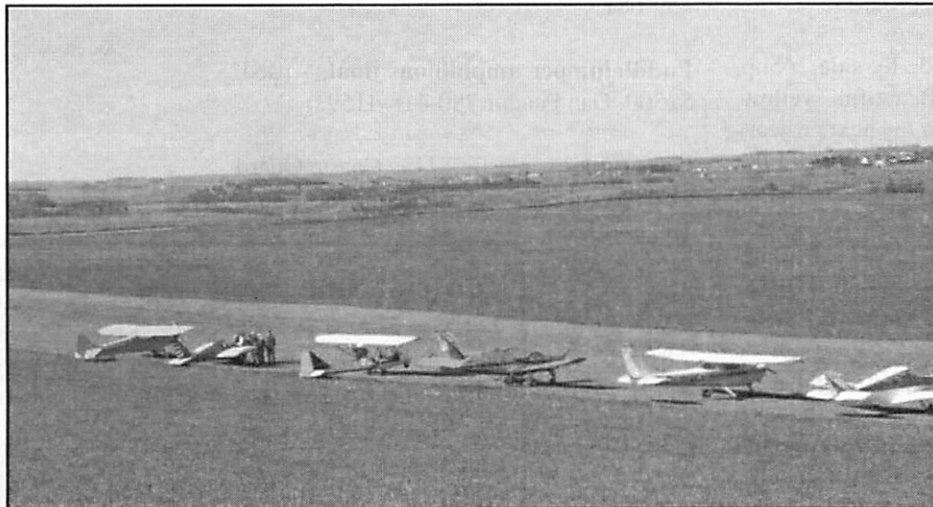
I have had the pleasure of being called by my son's school teacher to come and talk to the Grade 5/6 class about "Flight". This is the 2nd time I was asked to do it as my older son had the same thing when he was in Grade 5/6 a few years earlier. The first time I did the presentation I followed all the rules and spoke of the theory about "Flight". Most of the kids did not find it very interesting as they had heard all this before in class. Now with the second chance to do it again I was going to do things a lot differently than the last time.

I first asked the class who wanted to be a "Pilot" well there were about 5 kids that put up their hands. This included one girl; I thought yeah this is about the average. So I pulled out my old (1978) "Pilot Study Kit" bag and said out loud "all you need to do is get one of these" and I lifted up the bag. Well the kids eyes were open wide and looking like it was the last bell of the day. They started asking, "is that all we need"? I replied, "YES".

I then took out the book "From the Ground Up" and they all thought "oh no not another book to learn". I then said "yes everything you need to know is in here but I'm here to talk to you about what you get to do after you do all that reading and writing of tests to see if you learned what was in that big book". The class looked at me with amazement as I pulled out pictures I had taken of their school and community, some kids even saw pictures of their own house. The tide was turned, everyone want to know how I could do this. I told them of

more questions. I did in the end tell them that they had to learn the "boring stuff" in order to have the ability to view the world in a whole new light and if you could make a living at it "better yet". The part they loved was how they knew what the 3 axis's were but did not know what a "sideslip" was for. They knew the elevator went up and down but if you moved it quickly it would fill you with butterflies and that the ailerons could bank you to such an angle that a roller coaster was just for beginners. So after having my second chance to tell

what "flight" means to me I know I have given them a whole new view "From the Cockpit". So now I have my name in the teacher's book, but in a good way...



June 19th was a perfect fly-in breakfast day at Bishell's. Photo courtesy Carl Forman.

how you have an instructor to help you learn to fly at first, and then you get to "Solo". Next I told them stories of the flying trips we at the "CUFC" did just to get pancakes or a FREE hamburger. They just loved it.

The 45 minute lesson turned into 90 minutes and their teacher still had many

Thank you to everyone that has helped me in making the first 6 months of the Presidents position very enjoyable. If you know of a speaker we should hear from in the fall please let me know. I will be away to Oshkosh this summer so I will let VP Stu Simpson fill in for me with "From the Cockpit" next month. See you all at our next meeting in September.

