



Greater Houston Soaring Association

Tow Pilot Manual

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Table of Contents

Introduction.....	4
Purpose.....	4
Mission Objective	4
Jurisdiction.....	4
Schedule	4
Tow Pilot Mailing List.....	5
Weather Cancellations	5
Operations.....	5
Prior to Duty	5
On Arrival at Gliderport.....	5
Engine starting.....	5
Taxiing.....	6
Engine Run up and Check Flight	6
Parking.....	7
Crew Hard Start	7
Preparing to Launch	7
Take-Off.....	8
Rope breaks.....	8
Tow.....	9
Glider Release & Descent	10
Landing	10
After Landing	11
After Operations.....	11
Emergencies	11
Limitations	12
Tow Ropes	13
Airspace	14
Noise Abatement.....	15
GHSA Tow Patterns	16
GHSA Aerotow Launch Signals	17
Aerotow Launch Signals: In-Flight Signals	20
Boxing the Wake.....	22

High Tow vs Low Tow	24
Slack Line	25
Tow Pilot Currency & Requirements	26
APPENDICES.....	27
Taildragger Taxiing Control Positions	28
GHSA Tow Plane Spreadsheet User Guide	29
GHSA Tow Pilot Checkout Procedure	31
GHSA TOW PILOT APPLICATION FORM	33
New Tow Pilot Check List (For CFI and Chief Tow Pilot).....	34
References	35

Introduction

Purpose

The intent of this manual is to provide standardized operating procedures for tow plane operations specific to the Greater Houston Soaring Association (GHSA). These procedures represent the safest, most practical methods of operation based upon club experience, manufacturer's data, sport standards, and the best available information. If a situation arises for which these procedures are inadequate or do not apply, the pilot's best judgment should prevail.

Mission Objective

Operation of GHSA tow planes will be conducted with three goals in mind. In order of importance, they are:

- 1 To conduct the operation as safely as possible;
- 2 To provide the glider pilot with the best service possible; and
- 3 To accomplish this mission as economically as possible.

At no time must safety be sacrificed to advance another objective. Safety must always be first in priority, and shall be paramount in the conduct of all operations.

Jurisdiction

This manual has been prepared using information from a variety of sources. If a conflict is found between material in this manual and other sources, the sources below shall prevail in the order of priority show:

- 1 Federal Aviation Regulations;
- 2 Manufacturers' Manuals; and
- 3 GHSA Standard Operating Procedures
- 4 GHSA Tow Pilot Manual.

Tow Pilots must be familiar with the policies and procedures set forth in the GHSA Standard Operating Procedures in addition to the policies and procedures contained within this manual. During high wind days or any days you feel uncomfortable to tow you have the right and duty to stop operations. Reach out to the CFI and Dispatcher to make together sound and safe operating decisions!

Schedule

Two tow pilots per day are scheduled, unless other communicated by the GHSA Board. From April through October the morning shift is from 9-3 and the afternoon shift from 1 to end of flying. From November through March the morning shift is 9-1 and afternoon 1 to end of flying – tow pilots may sign up for both shifts. At least 4 weeks in advance tow pilots are expected to

sign up for duty once a month on the GHSA website. Once signed up, if you can no longer manage your shift it is your responsibility to find a replacement. If there are empty slots after the 1st of the month, pilots may sign up for additional shifts.

Tow Pilot Mailing List

The GHSA tow-pilot group mail address is ghsa-tow-pilots@googlegroups.com This will be used to send information about operational issues, maintenance requests etc. Tow-pilots personal email addresses must be registered in order for their mails to be accepted.

Weather Cancellations

You are expected to turn up at the field unless contacted by the dispatcher. If the weather is obviously unflyable, call the dispatcher before leaving home.

Operations

Prior to Duty

- Check status of tow-planes using the [on-line spreadsheet](#) to capture serviceability, squawks, need to initiate or complete oil change. If in doubt call the Tow Plane Maintenance Officer. See user guide in the Appendix
- Determine airworthiness of the pilot ! Use IMSAFE - Illness, Medication/Medical currency, Stress, Alcohol, Fatigue, Eating/External Pressures plus BFR currency & tow pilot currency FAR 61.69
- Check weather (in particular winds) and TFRs – Call Flight Service or study METARs/TAFs

On Arrival at Gliderport

- Note: During chilly days with temperatures in the fifties or lower use a heat gun under the engine for at least 30 minutes. Charge the battery if it was not connected to overnight charging.
- Pre-flight (include AROW), clean windshield with a clean rag (no paper towel). Keep oil between 11 to 12 qtrs. (Significant oil loss if overfilled). Set altimeter to 0ft.
- Close hangar doors after plane is removed
- Ensure ground crew inspect the rope and are aware of different breaking strengths – yellow 990 lbs, orange 2,000-2,200 lbs

Engine starting

- Review check list as necessary
- Check clear in front before getting in, in case a golf cart has been badly parked (Invisible from the cockpit)
- Adjust seat height, back angle & fore/aft position to maximize view over the nose & out the side windows. Disengage the control stick lock.
- Keep the stick back by holding between your knees.

- Normally use (Cold Start) 4-5 pumps of the throttle for first start and 2 when warm. Crack throttle to start.
Note: In cold weather conditions the engine may not start at first attempt. Multiple starting attempts will cause fuel to accumulate at the air intake below the engine that can ignite and cause a fire, in particular, if the engine fires but does not keep running. If a fire starts the pilot should continue to crank the engine to suck up the flames and vapors to extinguish the fire.
- A person may stand by with a fire extinguisher but should not charge in and prevent the pilot from cranking the engine. Under these circumstances a person with a fire extinguisher at hand must stand by assisting the tow pilot monitoring the lower part of the engine from a safe position. **ONLY APPROACH THE PROPELLER WITH THE CLEAR OK BY THE TOWPILOT.** Take extended pauses between start-up attempts to prevent fuel accumulation at the air intake!
- Ensure the radio is OFF prior to starting to protect it from electrical spikes from damaging the radio.
- Announce "CLEAR"
- Start with both magnetos ON
- Check oil pressure immediately after starting the engine.
- . You can confirm charging by looking for a positive indication on the ammeter and a voltage of 14V on the radio
- Allow engine to warm up at while running smoothly at 1,000 rpm or less until the oil temperature needle moves before applying power to taxi, particularly on colder days.

Taxiing

- Check clear ahead again before moving
- Lean the mixture when taxiing.
- Visually check approach clear & listen on radio 123.5MHz. Note this frequency is also used by the West Houston Practice Area so contains a lot of non-relevant calls
- Taxi on west side of hangar (avoiding the gravel) and west side of field to launch-point
- Position controls correctly with respect to the wind no matter what the wind-speed is. See Appendix for proper stick position for taxiing a taildragger – Remember "Climb into the wind, dive away from the wind" Note: Particular caution is necessary taxiing downwind in high wind conditions (>10 knots). Improper control stick position and/or applying of the brakes can cause raising the tail of the tow plane that results in a propeller ground strike. **UNDER ALL CIRCUMSTANCES THIS MUST BE PREVENTED!** The Towplanes have a demonstrated 15kts crosswind limit!
- Weave to ensure path remains clear

Engine Run up and Check Flight

- 1,700 rpm, max 150 rpm mag drop
- Cycle prop twice (May need to increase to 1,900 rpm to get drop)
- Exercise flight controls to verify full and proper operation.
- Check temperatures (Oil, CHT, EGT) & oil pressure
- Check engine monitor for discrepancies on the cylinder head temperatures.

- Conduct a brief check flight without a tow to verify proper engine and airplane mechanical function and to report ceiling, wind and visibility conditions at the “Crew Hard Start”.

