The Trailing Edge

July 2024

Evektor Harmony Flight Report

(***Evil Editor Zurg*** *managed to pivot his empire…er…employment when EAA Chapter 1000 folded and he was no longer needed to oversee publication of The Leading Edge. Besides overseeing the unscheduled publication of The Trailing Edge,* ***Evil Editor Zurg*** *set up a colony at EAA Chapter 1326 in Shelbyville TN, using* ***Project Police Officer Randy "Kanard" Kelly*** *as his on-site whipping boy. During a no-notice review of* ***Kanard's*** *records,* ***Evil Editor Zurg*** *noted that* ***Kanard*** *was due his "Not Biennial but every two years" Flight Review within 45 days. After being berated for not having a plan in place,* ***Kanard*** *thought fast and suggested that he could learn the ins and outs of the FAA Wings program, completing a phase and thus satisfying his Flight Review requirement while getting checked out in an* ***LSA Evektor Harmony*** *which had recently become available at the local flight school.* ***Evil Editor Zurg*** *was intrigued, but not satisfied.* ***Kanard*** *said "Think of the fun—turning the tables on a young flight instructor by showing up and telling him what we were doing that day!" This was certainly on-brand for the Evil Editor, but he still wasn't satisfied. In desperation* ***Kanard*** *said "Okay, howzabout I use the experience as source material for a newsletter article?" "Approved!" bellowed* ***Evil Editor Zurg****, who grabbed* ***Kanard's*** *last Chocolate Chip Cookie (C^3) and stormed out of the office in an ominous manner. Said flight report follows, mostly as originally published in the EAA Chapter 1326 newsletter.*)

Part 1: An excuse to fly a new airplane (Evektor Harmony Light Sport)

Evektor Harmony LSA. Nice big greenhouse!

A couple months ago I noticed there was a new airplane on the Shelbyville flightline, an Evektor Harmony Light Sport category aircraft owned by Hawkins Flight Academy (which is owned and operated by EAA Ch-1326 members Matt Wilkins and Mike Harris.) It looked pretty "neat", and with my 24 month mandatory Flight Review looming before the end of April 2024 and a whole bunch of other trips planned, I thought I'd get that out of the way. By coincidence, I'd just completed my Flight Instructor Refresher Course (FIRC) with the Soaring Safety Foundation and that gave me all the FAA Safety WINGS program academics credits I needed to complete a WINGS Phase.

For those of you not familiar with the FAA Safety WINGS program, it is designed as a convenient venue to allow you to get regular training in the academic and flight skills needed to stay proficient. Completing three academic and three flight training events designated for a specific "Phase" of WINGS completes the Phase and satisfies the requirement of a Flight Review. (Basically, you end up with a Flight Review certificate signed by the head of the FAA Safety Team.) Pilots love it because you've got a whole year to get your events done instead of one day like a

"traditional" Flight Review. Flight Instructors love it because it allows them to review a "broader" set of skills of their "students", and if a student bends an aircraft later, the CFI's signature isn't on the last "Flight Review Endorsement" making them a target for some tort-happy attorney. So - all I needed was three Flight Events to complete the Phase and satisfy my requirements for a Flight Review in the next couple weeks.

Anyway, being an EAA Newsletter editor and always hungry for stories, I thought a flight in a new aircraft I'd never been in before would make a good flight report story. Plus, practicing old skills in a new aircraft requires you to "think" about what you are doing because you can't rely so much on "muscle memory" (those "psychomotor skills" described in the FAA Aviation Instructor's Handbook.) Anyway, completing the WINGS Phase Flight Events in a new aircraft was a WIN-WIN-WIN-WIN scenario. I'd talked to Matt and Mike earlier about the possibility of completing a flight review in their new Harmony and (of course) they were happy to oblige me, even when I told them I was thinking of putting a story in our newsletter. (Remember - I'm from the flight test community. I'm happy to fly anything, but "the data are the data" and an "ugly baby" will mean an ugly report.) With the "permission" to fly out of the way, it was time to start the preparation.

