

WALKALONG GLIDERS

AUTHOR

DAVID ARONSTEIN

1. Introduction

You walk out to the flightline. Do a walkaround check and take off. As you depart, you can see the target zone in the distance. Scan the outbound route for hazards. Some weather. (The HVAC system is still on. Who overlooked that detail?) Microburst! Recover, regain altitude, re-orient. Plan your turn in for a target run... perfect approach... zoom! You are through, one pass successfully completed. Hairpin turn to make your second pass a few seconds quicker and from the opposite direction. On target! A little bit of your own wake hits you as you pull up. Next turn won't be as neat. To buy time you make a large oval. Third pass from the same direction as the 2nd. Now the air in the target zone is really bumpy. Try for a 4th, or call it a mission and return to base?

This is not a simulation. It is not R/C. It is not FPV (First Person View). You are not just seeing it, you are there, going through it all with your aircraft. You are flying a Walkalong Glider in a Long Range Strike event.

How much does it cost? Less than even a simple rubber free flight model because it does not need a rubber motor or a thrust bearing.

How complicated is it to build? As complicated, or as simple, as you like. It can be a one-piece flying wing made from a



Figure 1. Walkalong gliding: Dr. George Carroll illustrates perfect form. (Photos: David Aronstein except as noted).

foam sheet. Or it can be a fully built-up scale model of a multi-engine bomber complete with gun turrets and spinning props. (Don't make the props turn too smoothly. A little noise and vibration really add to the experience!)

What is Walkalong Gliding?

Walkalong gliding is a method of flying a glider in a continuous updraft. The updraft is generated by moving a board through the air under the glider, held at an incline. It is a form of slope soaring. In conventional slope soaring, the glider flies above the upwind side of a fixed hill or ridge, and the updraft is generated by the wind blowing up the ridge. In walkalong gliding, the updraft is generated by moving

the slope itself. Walkalong gliding has also been called “Air Surfing,” “Controllable Slope Soaring,” and probably other names as well.

Why is it Interesting

Walkalong gliding is a great way to show people that small, simple, inexpensive flying machines can do much more than the dime store (sorry, dollar store) toy airplanes which are all that much of the public knows about free flight. Walkalong gliding does not replace, but potentially complements, the entry-level rubber model (like the AMA Cub, or the newer AMA Alpha, or a Laser Cut Planes P-18) as a means to introduce people to the ethereal beauty of small, lightweight flying machines. They don’t just glide a little bit from point A to point B. With walkalongs, a young person can build something entirely with their own effort and experience flight in a fascinating way. Depending on the different factors of time, space, number of people involved and age/skill level, there will be situations when a walkalong exhibition or workshop would work better than a rubber power workshop or vice versa.

Purpose of this Article

The purpose of this article is to introduce the Free Flight community – you – to this relatively little known, but very simple and enjoyable, form of modeling, including:

- Basics of walkalong glider design, construction, and flying
- Ideas for using walkalong gliding to promote our overall hobby
- Walkalong glider “games” or contest ideas
- Walkalong glider resources
- There is also a brief history of walkalong gliding in the Appendix, contributed by Slater Harrison.

The Elephant in the Room

One might question whether walkalong gliding is really Free Flight, and I cannot give a definitive answer. Walkalong gliders have no onboard

control systems. They respond to air movements as any free flight model does. But we very deliberately induce air movements around them in order to sustain and even influence their flight. So, it has some elements that sound like free flight, and some that do not.

That said, I recommend that we nurture them under the free flight umbrella for following reasons:

- Their size, weight, and construction methods are very compatible with Indoor, Scale, and small Outdoor Free Flight models, making it a natural progression in building skills to go from one to the other.
- Walkalong gliders are largely do-it-yourself with no high value hardware or equipment involved. They are likely to get little interest from engine and electronics manufacturers, who often help sponsor R/C events.
- The models can in fact fly freely, and it is also fun to:
 - Glide them from balconies or upper-level seats which are sometimes accessible at Indoor sites.
 - Balloon-launch them. Rob Romash did this at the 2019 Indoor Nationals in Eager, Arizona. We had some 4+ minute flights in the thermals there!
 - Air-launch them from rubber models or electric R/C models.

I am grateful to have been invited to contribute a Walkalong article for the NFFS Symposium. Let’s enjoy them and use them to promote the aeromodelling hobby, and not worry too much about to which branch they belong.

2. Basics of Walkalong Glider Design, Construction and Flying

Design and construction – foam gliders

Foam gliders are the easiest to build and are also easier to fly than most stick and tissue gliders. I have been building stick and tissue for over 40 years; and I have to admit that for flying in very

challenging spaces (like the cubicles and corridors at work), the foam gliders are much more successful than the stick and tissue gliders!

You can cut the foam yourself, but I recommend starting with an order of foam sheets from sciencetoymaker.org (Slater Harrison). They cut very light foam to just the right thickness and you can get 100 sheets, approximately 4" x 8," for a very nominal price. There are plenty of patterns on the same website. Slater's "Bug" designs are very easy to keep aloft, but they also tend to wander in response to the slightest disturbance. For flying in confined spaces, where precision steering is important, I would recommend a Mike Thompson "Jagwing" or one of my patterns which are posted on the same site.

If you want to design your own, almost any planform will work as long as you bend some part of it up at the trailing edge for pitch trim; and give it some nose weight. I usually add a 1/32" square basswood nose boom with a bit of clay on it. A piece of tape will also work. Using 1/4" x 1/2" of duct tape, or a few layers of Scotch tape of similar size, is usually about right for any glider made from a 4" x 8" sheet of foam.