Fly Safe! ➔

For Sale

Hercules 084 Engine - 4-stroke, horizontally opposed, made by Teledyne, overhauled, price negotiable. Al, 403-271-0369 (07/04)

Murphy Renegade Spirit - S/N50, less than 100 hours on airframe, built under amateur built category and later changed to basic ultralight and modified to single seat. 18 imp gals fuel, full instruments, ELT, Icom A5. New Rotax 582 DC DI MOD 99, less than 10 hours, electric start, 2.58:1 "B" gearbox, 2-blade 74-34 Tennessee prop, \$26,500. Bernie Kespe 403-255-7419, office 403-259-5498 Ext 233, email bernie.raymac@shaw.ca (05/04)

Cavalier - 2 place side by side, zero time O-290-D2, low wing, tip tanks, 80% complete, selling due to health, \$18,000. John Ehrmantraut 256-7530 (04/04)

Engine - Arrow 500 GT, 65hp, 2 cylinder, horizontally opposed, 93 hrs, \$1200. Peter Wegerich, 403-862-7148, email wegericp@telusplanet.net (02/04)

Cuby II - 2-place, side-by-side, 65hp MZ202, low time. Beautiful yellow airplane I need money for my next project, \$19,000. Peter Wegerich, 403-862-7148, email wegericp@telusplanet.net (02/04)

Phantom One - 1982, 135TT airframe and engine, flys weekly, \$4,200 OBO. Dick Rankin 403-286-5735 (11/03)

Avid Aerobat - Advanced Ultralight, 102 hours since rebuild completed in January 2003, new Rotax 582 engine 3:1, Powerfin 2-blade 74" prop, new VFR instruments, new interior, new fabric and paint (red and yellow), wings rib-laced, new wide stance gear, new double tail spring with Matco tailwheel, tricycle gear option included, new cowling with twin rads, folding wings provide easy storage in garage, cabin heat, all maintenance logs up to date, cruise 95 to 100 mph, \$22,500.00 OBO, Troy, (403) 936-8424 or email for pictures brancht@tsesteel.com (10/03)

Notice: Classified ads are free to CUFC

members. Contact Bob Kirkby to place or renew your ad (see masthead). Ads will be dropped after 6 months unless renewed.

Ads reprinted from the St. Albert Flying Club Newsletter

Team MiniMax - blue & white, Rotax 447 with electric starter, drycell battery, 35 US gal tank, speed fairings on wing struts, wired for radio (power, PTT and antenna), skis, 185 TT, hangared at St. Albert, \$10,000 OBO. Ben Strafford 780-458-1606 or larandbe@telus.net

Modified Himax partially complete - fuselage 65% complete, empennage complete ready to cover, spars/ribs built, sufficient material to complete wings. Volkswagen engine with Colin Walker prop. Complete set of instruments. Excellent bargain for knowledgeable builder, \$3000. Viv Branson 780-460-8753 or email vbranson@interbaun.com.

Team Airbike plans - complete set, manuals, excellent condition, \$200 including shipping, OBO. Reg Lukask 780-459-0813.

Puddlejumper amphibious floats - used, \$2500. Dan Pandur 780-418-4159.

Gas tank - plastic, US Coast Guard approved, 11.5 US gals., new in box, \$75. Ron Swan 780-477-6112.

Judicial Sale

MiniMax Ultralight for sale to the highest bidder - as is, where is - submit bids in writing on or before July 10, 2004 to:



Sarah Emrich, Recovery Manager
Consolidated Civil Enforcement
150, 633 - 6 Ave. SW
Calgary, AB T2P 2Y5
Tel: 403-262-8800 Fax: 403-262-8801

Skywriter

Skywriter is the official newsletter of the Calgary Ultralight Flying Club - COPA Flight 114 and is published 12 times per year. Forward your articles and letters to:

Editor: Bob Kirkby 569-9541
e-mail: bob@skywalker.ca

Calgary Ultralight Flying Club COPA Flight 114

Meetings are held on the second Thursday of every month, except July and August, at 7:00 pm, at the Northeast Armoury, 1227 - 38 Avenue NE, Calgary.

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Past President: Bob Kooyman 281-2621
e-mail: kooyman-eng@shaw.ca

Visit the CUFC web site: www.cufc.ca

Dining in Vulcan

by Bob Kirkby

The call came in Monday morning (email call that is).

"Boys; Looks like Tuesday will be a good evening to fly. I suggest we rally for a flight from Kirkby Field to depart at 6:00 p.m., or so, on Tuesday evening."