Since I'd never flown with Hawkins before, Mike sent me all the paperwork to capture my short flight history, establish my citizenship (to satisfy the TSA), set up an account on their Aviatize web-based management application and sign the appropriate releases. The first available opening was the next day, but with forecast winds of 12 gusting 18 knots from over 45 degrees off runway heading, I decided that WOULDN'T be a good day to fly a new light aircraft with unknown characteristics. (Asking to fly on a day like that probably wouldn't say a lot about a pilot's Risk Management skills either to the young flight instructor they assigned to me.) So, we decided to push the flight a couple days out to when we were looking at lower winds and only about 5 knots crosswind max. Mike put me on the schedule with their instructor Caleb Kahler. OK, now I had a limited "flight test" to plan.

From their Aviatize site, I downloaded the Pilot's Operating Handbook (POH), checklist card and weight and balance data (W/B) for N641AH. Though there's something comforting about a physical flight manual, I didn't feel like printing 220+pages, and "soft" copies on both my MacBook and imported into Foreflight on my iPad gave me a good start. However, I DID print a hard copy of the Emergency Procedures (Section-III) for inflight reference in case something happened. (Better to have and not need than the other way around!) First, I reviewed the POH from a "big picture" perspective.

The aircraft is certified in the Light Sport Category. It has a low straight wing, tricycle-gear, steerable nosewheel (always!), 100HP carbureted Rotax with fixed 3 blade prop, a big front attached bubble canopy, dual configured cockpit, sticks, rudder pedals, and a "technically advanced aircraft" (TAA) based panel.

Wow - Dual Garmin G-3X 10.5 inch landscape primary flight displays with back up "steam gauge" airspeed on the far left and altimeter on the far right, Garmin audio panel, two axis coupled autopilot, electric pitch and roll trim and LOTS of circuit breakers. (Evil Editor Zurg note: "...Shoot, a fella' could have a pretty good night in Vegas with all that stuff...")

Harmony center Power quadrant and manual flap lever.

Harmony Cockpit Layout.

Garmin G3 Primary Flight Display with Power Displays on startup.

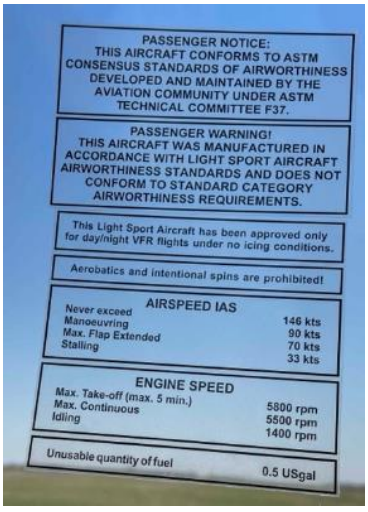
Garmin G3 Power Page Display on startup.

I started looking with more detail at all the stuff that would affect how the aircraft would feel and handle. Stick and rudder pedals on both sides. The central throttle "quadrant" was just a BIG vernier equipped knob with a large friction lock adjustment. No mixture control. The carburetor "pre-heater" was a tiny knob on a cable farther down the center console. There were no additional manual flap or trim indicators. The flaps were manual with the lever mounted between the seats. The fuel selector was easily visible and accessible in front of the flap handle with left, right and off positions.

Next, I printed out a copy of the pilot's abbreviated checklist card to compare with the other checklists in the POH. Matt and Mike had thoughtfully provided a list of "V-speeds" in their abbreviated checklist in ascending order so I could go ahead and highlight the list per the white and green arcs. I added the approach and best lift to drag (L/D) speeds to my card. I also noted there were ELT and stall warning sensor checklists in the POH which were NOT on the abbreviated card. Seeing as how I intended to do stalls during the flight, I made a note to myself to check the electric stall warning when I powered up the avionics on the ground to check the fuel sensors. Also, I noted in the POH that "steep stalls" (which I interpreted in this case as "high bleed rate/nose high stalls) or intentional spins were prohibited.

A spin prohibition is NOT unusual in most GA aircraft anymore, but since I intended to do a "Phase-B stall" (more on that later), I specifically located and memorized the "Flight Manual Spin Recovery" technique.

(Evil Editor Zurg note: Experienced flight testers will note this "flight manual" recovery is essentially the same as the "NASA Modified" recovery with the exception of "...push forward and hold..." the stick rather than "stick forward to neutral". The POH does NOT specify how far "forward" that "forward" is. In some aircraft pushing the stick forward during a developed spin is equivalent to an ice skater pulling in their arms and legs which will accelerate the spin rotation. Not to get ahead of myself, but it's important to note (especially if you are an instructor) that the generic spin recoveries published in some of the FAA manuals do NOT always match the flight



No spins today!! Wow, that's twice my Continental idle speed!