If the glider has a distinct wing and tail, you can bend some camber into the wing. If it is a flying-wing design, then you have to do this very sparingly, or not at all. A very little bit of camber near the leading edge can make the wing more efficient; but it is easy to put in too much. Then it will require very large elevator deflection to keep the nose up, which more than cancels out the slight benefit of the camber.

If you want to make a big foam glider, you will have to figure out how to join multiple sheets or cut your own foam. Mike Thompson has developed a method of joining that uses interlocking tabs along the joint, plus a little bit of glue or tape. Or just friction if you want to disassemble your glider for transportation. (His glider in Figure 17 has a 3-piece wing utilizing this type of joint.)

Figures 2 and 3 illustrate a foam walkalong glider. It is made from a single 4" X 8" sheet of foam from sciencetoymaker.org.

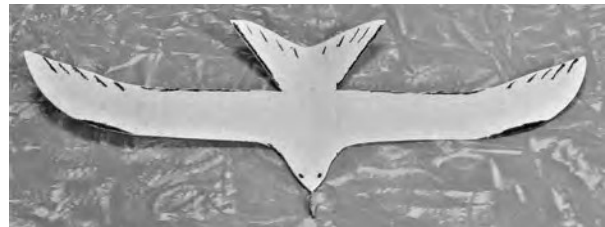


Figure 2. Foam "Seagull" walkalong glider

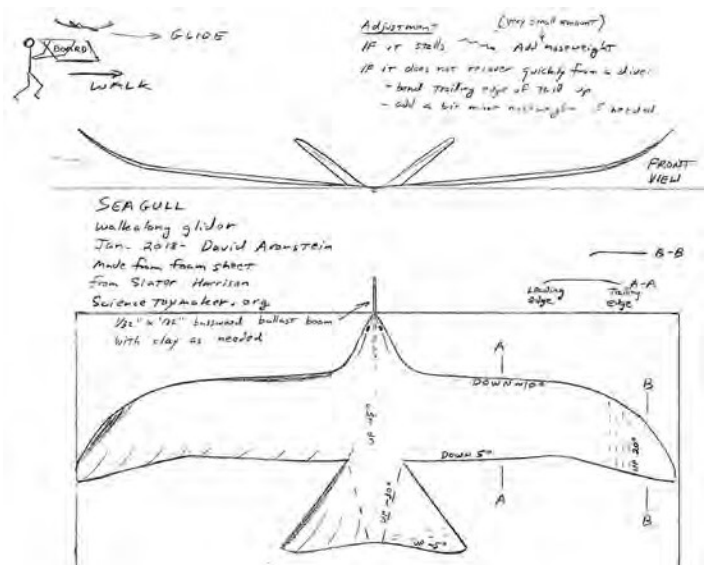


Figure 3. Pattern for foam "Seagull"



Figure 4. Assortment of stick and tissue walkalong gliders at a meet at Beechcraft ca. 2004 (Photo: Daniel Walton)

Design and Construction – Stick and Tissue Gliders

In terms of design, you have to learn a whole new set of principles for stability and control:

- Short-coupled models fly better than long ones. Anything like a typical free flight model will only dive if you try to fly it over a board. This is because the tail, being closer to the board, gets more updraft than the wing. If you are going to build walkalong gliders with tails, they need to be short-coupled.
- Tails should be small and high-set, i.e. T-tail, or at least, higher than the wing.
- Tails should have **more incidence** than you use on conventional freeflight models. The tail should be **6 to 10 degrees** trailing-edge-up, relative to the wing.
- For flying wing (tailless) designs, do not use a conventional cambered airfoil. Use a flat airfoil or a gentle S-curve with approximately the first 50% concave on the bottom; and the last 50% equally concave on the top. Then a very little bit of washout (tip airfoil nose down relative to the root), and some elevons. If you don't put in too much camber, you will not need very much elevon deflection.

Here are some considerations for scale or semi-scale models:

- With walkalong gliders, you can build scale models of many interesting types that do not lend themselves to rubber power such as multi-engine, jet, or glider. Freewheeling propellers add a nice touch, if you do happen to build a model of a propeller-driven full-scale subject.
- Instead of enlarging the horizontal tail, as is common practice on rubber scale models, I often enlarge the wing by approximately 10% in order to improve the glide performance.
- Scale models can have profile, or fully built up, fuselages. The vast majority built to date

are profile. For a profile fuselage, light 1/32" or 1/16" sheet is usually fine. Lightening holes & tissue covering can be used. If you are going to attempt a fully built up fuselage, just keep it light!

- Profile scale models, especially of full-scale jets, often have too much profile area forward. You may have to compensate for this by enlarging the vertical tail.

Finally, remember that full scale gliders have long wings for a good reason. Fikes, Laceys and Chambermaids are successful in rubber scale competition mostly because of wingspan limits in contest events. If contest rules are not limiting your wingspan – more is better.

In terms of construction, if you build Indoor free flight in any form you can build a stick-and-tissue walkalong glider. My most successful training design, the "Club Racer," has a 14" x 2" wing with 1/16" square construction, a med/light 1/16" sheet fuselage, and light 1/32" sheet tail surfaces. I build them to a weight of about 1.8 grams (including nose ballast). You can make successful gliders bigger or smaller, lighter or heavier, but this is a good reference point. If you build A-6 class indoor models, you are already in the right ballpark. Lighter, of course, will be slower and easier to fly in confined spaces; but more prone to handling accidents. Use your judgement and see what works in your venue and with the people who fly there.

Figures 4 through 7 illustrate some of the variety that is possible with stick-and-tissue walkalong gliders.

Flying

First, of course, trim your glider for a good "free" glide. Because walkalong gliders are typically short coupled and have a lot of decalage, you may be surprised how far forward the CG needs to be. The CG is typically anywhere from 10% to 25% back from the leading edge. Correct any severe turning tendency. Then you might want to take off a bit of noseweight,



Figure 5. Author's retro-futuristic fantasy airliner, piloted by his son Jesse.