Stu was back in the groove. He hadn't organized a flight anywhere for two weeks, due, I expect, to the rotten weather we've had lately and to his equally rotten shift assignments. I checked my calendar program and typed in a flying appointment for Tuesday evening.

The unpredicted, but predictable, rotten weather continued into Tuesday eliciting another email from Stu. "Looks like the wind is really going to pick up this afternoon after 4:00 p.m. I suggest we postpone for another evening this week." I scrubbed that appointment.

On Wednesday I spotted yet another email from Stu among the legions of spam and virus-stricken incoming I receive every day. This one more encouraging.

"Since we were shutdown last night, I propose we try again for Thursday night. Like Go-Cart Mozart, I've been checkin' out the weather chart, seein' if it was safe outside. I think it will be. Thus, I propose we depart Kirkby Field at about 6:00 p.m. for points yet to be decided." I re-arranged my calendar slightly and typed in another flying appointment.

Thursday evening I pulled into my driveway a little behind schedule at 6:01 pm. Seeing Stu pre-flighting the Giant I drove over to his hangar and asked where we were going. "How 'bout dinner in Vulcan", he replied. I said, "Sounds like a great idea but it'll take me about 30 minutes to get ready. You start out and I'll catch up."

"See you in the circuit at Vulcan," Stu acknowledged as I drove toward the house



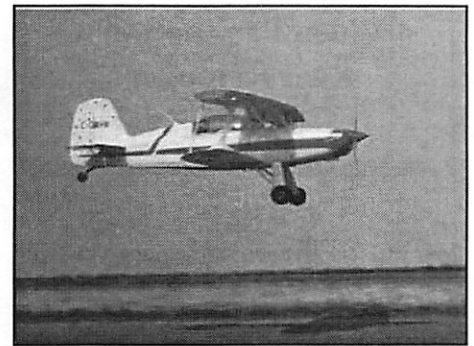
Stu and the Giant left first.

to get changed.

The Green Giant was long gone by the time I had the Starduster's O-320 warmed up. Once airborne I set the throttle and prop for 24 squared which gave me an indicated 125 mph. I expected to arrive in the circuit just as Stu was shutting down. Over Langden I call, "Dragonfly, Starduster, do you copy" Stu replied with a position of 7 miles back from Vulcan. By the time I heard Stu's clearing-the-active call on the Vulcan frequency I was 5 miles back myself. Stu advised he had used grass runway 23 since the wind was out of the west at 12 to 15 kts. Somewhat apprehensively I joined a right downwind for 23. Apprehensive because there are some very tall trees within a hundred feet of the button of 23.

I kept my final approach high until the last 500 feet then side-slipped in over the trees, not only to lose altitude quickly but also to be able to see the tree tops. Over the button I straightened out and set her down with a bit of a skip (as Carl says skip sounds better than bounce). The wind was strong enough that I stopped in about 300 feet. Good thing, as I turned to backtrack four gophers popped their heads out of some rather large holes a little further down the runway.

After signing in at the pilots' lounge we took the 5-minute stroll across the golf course for some fine dining in the club house. I had a delicious roast beef sandwich and soup while Stu devoured a monstrous cheese burger and fries. We enjoyed 45 minutes of good food and great



Bob and the 'duster in pursuit.

conversation while the rest of the patrons watched the Flames lose the second game of the Grey Cup playoffs.

Back at the airport the wind had died down a bit and we both decided it was safer to use paved runway 34 than tangle with the gophers. Although I had enough fuel to get home with reserve I decided to stop at High River and tank up with 100LL while Stu pushed on for home. I figured if I took off first I could stop in High River, fuel up, and still arrive at home base just about the same time as Stu.

I almost made it. I was 3 miles back when Stu was on final. He did a touch and go and was climbing for the circuit when I crossed mid-field. Stu fell in behind me on right downwind for 34 and we landed as the sun dropped below the horizon leaving the field in shadow.

After shutting down Stu puzzled over why no one else showed up for flying on such a beautiful evening. We surmised it must have been the hockey game. Oh well, everyone has priorities.

And so ended a great dinner flight to Vulcan. ➔



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Video Production Rust Remover

by Bert Lougheed

Many of us like to combine our flying with the hobby of photography. There is nothing more satisfying than getting back pictures that turn out well. Since our 2004 Air Tour is coming up, I want to devote this session to video photography. I have been doing cine photography since the 1950's but really sharpened my skills when I took the Sony Video Production Course.