Parking

- Park crosswind unless wind very strong, just to south of bunker when operating on R18 or north-east of windsock when operating on R36

Crew Hard Start

- Participate in the morning “Hard Start” checklist review with the Dispatcher, Instructor, Ground Crew and Intro Pilot.
- Report weather conditions observed during the Check Flight.
- Confer with the Ground Crew and make sure they are aware of proper launching procedures and signals. Discuss glider kiting and how to prevent it.
- Morning towpilot should brief the afternoon towpilot of all relevant information when he arrives. If morning towpilot is flying then afternoon towpilot should gather information from the dispatcher and instructor

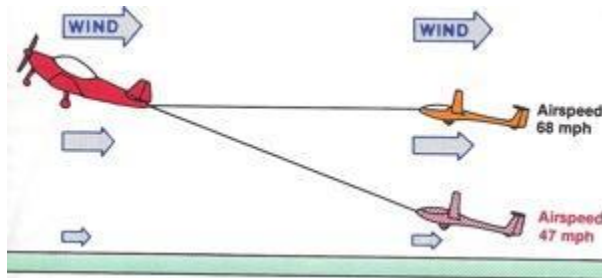
Preparing to Launch

- Taxi into position (no closer than 1 tow-plane wingspan to the glider) keeping the propwash clear of the glider. Stop at 45° to the direction of takeoff to allow ground crew to catch rope. This will also make it obvious to landing traffic that you are not about to take off. Throttle up and move forward on the 45° path until you have enough momentum to throttle back and turn the tail of the towplane past the glider with minimum power. Repeat in other direction if needed until far enough ahead of glider that taxiing forward with power and the tail pointing at the glider will not be a factor
- Observe requested tow height indicated by wingman or pilot
- Establish and verify radio communication with the glider pilot
- Be aware of hazardous conditions for tow-upsets
 - Inexperienced Pilot
 - Short Rope
 - Glider with aft C of G
 - Turbulent conditions
 - C of G/belly hook (especially on lightweight, low wing-loading gliders)
 - Air Brakes not locked
- Memorize a suitable set of pre-takeoff checks – FIGFEEPT is suggested
 - **F**uel (on & sufficient), and mixture full
 - **I**nstruments (oil pressure/temp; CHT; ammeter: etc.)
 - **G**lider (check mirror and glider for airbrakes and canopy)
 - **F**laps – set 1 stage for takeoff
 - **E**mergency Plan (reach and touch tow hook release-reminder)
 - **E**mergency Exits closed & locked
 - **P**rop set, **P**ersonnel Clear, **P**attern Clear
 - **T**rim set for takeoff

- Observe & comply with signals given by the wingman. Do not take up slack once the rope is attached unless he/she is at the wingtip
- During this period watch the glider canopy. When it is closed, close the window on the tug.
- If the stop signal is given prior to all the slack being taken up you must comply
- Once takeoff signal is given observe glider rudder waggle & reciprocate (or use radio)
- Do not launch until confirmation is received from both the glider pilot and the wingman
- If some slack remains in the rope, take it up gently before applying full power

Take-Off

- Apply power smoothly and gradually over 3-4 seconds to avoid shock heating.
- There is no need to hold on brakes whilst applying full power
- Make a radio call "Wallis Traffic, 42J departing Runway 18, glider in tow, Wallis Traffic"
- Avoid pushing the stick forward over zealously to raise the tail – in the event of a rope break this could result in a dangerous nose-over/propeller strike incident.
- In a cross wind apply full into wind aileron. Lift off once plane gets onto one wheel
- Rotate smoothly and then into the initial climb
 - Fly by attitude (accepting variations in airspeed)
 - Do not zoom up the wind gradient leaving the glider behind



- Tow at
 - 80 mph standard
 - 75 mph K6 or 1-26 (use 2 stage of flap for whole tow - don't forget to retract)
 - 85 mph Nimbus 3 or other heavy ship with ballast (no flaps needed)
 - Allow to accelerate to this speed before climbing
- Check in mirror occasionally that glider is maintaining position. Be alert to any tendency to be too high and prepare to release if necessary

Rope breaks

- Do not release the rope still attached to the tow-plane
- On the ground, as a rule continue the take-off and fly an abbreviated pattern
- If the rope breaks early in the launch before leaving the ground and there is adequate room for the tow plane to stop without a risk from the glider behind
 - Confirm where glider is maneuvering in mirror
 - Throttle back, but continue to move forward, steering to the left
 - Stop & taxi back once glider confirmed as no factor

- If in any doubt, continue take-off
- Airborne
 - Observe glider, give way and fly pattern
 - Be prepared for glider to turn 180° and land downwind if lower than 500'

Tow

- Flaps up passing end of runway (Do not tow with flaps extended unless required for slow glider due to avoid undue flap mechanism wear)
- Bring prop back 100 rpm (to approximately 2,400 rpm) at 200' (For noise abatement and improved propeller efficiency), leave throttle full
- Tow patterns
 - Make 1st turn into wind - Depending on wind speed & height, decide whether to make 2nd turn downwind back to field or upwind. Avoid no-fly zones.
 - Normally do series of long S turns into wind, or straight out if light glider & strong wind
 - Vary the tow pattern (including descend) to avoid noise disturbance over the same areas
 - Never tow downwind of field unless requested
 - In a crosswind, allow the glider-tug combination to drift downwind just after take-off so that in the event of a rope break the glider has an easier turn back to the field
 - 15-20° bank max.
 - Not more than 90° at a time
 - Fly by attitude
 - Lookout for traffic
 - If boxing the wake requested, turn downwind after first turn then back into wind for straight run from 1,500' unless very windy
 - Pattern tows - follow button hook. Aim for glider to be in a position to release at 1,000'. Be sure you know where the glider is. Give way if you cannot land before the glider.
- Aim to drop glider in lift at standard release heights (1,500', 2,000', 2,500', 3,000'). Be straight & wings level at these heights unless in shallow right hand turn in a thermal
- Do not attempt to thermal in continuous turns unless sure of glider PIC. It is not generally feasible to remain in a thermal due to high speed & shallow angle of bank
 - Be mindful of gaggles of gliders already thermalling beneath a cumulus cloud. You can bring the glider to the proximity of the gaggle but do not approach too closely. It is very difficult to see gliders – you must constantly look for gliders above, below and at your altitude
- Avoid level offs on tow whenever possible (unless a XC tow has been discussed before the flight). An abrupt level off will cause severe slack in the rope.
- Reporting Adverse Conditions
 - The Tow Pilot is in an excellent situation to monitor changes in weather and field conditions. Alert the Dispatcher of any conditions that will affect operations, such as approaching weather

Glider Release & Descent

- When glider releases, check mirror, verify that you are disconnected, then turn left, MP bottom of green, RPM bottom of green, mixture – pull about $\frac{3}{4}$ " and accelerate to 130 mph slowly to avoid shock cooling the engine (Greater than - 45°C Cylinder Head Temperature Difference)
- If not sure whether glider released - check mirror, make radio call, start gentle turn. Do not start descending until sure.
- Glider pilot to announce the release to the tow pilot.
- Announce release altitude in feet AGL so the dispatcher can record it. Example: "Wallis Ground, 42J, glider released, 3,000 feet"
- Watch for other gliders and airplanes
- Descend in this configuration (Typically 1,500 fpm)
- Monitor EDM-700 and if –NN CLD flashes (where NN Is the number of degrees/minute in excess of recommended rate), reduce rate of throttling back if still in this phase and/or reduce airspeed (Rate of cooling is proportional to the square of the airspeed)
- Use spiral descent if needed (No slipping turns), clear of pattern area - look through roof in 42J

Landing

- Enter pattern slightly higher than normal
 - Start throttling back and slowing down
 - Make radio calls entering downwind, base, final – state right or left so other aircraft know where to look
 - Do not level off. Aim to not increase power until on base or final to adjust glidepath
 - Aim to be at ~90 mph abeam the approach end of the runway with the throttle well back
 - Select prop fully forward (fine), trim for 80 mph, mixture rich
 - Select 2 stages flap on downwind or base,
 - Lineup the final, east of the runway
 - 3rd stage flaps after passing wires , with speed below 80 mph, close throttle
 - Use power as necessary to adjust approach. Aim to be 300 feet AGL indicated over wires. Slip over the runway after clearing the hanger, to avoid dragging rope on hangar – offset to east & slip back over if needed
 - Watch and avoid area next to hangar when cars, people, glider are present
 - Practice 3 point and wheel landings
 - In a strong cross-wind a 2 point is best (Main & Tailwheel)
 - Occasionally practice power off landings, but only closing the throttle when entering the pattern after the engine has properly cooled
 - Land on the east side of the runway, to the east of gliders
 - Do not rely on having to stop short if field is blocked width-wise. Use 2nd half of field if needed & taxi back
 - During higher wind conditions always land behind the glider staging positions to prevent/minimize downwind taxiing.

After Landing

- Note fuel used - 1 gal/1,000' except pattern tow = 1.5gal. Refuel when max 30 gallons calculated as used.
- Taxi in front of glider from east side - avoid prop wash blast
- If the wind becomes too strong it is safer pulling back the tow plane with a car connected to the tost hook vs. taxiing (Propeller Strike Prevention).