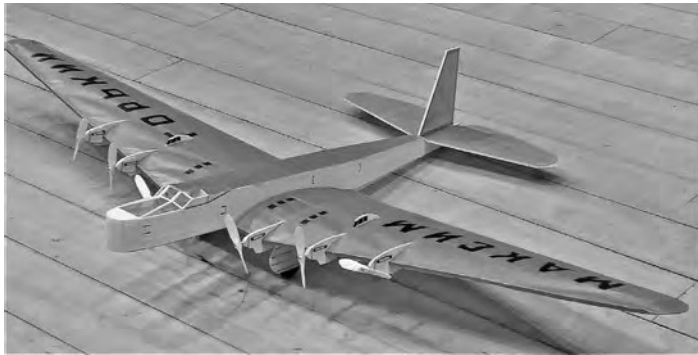


Figure 6. A relatively exotic full-bodied scale walkalong, ANT-20 Maxim Gorkiy built by Author's son Zevi.

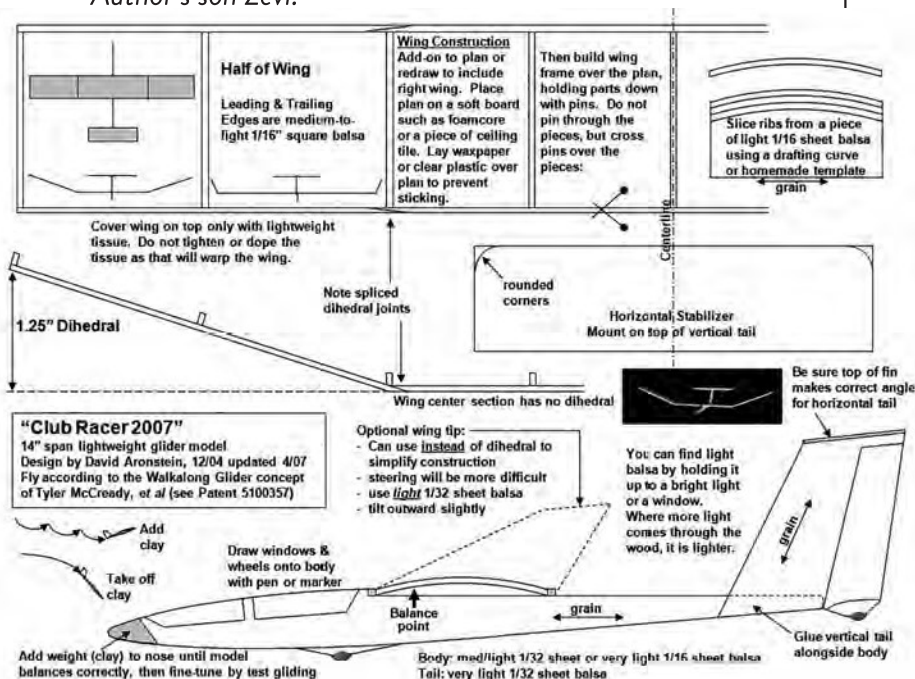


Figure 7. Plan for the "Club Racer," a successful training glider. Full size is 14" span.

so that the free glide has a slight stall. This is because the board often gives some nose down trim, because the tail is closer to the board and gets more updraft than the wing.

Now for the board. There are two primary ways to launch. One way to launch is to hold the glider in the same relationship to the board as it will be in steady flight. This is usually 6" to 12" above, and 0" to 6" ahead of the top edge of the board. The board angle must be steep, at least 45 degrees. Sixty degrees is better; some pilots fly very well with the board at 90 degrees. Now walk at approximately the same speed that the glider flies; point the glider's nose slightly down, and just release (do not toss!) the glider. If the speed and launch attitude are just right, you are flying! If the glider immediately gets ahead of you, try it faster next time. If the glider immediately falls back behind the board, try it slower, or point the nose down more.

Another way is to launch the glider from as high as you can reach into a free glide, then come up under it with the board. This may be easier if you are having a hard time releasing at the correct speed with the first method. As with

the first method, the board must be steep. And do not approach the glider from behind; this will only push it into a dive. You have to come up from below the glider. Neither method is absolutely easier than the other. The high altitude launch may be easier for a very slow glider, when the pilot has a tendency to walk too fast. But in general, you just have to see which method works best for any given glider and pilot.

Once you learn to maintain altitude, you will need to learn how to turn! Turns can be induced by "sliding" the board

to one side or the other, or by banking the board, or by some combination.

If you are flying in a confined space, you will soon encounter your own wake. Vary your path and/or your altitude so that you are not flying through the same air on every lap. If you know you are about to hit your wake, you can either bring the glider down close to the board so that the board is a more dominant influence than the turbulence; or conversely, build up some extra altitude ahead of time and then ease the board away from the glider. Let it fly freely through the turbulence, then come back under it with the board. Watching different pilot tackle the same problem in different ways is one of the fun things about this type of flying.

Avoid Common Mistakes

When launching, hold the glider from **behind and below**. A common mistake is to try to launch it with one's hand above or in front of the glider, which often results from picking up the glider after a landing. The pilot's hand will disturb the airflow and prevent a successful launch. You will need to remind beginner pilots to get a correct hold on the glider before they launch, even if they have to put down the board in order to do so. With foam gliders that have no fuselage, the hold can be from directly behind, with one finger on top of the glider and one on the bottom.

The Board Must be Steep

Many pilots flatten the board as they fly, and more so if they get into trouble. You get no lift with a flat board. Most modelers get this principal very naturally. Beginning pilots usually need to be reminded. I try to encourage pilots to hold the board with their fingers wrapped over the top edge of the board, because this makes it more natural to keep the board at a steep angle.