3.9 Unintentional spin recovery

NOTE

The airplane has not, when using normal techniques of pilotage, tendency to go over to spin spontaneously.

Standard procedure of recovery from spin:

1.	THROTTLE lever	idle
2.	Control stick	ailerons - neutral position
3.	Pedals	kick the rudder pedal push against spin rotation direction
4.	Control stick	push forward and hold it there until rotation stops
5.	Pedals	immediately after rotation stopping, set the rudder to neutral position
6.	Control stick	recover the diving

Harmony "Flight Manual" spin recovery.

manual recovery (and in some cases can exacerbate the spin), so you need to know the recovery technique tested in THAT aircraft.)

Then I mentally ran through the Pre-Flight checklists to see the "flow" as well as decide what (if any) items needed to be done in a specific order versus just checked out sometime during the walk-around.

Next, I took a look at the weight and balance documents. The Harmony had an empty weight of 814 lbs and a Max Takeoff Weight (MTOW) of 1,320 lbs.

The Weight and Balance worksheets looked fairly standard. I was a bit surprised as their worksheet had you do the standard "sum the weights and moments" and divide moments by total weight to get the CG position from the datum, but then they had you convert the CG to %MAC (Mean Aerodynamic Chord) and compare that to a %MAC envelope. Totally valid, but it requires an extra math step. Anyway, the POH had loading tables, moment charts, and CG charts, so a knowledgeable pilot had multiple ways of checking they were within CG limits. With me at my 160 lbs flying weight and a young slim flight instructor I wasn't concerned about being over gross or out of CG. I printed out a weight and balance worksheet just in case my instructor wanted me to do one.

Harmony Data Plate

OK, I basically knew all I needed to know to fly the aircraft safely, so now I needed to know WHAT maneuvers I needed or wished to fly to complete my WINGS Phase. I chose 3 Flight Activities from the WINGS "Basic Phase" events catalog, the ASEL - Takeoffs, Landings, and Go Arounds (A070405-07), ASEL - Slow Flight, Stalls, Basic Instruments (A0700405-08), and ASEL - Performance Flight Maneuvers and Ground Reference Maneuvers (A1001125-08). I downloaded and printed the Flight Activity Worksheets to find out the specific areas/maneuvers that needed to be done and quickly reviewed the ASEL Private Pilot ACS standards. (I'm NOT going to go into all that detail here, but I just noted them so I could "talk about them during the briefing and flight".) Basically, there were a number of items/maneuvers in the categories of Area III Airport Operations, Area IV Takeoffs, Landings, and Go-Arounds, Area V Performance and Ground Reference Maneuvers, Area VII Slow Flight and Stalls, Area VIII Basic Instrument Maneuvers, and area IX Emergency Operations.

Based on the subareas in those main areas, I roughed out a "mission plan" consisting of the following basic events:

Ground items:

Detailed brief of mission objectives and events

Expanded preflight and pre-takeoff checks

Expanded before takeoff briefing including normal crew items, speed and instrument checks, low altitude emergency procedures, a finally a review of the basic airspace plan and maneuvers

Takeoff and climbout:

Normal takeoff - runway heading until 500 AGL

Crosswind departure and climbout at specified heading and speed

Climb to 3,500 MSL (over 2,500 AGL)

Basic Maneuver Profile:

Clearing turns 90 deg left and right

Slow to Minimum Controllable Airspeed then 90 deg turns in both directions noting aircraft handling, buffet, etc

Recover to pattern airspeed then set up for stall series

Phase-A stall (straight ahead, neutral aileron & rudder, 1 knot/sec bleed rate, slow through horn, note other stall indications, then relax back pressure and recover)

Phase-B stall (same as Phase-A stall, except "aggravated controls" (full rudder in this case) for 1 second then recover)

Recover to cruise power

360 degree turns at 30 deg, 45 deg, and 60 degrees of bank noting stick forces, adverse yaw and spiral tendency

Return to KSYI:

Simulated emergency descent, power off and fly at maneuvering speed

Explore change in rate of descent using steady heading sideslip (straight sideslip)

Discuss use of flaps and airspeed on descent rate

Prepare for landing: Pre-landing checklist & approach calls

Landings:

First approach using 15 deg approach flaps and using both side-slips and straight slips to control descent on the glide path

Descend into ground effect then perform a full-power go-around

Second approach using normal landing flaps to full stop

Normal takeoff and pattern to 1000 ft AGL then perform simulated engine out emergency approach and landing

Caveat: All the maneuvers performed during the flight were well within the limits of the flight manual and FAA regulations for normal flight. That said, I'll caution you - do NOT go explore the deep stall regime of the aircraft flight envelope yourself unless you have been trained to do that and/or have had more detailed stall, spin or aerobatics training.