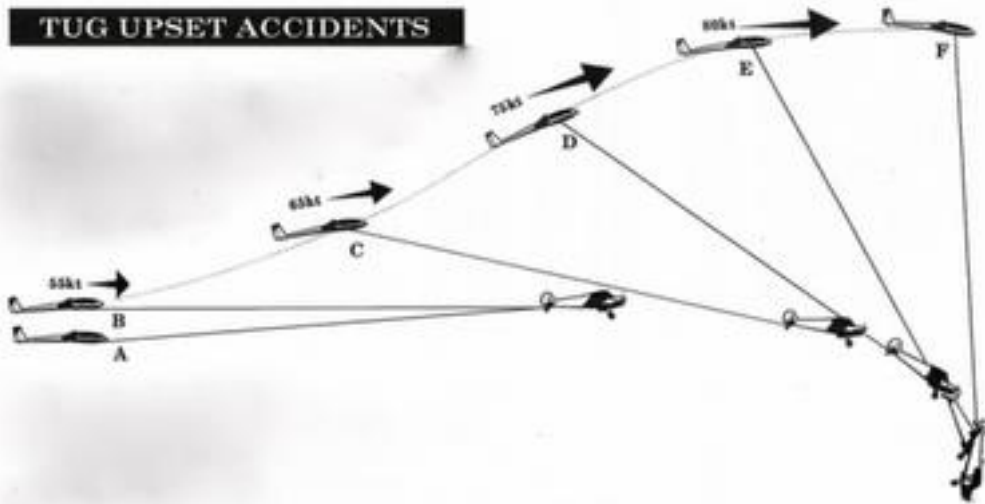
After Operations

- Refuel tow plane before putting in hangar
- Shutdown check SLIM: S-SWITCHES, L-LEAN (MIXTURE), I-IGNITION (OFF), M-MASTER (OFF)
- Initiate oil change if required. Performing first oil change requires supervision of experienced GHSA tow pilot.
- Ensure ground fuel tank system is off and locked
- Update on-line spreadsheet with flight times, #tows, oil & fuel used, squawks & oil change status if initiated

Emergencies

- Slow climb - check for glider airbrakes & waggle rudder if extended. Consider delaying the signal if climb rate does not pose a risk to the combination until the glider is at a safe height. Only release the glider if it poses a threat to the safety of the towplane. Some gliders will start the take off roll with airbrakes extended, but should advise the tow-plane of this beforehand
- Engine failure or problem below height needed to get back to airfield - release glider immediately without a wing-rock
 - Wing-rock reserved for non-critical issues (approaching cloud, student training...)
- Glider out to one side rocking wings = cannot release. Return to airfield, fly into wind and release
- If the safety or controllability of the tow plane is ever in doubt, do not hesitate to pull the tow release immediately. Be able to locate this without looking. The position of tow release handle is slightly different in each towplane. Part of the emergency plan in the prelaunch checklist should be to physically touch the release lever and make a mental decision on when you will use it. Even if an inexperienced glider pilot is, as a result of being ditched, faced with landing in a strange field, he may do better on his own than trying to cope with a confused situation involving two aircraft
- Be ready to pull the tow release if the glider "kites"(gets too high) and results in a loss of elevator control
- Tow plane upset is an abnormal occurrence which warrants special consideration. Upset occurrences are invariably serious and have sometimes proved to be fatal. The problem occurs when the glider is allowed to get so high behind the tug that the tug-pilot is unable to prevent the aircraft's tail from being lifted. The glider accelerates upward in a "slingshot" maneuver, tipping the tug

nose down and robbing it of its speed, thereby leaving the tug-pilot powerless to prevent the aircraft entering a vertical dive. Refer to the diagram below.



Limitations

- No aerotow retrieves are allowed except from airports marked on aeronautical chart
- The Agwagon maximum demonstrated crosswind component limit is 14 kts

Tow Ropes

§91.309 Towing: Gliders and Unpowered Ultralight Vehicles

(3) The towline used has breaking strength not less than 80 percent of the maximum certificated operating weight of the glider and not more than twice this operating weight. However, the towline used may have a breaking strength more than twice the maximum certificated operating weight of the glider vehicle if—

(i) A safety link is installed at the point of attachment of the towline to the glider vehicle with a breaking strength not less than 80 percent of the maximum certificated operating weight of the glider and not greater than twice this operating weight;

(ii) A safety link is installed at the point of attachment of the towline to the towing aircraft with a breaking strength greater, but not more than 25 percent greater, than that of the safety link at the towed glider end of the towline and not greater than twice the maximum certificated operating weight of the glider.

Glider	Max Gross Weight	Minimum 80%	Maximum 200%	Notes
Blanik L-23	1,124	899	2,248*	* Max rope strength per manual is 1460 lbs. (130%)
1-26E	700	560	1,400	
Grob 102	836	669	1,672	
Ka6cr	660	528	1,320	

Polypropylene Ropes used by GHSA

Tow Rope	Breaking Strength
Yellow Rope (1/4")	990lb Minimum Glider Weight (200% rule): 495lb Maximum Glider Weight (80% rule): 1,237lb
Orange Rope	2,000-2,200lb Minimum Glider Weight (200% rule): 1,000-1,100lb Maximum Glider Weight (80% rule): 2,500-2,750lb

Tow Rope Inspection

It is mandatory that the tow rope be carefully inspect before the first flight of the day for that rope (normally done by the ground crew)

- The normal tow rope length is approximately 200 feet.
- Minimal fraying on rope
- If the condition of the rope is found unsatisfactory, the rope must be cut near its ends so it cannot be used again until it is either repaired or replaced.
- Plastic tubing (as shown in image to the right) recommended for abrasion resistance but not required.
- Completely lay out tow rope and inspect full length, especially the ends.
- Check the towrope periodically throughout the day - confirm no knots have formed. A knot can decrease the breaking strength of the rope by 50%.

Tow Rings

- Tost Hook (two rings, bigger ring has "TOST" stamped on ring).