Finally, practice, practice, practice!

3. Promoting out hobby

We should always be looking for new opportunities to get our hobby in front of the public, and walkalong gliding is good for this. In general,

maybe we need to get a little less focused on competition, or at least, less exclusively focused on competition and more focused on outreach. (I say this to myself as much as to anyone else!) For competitions, both Indoor and Outdoor, we tend to take our models into locations that are very secluded. Sometimes we need to do the opposite, so that others can see, appreciate, and in some cases join, our hobby.

As I write this, sitting in my house which I have barely left for the last 2 weeks, it is hard to think about any kind of public event. The entire state that I live in is under a stay-at-home public health order except for essential work and a few other approved activities. Furthermore, throughout the nation, this is not the exception. It is quickly becoming, or already is, the rule. The "novel coronavirus" or COVID-19 pandemic will pass, but it may leave some permanent changes behind it, as 9-11 did. Life may be different in ways we do not yet know. There may be new limitations, but there may also be new opportunities. People might be ready for some new activities that are wholesome, mentally and physically engaging for grownups and kids alike, and very affordable. I expect that walkalong gliding will still have a place in the world!

Group Build-Fly Workshops

Any time you are doing a build-fly workshop for kids, you might consider doing it with walkalong gliders. In my experience, and I admit I have not done this as much as many of you, a build-fly workshop with a simple rubber-power model such as the AMA Cub or a Laser Cut Planes P-18, generally requires:

- An hour or two to build plus an hour for flying, possibly with glue drying time between.
- Builders at least 10 to 12 years old
- An instructor to student ratio of about 1 to 4

With simple foam walkalong gliders, it can work with a shorter build time, younger builders and/or a lower instructor to student ratio. I recently did a walkalong workshop at an elementary

school STEAM Club (STEAM is like STEM + Arts, i.e. Science, Technology, Engineering, Arts and Math. That sounds like an “everything” club to me, but it is still a time for kids to engage their minds constructively with a little adult guidance, so it is a good thing!). We had;

- One and one-half hours total for building and flying
- Students covering the range from 5 to 10 years old.
- Instructor to student ratio of 1 to 7 (3 instructors who knew what they were doing, plus about 2 parent volunteers with no prior exposure to walkalong flying, for 20 students).
- A classroom that would have been too small for rubber power flying.

It worked well. First, I gave a quick demonstration to get their attention and show them what they were about to accomplish. Then we built the gliders, which took us about half the time, including “free-glide” tests. Then we merged the groups and formed 2 lines, spaced as far from each other as the room would permit. I gave some reminders on how to fly them. On the club leaders’ call, the 2 students at the heads of the lines would fly. The others would wait, to give the active flyers some free air. The parent volunteers helped circulate boards back to the heads of the lines, so that on the call each new pilot already had their board. Finally, we let the kids fly “at will” for the remainder of the time. Some did very well and most had at least a little bit of successful flying. The youngest kids had more success just climbing up on a table and free-gliding their gliders from there. They still glided so much better than conventional paper airplanes. It was a bit chaotic but considering the age range and the number of students, it was a success. The STEAM Club leader certainly thought so. If you have the advantage of an older crowd and a little more time and space, you can build something more ambitious, or (probably a better idea) do a little more advanced flying.

Exhibitions

Public exhibitions are also important. I became active in modeling after my father and older brother went to an airshow where the local model club was giving a demonstration of control line flying. Before that encounter, we never knew the club existed. With walkalong gliders, a handful of people with some practice could put on a very effective exhibition. A couple of pilots take turns flying and provide instruction to interested passers-by. Two or 3 other club members hand out fliers announcing upcoming club activities. A table full of models on static display completes the picture! A mall, the local aviation museum, or probably a variety of other locations would be suitable. I have not done a mall show in a long time. If anything, our culture has become more averse to letting people do fun things in random public places, but with a little pre-coordination it can still happen.

Mainstream Modeling Events

A little walkalong flying on the side can make a regular model meet more fun for friends and family members who might not be into your primary area of interest. At an Indoor meet, this can be done in a side gallery or a hallway or room that is outside of the main flying area. Outdoor meets offer possibilities too. I have not talked much in this article about outdoor walkalong flying, but it can be done. If someone is willing to organize it, you can run any of the walkalong informal contest events as described in the following section.

4. Walkalong Glider Competitions

General Considerations

Just a few minutes ago, I was writing about not getting too wrapped up in competition. We now cautiously venture back into that realm. Just be sure to keep it light-hearted and fun. It should be something to draw people in, not drive them away. The first thing to know about walkalong glider competition is that it is different from traditional free-flight model airplane competition.

- Duration events get boring really fast, because some fliers will quickly achieve the ability to keep a glider aloft more or less indefinitely.
- Forget the builder-of-the-model rule. It fun to share models! Throw all the models on one table and try each other's models out. Let each flier choose any model for a contest flight. Obviously this has to be done with care and respect, which brings up the next point.
- You may have to instruct and remind new fliers how to handle lightweight models without damaging them. I have successfully used the "Standing Rules," copied below, to inform non-modeler kids and adults alike learn how to handle and fly walkalongs.
- Don't worry about proliferation of events – you don't need a different glider for each event! The main distinction between events is what you are trying to do, not the constraints on design and construction.
- In fact, I do not recommend trying to impose any constraints on design or construction at this time, and maybe not ever. Why not? First, because there are still too many unexplored possibilities. Second, because there seems to be little need to constrain the designs. In several years of running competitions, we have rarely seen any one type achieve dominance in any event.