Part 2: A "Harmonious" Flight (or "A Limited Flight Eval of the Evektor Harmony")

With a flight date on the books, my aircraft "study" complete, a hard copy of the checklist and Section-3, and a "flight profile" for my kneeboard, I was basically ready to go fly. A few minor items still needed to be done. I needed to make sure I had a payment method Hawkins Flight Academy would accept AND because this was the first time I had flown with them I would need to prove I was either a US Citizen or a "National" before they could provide flight training to satisfy the TSA requirement. That was simple enough as I had a current passport, so that went into my flight bag as well as my iPad, my latest powered aircraft and glider logbooks, and all the other support materials.

Tuesday morning March 19th, 2024 I showed up 30 minutes early to set all my stuff out and mentally rehearse again what we were doing so I could explain my preparation and my "mission plan" for my instructor. (I've discovered from previous "flights" in a new aircraft that some civilian trained instructors are not accustomed to a new student showing up with that much preparation plus also running a briefing.)

When my instructor, Caleb Kahler, showed up, I introduced myself, explained what I wanted to do and why, and finally noted that my overall objective was for both of us to "have fun". I gave him my logbooks, my pilot's certificates, and my passport so he could make the appropriate copies for his logbooks and the mandated TSA records. I then showed him the materials I'd printed out, gave him the WINGS event instructor worksheets, pointed out the "minimum" areas/events that needed to be covered and then reviewed the flight profile events I'd outlined. I noted that I had NOT calculated an exact gross weight or CG for us but had only done a "ballpark" estimate using "standard" weights and about 75% fuel load to see that we fit into the "envelope". He was comfortable with that. All the paperwork and ground briefing took about 45 minutes and after the final ground checklist item (go to the bathroom), we "stepped" out to the aircraft. On the way to the aircraft, Caleb asked which seat I'd rather sit in. Though I'm used to flying sticks with my right hand and "yoking" with my left hand, I said I'd prefer the (normal) left seat to fly stick with my left hand and run power and avionics with my right hand. The different stick motions would mean I'd have to "think" more about what I was doing rather than using "muscle memory".

The aircraft had flown the previous hour and was on the main ramp. Since it had already been preflighted and just flown I didn't plan on draining and checking the sumps. We turned on the master to check the fuel levels and I checked the stall horn sensor to make sure it worked and hear what it sounded like. It was a shrill electronic "beeeeeeeeeeeee", nothing like that bicycle horn that Cessna uses. (You think I'm joking - go take a look at the stall horn under the "glove box" of old "classic" Cessnas.) The gauges showed 1/3rd tanks and Caleb said it needed fuel so we pulled the chocks

and pushed it to the fuel pit. While he headed to the "pay station" I attached the ground cable to the exhaust stack, pulled the fuel hose out to the far filler and pulled the caps.

Flush caps with latches - a good place to collect water!

I asked him to let me re-install the caps so I could see how they worked but reminded him to double check them for me during the walk-around. The Harmony uses flush-mounted caps with counter-sunk latches. They immediately reminded me of the "killer caps" that Cessna used on their older singles which were notorious for allowing water that collected in the latch well to seep into the tank, but these were nice and tight and turned snugly. In hindsight while doing my notes, this was my faux pas of the day. Since Caleb had checked the sumps earlier in the morning and just flown a student for an hour, it was probably safe to assume there was no contamination in the tank, but that may not have been a good assumption if we had been a "transient" and weren't familiar with the fuel provider. Anyway, in the case of the Harmony, it only has two fuel drains, one for each wing tank sump but with no gascolator or carburetor sump up front.

Main tank fuel drains just forward of the flap hinges.

Nosewheel steering direct connections to rudder pedals but no gascolator drain.

With 1/3rd tanks to start and an additional 5 gallons on each side in an aircraft with only about 31 gallons useable, we were now "fat" on fuel. I pulled out my checklist and did the walkaround. I'd already checked the stall vane and horn on the left wing and proceeded counter-clockwise per the POH and checklist. The leading edges were clean and there were plastic vortex generator vanes aft of the leading edge. A couple of the vanes had "departed the fix".