Most of us can significantly improve our videos by following four simple rules:

1. **Hold the Camera Steady:** You have to be really steady. Always use two hands on the camera and make yourself into a tripod. Press the camera against your eyebrow or glasses to make it even steadier. In most cases don't use the little viewing screen to take pictures, use the through-the-camera viewfinder. Use the little LCD screen later to see what you got. When you pan, swivel from the hips. Try not to move your feet. Every step you take will be a jiggle on the screen.

2. **Pan Very Slowly:** Do not pan faster than the second hand moves in a watch, and never reverse-Pan. In most cases, pan from left to right. That is the way we read (unless you read Chinese) Viewers of the program are most comfortable if the movement is in that direction. Pan left to right--stop camera--return to the left, and then start the camera as you pick up the next action. You can pan quickly if you

are directly following an action such as an airplane taking off. Always try to frame your picture so that the action has room to move into the frame. For example: an airplane moving to the right should be in the left two-thirds of the frame so that it continually has "room" to fly into the frame.

At the end of the segment, let the plane fly out of the picture at the right, not just suddenly disappear

3. **Don't "Slide Trombone" the Zoom:** When using the zoom feature, never do the "slide trombone" trick. Never zoom in and then out without some time delay. The best technique is to slowly zoom in-- stop the camera-- zoom out and then re-start the camera for the next action. You can also use the opposite of this. Start with a close-up and then slowly zoom out.

4. **Don't Chop Off the Sound:** As you are using the above three techniques, remember that the camera is also recording a sound track. So try to anticipate, and start the camera before the person starts talking. Stop the camera when the person has finished a sentence.

If you can put these four ideas together you will find that your video technique will be approaching broadcast quality! An interesting activity is to sit and watch a TV program for half an hour and just concentrate on the way the professionals use the four techniques that I have identified.

To really see the effectiveness of these ideas, have fun some day and make a five minute story doing all these things wrong: don't hold steady, walk around while the camera is running, pan fast and then do a little reverse panning,

then add a little "slide trombone" with the zoom lens, and finally keep cutting off the speaker in the middle of his sentences. Then have a good look at the result. Don't watch for more than five minutes or you may lose your breakfast.

Happy shooting! ➔

Flying Events

July 10 - Annual Chestermere-Kirkby Field fly-in breakfast. 8:30 am to Noon. Contact Bob Kirkby 569-9541.

July 16-18 - Annual COPA Convention and AGM in Fredericton, NB. Info: www.copanational.org

July 17 - Fly-out to Vulcan to meet up with the Lethbridge Sport Flyers club. Breakfast at the golf club. Contact Dave Procyshen 403-257-8064.

July 18 - Vulcan fly-in breakfast 8:00-11:30am. Contact Ron Lucas 403-485-6837.

July 24 - Nanton Lancaster Air Museum annual fly-in breakfast and lunch at AJ Flying Ranch.

August 7-8 - Lethbridge air show, www.albertaairshow.com

August 8 - Pincher Creek fly-in breakfast 8:00-11:00am. Contact Al Cornyn 403-627-3538.


August 15 - Westlock air show and fly-in breakfast. Contact Fred Primrose 708-349-3533.

August 22 - Hanna fly-in breakfast, 0730 to 1100. Contact Mark Fredericks 403-854-4522.

August 23-27 - Annual CUFC Air Adventure Tour. Contact Stu Simpson 255-6998.

September 12 - Rocky Mountain House Air Show, 1300 to 1600. Fly-ins must arrive before 1200. Contact W.J. Horemans 403-845-7053.

September 18 - CUFC/COPA Flt 114 fly-in BBQ - details TBA.



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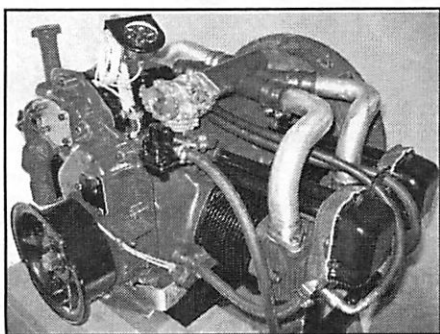
Located at
 Indus-Winter
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The 084 Hercules Engine

by Al Baljak

For those unfamiliar with 084-Hercules engines I would like to introduce a 4-stroke, 45hp engine with direct drive that's half the price of Rotax 447. It is made by American TELEDYNE company.