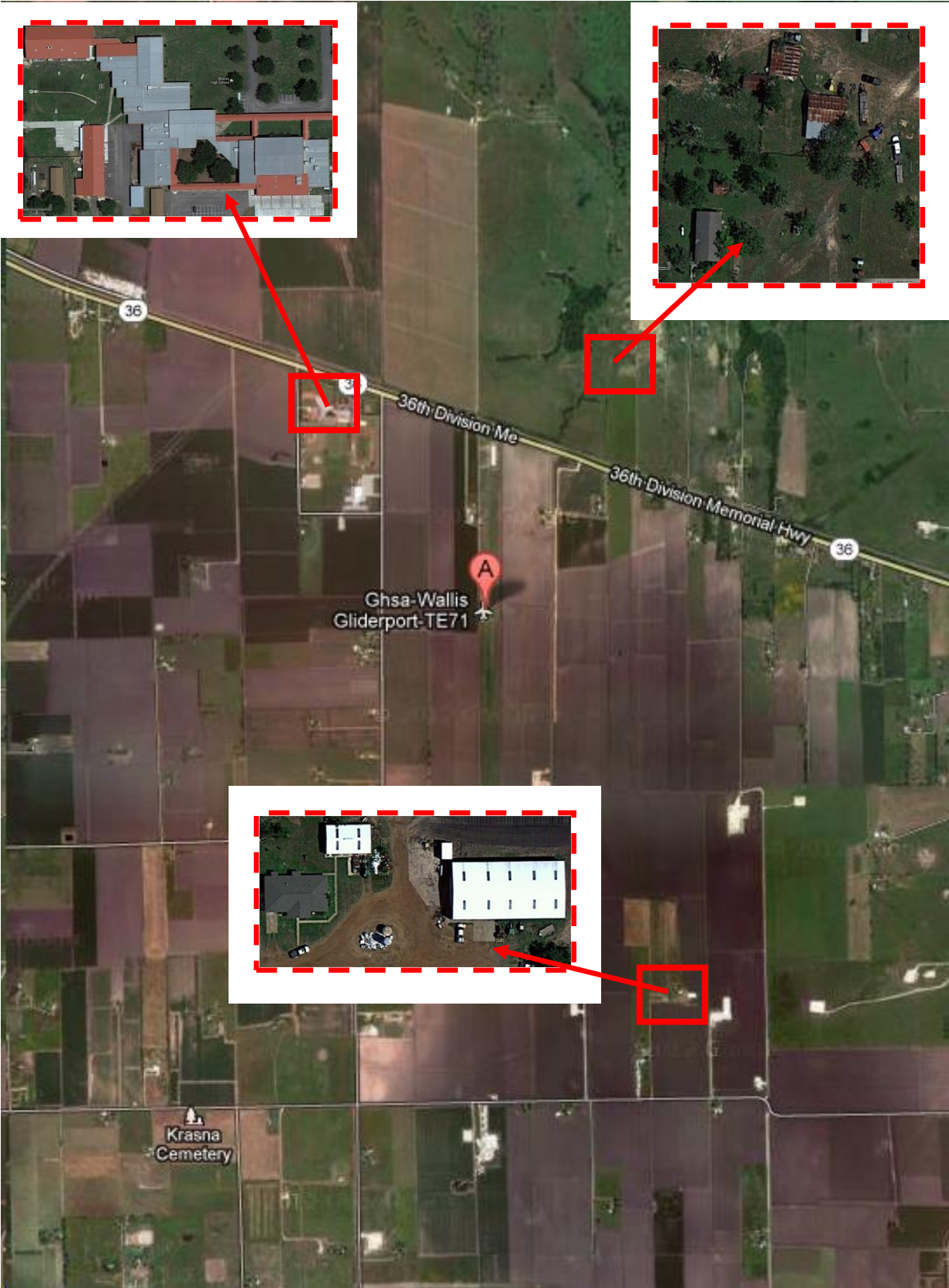
Airspace

Airspace above GHSA

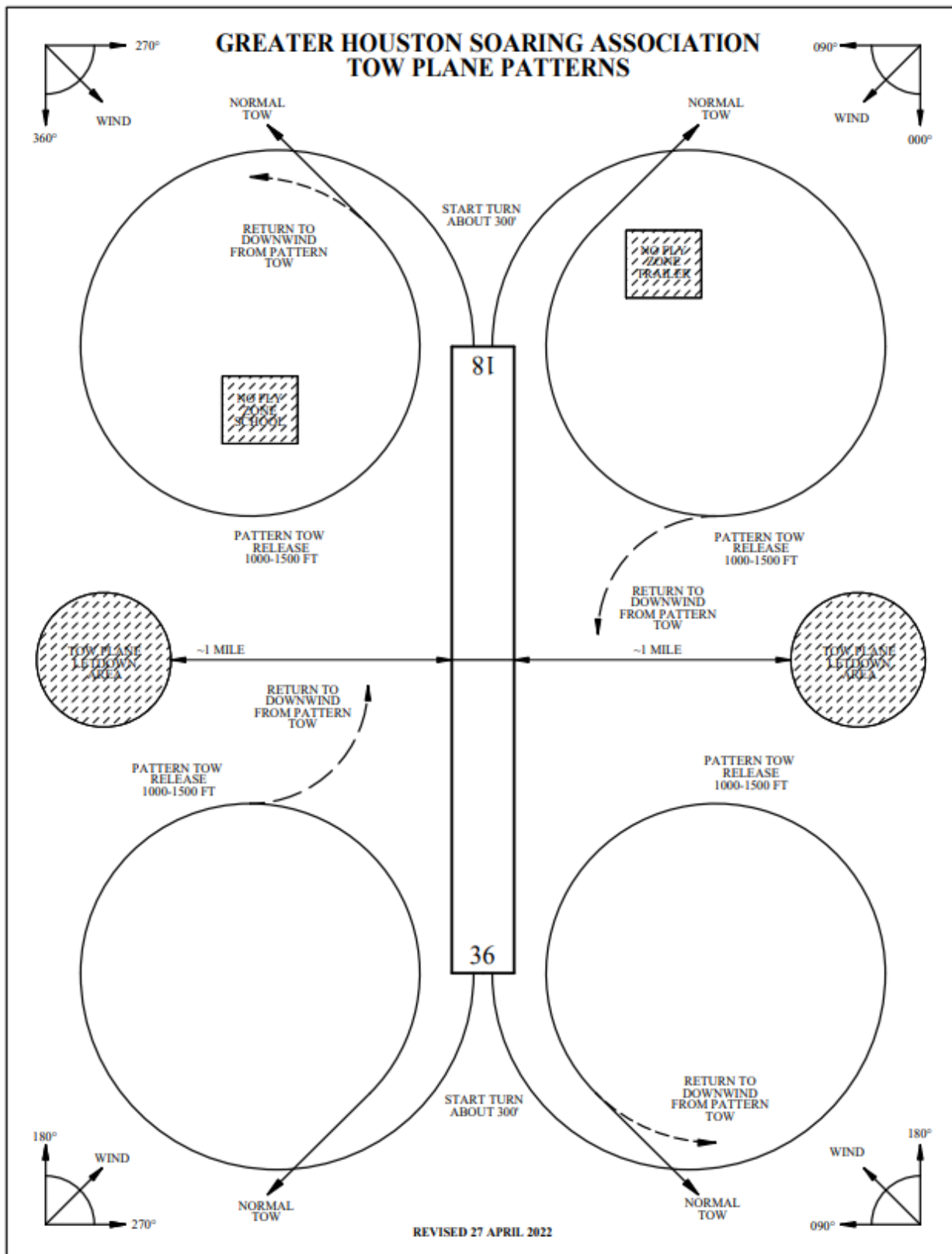
- Ground to 1,200 feet AGL is Class G Airspace.
 - Cloud clearance required - Clear of Clouds.
 - Visibility required - 1 sm
- 1,200 AGL to 10,000 feet MSL is class E Airspace.
 - Cloud clearance required - 1,000' above, 500' below & 2,000' horizontal.
 - Visibility required - 3 sm

Noise Abatement



Sensitive areas highlighted in RED



GHSA Tow Patterns





GHSA Aerotow Launch Signals

	Signal	Signal given by..	Signal received by..	Narrative
1	Glider's left wing is on the ground	Wing Runner	Tow Pilot*	The glider's left wing is on the ground, signifying that the glider pilot is not yet ready to launch.
2	"Pattern Clear"	Wing Runner	Glider Pilot	The glider pilot waits for the "pattern clear" from the wing runner. The glider pilot must not initiate the launch without this clearance.
3	Wing Runner at glider left wing	Wing Runner	Tow Pilot*	Once he has given the "pattern clear" call to the glider pilot, the wing-runner stations himself by the left wing (in clear sight of the tow pilot), but does not raise it.
4		Glider Pilot	Wing Runner	When he is ready to launch and for the left wing to be raised the glider pilot signals this to the wing-runner by raising his left thumb.
5		Wing Runner	Tow Pilot*	When it is safe to launch, the wing-runner picks up the wing and signals "take up slack" if any remains. If the wing-runner thinks there is a safety issue (e.g. field obstruction) he must not pick up the wing or give the "take up slack" signal. He should tell the glider pilot why he is delaying or not allowing the launch. If the glider pilot considers that the delay will be substantial and wants to relax his attention, he must release the tow-rope before doing so.

Both the "take up slack" and "begin takeoff" sequences originate with commands from the glider pilot and are conveyed to the tow pilot via the wing runner. This has the safety

advantage that the takeoff has to be sanctioned by three people, the glider pilot, wing-runner and tow-pilot before it commences.

6	 <p>Wing-Runner: "Stop"</p>	Wing Runner*	Tow Pilot*	<p>When the slack has been taken up the wing-runner signals "stop" to the tow pilot and others by raising the flag vertically above his head and keeping it still. He waits for the "begin takeoff" signal from the glider pilot, maintaining the stop signal. The glider pilot can abort the takeoff at this, or any point by releasing the tow rope. The wing runner, when he sees the tow-rope has been released, must lower the wing to the ground signifying that the launch has been aborted. When the wing is on the ground, he can discontinue the "stop" signal.</p>
7	Glider Rudder Wag	Glider Pilot	Wing Runner	<p>Providing he is still ready, the glider pilot signals "begin takeoff" by wagging the rudder left and right.</p>
8	 <p>Wing-Runner: "Begin Takeoff"</p>	Wing Runner*	Tow Pilot*	<p>Providing he is sure it is still safe (spoilers and canopy closed? runway clear?), the wing-runner conveys the "begin takeoff" signal to the tow-pilot and others. The wing runner must continue this signal until the takeoff roll has commenced. Once the takeoff roll has commenced, he can drop the flag. The glider pilot can still abort the launch by releasing the tow rope.</p>