Adhesive mounted vortex generators. (One's missing. So how many do we need???)

The wingtips are flared and there is an electrically actuated trim tab on the left aileron. When I got to the trailing edge inside the aileron, I realized I hadn't dropped the flaps. I laughed and remarked "that's why we have checklists" to Caleb, then climbed up the wing and lowered the flaps. The Harmony has split flaps that are about half span and probably less than a foot wide in chord. Being used to my 182's big Fowler flaps (40 degrees of Fowler flaps are GREAT drag producers) and remembering the top of the "white arc" (V_{FE}) of the Harmony as 70 KIAS, I made a mental note to pay extra attention to airspeed during final descent. The empennage is pretty conventional but unlike

the "split" elevator and offset trim tab of my Skylane, the Harmony has a full span elevator with a centrally mounted electrically driven elevator trim and a large "cutout" in the bottom of the rudder to clear the elevator and trim tab.

Electrically actuated aileron trim tab.

Split flaps under the trailing edges.

The right side VOR sensing antenna was loose so I tightened it up and noted to tell Matt and Mike. When I got to the engine compartment the checklist said Oil...turn prop to "burb" (burp?) engine then oil level check. I found a filler cap, but there was no dipstick! "Where's the dipstick?" I asked Caleb. (Evil Editor Zurg note: one of our Ch-1326 technical experts tells me the Rotax is a dry sump engine so you may have to pull the prop through a couple blades to "burp" it to accurately measure the oil level.)

Gurgle, gurgle - BURP!

Full span elevator with electrically actuated central trim tab.

Rotax oil filler cap. (Where's the dipstick?)

"Inside the oil filler" he remarked. OK, this was the first time I'd preflighted a Rotax, but yea verily, you remove the rather large oil filler cap, and inside the recess is the dipstick. That's actually a good idea as the "drips" go back in the engine when you check the oil. The rest of the preflight was uneventful.

So THERE is the dipstick!

The "Before Start" and "Starting Engine" checklists were straight forward and ran smoothly. The Rotax started up on the first blade (dual electronic ignition is great.) After it starts and smooths out, you run the engine at 2,500 RPM to warm up. It was pretty smooth and pretty quiet, but I had to consciously overcome some "cognitive dissonance" to run the engine to 2,500 RPM for warmup when that's close to the redline of the O-470 in my Skylane. The big vernier knob on the throttle was a "good" and "bad" feature. The large vernier control was really good on the ground when dealing with a high-revving geared engine, but actuating the push-button to override the friction lock felt awkward. (Editor note: I've talked to some pilots who do not like vernier controls because they want a more immediate response when they need to modify power settings.) We ran the "Taxi" checklist, listened to the AWOS and started to taxi to the active runway. Steering by the rudder pedals was pretty tight but not too "twitchy". Caleb noted the rudders were always connected to the nosewheel and remarked it was not unusual for most students to wander all over the taxiway.

The vernier throttle worked well during taxi. We got to the runup area and started the "Before Takeoff" checklist. The cognitive dissonance momentarily reappeared as I ran the engine up to 4,000RPM for the magneto checks, and after runup we went back to 2,500 RPM for the rest of the checklist. I went beyond my normal departure brief since we had a lot to do. I briefed the instruments I'd check on runup, airspeed alive, a "reference airspeed" for abort criteria, takeoff emergencies (no turns back below 500 ft), transfer of controls, crew duties, then quickly reviewed the maneuver series and airspace. Caleb had no questions, so I announced departure, rolled onto the runway and brought up power as smoothly as the throttle would let me. The vernier and friction controls fought me so power application was not as smooth as I would have liked. Gauges were good. I called "airspeed alive" and "gauges good", then "V1" when we hit 45 KIAS as briefed. (Note: Yes, I know there really isn't a "V1" in a light single, but it makes a good "reference" and is easy to call.) As we approached the 57 KIAS rotation speed the wind blew us off centerline and I came in with rudder and the nose IMMEDIATELY jinked in that direction of the rudder. "Remember the connected nosewheel" Caleb remarked. I made a mental note to keep weight off the nosewheel for any future high speed ground ops.