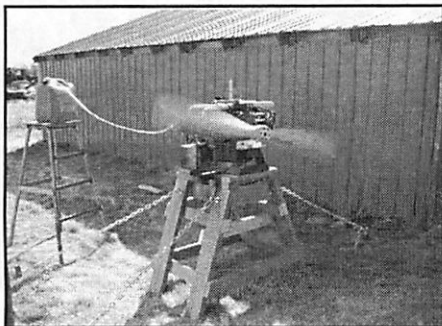
This engine was originally used by the military as a GPU (ground power unit) to power water pumps and generators. Today they are sold as surplus engines and new



The 084 Hercules 4-stroke engine.

parts are available and very cheap compare to any other engines. Government requirements for military acceptance of these engines are that they had to be able to constantly run at 3600 rpm for 1500 hours at 6000 foot altitude at 107 degrees temperature. After passing this criteria they were widely accepted in the military.

The 084-Hercules engine is a very simple and dependable engine with 1500 hours TBO.. Dimensions are 28"W x 21"L x 18"H. When stripped down and ready for an aircraft it will weight around 135 pounds and with stock 40-45HP it will



easily spin a two blade wooden 54 x 27 prop at 3000 rpm, with direct drive producing 225-250 pounds of trust.

It has a PMA (permanent magnet alternator) that makes 24 volts DC and with a voltage regulator rectifier it will produce 12V to run electronics on your aircraft. With electronic ignition it will produce 51HP and some of the guys down in States are getting them up to 80 HP.

Fuel consumption is 1 to 1.5 gph on automotive fuel. Some of the guys are flying them for 6 years trouble free and they are flying in J3 Kitten/Reliants, N3 Pups, SkyRaiders, Mini-Max, Hi-Max, Texas Parasol, Air Bikes, JDM-8, etc. Prices are anywhere between \$500 and \$3500 US depending of the shape. The whole engine is made to military specs and it is set up in opposed configuration with a single carb.

Anybody interested in these engines can contact me at 271-0369 to get more info. There is also a web site for these engines at www.surplusengines@yahoo.com and then go to surplus engines.

I'm installing an 084-Hercules on a V-MAX that I am building. There is also some great pictures on the web site of people flying these engines on variety of ultralights. →

COPA Guides Updated

COPA offers eleven COPA Guides available free to COPA members on the COPA website. Each COPA Guide is a separate book full of aviation wisdom gathered from COPA Staff, COPA Flight contributors, and COPA members.

A complete revision of each COPA Guides has just been completed to ensure that all are completely up to date.

Of special interest to club members will be the *COPA Guide To Ultralights*. Adam



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Hunt, Manager of Member Services and an ultralight owner himself, did a excellent job on this guide. It is an valuable document describing ultralight flying in Canada and even includes one of Stu Simpson's flying stories.

The COPA Guides are available in the "Members Only" section at www.copanational.org. The Guides are available in HTML, Acrobat and MS Word formats. The COPA Guides are also available on paper for a nominal fee to cover printing, postage and packaging.

Behave yourself at Fly-ins this summer

So you are coming into a fly-in and you decide to do a low approach and then make a high-speed pass down the runway and pull up before joining the circuit.

The definition of "air show" is in CAR 101: "air show" means an aerial display or demonstration before an invited assembly of persons by one or more aircraft. Was your buzz job a demonstration? If you did not perform a standard approach, a normal overshoot and climb-out followed by a normal cross-wind and down-wind, it could easily be established that you were performing a demonstration and therefore an air show, and without having an operations certificate.

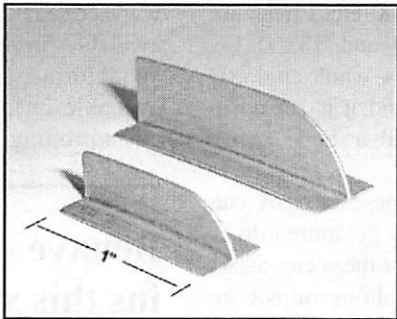
If Transport Canada is watching you could be in for a big fine, not to mention a big accident!