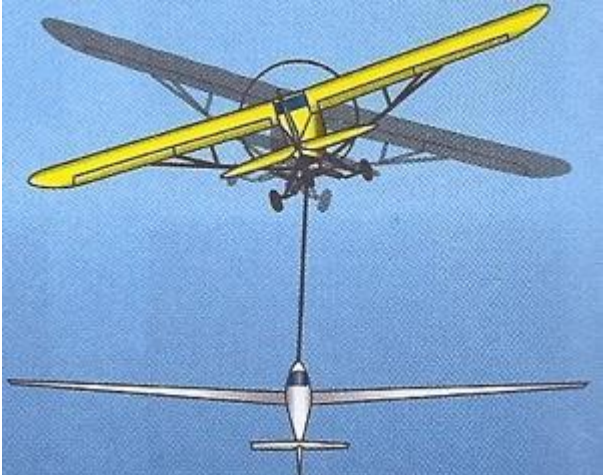
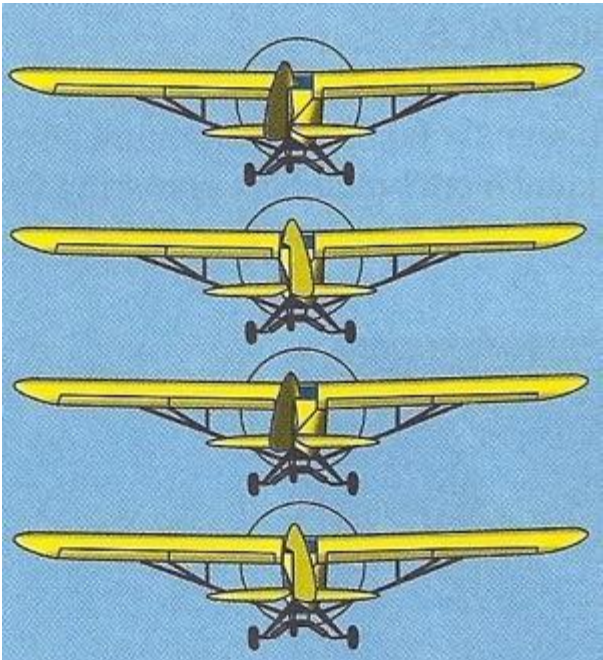
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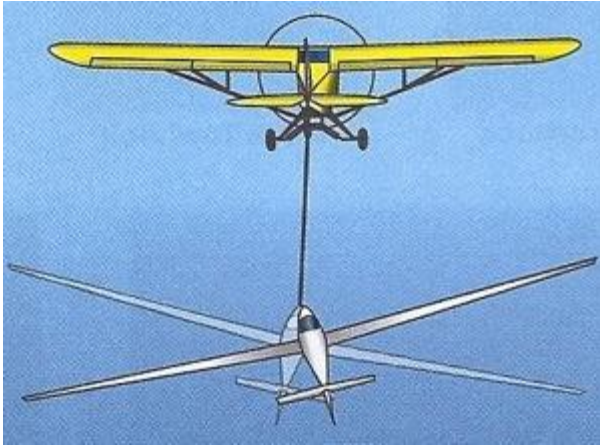
9	Tow plane Rudder Wag	Tow Pilot*	Glider Pilot	<p>The tow pilot watches for the rudder waggle from the glider pilot and the signals from the wing runner. When the tow pilot confirms that the glider pilot is ready and observes the "begin takeoff" signal from the wing runner and determines that it is safe to launch, the tow pilot wags the rudder and starts the launch. The tow plane rudder wag is informational only, a reminder to the glider pilot and wing runner to pay full attention to the launch.</p> <p>*The Rudder Wag when airborne has a different meaning. It means "Something is Wrong with Glider - Close Airbrakes".</p>
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*The wing runner's signals are not just for the tow-pilot. They inform the entire operation what is happening or just about to happen, especially for those retrieving gliders which have recently landed. It is therefore important that these signals not be discontinued without giving some other indication of the changed circumstance; e.g. a discontinued or aborted launch can be signaled by lowering the wing.

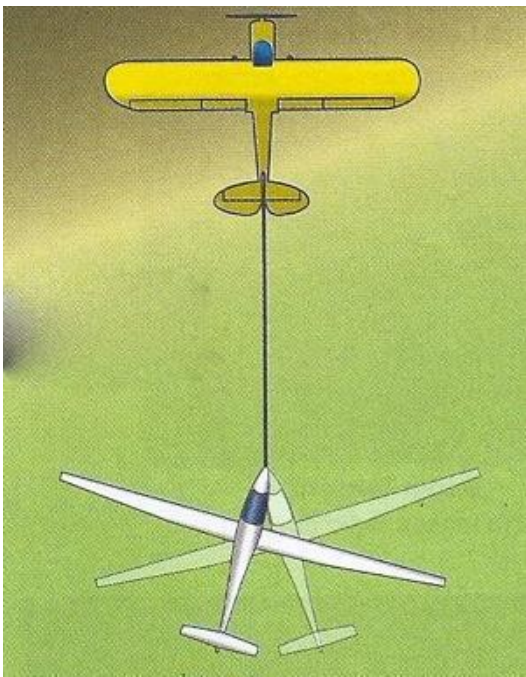
Aerotow Launch Signals: In-Flight Signals

As the tow-planes and almost all gliders are fitted with radios, in general it is preferable to use radio to communicate on the issues below. Aerotow signals should only be used when radio communications are not available or for training purposes.

	<p>Glider: Release Immediately</p> <p>Tow Plane Rocks Wings</p>
	<p>Something is Wrong with Glider - Close Airbrakes!</p> <p>Tow Plane Fans Rudder (Airborne Only).</p> <p>Also known as the "Rudder Wag" or "wagging the rudder". Tow Pilots are encouraged to practice this maneuver after a briefing with a CFIG that will be in the glider being towed. Improper application of rudder inputs can result in a wing rock that resembles the "Glider: Release Immediately" signal.</p> <p>*On the ground, fanning the rudder means that the tow plane is ready to commence the tow.</p>



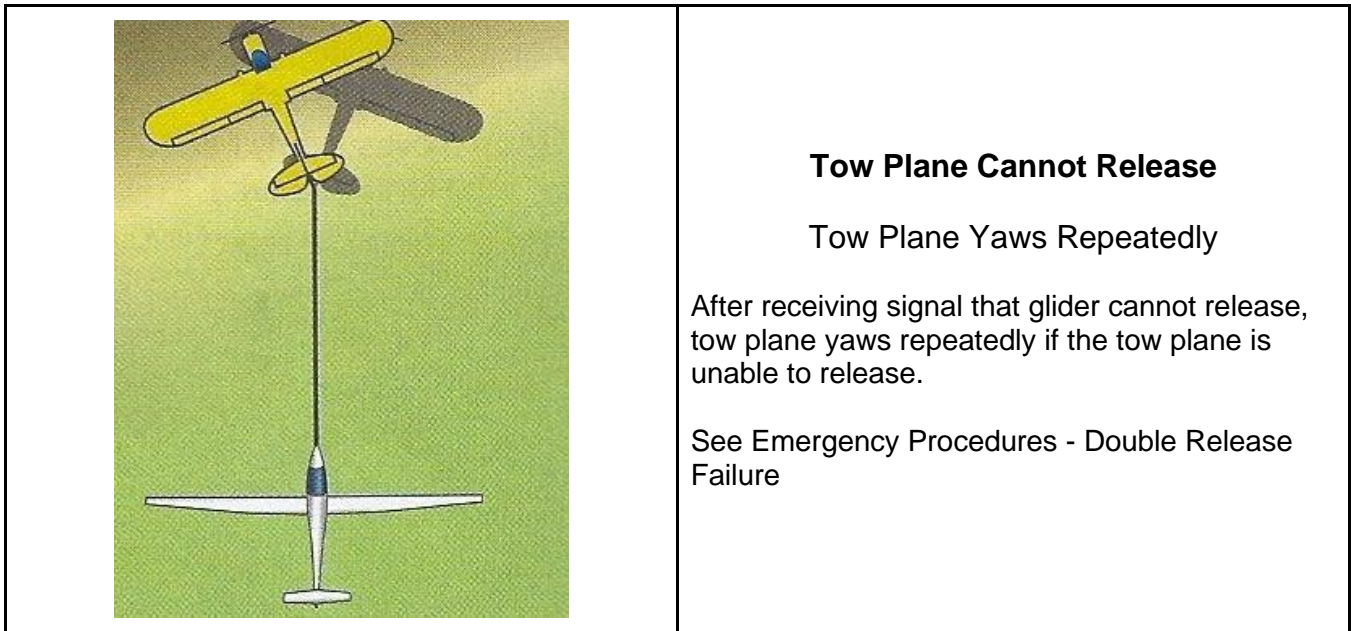
Increase Tow Airspeed
Glider Rocks Wings Repeatedly



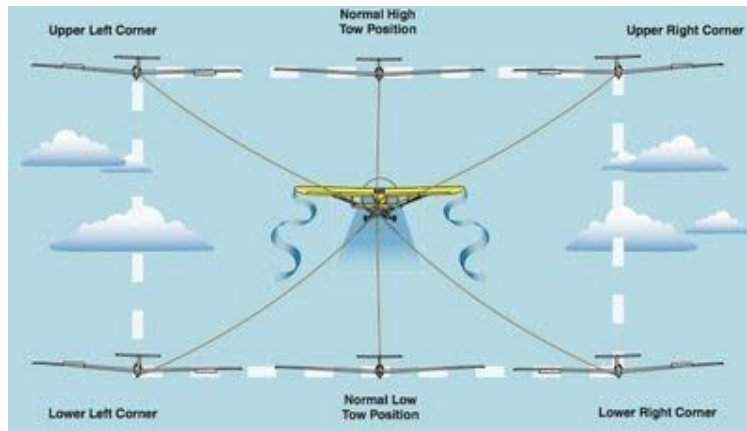
Decrease Tow Airspeed
Glider Yaws Repeatedly



Glider Cannot Release
Glider moves to the left side of tow plane and rocks wings



Boxing the Wake



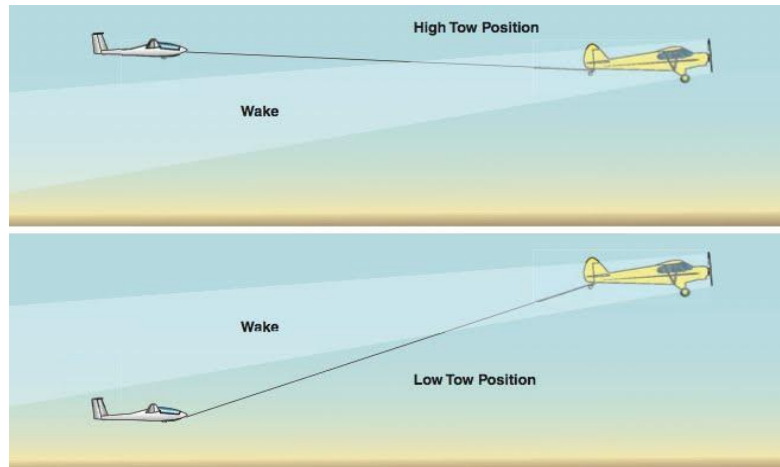
Purpose

Boxing the wake is normally done during glider pilot training and with an instructor for the following reasons:

- Demonstrates glider pilot's ability to control the sailplane in a smooth, coordinated manner
- Shows understanding of the position limits on tow
- Shows ability to recover from an extreme tow position
- The maneuver is required by the FAA Airmen Certification Standards

A brief radio communication by the glider before starting the maneuver is greatly appreciated and preferred. It is generally accepted at GHSA that the glider's transition down through the wake is the signal that the glider is beginning the "box the wake" maneuver and the tow plane is expected to maintain current heading and speed. This can be "non radio" coordination in the event that radio communication is not possible.