So be creative in figuring out new events (even call them games); and let the designers/builders exercise their creativity. Creativity is one of the most appealing things about our hobby and here is an opportunity to let people exercise it freely!

Standing Rules

If you are going to organize some walkalong glider competitions, it is useful to have some general guidelines. I have used the following very successfully.

Except as modified by specific event rules, the following standing rules always apply:

- Anybody may use any glider and any board of their choosing.
- At least one official flight area, and at least one practice area, will be designated based on available space. Please stay within your designated space.
- Scored flights:
 - No limit to the number of attempts, but we will take turns so that all competitors have approximately equal opportunity to make scored flights.
 - Any "false start" (i.e., an attempt in which you do not achieve roughly 10 seconds of sustained, controlled flight) may be re-flown immediately and will not count against you, whether it is for practice or for a scored flight.
 - One official flight in progress at any given time, in each designated area. Note that if the area is large enough for multiple scored flights with little risk of interference, the contest officials may relax this restriction.

Practice:

- Practice flying and fun flying are encouraged in the practice area(s). However, except as noted below, official (scored) flying will have priority for gliders, and right-of-way in the event of any airspace conflicts.
- Multiple fliers may practice at one time in the practice area(s), but please be sensible.
- Each flier is permitted one short practice flight with their glider of choice in the official flying area, immediately prior to any official flight attempt.

Spectators and pilots:

- The aircraft are fragile! However, they fly slowly enough that they will usually not be damaged by flying into each other, into you, or into anything else. Nor will they damage anything or anybody that they fly into. The greatest hazard comes from energy brought into the collision by much larger bodies, i.e. people. Therefore, in the event of any actual

or imminent mid-air collision, the best thing to do is STAND STILL.

- The same applies to gliders about to hit an obstacle, a person, or the floor – both the pilot flying the aircraft, and anybody in the path of the aircraft, should stop and STAND STILL. This is the best way to avoid damage to people and aircraft.

Specific Competition Events

Duration

A duration contest is a good first step, to motivate beginning flyers to master the basic skills of maintaining altitude and steering when necessary. However, once they master these basic aspects, the flights can get very long. So it is best to have a “max” such as one minute or two minutes.

If you want to have a single winner, then you can impose a more difficult challenge for everybody who achieves the maximum duration. Here are a couple of ideas for the fly-off:

- A speed run with the same airplane that you used for the duration flight
- Another duration flight with a very difficult glider (all pilots in fly-off use the same glider).

Race (i.e. timed speed)

This is a logical second step. Mark out a course, either out-and-back or a closed course around some pylons. Chairs make good pylons. Two laps add challenge and excitement. To allow everybody to make a score, re-launches are permitted if you crash on the course. Re-launch from the same place where the airplane came to rest. You could impose a scoring penalty for re-launches, but we have not found that to be necessary. The time lost picking up the glider and re-launching is usually enough of a penalty.

Optionally, you can award a 5 second bonus for flying a scale or semi-scale model of a race plane.

Team Relay

Same as “timed speed,” but you have to perform the added task of an inflight handoff from one pilot to the other. Suggested format is one lap with the first pilot, one lap with the second pilot. If the second pilot does not accomplish some controlled flight after the handoff (for example, reaching the next pylon) then you could impose a penalty (such as +10 seconds on the team’s time) or require the first pilot to re-launch and then re-do the handoff.

Sumo

Fly as long as you can within a defined “ring,” You can have different size rings for Beginner (large, for example 16'x20'), Intermediate (12'x16') and Advanced (8'x12') categories. Scoring stops when the glider lands or the pilot steps out of the ring. If the glider leaves the ring but keeps flying, and the pilot stays in the ring, keeps timing until the glider lands. If the glider leaves the ring and then re-enters the ring, and the pilot regains control keep timing!

You may not touch your opponent’s loin cloth or top-knot. (Just kidding – we have only run this as an individual timed event with one pilot in the ring at a time.)

Slow Race

Take as long as you can to fly a defined course with no errors. In this case, the right and left boundaries of the course need to be clearly marked. We used chairs with string tied to the backs.

An error is any of the following:

- Aircraft lands or crashes
- Pilot touches or leaves the boundaries of the course
- Aircraft leaves the boundaries of the course
- Aircraft flies in the wrong direction. Aircraft may zig zag within the course boundaries but may never fly in the reverse direction on the course (i.e. may never turn more than 90 degrees away from the local course center-

line). Judges need to watch closely, without interfering!

Score is the time you take to complete the course or to your first error, whichever comes first. An error ends the timing and ends the attempt (no relauches). High score wins.



Figure 8. John Griswold negotiates the Slow Race course. Beechcraft "B" in Background. (Photo: Daniel Walton)

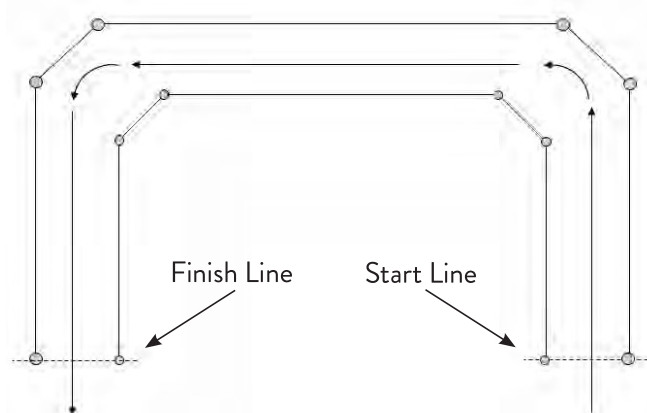


Figure 9. Slow Race course

Obstacle Course

Make up a course with as many clever obstacles as you can think of. Try to provide at least 20' of clear flying distance between obstacles, for pilots to recover control and regain altitude. Our favorite obstacle course consisted of:

- Chair slalom (approximately 6 chairs in a line, spaced 6' to 8' apart)
- Limbo bar (about 3' off the ground; must fly under)

- High bar (about 7' high; must fly over. We used a rolling coatrack that was usually available at our flying site).
- Two hula hoops taped to the backs of chairs so they were at a comfortable height to fly through; and about 15' apart so that you have just enough time to regain control after the first hoop and direct your glider through the second hoop.