Vortex Generators for the Cherokee 235

by Bob Kirkby

In recent years the FAA has granted a number of STCs to companies that manufacture vortex generator kits for general aviation aircraft. I've been keeping an eye on these developments wondering what such a kit would do for my Piper Cherokee 235. When two friends recently installed kits on their Cessna 182s and reported spectacular results, I decided to look more closely.

The 235 is the heavy hauler of the 4-seat Cherokees. Mine is a 1964 model with an empty weight of 1567 lbs and a gross of 2900 lbs. I typically operate from short grass strips at fairly high elevations and I thought the installation of vortex generators might give me better short field, high altitude performance and provide an extra margin of safety. My home strip is 2000 feet of turf perched 3500 feet above the beach.



Two sizes of VGs are used.

How Do They Work?

Vortex generators (VGs) are usually found on STOL, multi-engine, airline transport, and military aircraft. Look out the window of any airliner and you'll see these tiny fins located at strategic points along the wing. VGs work by re-energizing the boundary layer airflow along the wing or control surface causing it to remain attached to that surface for a longer period of time (further back toward the trailing edge).

This has two beneficial effects. Used in front of a control surface, such as an aileron or elevator, the re-energized boundary layer increases control effectiveness at slow speeds, particularly during landings.

Used along the leading edge of the wing the effect is to increase the stall angle of

attack and hence decrease the stall speed. The wing stalls when the boundary layer separation point moves progressively forward with higher angles of attack, eventually moving forward of the center of lift. The VGs keep the boundary layer attached further aft, which delays forward motion of the separation point, permitting a higher angle of attack. Thus, the stall speed drops below the wing's pre-VG condition.

In search of a good vortex generator kit for my Cherokee, I contacted Charles White, President of Micro AeroDynamics of Anacortes, WA. His company has been engineering VGs for several years and currently holds STC's for over 100 general aviation aircraft models and is continually adding more. White's outfit also has kits for several homebuilt aircraft. The

STC for my aircraft applies to all Cherokees with the Hershey Bar wing. White had a kit in stock and ready to ship. Three days later it was on my doorstep.

Installing the VGs

Although I'd heard White's packages were very complete and easy to install, I was still amazed at the kit's completeness and straight forward installation process. Micro

AeroDynamics leaves nothing to chance, including everything necessary to measure and position the VGs, even a pencil and a spool of thread! It's all there except isopropyl alcohol, which is used to clean up excess glue.

My first chore was to wash the aircraft since a clean surface is required for gluing. I recall thinking at the time that post-installation washing would become more of a chore in order to avoid damaging the VGs. I was

right. One also has to be extra careful to avoid damaging the VGs when refueling.

The installation instructions are very clear and easy to follow. The first step is to place the supplied masking tape on the wing in specific locations so that pencil marks can be made without damaging the

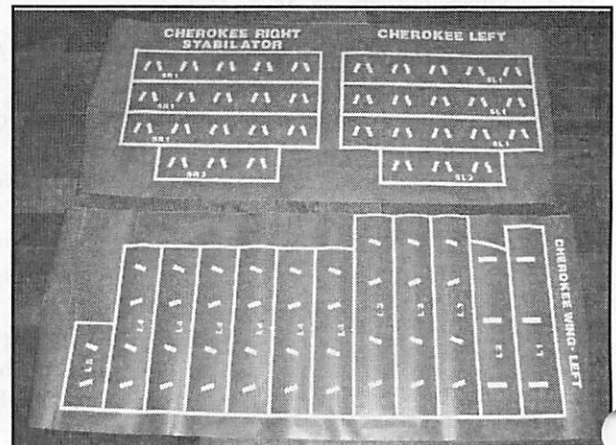


The kit is very complete.

paint. Then, measure from strategic seams in the wing to location points on the tape (Micro AeroDynamics even supplies a tape measure). Now, stretch the supplied thread between these points and tape it down. The thread serves as a straight line to align the templates.

The VG templates are vinyl stick-on sheets like those used to make vinyl sign lettering, and have cutouts where each generator attaches. Using the thread lines as a guide, you stick the sheets onto the wing in a specified sequence. That's all it takes to locate the VGs in their correct positions.