High Tow vs Low Tow



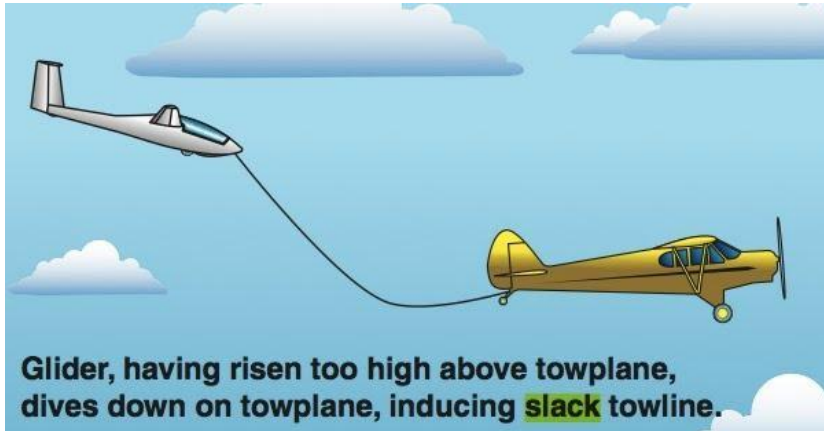
HIGH TOW

- High tow is an Aerotow flight with the glider positioned above the wake of the towplane.
- High tow is the preferred position in the US (Low Tow exceptions below).
- High tow affords the glider pilot an ample view of the tow plane and provides a measure of protection against fouling if the tow rope breaks or is released by the tow plane because the tow rope falls below the glider in this position.
- During level flight aerotows, positioning the glider above the wake (high tow) of the towplane has several disadvantages:
 - The towplane wake is nearly level rather than trailing down and back as it does during climbing aerotow operations. Because the tow plane wake is nearly level, the glider must take a higher position relative to the towplane to ensure the glider stays above the wake. This higher position makes it difficult to see the towplane over the nose of the glider. Easing the stick forward to get a better view of the towplane accelerates the glider toward the towplane causing the tow rope slack.

LOW TOW

- Low tow is an Aerotow flight with the glider positioned below the wake of the tow plane.
- Low tow offers the glider pilot a better view of the tow plane but puts the glider at risk from tow rope fouling if the towrope breaks or is released by the tow plane.
- Low tow is used for cross-country and level flight aerotows. Any cross-country aerotows require good planning and good communications between both pilots before and during the tow.
- In the unlikely event of a double release failure the glider transitions into low tow before beginning the descent to land with the tow plane. See Emergency & Abnormal Procedures for more details.
- Positioning the glider beneath the wake of the tow plane in level flight offers an excellent view of the tow plane but the danger of fouling from a tow rope failure or inadvertent release is greater when flying in the low tow position. Gliders using a center of gravity (CG) tow hook during low tow position on level flight aerotows may encounter the tow rope sliding up and to the side of the glider nose causing possible damage.

Slack Line



Slack line is a reduction of tension in the towrope. If the slack is severe enough it might entangle the glider, or cause damage to the glider or towplane.

The following situations may result in a slack line.

- Abrupt power reduction by the towplane
- Tow plane abruptly leveling off
- Aerotow descents
- Turning the glider inside the towplane turning radius
- Turbulence
- Abrupt recovery from a high tow position
- Slack Rope conditions may be intentionally induced by the instructor - the student practices recovering

Slack line recovery procedures should be initiated by the glider pilot as soon as the glider pilot becomes aware of the situation. The glider pilot's initial action should be to yaw away from the bow in the line. In the event the yawing motion fails to reduce the slack sufficiently, careful use of spoilers/dive brakes can be used to decelerate the glider and take up the slack. When the towline tightens, stabilize the tow, then gradually resume the desired aerotow position.

Glider Pilot Emergency Procedure: When the slack in the line is excessive, or beyond the pilot's capability to safely recover, the glider pilot should immediately release.

Tow Pilot Emergency Procedure: If slack rope entangles the glider then the tow pilot should release immediately.

Tow Pilot Currency & Requirements

[§ 61.69 Glider and unpowered ultralight vehicle towing: Experience and training requirements.](#)

It is mandatory that you read the short reference (above) to the FAA tow pilot regulations. You are responsible for ensuring that you have received the proper training, required endorsements and that you maintain your tow pilot currency in order to be covered under the club's tow plane insurance.

Currency requirements in plain words:

Tow Pilot [with](#) Glider Certificate

§ 61.69 6 (ii) Within 24 calendar months before towing has made at least 3 flights as pilot in command of a glider towed by an aircraft.

Tow Pilot [without](#) Glider Certificate

§ 61.69 6 (i) Within 24 calendar months before towing has made at least 3 actual or simulated tows of a glider while accompanied by a qualified pilot (A current tow pilot with all endorsements).

Since we only have a single seat towplane we cannot conduct "actual accompanied" tows. Therefore, please fly 3 simulated tows with another tow pilot and document the flights in your logbook.