- Aircraft carrier (table) for landing

The limbo bar was fun. Some pilots stepped over the bar while the airplane went under. Some sent the glider under the bar and then ran around the end of the bar to meet it on the other side. Some went under the bar with the glider. All methods are legal, as long as the glider goes under and the pilot has control before and after!

Scoring is:

- + Five points per obstacle successfully flown. Must have controlled flight before and after the obstacle.
- - One point per crash. Restarts allowed.
- - One point per second that it took to fly the course
- Same as Long Range Strike (below), the carrier landing is worth 10 points if perfect, or 5 points if you make contact with the carrier but do not come to rest, upright, on the deck.
- Three-point bonus for using a model of an Aerobatic or Sport aircraft.

Long range strike

Just like it sounds, in this event you have to fly to a target as far as practical from the launch area (usually the opposite end of the room), make at least 2 passes over the target and return to base. It is easier to lose points than to gain them in this mission, so we started with a base score of 100 and added or subtracted points as follows:

- Base score: 100 points
- - One point per second of mission duration

- - Five points per crash (restarts are allowed)
- + Ten points per extra target pass (above the minimum of 2)
- + Five points for scale or semi-scale model of military aircraft
- Carrier landing (a table serves as the aircraft carrier or landing strip):
 - Perfect landing on the carrier +10 points
 - Crash on carrier; or land on carrier but subsequently fall off: +5 points

Tip:

After a couple of target passes, you will be flying through your own wake, which makes it more difficult. Therefore you have to judge when the time, plus the risk of crashing, outweighs the points gained.

Team airlift (disaster relief)

The mission is to ferry relief supplies across a “river.” Make the river with two parallel lines of chairs. The lines should be approximately 6’ apart. Teams of two, with one pilot on each side of the river. One pilot launches the aircraft and calls for timing to start when s/he is ready.

Scoring as follows:

- As many passes over the “river” as possible in 1 minute (one point per pass)
- Neither pilot may enter the river. Flight over the river is unassisted.
- Pass must begin and end with controlled flight to count.
- Scoring ends at 1 minute or end of flight, whichever comes first.
- Three-point bonus if the aircraft is a scale or semi-scale model of a Utility or Transport type aircraft (including ex-military); i.e. an aircraft that might actually be used for this type of operation.

Tips:

- When receiving, do not stand directly in front of the glider. Instead, stand to one side of its path. Let it fly by you, then come in behind

and under it with the board. Then climb and turn!

- When passing the glider, gradually let your board drop below and behind the glider. Do not stop the board suddenly, this will make a disturbance that could cause the glider to stall & crash.

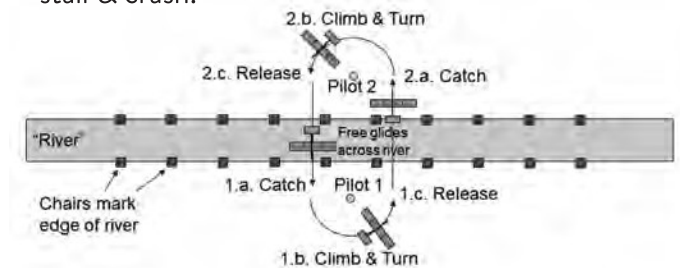


Figure 10. Team Airlift course

Altitude

Objective is to fly over a bar, which is raised each round. An easy setup is to use 2 helium balloons, each tied to a chair about 8’ apart with plenty of extra string. A cross string is tied between the two balloon strings. You might put something light but highly visible on the cross string, like a ribbon loosely spiral-wound around it, to make it easier to see whether the glider flies over it or under it.

- By rounds, barrier raised each round
- Three tries per round per contestant to make it to next round
- Controlled flight required before and after flying over the barrier.

As an example, one year our barrier heights were 65”, 73”, 90”, and finally 105”. Out of 10 pilots, all 10 made the first 2 rounds; 8 cleared the 90” barrier; and only one cleared the 105’ barrier. Maybe we should have made the increment smaller as we got higher.

Big race (i.e. simultaneous)

This is a great season finale (if you have to end the season at all).

We first did this with a winding “cross-country” course, and a massed start. The start made a great picture (below), but about 5 seconds

later it was complete chaos. Chuck Powell's Hawker 850 business jet (list price about \$8 million at the time) got stepped on and was a total loss. After that we adopted an out-and-back layout with a separate lane for each pilot. This worked much better. Fly multiple heats if you have more pilots than lanes.