I accelerated to Vy (65 KIAS) and pulled the flaps up at about 150 feet (per the POH) and continued the climbout. At 500 feet I turned crosswind and announced a crosswind departure. We continued to climb to 3,500 feet out about 6-8 Nautical Miles East to do our maneuvers. I made a few turns during the climbout to see how it tracked and used the electric trim to tweak the stick forces. The trim worked pretty good but the Harmony was pretty clean and the

turbulence did require a decent amount of crosschecking and "pilot input" to stay within about ± 3 KIAS during the climb. When we reached our altitude, we accomplished two 90 degree clearing turns. The aircraft turned easily at cruise power and I had no problem stopping turns within about 5 degrees of desired heading. After the second turn we slowed down to start the flight at minimum controllable airspeed (MCAS). I left the flaps up for the flight at MCAS and stalls. When my airspeed slowed to somewhere around the bottom third of the white arc, the stall horn came on (though I didn't notice it at first because of my noise cancelling headset) but the controls were still pretty responsive. The vernier throttle control worked well here as I could SLOWLY reduce power. The controls started to feel "mushy" below 40 KIAS so I stopped there. I added enough power for about another 3-4 KIAS and accomplished some 90 deg turns at 15 degrees of bank. The stall horn "squealed" in protest the whole time, but the aircraft was well behaved. I added power to get back to the top of the white arc, I left flaps up, then reduced power to idle (about 1500 RPM I recall) and established about a 1 KIAS/second bleed rate to do a straight-ahead Phase-A stall. On came the horn, the controls got sluggish and I started to feel some airframe buffet so I released back pressure, added power and recovered. I then said "I'm going to do a Phase-B stall, so at the stall indication I'm going to apply full rudder for 1 second then release and recover". (Evil Editor Zurg note: A "Phase B stall" is a standard flight test maneuver used to investigate the spin resistance/susceptibility of an aircraft. It involves stalling the aircraft, applying "pro-spin" controls for 1 second then neutralizing the controls. An aircraft that does not react adversely within that 1 second period is considered "resistant" to a spin, which is what you normally want in a training aircraft.)

I came back on the power again, and established the same slow bleed rate. Knowing that torque could cause the aircraft to roll faster to the left than to the right, I'd already decided that at the stall I was going to use right rudder. (Evil Editor Zurg note: in the test business, this is known as the "build up approach". You start simple, then accomplish maneuvers in increasing difficulty or risk. A Phase A stall before a Phase B stall and using RIGHT rudder versus left rudder the first time reduces the chance of encountering a hazardous condition before learning more about how the aircraft will handle in that condition.) The aircraft decelerated into the same mushy control regime and buffet as before. The stick was almost full aft so I applied full right rudder. This is one of those times when you experience "time dilation" and the world seems to go into "slow motion". I remember applying rudder then going "One one-thousand, release...." and just as I started to release the right rudder, the nose suddenly dropped and she rolled off to the right about 40 degrees. The world snapped back into "real time" - I kicked in full left rudder and the roll immediately decelerated, I released back pressure, called "recover", then used coordinated controls to pull up and roll out and added power. The vernier throttle control "unlock" button felt awkward so I ended up pushing the power in to some point then using the vernier to get back to a reasonable power setting. "That was unexpected..." I announced on the intercom. I don't recall what if anything Caleb said at the time. (Evil Editor Zurg note: He was probably thinking "What the h..l did I agree to do with this yahoo?)

For me, those last 30 seconds were the most "interesting" part of the flight. Coming from the flight test community, any "unexpected outcome (result)" is a matter of concern and could be a reason to terminate the test and go home until you analyze the data. However, there is a BIG difference between an "unexpected" event and an "unanticipated" event. In the stall regime, what the aircraft does depends on the entry maneuver, the exact CG, any "residual" roll or yaw and even just turbulence. A stalled aircraft may do nothing more than just bob its nose up and down and scream at you with the horn, or it may drop the nose straight ahead, or it can roll off on either side, or it can suddenly completely depart controlled flight. All of those results were "anticipated" and I had reviewed and practiced a response to each of those. So, although I didn't "expect" the Harmony to rapidly roll off to one side after only 1 second of "aggravated" input, I had certainly "anticipated" that outcome and had an immediate response available. When she "rolled off" but immediately responded to the rudder inputs, that made it an "interesting" result versus something to be concerned about. The Harmony was happy, I was happy, so now it was time to finish the profile.