APPENDICES

Taildragger Taxiing Control Positions

GHSA Tow Plane Spreadsheet User Guide

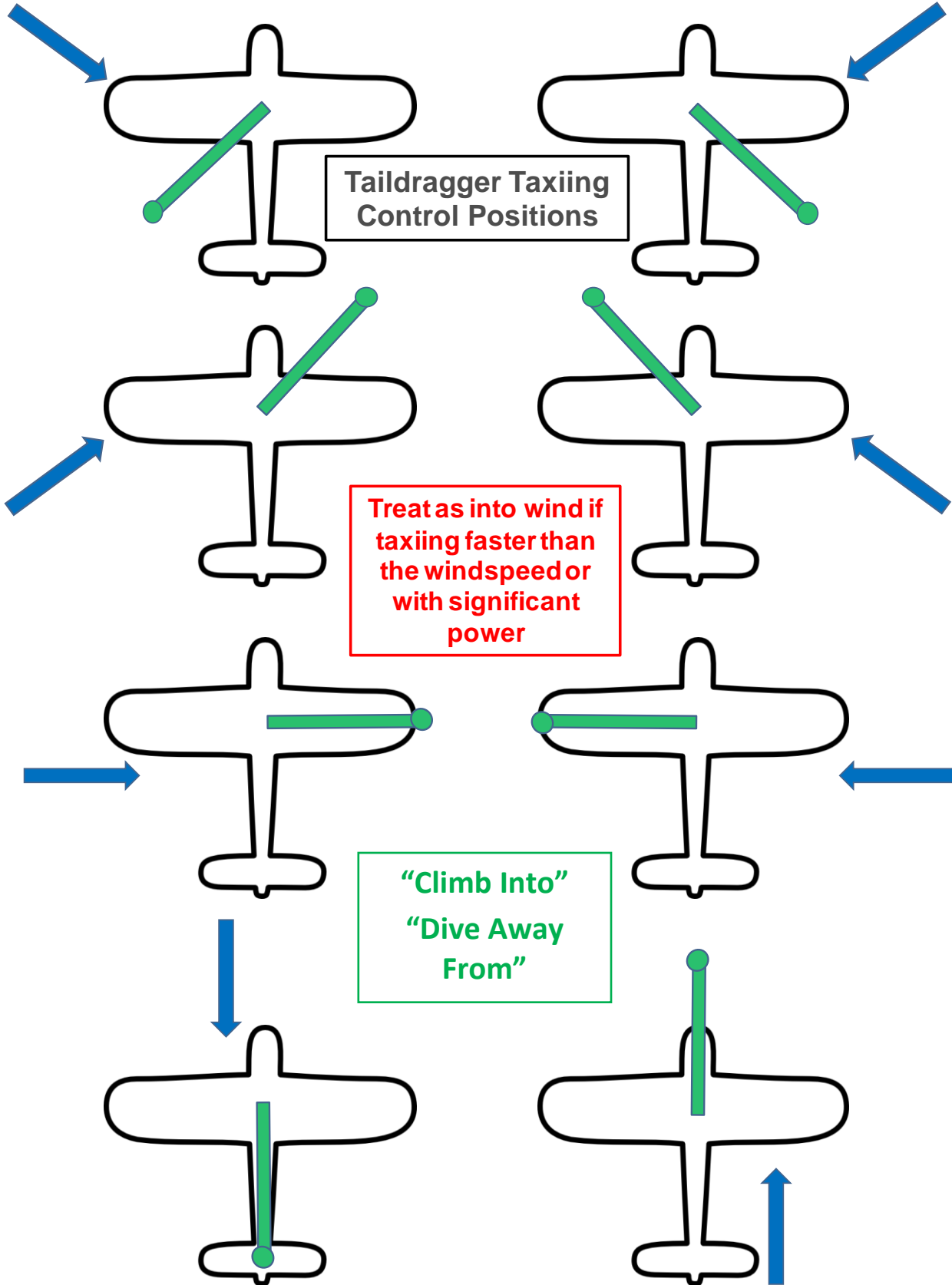
GHSA Tow Pilot Checkout Procedure

GHSA Tow Pilot Application Form

GHSA New Tow Pilot Check List

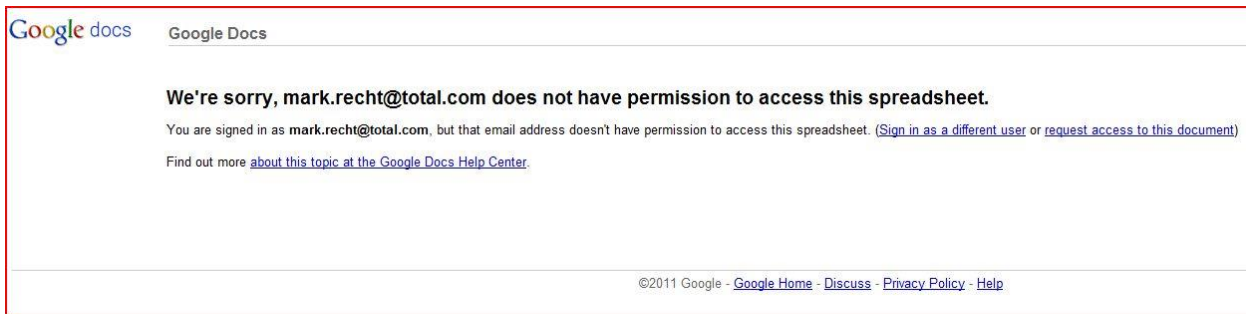
References

Taildragger Taxiing Control Positions

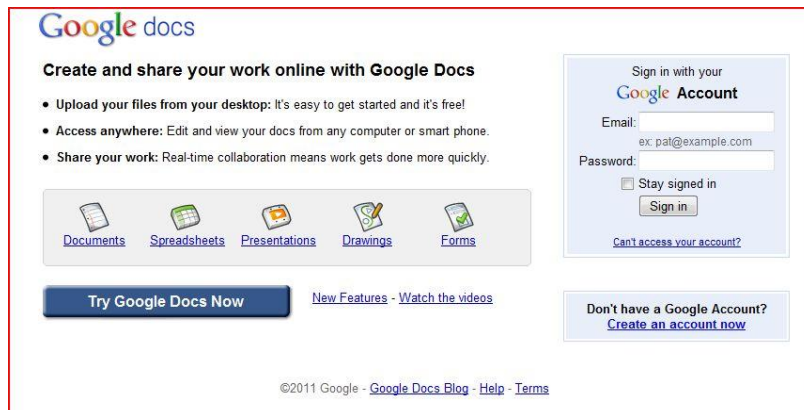


GHSA Tow Plane Spreadsheet User Guide

1. Access the spreadsheet at <http://tiny.cc/ghsa-towplanes>
2. You can also access it from the GHSA Homepage [here](#)
3. If you see a message like this one it means you have your own Gmail/Google account which does not have access to the spreadsheet. Send the email address that it says does not have permission to craigsho@swbell.net and I will add you



4. If you see a message like this one, use the generic logon "ghsa.towpilots@gmail.com" password "soaring99"



5. Here is what the spreadsheet looks like and what you need to fill in

Select current status from drop-down list

1. Serviceable
2. Serviceable with squawk
3. Un-serviceable

Calculated automatically

	B	C	D	E	F	G	H	I	J	K
1		42J is currently -->	Serviceable with squawk		Hours to Next Oil Change -->		7.8	Fuel Left in Bunker -->	1,663	
2		Date	Tow Pilot	Hours Up	Hours Dn.	Total	# Tows	Oil Added	Fuel Added	Squawks / Work Done
3	11/20/2010	Gary Walker	3,294.8	3,296.2		1.4				
4	11/20/2010	Lou Landucci	3,296.2	3,297.8		1.6			23.3	
5	11/20/2010	Tom Lawson	3,297.8	3,300.1		2.3			24	
6	12/5/2010	Mark Recht	3,300.1	3,300.1		0.0				Oil drained, pending new drain hose. Oil filter replaced. Carb heat Scat hose replaced. CHT probe removed
7	12/12/2010	Mark Recht	3,300.1	3,300.1		0.0		12		Oil drain hose replaced. CHT probe repaired & refitted. Oil refilled. Fire extinguisher replaced - new bracket installed. Tailwheel replaced - spare in west locker. Next Saturdays tow-pilot to test run engine & check for leaks.
8	12/18/2010	Mark Recht	3,300.1	3,301.8		1.7				Engine run OK - no oil leaks
9	12/18/2010	Tom Lawson	3,301.8	3,305.0		3.2	16	1	48.4	Not charging consistently, left on trickle charge overnight.
10	12/19/2010	Mark Recht	3,305.0	3,306.8		1.8	8	1		Charging OK - remember to start with Alternator OFF initially and switch on when engine is running !
11	12/19/2010	Ken Carrison	3,306.8	3,308.8		2.0	9		39.2	
12	12/26/2010	Ken Carrison	3,308.8	3,310.9		2.1	11	0	14	Added brake fluid.
13	12/26/2010	Philippe Heer	3,310.9	3,312.8		1.9	9			Could use a good outside clean.
14	1/2/2011	Mark Recht	3,312.8	3,314.5		1.7	9	1	18.4	Altimeter adjustment knob found sheared off & lying on cockpit floor. Will research replacement altimeter this week.
15	1/2/2011	Bob DeLeon	3,314.5	3,317.3		2.8	12	0	30.7	Only squawk is the same as Mark's above
16			3,317.3							

Automatically copied from previous Hours, but you can over-write if there is an error

Click here to switch between the 2 tow-planes

Fill in

1. Date
2. Your name (from drop-down list)
3. Hobbs hours at end of shift
4. # Tows
5. Oil Added
6. Fuel Added
7. Squawks

6. Be careful as the formulas in the spreadsheet cannot be "protected", so if you overwrite them, the automatic calculations will stop working! Also, be careful not to accidentally delete any previous entries.

Finally, the mailing list to send a message to all tow pilot is ghsa-tow-pilots@googlegroups.com

GHSA Tow Pilot Checkout Procedure

1. New potential tow pilot should contact any GHSA board member for information concerning towing at GHSA.
2. Responsibilities:
 - a. The chief flight instructor and the chief tow pilot oversee and conduct all aspects of the tow pilot background check, training and qualification. They also jointly ensure the GHSA Tow Pilot Manual and associated training materials are periodically updated and continuous tow pilot training for all tow pilots is conducted as necessary.
 - b. The GHSA Board determines the minimum required tow pilot training, experience and recency in addition to the FAR [§ 61.69](#) requirements. The GHSA Board approves and revokes tow pilot privileges.
 - c. The tow pilot must adhere to all FAR [§ 61.69](#) and GHSA requirements including but not limited to maintain towing currency.
3. New potential tow pilot must complete & return “GHSA TOW PILOT APPLICATION.doc” form to the chief flight instructor/tow pilot for review/vetting. The chief flight instructor/tow pilot present their findings and recommendations to the GHSA board.
4. If accepted, the tow pilot should study the Tow Pilot Manual and complete both the Wingrunner, Tow Pilot Online Courses & Quizzes, free from www.soaringsafety.org (see below) and the GHSA Tow Plane Check-Out Test.
5. Unless already signed off for solo in gliders, tow pilot should schedule & complete dual ground & flight instruction in a glider and obtain the following logbook endorsement from a CFI
 - a. “I certify that I have given ground and flight instruction to _____, holder of _____ license # _____, as required by FAR 61.69(a)(3) CFI Name, Number, Date, Expiry”
 - b. A minimum of 3 glider flights are suggested covering the following.
 - i. #1 – Explain airspeed limitations, emergency procedures, signals & maximum angles of bank. Demonstrate the takeoff and tow. Demonstrate high & low tow positions, turns on tow, slack rope and the following signals: Glider problem, glider cannot release, tow plane emergency release. Demonstrate & allow practice of normal glider handling after release – straight & level, turns at different speeds & angles of bank. Demonstrate normal glider pattern & landing.
 - ii. #2 – Demonstrate the takeoff and allow to fly the tow with assistance. Demonstrate descending & climbing in the wake, boxing the wake & out of position maneuvers. Allow to practice turns on tow with assistance and observe a normal release. Allow to practice normal glider handling after release – straight & level, turns at different speeds & angles of bank. Demonstrate effect of airbrakes & normal glider pattern & landing.
 - iii. #3 – Allow to fly the takeoff and tow with assistance, descending and climbing through the wake, boxing the wake, flying turns on tow and completing a normal

release. Allow to practice normal glider handling after release – straight & level, turns at different speeds & angles of bank. Allow to fly the pattern with assistance.