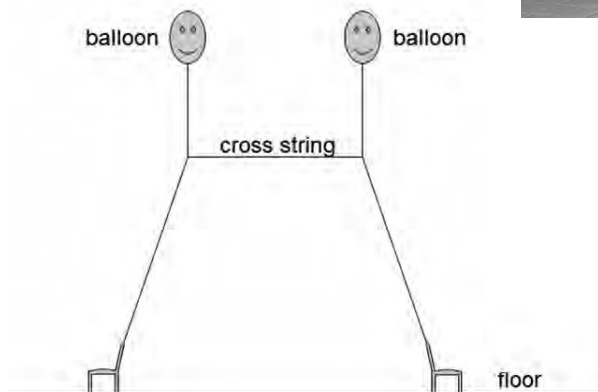


Figure 11. Altitude setup



Figure 12. Young Jesse Aronstein gets a Club Racer WAY overhead and clears the line. (Photo: Daniel Walton)

Since many pilots are flying at once, it is not possible to give every pilot the choice of any glider. If you have been keeping score through the season, you can use season score as a basis for ordering the choice of gliders. (Lowest season score chooses first, down to season leader who chooses last). Or you can award glider selection by age. Depending on your group,



Figure 13. Start of an early "Big Race" at Beechcraft, ca. 2004. (Photo: Daniel Walton)

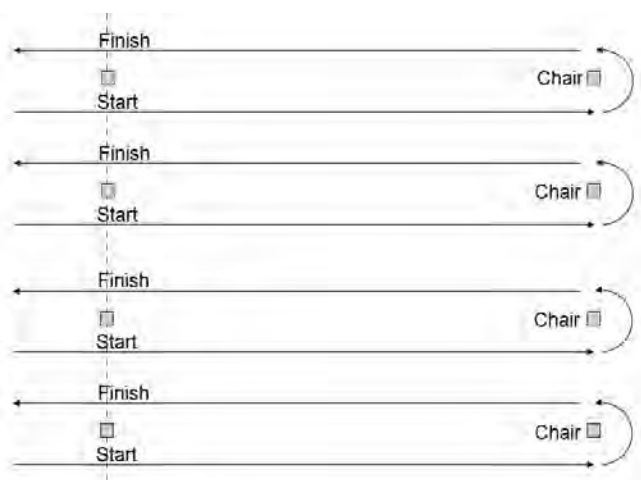


Figure 14. Improved "Big Race" course

you may want to give the youngest fliers the advantage of choosing first, or maybe the oldest fliers. Or maybe alternate between oldest and youngest, working your way towards the median of the age range.

Define Your Own

In figuring out new events, some thought is required to make sure the scoring formula rewards the intended accomplishments, penalizes errors, does not have loopholes, and does not lead to interminably long flight attempts. See the examples above. We did not get them all right the first time, but the versions given have all been used successfully.

If the contest represents a realistic full-scale aircraft mission, you can award bonus points for scale or semi-scale models of aircraft that would actually perform that mission. If your group meets at or near an aviation center of some

kind, such as a glider port, or an Air Force or Air National Guard base, then you should certainly try to make a walkalong event out of whatever mission(s) the local center supports.

Season Scoring

If you have the opportunity to run a series of glider meets, you may want a season scoring system. One way is to award one “season point” for every contestant that you finish ahead of, in any meet. Half a point for tying with another contestant. So if there are six fliers in a meet and you come in 2nd, you get 4 season points for that meet. If the next meet has 4 fliers and you tie for 1st, you get 2 1/2 season points for that meet. And so on. Add your season points from all meets, and this is your season score. You can cap the number of meets that a participant is allowed to count, so that participants who cannot make all meets still have a chance.

All that said, the atmosphere at walkalong meets should always be fun and friendly. Share gliders, share ideas, have fun!

5. Conclusion

Now you have the basics of what walkalong gliding is, how to do it, and how to organize some fun group events. Throw one together and give it a try! Just remember to keep it light with 1/16" square construction, a flying wing or short-coupled T-tail, and about 5 deg more decalage than you would use on a conventional free flight model. Peruse the resources below, enjoy it, and share it!

Resources

You can find a lot by searching for “Walkalong Glider” in Google or YouTube, but here are some sites that are especially good for getting started:

<https://sciencetoymaker.org/walkalong-glider-airsurf-air-surfing/> - patterns for paper and foam gliders; **foam sheets and pre-made gliders available to order** (nonprofit and supports physics education!); instructions for building, flying,

and for organizing instructional events; history, overview of current activity around the world. Other types of science are projects on the main site (sciencetoymaker.org). Slater Harrison maintains this very extensive site. Some pages of specific interest are listed below:

- Foam store and pre-made gliders: <https://sciencetoymaker.org/walkalong-glider-airsurf-air-surfing/glider-store/>
- Instruction for making gliders: <https://sciencetoymaker.org/walkalong-glider-airsurf-air-surfing/make-your-own-gliders/>
- Tumblewing patterns and instructions: <https://sciencetoymaker.org/walkalong-glider-airsurf-air-surfing/make-your-own-gliders/paper-gliders/>

<https://sites.google.com/site/controllablelope-soaring/> - another very comprehensive site with designs, science project idea, contest/game ideas, and videos; designs (including building instructions and flying tips) for many types of walkalong gliders, including one-piece paper “tumblewings” (see Figure 16), other paper designs, stick-and-tissue, and even natural gliders such as certain types of gliding seeds, and dried butterflies. (Phil Rossini).

- Includes (among many other useful links) a page with downloadable plans for several of the author’s stick and tissue walkalong gliders: <https://sites.google.com/site/xsurferdude/daviddesigns>

<https://www.endlesslift.com/tag/walkalong/>

- how to organize a walkalong glider party. Main site has a lot of other information to help people get started making all kinds of simple flying things; plans for many classic simple free flight models; postal contest announcements and results. (Gary Hinze and Darcy Whyte).

<https://wildparkwerkstatt.tumblr.com/walkalongglider> - Description (in German) with some very neat diagrams; photos and videos; patterns for some biologically-inspired foam gliders in the form of manta rays, pterodactyls,

sea turtles, dragonflies, waterbugs, and even one or two that look like man-made airplanes. Main site includes other types of flying projects and general science projects. (Thomas Buchwald).

<https://www.thepaperairplane.com/> - If you are interested in trying paper walkalong gliders, this is the site. (John Collins).