(continued on page 7)



The templates come in easy to handle sections with a cutout for each VG.

VGs - continued from page 6

The next step is to glue them in place through the cutouts. This is accomplished with Loctite 330, a 2-part glue. Just spray an aerosol activator solution on the cutout hole, apply a bead of glue to the bottom of the VG and press into place. It sets in less than 1 minute and cures completely in 24 hours. Because the glue sets so quickly you have to clean up any excess as you go. You simply proceed one at a time until they're all in place. Then the vinyl template, thread and masking tape are all removed. I found the process quite easy on the wings, though I expect it would be more difficult with a high-winged aircraft.

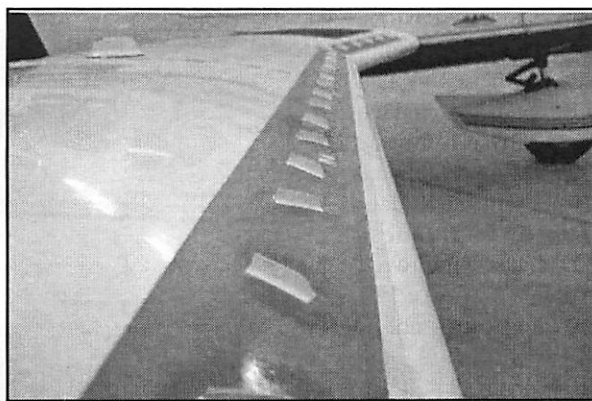
Attaching the VGs to the Cherokee's stabilator was tougher than the wings only because I had to lie on my back. Because the stabilator supplies negative lift the VGs have to go on the bottom surface. Doing the vertical stabilizer was easy, as the VGs simply attach along the trailing edge of the stabilizer just ahead of the rudder. The purpose of these VGs is to improve the low-speed effectiveness of the stabilator and rudder.

All added up, there are 88 VGs on the wings, 72 on the stabilator and 24 on the vertical stabilizer, for a total of 184. Total installation time, not including washing the plane, was 7.5 hours.

Ready to Test

I wanted to do a good before-and-after performance comparison. Obviously low speed handling characteristics would be a qualitative judgement but stall speed and cruise speed changes could be measured quantitatively. I enlisted the services of my friend and frequent co-pilot, Wilf Stark, to be the data recorder and we set up some comparative tests to be run before and after the VG installation.

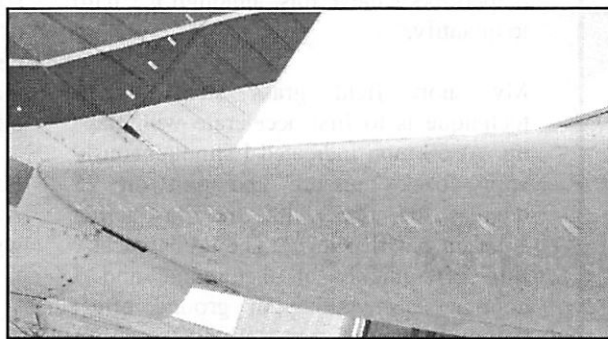
Prior to installing the generators I filled the tanks with exactly 420 lbs of fuel. The Cherokee tanks have a convenient marker tab at the filler neck for this. I



The VGs glued in place through the template slots.

carefully noted every loose item in the aircraft and estimated its weight so we could duplicate the weight for the post-installation flight. Wilf even noted what he'd eaten for breakfast, but I wasn't so meticulous. Our total take-off weight was 2327 lbs, or 80% of gross. We were going to do all tests at a pressure altitude of 6000 feet so I noted the altimeter adjustment and off we went.

We would start our test sequence exactly 10 minutes into the flight so that the weight would be identical for each test.



The VGs are installed on the bottom of the stabilator and up the trailing edge of the vertical stabilizer.

This allowed time to get to the appropriate altitude, adjust the mixture and reach a location of little conflicting traffic.

We did the cruise speed test first which consisted of flying on three headings 90 degrees to each other and recording the GPS ground speed once stabilized. Later a complicated equation would resolve the three vectors and produce a true airspeed, assuming the wind didn't change for the 5 minutes it took to gather the data. We repeated this at three different power

settings, using the MP and RPM settings from charts in the POH for 55%, 65% and 75%. By repeating this precisely on the post-installation flight we'd be able to determine how the VGs affected cruise speed.