6. Tow pilot should conduct 3 simulated tows whilst accompanied by a suitable qualified tow-pilot per FAR 61.69(a)(4) and obtain the logbook endorsement for such flights per FAR 61.69(a)(5)
 - a. Aircraft used should preferably be tailwheel.
 - b. If applicant does not have access to a suitable aircraft, he may contact Texas Tail Draggers (Joy Bowden owned operated) on South Highway 6 (texastaildraggersinc.com) and arrange to fly one of their Citabrias or Decathlons
 - c. The following logbook endorsement should be obtained.
 - i. "I certify that I have accompanied _____, holder of _____ license # _____, during three flights with him as the sole manipulator of the controls simulating towing flight procedures as required by FAR 61.69(a)(4). I certify that I am qualified per FAR 61.69(c) (or, as applicable, FAR 61.69(d)) and find him/her competent to act as tow pilot. Name, License Number, Date"
7. Contact the GHSA Chief Flight Instructor/Tow Pilot to arrange.
 - a. Briefing on towing procedures & currency requirements per FAR 61.69(a)(6)
 - b. Briefing on the Agwagon
 - c. Completion of 10 observed take offs and landings to a full stop in the Agwagon
 - d. Completion of 3 tows with the chief tow pilot in a Blanik
 - i. First Tow: Basic tow to 2000 or 3000 feet with the glider pilot staying in position...in other words, a 'routine' tow.
 - ii. 2nd Tow: The GLIDER demonstrates the "air to air" signals i.e. rocking his wings, yawing the glider, boxing the wake, getting out to the left and/or right to simulate telling the tow plane to turn
 - iii. 3rd Tow: The glider simulates a tow with a rank beginner at the controls, i.e., get high on tow, get low on tow, get some slack in the rope...in other words, do what an inexperienced student would do to the limits an instructor would permit the student to go

Online Courses from

www.soaringsafety.org

1. Choose 'Online Learning' on left side.
2. Take both the 'Wingrunner' & the 'Towpilot' courses.
3. At the end of the course, choose 'SSA Members Click Here'(very small print).
4. Take Quizzes, print certificates and give both to GHSA Chief Instructor/Chief Tow Pilot

GHSA TOW PILOT APPLICATION FORM

1. Pilot Name: _____
2. Street Address: _____
3. City: _____ State: _____ Zip: _____
4. Phone #: Residence _____ Business _____ Cell _____
5. Birth Date _____ Age _____ Occupation _____
6. Pilots License Number _____ Date of last BFR _____
7. Glider Licenses: Student Private Commercial Other _____
8. Have you been under a Doctor's care for any physical or mental disorder within the last three years?
 Yes No If yes, explain: _____

9. Power Licenses: Student Private Commercial Other _____
10. Date of last medical? _____ Class _____
11. Total Numbers/Hours: Glider _____ Power _____ Tailwheel _____ Motorglider _____
What Power Airplane flight experience do you have (Cessna 182, etc.)? _____
Do you have constant speed propellor/complex airplane experience? How many hours? _____
12. Total Numbers/Hours in the last 90 days: Glider _____ Power _____ Tailwheel _____
13. Date of High Performance Endorsement: _____ Tailwheel Endorsement: _____
14. Glider Flights
 - a. Total number of flights in all gliders: _____
15. Tow planes:
 - a. Total time in Cessna 188 Ag Wagon? _____
 - b. Total time in other tow plane type (specify)? _____
 - c. Total number of glider tows given? _____
16. Any aviation accidents or violations? Yes No If yes, please provide details.

17. During the past three years, has any insurer cancelled or declined any insurance issued or requested by the applicant? Yes No If yes, explain _____

Signature: _____ Date _____

New Tow Pilot Check List (For CFI and Chief Tow Pilot)

- GHSA Tow Pilot Application Form Received
- Pilot certificate, Endorsements (Tailwheel, High Performance), Flight Hours (Total & Tail Wheel) and Recency, Medical, BFR Verification and Photo ID checked
 - GHSA Minimum Two Pilot Requirements
 - Total Hours: 250
 - Total Tail Wheel Hours: 50
 - Recency: 5 hours PIC and 20 Take-offs/Landings in the last 90 days
- Recommendation to how to proceed with applicant to the GHSA Board submitted
- GHSA Board approval received to start GHSA Tow Pilot training
- Training Items prior to first towing completed
 - Review Tow Pilot Manual
 - Review GHSA Webpage Content and Standard Operating Procedures (e.g. Liability)
 - Wing Runner Certificate completed
 - Fly in with a tail dragger to GHSA
 - Tow Pilot SSF Exam completed
 - GHSA Tow Pilot Test Passed
 - Texas Taildraggers or designated FBO (At least 3 simulated Tows and Endorsement)
 - Taildragger flight orientation with Chief Tow Pilot at GHSA
 - Final review and recommendation submitted to GHSA Board
- GHSA Board New Tow Pilot recommendation review. Approval to practice towing in 42J/45V.
- Training Items flying GHSA Towplanes
 - Agwagon Manual review completed
 - Oil Change training completed
 - Constant speed propeller operations reviewed
 - Start-up and Shutdown (Cold Weather Preparation and Fire Hazard) reviewed
 - High Wind operation practices and hazards reviewed
 - Taxing Practice with emphasis control stick position and breaking completed
 - 10 observed take-offs and full stop landings completed (Min 5 each for 45V and 42J)
 - GHSA CFI log-book sign-off "Ok to Tow" completed
 - 25 actual tows observed by CFI or experienced tow pilot completed (1/2 day towing only)
 - Take picture of the new tow pilot and share with GHSA secretary to post on web-page
- Inform GHSA Board that the training was completed successfully.
- Monitor towing behavior and performance. Provide additional coaching when needed.

References

This GHSA Tow Pilot Manual was compiled by using the best practices from the following sources:

[Agwagon Manual](#)

[Agwagon Oil Change Procedure](#)

[SCOH Towpilot Manual](#)

[FAA Glider Flying Handbook 2003](#)

[Tow Pilot Manual](#) by Burt Compton

[Tow Pilot Manual](#) by the Texas Soaring Association

[Soaring Safety Foundation](#)

[Tow Pilot Operations Manual](#) by the Las Vegas Valley Soaring Association

[Aerotowing Manual](#) by the Gliding Federation of Australia

[Preventing Launching & Landing Accidents](#) by Thomas Knauff

[Glider Emergency Procedures](#) by Thomas Knauff

[Glider Basics](#) by Thomas Knauff

[Safer Soaring](#) by Bob Wander

[Gliding Safely](#) by Derek Piggott

[Gliding](#) by Derek Piggott

[Beginning Gliding](#) by Derek Piggott

Flying Sailplanes by Helmut Reichmann (out of print)

Change Log of Major Changes

(Detailed changes can be viewed in the Word Document)

Date	Location	Change	Reason
4/28/23	Page 7: Jurisdiction	"Right to Stop" operations	Improve Tow Plane Operations Safety
4/28/23	Page 8: On Arrival	Use of heat gun during cold weather	Preventing Engine Fires
4/28/23	Page 9: Engine	Added cold start procedure/ requirements	Improve Tow Plane Operations Safety Preventing Engine Fires
4/28/23	Page 10: Taxing	Taxing in high wind conditions	Preventing Propeller Strikes
4/28/23	Page 10: Engine	Check flight before first tow required	Improve Tow Plane Operations Safety
4/28/23	Page 13/14: Landing	Clearance of hangar, high wind operations	Improve Tow Plane Operations Safety, Protect people/equipment at hangars
4/28/23	Page 32: Currency	Added currency requirements	Clarify requirements for Tow Pilots with and without glider rating
4/28/23	Page 41: New Pilot Check List	Checklist for Chief CFI and Tow Pilot qualifying new tow pilots	Too many Prop Strikes. Improve Tow Plane Operations Safety