Appendix: walkalong gliding people and history

Here are a **few** of the people who helped develop Walkalong Gliders in some manner, and/or who are active in it today. Obviously there

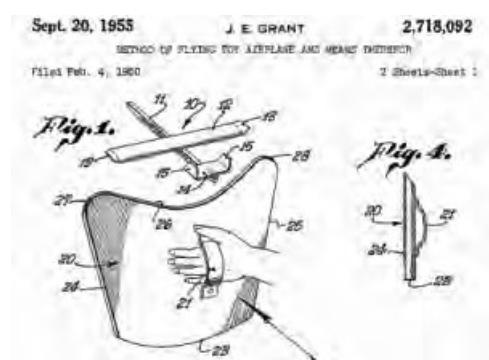


Figure 15. Excerpt from Grant's patent

are many more. If you are not mentioned herein and feel that you should be, I apologize and I would love to hear from you and be introduced. (This section was contributed by Slater Harrison with some minimal additions by myself.)

The first record we have of a walkalong glider is in 1950. Joseph E. Grant, a man of spectacularly diverse interests, applied for a patent for "Method of flying a toy airplane and the means therefor." He pitched to the Milton Bradley Company but did not get traction. He was ahead of his time.

In the 1970s, Dr. Paul MacCready was pursuing the £50,000 Kremer Prize for human powered aircraft. The documentary about that successful pursuit (which won an Oscar for Short Subject in 1979) - *The Flight of the Gossamer Condor* - also briefly showed his son Tyler flying a walkalong glider. His sons Tyler and Parker had independently invented walkalong gliders again and

became aware of Grant's earlier work only when they applied for their own patent in 1992. Later, Tyler MacCready would demonstrate and explain walkalong gliders to Alan Alda on the TV program *Scientific American Frontiers*. It was the MacCreadys who coined the term "walkalong glider."

The concept of walkalong gliders was kept alive in hang gliding communities and among aerospace engineers. As more people became aware of them, first in television and then explosively through the Internet, people around the world innovated various branches.

Phil Rossini of Massachusetts was one of the first to establish an online presence for walkalong gliding. He posted articles on design and flying, and relentlessly demonstrates ("interprets" in Museum terminology) walkalong gliding at museum events and malls. He has flown real butterflies (which he has been able to find dead but intact) as walkalong gliders.

John Collins, AKA the Paper Airplane Guy, invented an altogether different kind of walkalong glider. In 1995 he published a book about paper airplanes, *Return to the Fold*. In addition to fixed wing planes, one of his designs flies by tumbling about the long axis. He calls it the Tumbling Wing (also sometimes called Tumblewing). It is a good design for using paper instead of foam. (There were some free-flight and R/C models in the 1960s and on, which used this type of wing, mounted to a conventional fuselage and tail roughly in the place where a conventional wing would otherwise be.)



Figure 16. Tumblewing by John Collins

In 1996, Kouyou Nagamatsu wrote a book, *Fantasy Wing*, that featured bio-mimicry gliders made from very thin (less than a millimeter) sheets of EPS foam. They took the form of birds, Pteranodons, and even unicorns. Although not used as walkalong gliders per se at first, they were soon adapted. Thin foam gliders are more delicate, slower-flying than the durable, faster Depron gliders that the MacCreadys developed. EPS (expanded polystyrene) varies in density but can be as low as 4 kilograms per cubic meter which is just a few times denser than air itself. The slower flight of thin EPS can be helpful for beginners just learning to fly, although the air has to be dead calm.

David Aronstein (the author of the present article) figured out how to overcome the lift differential from fore to aft. That allowed scale models with tail sections to join the typical “flying wing” form. He also created meets with careening dogfights and obstacle courses.

Michael Thompson has developed propellers for walkalong gliders shown in Figure 17 (albeit freewheeling, just for looks). He also invented the Jagwing, which has points forming the leading edge. It is not the most efficient design, but it is simple to make and easy to fly—a good first glider. Points act as vortex generators, delaying the stall and making it gentler when it occurs. Michael has created other, sometimes other-worldly walkalong designs on his *YouTube* channel [gliderguider1](#).

In Germany, Heinrich Eder has created large gliders that are so efficient that they stay aloft just from having someone walk underneath without a board. Thomas Buchwald organizes all kinds of wonderful flight activities, including walkalong gliding and traditional free-flight, at a “Werkstadt” or educational kids’ camp. Alfred Klinck designed a very docile flying wing, about the size and weight of a Pennyplane wing. I do not know



Figure 17. Multi-prop model by Michael Thompson (Photo: Michael Thompson)

much about Alfred, but there are *YouTube* videos of him teaching a class to build and fly his design, the “Marschflugzeug” (Walkalong Glider).

Walkalong gliders have taken on a regional flavor in Thailand, where racing has become spectator sport. Fans pack bleachers to watch relay races. Someone in China holds the Guinness World Record for fastest time, although rumor has it that a U.S. challenge is imminent.

Darcy Whyte maintains a website, Endless Lift, with a Walkalong section as well as many simple rubber designs and online contests (Cloud Tramp, Sky Bunny, Worldwide Postal, etc.).

Finally, Slater Harrison (who modestly, and characteristically, left himself out of this section) is a schoolteacher in Pennsylvania. He uses walkalong gliders to teach science and to provide a constructive activity for kids before and after school, and maintains a website called Sciencetoymaker with all kinds of DIY science projects including walkalong gliders. If you are going to lead a walkalong build-fly workshop, Slater’s wire-cut foam sheets are the BEST material that is available for this purpose, bar none!

For additional information, this page has a more thorough treatment of the history: <https://sciencetoymaker.org/airsurf/history-of-walkalong-gliders/>

-and this page tracks goings on around the world: <https://sciencetoymaker.org/airsurf/foam-walkalong-glider-gallery/>