Next, we did our stall tests. The plan was to measure indicated airspeed at the stall in three configurations: no flaps, 10 degrees of flap, and 40 degrees of flap. We did this at idle power with full fine prop pitch and recorded the indicated air speed as close to the break as we could. The Cherokee stall is noted for being very gentle. There's good warning with a strong buffet and it starts to mush well before the nose drops. It rarely drops a wing.

As we progressed through each step of the evaluation, Wilf made meticulous notes on the test card.

The Results

Now to find out what the vortex generators actually do. The next good weather day Wilf and I did the post-installation test flight, which duplicated the first one.

I'll present the quantitative results first. I fully expected some increase in drag with a corresponding decrease in cruise speed. I also expected this decrease to vary with airspeed. The effect was less than expected with virtually no variation at the different power settings. The pre-installation TAS ranged from 137.0 mph to 158.1 mph. At 55% power TAS decreased by 1.9 mph and at 75% power by 2.1 mph. The average penalty seems to be 2.0 mph, which is only 1.3% at a typical cruise of 150 mph.

The stall speed tests showed a more remarkable difference (see Table 1). The POH really skimps on providing stall speed numbers. It merely states a stall speed of 70 mph without flaps and 60 mph with flaps, ignoring the fact that

(continued on page 8)

VGs - continued from page 7

there are three flap settings. Of course this is at full gross and under standard conditions at sea level. We were at 80% of gross.

Wilf and I recorded the IAS and later converted to TAS. Before the VG installation the numbers are very close to the book value. After the VG installation the stall speed decrease ranged from 2 mph with no flaps to 9 mph with full flaps. Micro Aerodynamics claims a stall speed reduction of 5 mph, which is what we averaged over the three configurations.

Low speed handling characteristics definitely changed. First, at the stall I noticed a more abrupt break and a definite left wing drop every time. This is not necessarily a bad thing, it just means the Hershey Bar wing now behaves a bit more like other wings.

Stall Speed Test			
	No Flaps	10° Flaps	40° Flaps
Before VG			
IAS	60	55	54
TAS	65	60	59
After VG			
IAS	58	50	45
TAS	63	55	50
Change			
IAS	-2	-5	-9
TAS	-2	-5	-9

Table 1

Low speed control is significantly improved. The ailerons are more responsive and maintain more effectiveness right up to the stall. During gusty conditions on landing the Cherokee now has tighter response in all axes and reduced control movements.

The most improved control surface is the stabilator. In the flare and while floating down the runway the stabilator is noticeably

more sensitive to the point where I've had to remind myself to be more delicate with it. Rudder effectiveness has improved as well, although not as much as the other two controls. Since installing the VGs the strongest cross wind I've found was 12 kts which isn't enough to test the limit. This particular landing was quite gusty, too. I did notice overall smoother results than I'm used to, and not just because I was just having a better day.

One of my original objectives was shorter take-off and landing rolls. Or put another way, an improved margin of safety when operating from short grass strips in the high country. I'm certain the VGs have helped me achieve this, although it's hard to quantify.

My short field grass strip takeoff technique is to first accelerate with flaps up. At 60 mph indicated I simultaneously apply back pressure and pull on 25 degrees of flap with the fast-acting Johnson bar flap lever. The 235 typically lifts off quickly at that point and I continue accelerating in ground effect before climbing out. With the VGs installed it literally leaps off the runway when I pull the flap level. I'm now using this technique at 50 mph which means my takeoff roll has decreased significantly. This performance correlates with the improved effectiveness of the flaps demonstrated in the stall tests.

Previously, I'd set



The vortex generators installed on the right wing.

the maximum comfortable take off weight from my 2000 feet grass strip at 2750 lbs at 15 degrees Celsius, which gives me a 1500 foot take-off roll. Based on what I've seen so far I suspect that takeoff roll will decrease to about 1300 feet.

The bottom line is the VGs performed as good as or better than advertised at low speed with very little penalty at cruise speed. Whether you look at the addition of vortex generators as giving you more performance, or just adding a safety margin, they definitely do make a difference.

For more information visit Micro Aerodynamics' web site at www.microaero.com.



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