Even after finishing the stall series, we were still at almost 3,500 feet and needed to lose altitude on the way back to the field. We headed back to the field and set up for the "emergency descent" event. (Evil Editor Zurg note: the FAA doesn't specifically define an emergency descent as it is situation dependent. A power off high speed "clean" descent may make more sense for something like a pressurization emergency whereas a situation driving an immediate landing may drive a low speed high drag descent.) I "verniered" the throttle back to about 1,500 RPM and lowered the nose and accelerated to the maneuvering speed (90 KIAS). We discussed our options during the descent. I obviously could have gone well into the yellow arc if I needed more descent rate, but it was kind of bumpy so I decided maneuvering speed was a good safe bet. Alternatively, I opined we could drop landing flaps (30 or 50 degrees) and slip at the top of the white arc, or even just slow down well into the "backside" of the power curve to use "induced drag" to increase descent rate. All those techniques will get you down quickly, but without some "flight test" points I couldn't say which would work better for the Harmony. (Evil Editor Zurg note: in some aircraft the airfoil will stall before you get to a definite "backside" of the power curve. The Harmony POH did not have a lift/drag curve provided but the climb charts did have a visible peak well above stall speed, so it is probably reasonable to assume that a power

off full flap descent slightly above stall speed would generate a significant sink rate.) I didn't specifically note what our maximum descent rate was during this power-off descent but we had no problem getting to an altitude I was comfortable with to set up for pattern entry.

During the descent, we pulled up the AWOS to check the winds, then I turned to a heading to set us up for a 45 deg entry into downwind for runway 18. I completed the before landing checklist, announced our position and intent, then reviewed what approach we would do. I noted the speeds I wanted to fly and said I would use 15 degrees of approach flaps and would use a turning slip or straight sideslip (A.K.A. "steady heading sideslip") to control my descent angle simulating a flaps malfunction (as "emergency procedures" were on all three WINGS flight events worksheets). We entered downwind, I announced downwind and intent to do a low approach and lowered 1 notch (15 deg) of flaps. I looked at the runway for reference then looked back at airspeed to see that I was right at the top end of the white arc. "Wow, this is really slick. It's easy to overspeed the flaps" I noted and Caleb chuckled and concurred. I "thumbed" in a little more nose up trim and "noted to self" to keep a closer eye on the backup ASI (which was easier to see while looking out to the left at the runway). The Harmony stayed "light" on the stick in the pattern and slipped pretty well. I sideslipped around the turn to base leg then transitioned to a straight slip on base and selected a building in the distance to use as my "flight track" reference. I didn't note any obvious airspeed indicator errors during the slips and control forces remained light. I called base, then turned to final and slipped down towards the runway using an "aim point" near the "captain's bars" about 1/5th of the way down the runway. At about 50 feet I stopped slipping and started adding power to go around. Just like during the stall recovery I "pushed" the throttle part way to get an initial power setting. There was a noticeable pitch change, but not much so I continued "verniering" in power till full power. We were already at 15 degrees of flaps which I left there until about 150 feet per the checklist recommendation. At 500 feet we turned cosswind and I noted I'd continue climbing to 1,000 feet and accomplish a normal landing with full landing flaps (50 degrees). I flew a normal pattern selecting the first notch (15 degrees) on downwind, then the second notch before entering base. I was a bit on the high side (that's my typical GA airport pattern) so I went to full flaps (50 degrees) prior to final. The Harmony was coming down, but not like I expected (I've got 40 degrees worth of Fowler flaps on the Skylane which give me LOTS of drag), so now I'm adding slip and it's apparent I'm still going to be to the "captain's bars" before I can land. In my head, I'd originally been planning to do a touch and go, but with the 1st third of the runway approaching, about 5-6 knots of crosswind and with a so far "unknown" touchdown behavior, I decided a "full stop" was more in order. I told Caleb that after the flare that I was going to add a little power and treat it like a soft field touchdown. I flew glide speed down to about 30 feet then verniered in a little power and raised the nose higher to float farther in ground effect and settled onto the mains. Touchdown was smooth, but I had some rudder in to control the drift and as soon as the nose gear settled she "jinked". I was compensating as Caleb again remarked "remember the nosewheel steering is always connected". (Yea verily!) I came back on the stick to get the weight off the nosewheel which helped keep her straight, then we slowed down and exited at the center taxiway.

I glanced at my watch to check the time and said "I think we've got plenty of time for another pattern" so we headed back to the end of 18. At the end, we did a quick before takeoff checklist again (without a runup) and I briefed this would be a simulated engine out emergency. Caleb acknowledged and noted that 1000 ft midfield would work fine. We checked the pattern, announced our intentions for a closed pattern with a simulated emergency to a full stop then rolled onto the runway. Power up, gauges good, airspeed live, rotate and climbout. We raised flaps at 150 feet, turned crosswind at 500 feet, then climbed up and turned into downwind. I leveled off, repeated the plan for a simulated emergency and Caleb acknowledged 1000 feet midfield entry, then I made the downwind call. At mid field, I "verniered" power back to 1500 RPM idle and announced, "simulated power loss". I then verbally noted, "slowing to best L/D" (my glider vocabulary keeps sneaking in), then called out the items as I went through them, I checked gauges, checked the fuel selector, checked the ignitions, then noted that if I had time I would squawk 7700 and transmit a mayday. I turned towards the runway and started adding drag first with flaps then with a slip. I had enough altitude that if I'd needed to land earlier in the runway I could have reduced drag and turned downwind for a short, modified pattern, but I had plenty of runway and with being unfamiliar with how much altitude I would lose in the turns, I decided the easiest and safest approach of just using the last half of the runway was the least risk. I descended into ground effect, pulled power all the way back, eased back on the stick to establish my landing attitude, and once she touched down I eased the stick back to keep the nose up and aerobraked until the nose came down on its own. This time the Harmony didn't "jink" as the nose gear set down so apparently keeping load off the nose gear until the slowest speed is one of the secret techniques for this aircraft. Only light braking was needed to make the next taxiway so I pulled off and announced we were clear of the runway. While taxing back into parking I asked what our total time was, and Caleb noted we had flown about 0.8 hours.

The winds had been starting to pick up so we tied down the Harmony and headed back to the Hawkins Flight Academy Office. Caleb and I had pretty much talked about everything during the flight so there wasn't really anything to debrief beyond just a brief list of the maneuvers to make sure we'd covered all required areas specified in the

WINGS flight event worksheets. We accomplished ALL of the flight maneuvers I'd planned for our "profile" in a bit over 0.8 hours and Caleb expressed surprise in he fully expected us to take 1.5 hours to accomplish all those tasks. He also noted it was good to fly with somebody more knowledgeable and communicative in the cockpit than what he normally saw with students. (Oh ye of little faith - we ARE the Project Police!) Then I helped Caleb get into the FAA Safety website to set up his FAAST instructor account. He established an account but got locked out during the login, so I went into my account and requested credit for those 3 activities. Fortunately, even though he was locked out, his account was active and I was able to request credit for those activities using his FAAST designated email address. I went to talk to Mike Harris and Matt Wilkins about settling my financial account for the day and gave them the brief summary of my "findings". Basically, those were:

1) Overall, the Harmony was easy and fun to fly - it was light on the controls and very responsive;
2) the hard linkage between the rudder and nose gear required a bit of compensation during takeoff and landing in crosswinds;
3) because of the recessed fuel cap latches, I recommended that the sumps be drained and checked anytime the aircraft was left out in the rain;
4) the vernier controlled throttle and friction lock had a bit of a "learning" curve to get used to; (NOTE: when I went back to take pictures the next day I "played" with the throttle a bit and I think I just had the friction lock too tight because of the different feel between it and the one on my Skylane's throttle quadrant.)
5) I felt the aircraft might be "susceptible" to spinning if deep stalled with cross-controlled flight controls or inadvertent rudder inputs and that instructors should be prepared in case a student doesn't recover rapidly.

By the time I finished debriefing Mike and Matt, paying for my flight time, and general "hangar flying", Caleb was back in the office and was able to log into his FAA Safety Team account, access the "Instructor Portal" and validate my Flight Events. Supposedly, this completed the "Basic Phase" of the WINGS program for me, so I was curious as to how long it would take the FAA computers to figure that out and give me credit. I packed up my flight bag and headed home. After getting home I went online and there were already emails from the FAA Safety Team validating my activity, showing phase completion, and attaching a "completion" certificate as well as a "Flight Review" requirements completion certificate signed by the head of FAA Safety. It was a nice "finishing touch" to an enjoyable flight day.

- **Randy Kelly**
EAA Ch-1326 Project Police (among other things)